AN OPERATIONAL APPROACH

TO

MULTIVARIATE CLASSIFICATION

with Reference to Agriculture

by

K.A. YEOMANS

SUBMITTED FOR THE DEGREE OF

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ABSTRACT

Social and economic classification schemes have traditionally been administrator constructed, are essentially univariate in nature and reflect the historical development of a range of structures in society. Advances in multivariate statistical analysis over the last fifty years, together with modern computing power, have made possible the classification of companies, farms, people, families, commodities or any other entities using data based polythetic methods.

The feasibility of designing an efficient and understandable operational approach to this type of multivariate classification is investigated with reference to agriculture and the results compared with a proposed *a priori* Farm Typology.

The requirement to reduce the size of the variable set employed in an optimisation-partition method of cluster analysis suggested the value of principal components or factor analysis as a means of identifying major 'source' dimensions against which to measure farm differences and similarities. Such source dimensions were found to be not unduly sensitive to changes in the sets of either observations or original variables. The need to standardise variables prior to the extraction of factors was, however, confirmed.

The euclidean cluster analysis incorporating the reduced dimensions quickly converged to a stable solution and was little influenced by the initial number or nature of 'seeding' partitions of the data. The most distinctive cluster classes were equally identified in three experimental samples of 500 observations, while the slightly poorer resolution of general mixed farm groups was hopefully eliminated by final classification based on a ten per cent sample of some 2200 observations.

Although size standardisation of most Farm Structure Survey variables has occurred, *Classification I* using unstandardised component scores still had an important holding size element. Upon standardisation the first two size/technology components have their weight in classification reduced so that an alternative *Classification II* was produced.

The assignment of non-sampled observations from the population to the classes of *Classifications I* and *II* was completed using classification functions, stepwise multivariate analysis of variance having indicated the number of useful discriminating variables to be some two-thirds of the total originally included in analysis.

The final schemes were found to be both interpretable and meaningful agriculturally and superior in their explanatory power in comparison with the Farm Typology.

KEYWORDS CLASSIFICATION, MULTIVARIATE, CLUSTER, AGRICULTURE, ASSIGNMENT.

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AN INTRODUCTION TO CLASSIFICATION

1.1 The Origin of Classification

One of the basic methodologies of science, in reducing the complexities of nature to a manageable form, is to classify. Classifying things is perhaps the most fundamental and characteristic activity of the human mind and underlies all forms of scientific endeavour. Man as a problem solver has developed from primitive roots essentially by feats of classification.

Durkheim and Mauss (1903) maintain that the first logical categories were social categories, the first classes of things were classes of men. They claim to show how the notion of a system of classification was born and they conclude by identifying the forces which induced men to divide things as they did between classes. The argument is based upon the fact that our ancestors were already social animals at the point in time when they became human. Effective social group organisation would depend on the ability to recognise, classify and react appropriately to a large number of other individuals and events. In particular, this would be based on communication through language, the essential elements in which are nouns and verbs implying the classification of things and of actions or events.

The development of the concept of numbers, of counting and of measurement is clearly of fundamental importance to the development of science. However, neither counting nor measuring can be considered the most fundamental process in studying man and his environment. Before you can do either to any purpose there must first be a selection of what it is proposed to count or measure, which presupposes a classification.

1.2 A Historical Perspective

In all branches of science classification, whether it is of stellar spectra, of igneous rocks, of pressure distributions, of algae, of industry, of social class, or of books, has always occupied a central position comparable with that of mathematics and logic. Formal classification in botany and zoology predates other applications. Aristotle (384-322 BC) gave to the animal kingdom the first written formalisations of categories and referred to such major groups as birds, fishes, whales and insects. Currently accepted families of plants were recognised at the same time by Theophrastus (380-320 BC). Greek and Roman physicians also developed several typologies based on variations in physical characteristics thought to result from a mixture of the four humours (eg Galen AD 129-199).

No further developments in formal classification construction are identifiable until the Renaissance, when Gesner (1516-1609), Willughby (1635-1673) and Ray (1628-1705) initiated classification nomenclature used by Linnaeus in his *Genera Plantarum* (1737) and *Critica Botanica* (1737). To Linnaeus is owed the system running from phylum and class down to genus and species, a system well known and almost universally adopted in the animal kingdom.

The range(1) and extent of classifications in the life sciences at the present time is bewildering. The observations classified include not only plants, animals and insects, but cells, micro-organisms, communities of interdependent members, fossil records, diseases, symptoms of disease and drugs.

The spread of classification activities outside the life sciences, in the past 150 years, is equally impressive. In the earth and engineering sciences, taxonomies of land and rock formations, soil, river systems,

(1) A list of papers on classification applications is provided in the Bibliography.

cities, counties, regions of the world, land use patterns, weather conditions, finger prints, regional accents, wave forms, radar signals and circuit design illustrate the diversity of applications. Although in the social sciences one can trace administratively based classifications back to the Doomsday Book, classifications of occupation and industry to the Craft Guilds, and commodity classifications to Customs and Excise records, the enthusiasm of the social scientist for formal classification is most evident in the 20th century. Among the many objects of their analysis are found families, neighbourhoods, clubs and other social organisations, criminals and crime, cultures, teaching methods, languages, archaeological findings and sites, political regions, legislators, political issues, consumers, trade cycles, markets, investments and credit risks, as well as the well-known industry, product and social class (socio-economic group) classifications. It is this realm of study which has provided the most innovative examples of classification methodology in the past two decades.

1.3 Terminology

A classification may be defined as a means by which entities or observations are usefully divided into meaningful subgroups (classes) such that entities within a subgroup are as similar as possible while differences between subgroups of entities are as great as possible. Clearly a classification is only meaningful in relationship to its end use and will be valuable only insofar that the number of classes is considerably smaller than the number of observations to be classified.

While there is a widespread agreement on the nature and broad objective of a classification, there is less agreement on the terminology to be used. The words classification, systematics, typology and taxonomy are commonly treated as synonyms. Crowson (1970) suggests that "originally and properly, classification would have denoted the activity of placing things in classificatory groups", whereas *systematics* would be the body of general theory leading to the formation of classifactory groups and underlying the classification activity. Dagnelie (1966), on the other hand, claims that the process of choosing which of a number of defined classes a new entity should be allotted, is better described as *identification* or *assignment*. Kendall (1966) adds further to the discussion by distinguishing between classification and *dissection* on the basis of the presence or absence of the requirement that entities in one class should be distant from entities in another class. He argues that "all collections of entities can be dissected; not all can be classified". The terms *typology* and *taxonomy* have come into common use only recently and appear to be more related to Crowson's systematics than to Dagnelie's assignment. Specific uses of *numerical taxonomy* usually refer to computer-based methods of *cluster* analysis which forms the main basis of classification to be considered in this thesis. It is finally necessary to distinguish between classifying things and naming them. *Nomenclature* is concerned with the naming of groups of entities which comprise the elements of the classification under consideration. Nomenclature does not imply names in the strict grammatical sense of the word. The Dewey library classification system is based on numbers, and other schemes on combinations of numbers and letters as in market research social class groupings.

No resolution to this problem of semantics is offered here. The use of each word will, hopefully, be intuitively obvious in the context in which it is employed.

1.4 Classification Methodology

There are two quite distinct methods employed in classification construction. These are the *a priori* and the *data based* approaches. The former is typified by the subjective, administrator-constructed, *standard* classifications of industry, agriculture, trade, occupations, social class, commodities and products. These are in day-to-day use in most countries' statistical offices or bureaux for the collection, analysis and presentation of the data used to monitor the social and economic health of the country. Such classifications are frequently the evolutionary product of historical forces and political factors and are usually univariate in structure.

It is certainly true that the UK Standard Industrial Classification has changed in detail over the past thirty years to allow, for example, the separate specification of electronics and plastics industries. It is equally clear, however, that the basic criterion of classification for companies is univariate, being determined by the company's declared principal activity, and is a historical development from the way in which pre-industrial revolution industry was organised. As such the classification may mask important differences in companies which are more crucial than their end product to the diagnosis of industrial and economic well being. Types and sources of materials, patterns of energy use, range of skill - grades of labour, geographical location, methods of distribution used, sophistication of technology, finance, size, ownership and control are among the many factors which may be as important or more important than end product. Government policy may need to be directed towards changing any combination of these elements and yet has to be based on evidence compiled in relationship to only one.

Data based approaches to classification are, in contrast, multivariate, and seek to group together into classes observations which are similar to each other with respect to a range of measurable characteristics or variables. Inevitably, there are non-numerical constraints in a real-world classification scheme which such methods cannot incorporate. In classifying agricultural holdings on a European basis there may be political considerations which need to be allowed for in the sense that one country, more dependent than others on a particular crop type or more sensitive to the interests of a particular type of holder, will require these elements to be separately depicted in the classification scheme. While such external factors cannot be explicitly taken into account, other than through the selection of classification variables, they should be considered in the practical interpretation of data based methods.

Clifford and Stephenson (1975) divide data based methods into *monothetic* and *polythetic* types. The first involves the subdivision of the observations to be classified by one variable after another in sequence. Thus one first seeks that variable from those available for classification which most distinguishes one group of observations from other groups. Given the classes so formed, a search is made among the remaining variables to find the best one for further class breakdown. The principle is continued until an acceptable classification has been developed. When used with dichotomous qualitative variables, indicating the possession or non-possession of a defined attribute, this is the classic data based hierarchical method of the biologist.

Polythetic approaches involve the formation of classes on the basis of the overall similarity or dissimilarity of individual observations with respect to all the classification variables simultaneously. Because of the problems inherent in manually handling large quantities of data on numerous qualitative or quantitative variables, the polythetic methods find their main applications through the medium of fast digital computer systems and have developed rapidly in the last twenty years.

Cormack (1971) subdivides polythetic approaches into three:

"(i) *hierarchical classification*, in which the classes are themselves classified into groups, the process being repeated at different levels to form a tree (or dendogram);

(ii) *partitioning*, in which classes are mutually exclusive, thus forming a partition of the set of entities;

(iii) *clumping*, in which classes or clumps can overlap, and a clump and its complement are treated as different types of class."

The advantages of both the *a priori* and the monothetic data based methods are that group definitions are simple and unambiguous. This leads to understandability and the specification of simple rules for the assignment of new observations to classes.

The monothetic approach has an important advantage over polythetic methods in that computation is relatively fast and the addition of new observations to the data set usually leaves the majority of groups unaltered. Offsetting these advantages is the proneness of monothetic methods to generate mis-classifications. Suppose that two groups are distinguishable by a binary attribute. An observation which on the whole resembles members of the first group happens to possess the state of the attribute corresponding to the second group. It will thus be misclassified from the polythetic viewpoint of the classification users who are concerned with overall resemblance.

This is also the essential weakness of the *a priori* univariate approach. For example, a privately owned, small, labour intensive company manufacturing on a multi-product basis, may be classified as belonging to Order IV (Chemicals and Allied Industries) of the UK S.I.C. because its principal product is paraffin wax. Its resemblance to other members of that order such as the publicly-quoted, large, capital intensive oil refiners (eg Esso, Shell, BP and ICI) is minimal. Its affinity to other small companies in a variety of other industries is much greater in relationship to the ownership, management, finance and technology employed.

The simultaneous strength and weakness of the polythetic approach is that all relevant variables contribute to the determination of classes. This might appear to lead to impossibly large quantities of computation. Fortunately, strategies have been developed to overcome this difficulty, albeit that some are sub-optimal in a mathematical sense.

Also, the problem of weighting of classifying variables is seen by many antagonists of the polythetic approach as a major weakness. The choice and weighting of variables is, however, no more and no less of a problem in relationship to this method compared with any other. As Yeomans and Golder (1975) point out in a similar problem area, "When as is common in the social sciences there are many potentially dependent variables in an enquiry with little or no qualitative knowledge of the relation between these and the stratifying factors, there will be almost no way of weighting these factors' relative importance *vis-a-vis* the aims of the whole research project. With developments like the multi-purpose questionnaire of S.S.R.C. or the socio-economic area classification suggested by OPCS (Craig, 1975), one would additionally need to weight the relative importance of different research projects or even potential research projects as well as for the multiplicity of dependent variables." Thus the purpose(s) of the classification dominate the discussion and will determine the selection of variables and any arbitrary weighting of these. As Muir *et al* (1970) succinctly put it "the arguments about the ethics of weighting become irrelevant when it is realised that infinitely more weight is given to an observed variable compared with an unobserved one." As long as the basis of any weighting is made clear to the user of a classification obtained in this way, then he may decide for himself as to its merits.

1.5 Purposes and Properties of Classification

That there is no single purpose in classification is shown by the increasing bibliography of classification classifications (Good, 1965; Ball, 1971). In addition to the obvious attempts to find true typologies which provide a standard of reference, various authors stress the usefulness of classification construction in data exploration, data reduction, hypothesis generation and testing and prediction. While it is true to say that any one of these objectives may be more central to a particular study, it is equally true that all are inherent in the rationale of classification construction. Without an initial hypothesis of a categorical structure within a set of entities, there is no *a priori* justification for the formation of a classification. The existence of classes of similar entities means that we may compare the characteristics of m classes rather than n individuals ($m \ll n$). Through such data reduction, simplification with minimal loss of information is sought leading to a more concise and understandable account of the observations under consideration.

In developing a classification scheme, unsuspected clusterings of entities may appear, which highlights the value of the data exploration objective and may throw up further testable hypotheses which enhance the efficacy of the final operational classification.

Williams and Lance (1965) suggest that "a classification is predictive with precise purpose unknown at the time of classifying." While this may be true in certain circumstances, it is this writer's view that predictive purposes should be explicit wherever possible. Yates (1978) classified households, and particularly household shopping agents, on 16 variables ranging from social class and household composition to mobility constraints, with the specific purpose of predicting likely food shopping patterns (frequency, timing, location, expenditure). This ability to classify on one set of factors and thus successfully predict differences in other variables is clearly of the essence of classification. Without this property a classification is of limited value. Williams (1971) has attempted a formalisation of this concept of predictability by distinguishing between *extrinsic* and *intrinsic* classification. In the former, the classification of intrinsic data is arranged to predict as closely as possible the extrinsic situation. Intrinsic classifications are used to derive groups solely from known group characteristics. As in Yates' (1978) research, the groups may then be examined to determine if they reflect extrinsic discontinuities. The value of the explicit extrinsic approach was illustrated by Macnoughton-Smith (1965) in sociological analyses where it was found that "irrelevant" resemblances masked investigations of extrinsic basic causality. However, the power of the intrinsic method, which must rest on the existence of correlations between predictor (classifying) and predicted variables, is that measurements need only be made on easily observed characteristics of individuals.

The properties of a classification scheme are suggested in part from the consideration of their purpose(s). In relationship to biological classification Silvestri and Hill (1964) have stated *objectivity, stability* and *predictivity* to be among the more important features of a classification. By objectivity they imply that independent workers should reach similar conclusions on class structure, which in principle rules out *a priori* methods. A classification may be said to be stable if it is little influenced by new data or if several samples from the same data material lead to the same class configuration. As such, stability should also imply robustness against errors in the data. If a classification is to remain essentially unaltered when additional individuals are observed or when extra variables are measured on the same entities, it must clearly be able in some sense to predict unobserved variables, and the variate values of new individuals.

Borko (1965) and Forgy (1965) also include *practicability* and *interpretability* as criteria for assessing the quality of a classification. It is claimed by them that a classification should be practical in that the classes isolated empirically from samples of data should reflect the structure of the whole. By this it is suggested that if an accepted standard classification exists for the mass it should be determined whether its most important classes are identified by the new classification procedure. Cormack (1971) takes exception to this view in stating that "the current swell of classificatory publications is mainly devoted to "testing" published techniques on data for which "standard" classifications exist. When the technique fails the author's response is to modify the technique instead of thinking about the "standard" classification or questioning the value of the whole process."

Perhaps interpretability, which indicates understandability and acceptability, is the most important criterion by which to judge a classification scheme. The orientation of modern classification procedures towards mathematically optimum efficiency may lead to a classification which is meaningless when interpreted by practitioners of the discipline concerned. Additionally, the difficulty of prescribing relatively simple and intuitively plausible rules for the assignment of new individuals to classes may reduce the acceptability of a scheme to the relatively näive user.

1.6 Summary

It will be clear that there is an impressive and growing body of literature on classification methodology. That there are conflicts and areas poorly resolved is equally clear from perusal of this literature. To shed light on these issues Cormack (1971) suggests that "Two types of study seem likely to be highly informative but have been surprisingly little carried out. Firstly: studies of real data if either the variables or the entities are divided into subsets, either randomly or to a chosen pattern, and clustering performed independently on each subset. ...... Secondly: studies of concocted data of known structure." Kendall (1971) reinforces the point when stating that "none of these methods is very reliable unless the situation is reproducible ...... it seems to me to be desirable to split the observations into two or more groups and do any exercise on each of them and see if you get similar results from the subgroups ...... This is a technique which ought to be much more employed than it has been."

It is the purpose of this thesis to attempt a partial remedy of these criticisms. To this end an examination of the performance of a polythetic classification of European Agricultural Holdings will be undertaken and compared with a proposed *a priori* typology.

In the next chapter the methods of multivariate analysis employed in such polythetic approaches are reviewed, while the specific techniques and algorithms of this study are discussed in Chapter III.

CHAPTER II

MULTIVARIATE METHODS IN CLASSIFICATION

2.1 The Origin and Development of Multivariate Analysis

Statistical multivariate analysis is at best just over 100 years old. It traces its origin to Francis Galton's work on correlation in *Heritory Genius* (1869). Galton, who in 1883 wrote that "the object of statistical science is to discover methods of condensing large groups of allied facts into brief and compendious expressions suitable for discussion", defined many of the eventual problems of multivariate statistics and outlined solutions which were later provided in detail by Pearson and Yule (multiple regression), Pearson, Edgeworth and Hotelling (principal component analysis) and Spearman, Burt and Thurstone (factor analysis). The upsurge of interest in the 1920's and 1930's in multivariate methods associated with psychological measurement was the setting for the pioneering work on discriminant analysis (Fisher, 1936; Welch, 1939), and cannonical correlation (Hotelling, 1935 and 1936). Both of these were extended and generalised in the post-second world war period (Rao, 1948; Horst, 1961), while from the late 1950's the first of a growing volume of papers on clustering methods appeared.

2.2 The Data in Multivariate Analysis

The raw data used in multivariate analysis comprises p variables measured on n observations and may be represented as a matrix

$$X^* = \begin{bmatrix} X_{11} & X_{12} \cdots & X_{1p} \\ X_{21} & X_{22} \cdots & X_{2p} \\ \vdots & \vdots & \vdots \\ X_{n1} & X_{n2} \cdots & X_{np} \end{bmatrix} = \begin{bmatrix} X_{ij} \end{bmatrix}$$

The type of variable available has important consequences for many types of analysis.

Although in general one may distinguish any number of states of a qualitative or *nominal scale* variable, only the dichotomous distinction - "possession/non-possession" of an attribute - represented by a *binary* variable -is admissable in multivariate techniques. The restriction exists because there is no measure of order, spacing or distance in a manifold classificatory variable; yet many statistical methods assume and require such measurement concepts.

Fortunately, a multi-state qualitative variable can be reduced to a series of binary variables. For example, the sex of the farm-holder as reported in recent farm structure surveys is either

(a) Male

or (b) Female

or (c) Not applicable because of joint or corporate ownership.

While it would be unacceptable to represent the three states of this variable by 0 = Male, 1 = Female and 2 = N.a. or 1 = Male, 2 = Female and 3 = N.a., it is possible to construct two binary variables which are encoded as follows:

	X_1	X_2
Male Holder	1	0
Female Holder	0	1
Joint/Corporate Holder	0	0

Alternatively, some qualitative variables may have their states collapsed to form the required dichotomy. A question asking about other gainful work undertaken by the holder outside agriculture has three possible answers, i.e. Yes, No, Not Applicable. By merging the latter two categories one produces the following situation:

X	
1	Individual Holder with other gainful work
0	All other cases.

This, of course, leads to a loss of information as does the reduction of a quantitative variable to a binary form. The conversion of data on the number of milking machines owned by a farm to a binary variable which indicates whether or not one or more milking machines are owned illustrates this.

Although used only once in this investigation, *ordinal* scale measurement may be incorporated into multivariate analysis, particularly when the *ranking* of a quantitave variable has taken place. Once again, a loss of information occurs but this may be justified by the consequential transformation of a non-linear monotonic to a simple monotonically increasing (decreasing) variable. Thus the number of years' agricultural education received by a farm manager may be represented by an ordinal variable taking the values 1 = None, 2 = Primary, 3 = Secondary and 4 = Higher.

Metric characteristics measured on a *ratio* scale have the highest information content because a measurement of distance and hence a standard unit of measurement is definable for them. As it is rare for such quantitative variables to have identical units of measurement, it is common to use dimensionless *standardised* or *normalised* values for analysis. Standardisation of a variable involves the subtraction of the mean and division by the standard deviation which gives a variate with zero mean and unit variance (thus a total sum of squared deviation round the mean of n). Normalisation further transforms a variable such that the total sum of squares equals unity and is achieved by dividing the values of a standardised variable by $\sqrt{n}$. Such linear transformations do not entail a loss of statistical information but can considerably and validly influence the results of techniques such as principal component analysis and cluster analysis.

It should be noticed at this point that variances and covariances of variables may be found by expressing the original variables as deviations round their means giving the matrix X

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1p} \\ x_{21} & x_{22} & \cdots & x_{2p} \\ \vdots & \vdots & & \vdots \\ x_{n1} & x_{n2} & \cdots & x_{np} \end{bmatrix} \qquad \text{where } x_{ij} = X_{ij} - \bar{X}_j$$

and computing

$$V = \frac{1}{n} X'X = \begin{bmatrix} \mathrm{Var}(X_1) & \mathrm{Cov}(X_1X_2) & \cdots & \mathrm{Cov}(X_1X_p) \\ \mathrm{Cov}(X_2X_1) & \mathrm{Var}(X_2) & \cdots & \mathrm{Cov}(X_2X_p) \\ \vdots & \vdots & & \vdots \\ \mathrm{Cov}(X_pX_1) & \mathrm{Cov}(X_pX_2) & \cdots & \mathrm{Var}(X_p) \end{bmatrix}$$

When standardised variates are used this *variance-covariance* matrix is the *correlation matrix*, R, showing the linear associations between variables, ie if

$$Z = \begin{bmatrix} z_{11} & z_{12} & \cdots & z_{1p} \\ z_{21} & z_{22} & \cdots & z_{2p} \\ \vdots & \vdots & & \vdots \\ z_{n1} & z_{n2} & \cdots & z_{np} \end{bmatrix} \qquad \text{where } z_{ij} = \frac{x_{ij}}{S_j}$$

Then

$$R = \frac{1}{n} Z'Z = \begin{bmatrix} 1 & r_{12} & \cdots & r_{1p} \\ r_{21} & 1 & \cdots & r_{2p} \\ \vdots & \vdots & & \vdots \\ r_{p1} & r_{p2} & \cdots & 1 \end{bmatrix}$$

For normalised variates the simple cross-product matrix defines the correlation matrix, i.e.

$$R = Z^{*'} Z^{*} \text{ where } Z^{*} = \left[\frac{z_{ij}}{\sqrt{n}}\right]$$

The geometric interpretation of the raw data matrix varies according to the data types employed in analysis. Every observation may be seen as a point in p-dimensional space, E_p, on whose co-ordinate axes, situated at right angles to each other, are plotted the values of the p characteristics. If all p characteristics are binary and can take only the values 0 and 1, then the space E_p is made up of the cornerpoints of a p dimensional cube with side-length 1. There are, therefore, a maximum of 2^p points in the space. If all p-characteristics are ordinal or discrete quantitative, the space embraces a mass of grid points considerably in excess of 2^p. Finally, if all p variables are continuous, the space may be fully occupied within the delimiting range of the variables in question.

2.3 Geometrical Representation of Multivariate Data

Clearly, with p = 2 or p = 3, two or three dimensional representations of the data can be constructed and evaluations made by eye of the presence of correlations between variables and clusters of observation points. Once we move to 4 or more variates this invaluable standard graphical basis for the assessment of structure within the data can no longer be applied. Admittedly, the common practice of viewing the variates in subgroups of two or three is still possible but this can be misleading as Cattell and Coulter (1966) have demonstrated. What is needed is a method of obtaining a visual representation of multivariate data which may give qualitative insight into their 'structure' and indicate the most appropriate models to use for more detailed analyses.

Ordination techniques involve the representation of the n, p-dimension vectors of observations in a lower space $p^* = 2$ or 3. Sammon (1969) has suggested a method which involves the minimisation of a function of differences in the distances d_{ij}, between the points in the original p-space and those in the reduced space p^*, denoted d^*_{ij}. The function

$$E = \frac{1}{\sum\limits_{i<j} d_{ij}} \sum_{i<j} \frac{(d_{ij} - d^*_{ij})^2}{d_{ij}}$$

is minimised by the adjustment of points using a steepest descent procedure. A simpler method described by Gower (1966) is based upon and n x n matrix of distances between the observations with respect to the variables. As with the standard principal component approach (discussed below) this procedure rests upon an extraction of latent roots and vectors. The first two or three of the principal co-ordinates may give a reasonable representation of the original distances between points so that a plot can be made and a visual search for 'structure' undertaken.

Andrews (1972) has described an alternative approach based on plotting a sin-cosin function for each p-dimension point defined as

$$f_x(t) = X_1 / \sqrt{2} + X_2 \sin(t) + X_3 \cos(t) + X_4 \sin 2(t) + X_5 \cos 2(t) + \ldots$$

over a range of t from $-\pi$ to $+\pi$. Because distances between points are preserved, close points will appear as curves which remain close together while distant points will be represented by curves distant from each other over at least some range of t. Examination of the plotted functions may thus show evidence of 'clusters', 'outliers' and other features of the data.

Chernoff (1973) proposes a third radically different solution to the problem based on the production of cartoon faces, one for each observation, in which the individual facial features vary with values taken by particular variables. The author argues that people are accustomed to studying and classifying facial types so that other observations expressed in terms of facial appearance should be equally classifiable.

Stress has so far been placed on the conventional representation of observation points in variable space. An alternative and complementary picture of the data is given by imagining variables plotted in observation space. Given an n x p matrix such as X above, it is perfectly possible to focus on the columns rather than the rows of the matrix thus depicting the observation scores on each variable rather than the variable values of each observation. A *vector* constructed by joining the variable point to the origin of this n-space is a geometrical representation of the variable. The angle between two such vectors measures the correlation between the variables while the vector lengths are proportionate to the variable standard deviations. As p is usually much smaller than n it should be noticed that p variable vectors may be represented in a maximum of p-dimensions rather than the n-dimensions we start with. For example, with n = 3 and p = 2

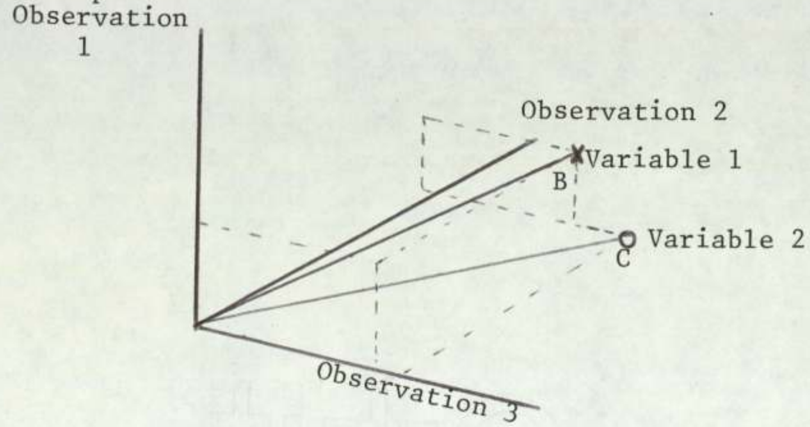
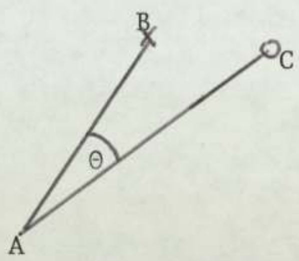


Figure 2A Vector Diagram A

Points A, B and C define a flat 2-dimensional plane so that vectors AB and AC may be shown without axes as

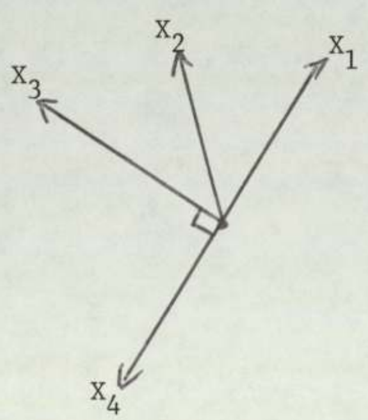


Where $\cos(\Theta) = r_{12}$

and $\frac{AB}{AC} = \frac{S_1}{S_2}$

Figure 2B Vector Diagram B

Vectors close together ($\Theta \to 0^o$) show high positive correlations, those at rightangles ($\Theta = 90^o$ are *orthogonal* and have zero correlations, while obtuse angles ($90^o < \Theta < 180^o$) between variable vectors indicate inverse associations. (Figure 2C).

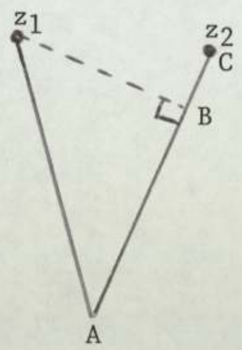


Correlation Matrix

$$R = \begin{bmatrix} 1 & 0.5 & 0 & -1 \\ 0.5 & 1 & 0.5 & -0.5 \\ 0 & 0.5 & 1 & 0 \\ -1 & -0.5 & 0 & 1 \end{bmatrix}$$

Figure 2C Vector Representation of Correlations between Variables

Vectors of standardised or normalised variables will have equal lengths and possess the additional property that projections from one to another will also define correlations, ie Fig. 2D



$$\frac{AB}{AC} = r_{12}$$

Figure 2D Vector Diagram C

It is evident that such representations of variables in vector diagram form most clearly portray the pattern of variable relationships in the data.

2.4 Principal Components

It is frequently the case that p, the number of variables in a multivariate problem, is large, and in addition, that there are significant inter-correlations between the variables, so that some are substantially linear combinations of others. In this event, there will be fewer significant dimensions of difference between observation and observation than the number of variables. Therefore, to determine, for instance, a clustering of observations based on the p variates rather than $p^* < p$ dimensions, would be both inefficient computationally and based on non-significant differences between unit and unit. Principal component analysis (PCA) has as its most distinctive characteristic the data reduction capability implied above. Given a matrix of covariances or correlation co-efficients between a set of variables, PCA enables us to see whether some underlying pattern of relationships exists such that the data may be "re-arranged" or reduced to a smaller set of components which may be taken as source variables accounting for the observed inter-relations in the data.

The components are defined as exact mathematical transformations of the original data and are extracted in such a way that each component is independent from the others; that is, components are orthogonal. No particular assumption about the underlying structure of the variables is required, other than the exclusion of multi-state nominal scale measurement. It is only necessary to find the best linear combination of original variables - best in the sense that the specified combination would account for more of the variance in the data as a whole than any other linear combination of variables. The first (principal) component may therefore be viewed as the single best summary of linear relationships exhibited in the data. The second component, also expressed as a linear combination of variables, must be orthogonal to the first and should account for as much of the residual variance as possible after the effect of the first component is removed from the data. Subsequent components are similarly defined until all the variance in the data has been exhausted. Thus, unless there is perfect multi-collinearity in the data, the principal component solution requires as many components as there are original variables.

The transformation can be explained geometrically in two ways. The first assumes that the dispersion of observed values in the space E_p is approximately described by an ellipsoid. Representation of the data can be considerably simplified if new co-ordinate axes are determined which coincide with the principal axes of the ellipsoid. Thus in a $p = 2$ example, two new axes are defined and may be seen as a rotation from the original variate to principal co-ordinate axes.

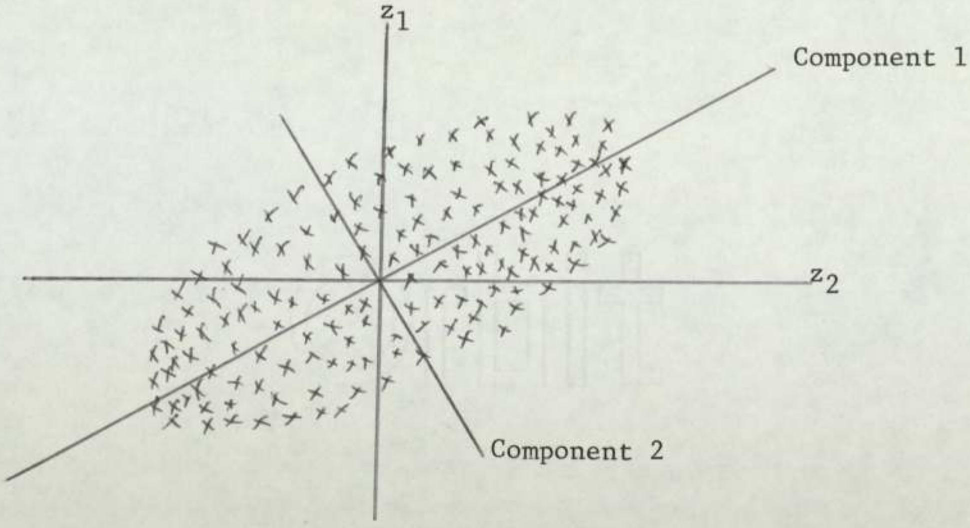


Figure 2E The geometry of principal component analysis

Alternatively, in vector form the first component is seen as a new vector having the highest possible correlation with the observed variables, while the second component is orthogonal to the first. (Figure 2F)

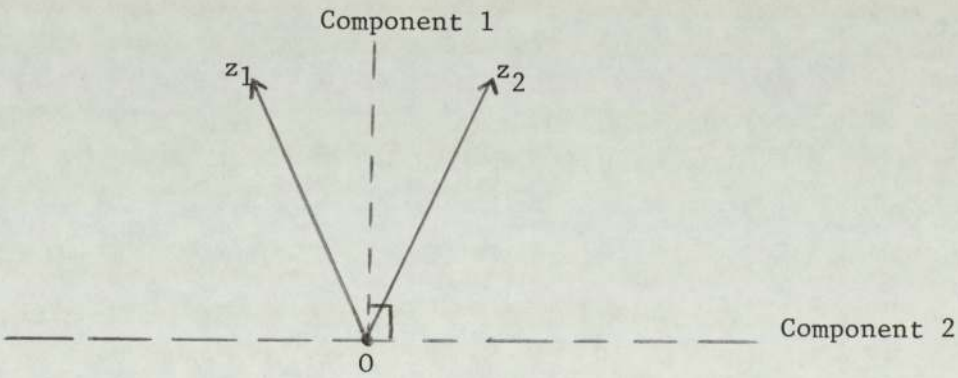


Figure 2F A vector representation of PCA

In general, the direction of the first component may be thought of as the path which would be taken by a stationary object initially at the origin in Fig. 2F, which is simultaneously pulled with equal force in the directions of each variable vector.

Thus mathematically PCA is designed to transform the matrix of observations on p observed variables in deviation or standardised form (X or Z) into a matrix of p uncorrelated hypothetical variables, C, which decrease in variance from the first to the last. This may be achieved by post-multiplying X or Z by an orthogonal matrix of weights, F or G, columns of which are the normalised latent vectors (eigenvectors) of the p x p variance-covariance matrix, V, or the correlation matrix, R . The F or G matrix is suitably arranged so that the first eigenvector corresponds to the largest latent root (eigenvalue) of V or R, the second vector to the second largest latent root and so on. Thus

$$C = XF \quad \text{or} \quad C = ZG$$

The latent roots of V or R may be found by solving for λ_j in the determinant

$$|V = \lambda_j I \quad | = 0$$

or

$$|V = \lambda_j I \quad | = 0$$

as appropriate, which in turn involves finding the roots of a polynomial of order p. Only if the V or R matrix is singular will one or more of the roots be zero. In general, there will be as many non-zero latent roots as the rank of the variance-covariance or correlation matrix.

The normalised latent vector, $\underset{\sim}{f}$, which corresponds to one of the eigenvalues, λ, is used to produce a vector of component scores, $\underset{\sim}{c}$, from

$$\underset{\sim}{c} = X\underset{\sim}{f}$$

Now $\underset{\sim}{c}'\underset{\sim}{c} = (X\underset{\sim}{f})'X\underset{\sim}{f} = \underset{\sim}{f}'X'X\underset{\sim}{f}$

from which $\quad \text{Var}(\underset{\sim}{c}) = \frac{1}{n}\underset{\sim}{c}'\underset{\sim}{c} = \underset{\sim}{f}'\frac{1}{n}(X'X)\underset{\sim}{f} = \underset{\sim}{f}'V\underset{\sim}{f}$

Denoting the Var $(\underset{\sim}{c})$ by λ, we obtain

$$\lambda = \underset{\sim}{f}'V\underset{\sim}{f}$$

Now the normalisation and orthogonality of

$$F \text{ in } C = XF \text{ means that } F'F = FF' = I$$

so that $\quad \underset{\sim}{f}'\underset{\sim}{f} = \underset{\sim}{f}\underset{\sim}{f}' = 1$

Thus $\quad \underset{\sim}{\lambda}\underset{\sim}{f}'\underset{\sim}{f} = \underset{\sim}{f}'V\underset{\sim}{f}$

and on the premultiplication of both sides by $\underset{\sim}{f}$ we obtain

$$\lambda\underset{\sim}{f}\underset{\sim}{f}'\underset{\sim}{f} = \underset{\sim}{f}\underset{\sim}{f}'V\underset{\sim}{f}$$

$$\lambda f = Vf$$

Re-arrangement gives $\quad V\underset{\sim}{f} - \lambda\underset{\sim}{f} = 0$

or $\quad (V - \lambda I)\underset{\sim}{f} = 0$

Substituting each latent root in turn into this last expression leaves us with p homogeneous equations in the p unknown elements of the $\underset{\sim}{f}$ vectors, which may be solved to give $\underset{\sim}{f}'\underset{\sim}{f} = 1$ (normalisation). Such solutions will give component score vectors having variances equal to the eigenvalues corresponding to the solution.

In principle, identical steps lead from the initial use of standardised variables to

$$(R - \lambda I)\underset{\sim}{g} = 0$$

It should be noticed, however, that latent roots and latent vectors are not invariant under changes of scale such as that inherent in moving from variables measured in deviations round means to standardised variables. In general, different results are obtained from the use of the V and R matrices. As the fortuitous differences in the scale and thus variances of observed variates are not usually considered germane to the problem "it seems reasonable to regard the standardised variables as a better basis for judgement" (Kendall and Stuart, 1970). Nevetheless, the ultimate decision about the nature of the data to use is a non-statistical one; from the statistical viewpoint standardisation is a nuisance in that it complicates the sampling and distributional theory involved in inferences about 'significant' components.

Whether or not standardised variables are employed, it is important to realise that no information is lost in a full principal component transformation. Since $F F' = I$, it follows that

$$C C' = X F F' X' = X X'$$

indicating that the sum of squares for an undividual is unchanged under this transformation. This is confirmed when one accepts that

$$C = X F \quad \text{and} \quad X = C F'$$

While it may appear that in defining components as linear combinations of variables and variables as linear combinations of components, there is a circularity in the reasoning. This is true in the sense that the score of an observation on the full set of components contains exactly the same information about an observation as that contained in the original variables. However, some views of the same scene are more illuminating than others and transformation of a set of data variables into components may well reveal important relationships which are difficult to discern among the variables in their original form.

One way of facilitating this understanding when dealing with standardised variables is to scale the normalised latent vectors, $\underset{\sim}{g}$, so that the sum of squares of each is equal to the corresponding latent root, λ, i.e.

$$\underset{\sim}{h} = \sqrt{\lambda}.\underset{\sim}{g}$$

The elements of the vector, $\underset{\sim}{h}$, may be interpreted as the correlations of the observed variates with a particular component which enables the underlying dimension of this component to be better understood. These so called *factor loadings*, when squared, indicate the proportion of the total variance of an observed variable accounted for by a particular component. Contrast this with the square of an element in $\underset{\sim}{g}$ which shows the proportion of the components variance which is accounted for by a given variable. Both are clearly revealing, although examination of factor loadings enables the distinction of the factor analyst, between *common* and *unique* factors (components), to be made. When a component contains two or more variables with significant[1] loadings, it is described as a common factor, meaning that the component summarises and explains the information contained by such variables. A component with only one significant loading is described as unique in the sense that is is close to one variable but essentially orthogonal to all

1 The concept of the statistical significance of eigenvalues and vectors is discussed below.

others. It is clear that such a variable contains information not reflected in remaining variables so that it will be largely uncorrelated with these. The latent root of such a unique factor can be expected to be close to unity.

Although mathematically PCA has many desirable features, in summarising data optimally, there are certain circumstances in which the substantive interpretability of results may be improved by further axis rotation, even though this will alter the relative sums of squares explained by the new factors. *Orthogonal* or *oblique* rotations may be justified in the circumstances depicted in Fig. 2G. Clockwise orthogonal rotation of axes C_1 and C_2 to A_1 and A_2 would clearly increase to near unity the loading of variables X_3, X_4 and X_5 on factor A_1, while reducing the loadings of variables X_1 and X_2. Similarly, the second new factor, A_2, would load highly on X_1 and X_2 and have low loadings on X_3, X_4 and X_5. The *varimax* method of axis rotation described by Kaiser (1958) seeks this type of clarification of the structure of variables in

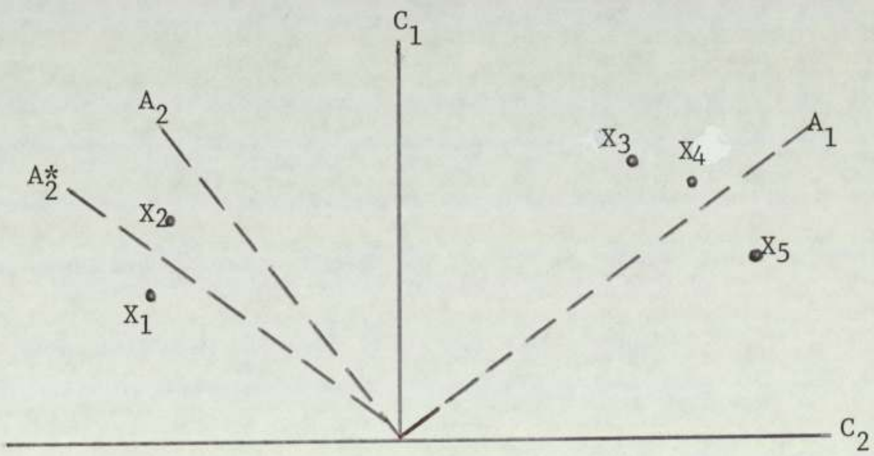


Figure 2G Possible Axis Rotation

attempting to polarise loadings between zero and unity. *Promax* rotation offers one example of a non-orthogonal or oblique approach to rotation. A rotation to A_1 and A^*_2 in Fig. 2G, will polarise loadings on variables even more than the varimax method, and would be justified if *a priori* grounds exist for a hypothesis of correlated source dimensions in the investigation to hand.

The problem of defining the significance of components or factor loadings has engaged writers for the past forty years.

Essentially, there are three approaches available for the investigation of the number of components which should be employed. Only common variance is required in most studies and the methods used rest on assumptions as to when this has been achieved. *Kaiser's criterion* (1961) is the simplest to define and use, which accounts for its popularity. Only components based on standardised variates and having latent roots greater than unity are considered to be of value as common factors since such components will explain more of the total variance in the data than an original observed variate. Admittedly, this is a rough-and-ready procedure for which it is difficult to advance a convincing theoretical argument. Slightly more sophisticated is Cattell's (1966) *scree test* which shows a plot of eigenvalues against component numbers. At the point where the rate of decline in the eigenvalues assumes a near linear form, one is deemed to have distinguished the *rock face* of common components from the *scree* of unique components. Craddock and Flintoff (1970) and Farmer (1971) show that the cut-off point is more clearly distinguishable if the logarithms of eigenvalues are plotted but in either case the approach often indicates a very different number of "significant" components compared with Kaiser's criterion.

Unfortunately, some of the more rigorously based methods are not particularly helpful. While it is possible to test the overall equality of the eigenvalues using the correlation determinant, the more useful specific tests for a significant cut-off number of eigenvalues are much less certain.

It may be shown that

$$-n \left\{1 - \frac{2p + 11}{6n}\right\} \log |R|$$

is distributed as χ^2 with $\frac{1}{2}p\ (p - 1)$ degrees of freedom. A non-significant result from this test indicates that transformation to principal component scores is no better than representation of the data by the original variables; the original variables are in fact uncorrelated in the population from which the data is drawn. However, it should be pointed out that it is exceedingly rare for this test to produce non-significant results.

Kendall (1975) and Kendall and Stuart (1970) quote a number of assymptotic results concerning latent roots and vectors which were first obtained by Girshick (1939) and Anderson (1963), who proved the assymptotic normality of the distribution of these statistics. While the assymptotic standard error of the latent roots obtained from the variance-covariance matrix is relatively simple, being

$$SE(\lambda_1) = \lambda_i \left(\frac{2}{n}\right)^{\frac{1}{2}}$$

the results for a correlation matrix are much more complicated -

$$SE(\lambda_i) = \left[\left(\frac{2}{n}\right)\left(\lambda_i^2 + \sum_{\alpha,\beta=1}^{p} g_{\alpha_i}^2 g_{\beta_i}^2 r_{\alpha\beta}^2 - 2\lambda_i \Sigma g_{\alpha_i}^4\right)\right]^{\frac{1}{2}}$$

and little used.

Bartlett (1951, 1954) has suggested alternative and somewhat heuristic tests of the distinguishability of principal components using eigenvalues. The hypothesis tested is whether the last p-k latent roots differ significantly among themselves. If the test statistic L is computed as

$$L = \left(\frac{\sum_{i=k+1}^{p} \lambda_i}{p-k} \right)^{p-k} \Bigg/ \prod_{i=k+1}^{p} \lambda_i$$

it may then be shown that

$$(n-k-\tfrac{1}{2}) \log_e L = B$$

is distributed as a χ^2 distribution with $\frac{1}{2}(p-k-1)(p-k-2)$ degrees of freedom[1]. Once an initial test based on the correlation determinant has proved conclusive, it will be inferred that at least the first eigenvalue must differ from the rest. Then with k = 1, Bartlett's test evaluates the second eigenvalue, with k = 2 the third, and so on, until no further significant result is obtained. Unfortunately, in circumstances of large n and very small final eigenvalues,

$\prod_{i=k+1}^{p} \lambda_i$ will be exceedingly small so that all but one or two roots will be shown to be significant, even though close to zero. It appears that the essential difficulty in testing eigenvalues is that any non-zero value "however small is significant in the sense that it could not have arisen from a population in which the corresponding parent value is zero" (Kendall, 1975).

The assymptotic variance of the co-efficients of a latent vector, also derived by Girshick *(op cit)*, is

---

1 Modifications to improve the χ^2 approximation are given in Lawley and Maxwell (1963).

$$\text{Var}\ (g_{jk}) = \frac{1}{n} \sum_{s \neq k=1}^{p} \frac{\lambda_k \ \lambda_s \ g_{js}{}^2}{(\lambda_k - \lambda_s)^2}$$

but once again this result is rarely used because of its complexity. Burt and Banks (1947) have produced the most frequently employed approach to the determination of the significance of factor loadings as opposed to normalised latent vector elements. They point out that statistically significant loadings should vary with the number of variables in the analysis and should increase the higher the component number being considered to allow for the gradual intrusion of specific and error sources of unique variance. The Burt-Banks formula is

$$h_\alpha = r_\alpha \left(\sqrt{\frac{p}{p+1-j}} \right)$$

where h_α is a significant loading at an α significance level, r_α is the α significant value of a Pearson product-moment correlation co-efficient, p is as usual the number of variables, and j is the component number. It thus has the merit of allowing not only for the sample size but also for the number of variables correlated and the number of components extracted up to the one under examination.

Finally, it should be noticed that principal component analysis, together with other multivariate techniques, is particularly sensitive to 'outliers' in the data. For example, in Fig. 2H the presence of the outlier at A would cause the principal axis of the transformation to be at or near AB, whereas for the dense ellipse of points it would be at XY

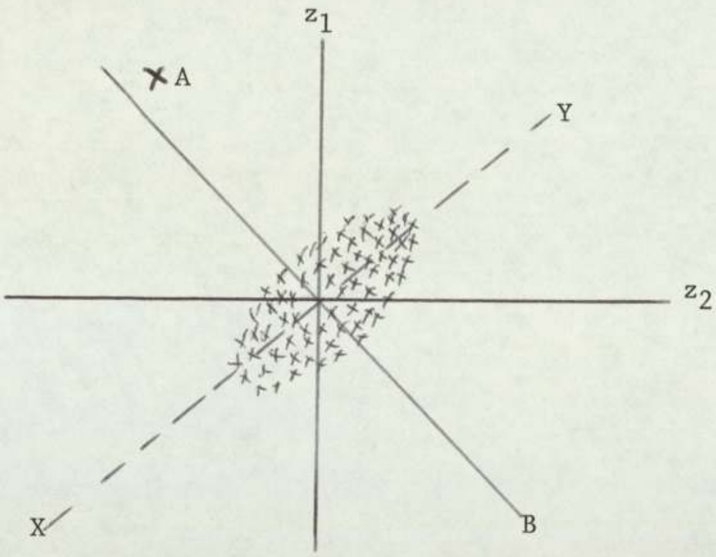


Figure 2H The Effect of Outliers

Gnanadesikin and Wilk (1969) gave an example of this problem while Anscombe (1960) and Bliss *et al* (1956) provide methods for the detection and removal of outliers in multivariate normal distributions.

2.5 Cluster Analysis

Principal component analysis and the related methods of factor analysis are concerned with the detection of structure within the p- *variables* of multivariate data sets. Cluster analysis methods focus on structuring the n- *observations* into m groups using an objective rule. This structuring should produce observation clusters in the space Ep, such that each cluster is seen as a continuous region in the space containing a relatively high density of points and separated from other dense regions by subspaces which are sparsely populated.

In the absence of prior knowledge about either the number of groups involved or their composition, the appealing solution is to enumerate all the possible arrangements of observations and choose the best one in 'some sense'. Unfortunately, this approach requires

$$\sum_{m=1}^{n} \left[\frac{1}{m!} \sum_{k=0}^{m} (-1)^{m-k} \binom{m}{k} k^{n} \right]$$

partitions of the data to be made. Such a sum of *Stirling* numbers of the second kind leads to over 4 x 10^8 partitions with only 25 observations and is clearly impractical even with modern computing power.

Thus over the past 20 years much attention has been given to the development of cluster analysis algorithms which seek an acceptable solution to the partitioning problem while considering only a small number of the full set of alternatives. The basis and properties of the extensive range of these algorithms are reviewed in detail by Sokal and Sneath (1963), Ball (1965), Cormack (1971) and Everitt (1974), and will only be examined in outline here.

Hierarchical clustering methods require a measure of the *similarity*, *association*, or *distance* between the observations to be grouped, and are based upon matrices of such measures.

For binary variables Sokal and Sneath (1963) suggest one of a number of *similarity* or *association* co-efficients such as the *simple matching co-efficient*

$$M_{kl} = a_{kl} / p$$

where a_{kl} represents the number of attributes in which the observations k and l correspond or match. The number of similarity co-efficients discussed in the literature is large because of uncertainty over how to incorporate negative matches and whether or not matched pairs should be differently weighted compared with unmatched pairs. Sokal and Sneath conclude that no hard and fast rules exist for a decision here.

An alternative and sometimes equivalent approach is to compute association measures between observations. The chi-square statistic and measures derived from it and correlation co-efficents of various types are examples of the more popular measures used in determining the degree of correspondence between observations.

The common use of the Pearson product moment correlation does, however, pose certain problems. In contrast to the standard (R-technique) approach which determines the strength of a correlative connection between two variables, the dual (Q-technique) involved here is based on the calculation of a correlation co-efficient between each pair of observations. This necessitates the standardisation of variable values first, since different variables measured on an observation will normally have different units of measurement. The product-moment correlation calculated on the basis of p variables for the kth and lth observations is then proportional to

$$Q_{kl} = \sum_{j=1}^{p} z_{kj} z_{lj} = \underset{\sim}{z}_k \underset{\sim}{z}_l'$$

Kendall (1966) suggested the use of rank correlation co-efficients of the original variables instead of the product-moment method based on standardised characteristics, because the former are independent of monotonic transformations. Other authors also object to the product moment approach including Fleiss and Zubin (1969), Eades (1965) and Ihm (1964), who concludes that the measure does not provide a sensible classification where the distance as well as the correlation between observations is relevant. Two observations may have parallel variable profiles, giving a high correlation, but nevertheless be very distant from one another. A further problem is that the concept of the arithmetic average, implicit in the product moment formula, has little or no meaning when calculated over the disparate variable values of a single observation.

Instead of a similarity or association measure, classification may also be based on a measure of dissimilarity of observations. The unweighted Euclidean distance, or more precisely the square of this distance, is the most widely known of a range of *metrics*, and is defined for standardised variates as

$$D_{kl}^2 = \sum_{j=1}^{p} (z_{kj} - z_{lj})^2 = (\underset{\sim}{z}_k - \underset{\sim}{z}_l)(\underset{\sim}{z}_k - \underset{\sim}{z}_l)'$$

for the kth and l th observations. The measure corresponds geometrically to the quadratic distance between points $\underset{\sim}{x}_k$ and $\underset{\sim}{x}_l$ in the p-dimensional Euclidean space, E_p. The Euclidean metric has a long history and was suggested by Pearson (1925) in his *co-efficient of racial likeness* which is proportional to D_{kl}^2.

It should be noticed that the similarity measures M_{kl} and Q_{kl} may be converted to Euclidean distances using the following relationships due to Gower (1966)

$$D_{kl}^2 = Q_{kk} + Q_{ll} - 2Q_{kl}$$

$$D_{kl}^2 = p\ (1 - M_{kl})$$

which confirms the validity of incorporating binary and ordinal variables in Euclidean-type clustering procedures.

The Euclidean distance has the great advantage of being easy to calculate. However, as early as 1936, R A Fisher pointed out that the measure has one main disadvantage. It reflects strongly correlated variables with the same weight as variables having weak correlations, so that the strongly correlated characteristics indirectly receive too great a weight. This disadvantage is avoided if the *generalised* distance suggested by Mahalanobis (1936) is applied instead, where

$$D^{*2}_{kl} = (\underset{\sim}{z}_k - \underset{\sim}{z}_l)\ R^{-1}\ (\underset{\sim}{z}_k - \underset{\sim}{z}_l)'$$

and R^{-1} is the inverse of the correlation matrix. If all observed variables are uncorrelated by pairs, the generalised distance becomes the unweighted Euclidean distance since R and R^{-1} will be unit or identity matrices. Otherwise, the values of individual variables are inversely weighted according to their correlations with other variables.

A direct application of the generalised distance for clustering is not practical since this requires a great deal of computation. However, it is possible to bring the theoretical advantages of this measure in line with the simple calculability of the Euclidean distance by virtue of a principal component transformation of the original data. The variable values for the ith observation are first converted to component scores

$$\underset{\sim}{c}_i = \underset{\sim}{z}_i\ G$$

and the results standardised. This involves dividing each variable element in $\underset{\sim}{c}_i$ by the square root of the eigenvalue appropriate to that variable, ie

$$\underset{\sim}{b}_i = \underset{\sim}{c}_i\ \underset{\sim}{\Lambda}^{-\frac{1}{2}} = \underset{\sim}{z}_i\ G\ \underset{\sim}{\Lambda}^{-\frac{1}{2}} \quad \text{where } \underset{\sim}{\Lambda}^{-\frac{1}{2}} = \begin{bmatrix} \frac{1}{\sqrt{\lambda 1}} & 0 & \cdots & 0 \\ 0 & \frac{1}{\sqrt{\lambda 2}} & \cdots & 0 \\ 0 & 0 & \cdots & 1/\sqrt{\lambda p} \end{bmatrix}$$

Now the Euclidean distance for the kth and lth observation with respect to the standardised component scores, $\underset{\sim}{b}_i$, is

$$(\underset{\sim}{b}_k - \underset{\sim}{b}_l)(\underset{\sim}{b}_k - \underset{\sim}{b}_l)'$$

$$= \quad (\underset{\sim}{z}_k G\underset{\sim}{\Lambda}^{-\frac{1}{2}} - \underset{\sim}{z}_l G\underset{\sim}{\Lambda}^{-\frac{1}{2}})(\underset{\sim}{z}_k G\underset{\sim}{\Lambda}^{-\frac{1}{2}} - \underset{\sim}{z}_l G\Lambda^{-\frac{1}{2}})'$$

$$= \quad (\underset{\sim}{z}_k - \underset{\sim}{z}_l)G\underset{\sim}{\Lambda}^{-\frac{1}{2}} \quad (\underset{\sim}{z}_k - \underset{\sim}{z}_l)G\underset{\sim}{\Lambda}^{-\frac{1}{2}}\,'$$

$$= \quad (\underset{\sim}{z}_k - \underset{\sim}{z}_l)G\underset{\sim}{\Lambda}^{-\frac{1}{2}}\underset{\sim}{\Lambda}^{-\frac{1}{2}}G' \, (\underset{\sim}{z}_k - \underset{\sim}{z}_l)'$$

Remembering that

$$(R - \underset{\sim}{\lambda} I)\underset{\sim}{g} = 0 \quad \text{or} \quad R\underset{\sim}{g} = \underset{\sim}{\lambda}\underset{\sim}{g}$$

and the generalisation

$$RG = G\underset{\sim}{\Lambda}$$

we may obtain, on premultiplication of both sides by G' and inversion

$$(G'RG)^{-1} = \underset{\sim}{\Lambda}^{-1} \qquad \text{since } G'G = I$$

Thus $\quad G'R^{-1}G = \underset{\sim}{\Lambda}^{-1}$

and $\quad R^{-1} = G\underset{\sim}{\Lambda}^{-1}G' \quad$ on premultiplication

by G and postmultiplication by G'

Now $\quad G\underset{\sim}{\Lambda}^{-\frac{1}{2}}\underset{\sim}{\Lambda}^{-\frac{1}{2}}G' = G\underset{\sim}{\Lambda}^{-1}G' = R^{-1}$

Therefore the Euclidean distance between observations k and l for standardised component scores, equals

$$(\underset{\sim}{z}_k - \underset{\sim}{z}_l)R^{-1}(\underset{\sim}{z}_k - \underset{\sim}{z}_l)'$$

which is the generalised distance between the observations on the original variables.

Whichever measures of similarity, association or distance are employed in practice, the hierarchical approach to clustering is essentially the same. With *agglomerative* methods there are initially n clusters with one observation in each. A search of the similarity matrix is made for the most similar part of clusters, which are merged. The similarity matrix is updated and reduced in size by one row and one column. The procedure is repeated n-1 times until there is one cluster of n observations. Different agglomerative procedures, such as *nearest neighbour* (single linkage), *furthest neighbour* (complete linkage), and *group average method*, are employed by varying the approach used for defining the most similar pairs and for updating the revised similarity matrix. Ward's (1963) proposal is worthy of note in that his merger rule is based on the total sum of squared deviations of every point in a cluster from the *centroid* of the cluster. At each step in the analysis the union of every possible pairs of clusters is considered and the two clusters whose fusion results in the minimum increase in the sum of within cluster sums of squares are combined.

Polythetic divisive methods of hierarchical clustering are less numerous and in some cases quite impractical for even moderately sized data sets (Edwards and Cavalli-Sforza, 1965). McNaughton-Smith's (1964) *splinter* group method offers one possibility. A splinter group is formed by sequential additions of the observation whose total dissimilarity with the remainder less its total dissimilarity with the splinter group is at a maximum. Once the splinter group is complete the procedure is repeated on the two clusters and so on, until the data are divided into n clusters of one. A second approach is based on discriminant analysis (discussed below). The essential idea is to begin with an initial partition, compute a linear discriminant function, and then iteratively re-assign points, recomputing discriminant functions at each round so as to find the most strongly separable groups. Cassetti (1964) and Hung and Dubes (1970) both provide programmes for this method.

Optimisation-partition methods offer the main alternative to hierarchical clustering. All require the optimisation of a cluster criterion, based on the generalised analysis of variance, through an iterative procedure which allows the re-allocation of observations. Thus poor initial partitions may be corrected at a later stage, a feature which none of the hierarchical methods possess.

In the univariate case (p = 1) it may be shown that

$$\sum_{k=1}^{m} \sum_{i=1}^{n} (X_{ik} - \bar{X})^2 = \sum_{k=1}^{m} n_k (\bar{X}_k - \bar{X})^2 + \sum_{k=1}^{m} \sum_{i=1}^{k} (X_{ik} - \bar{X}_k)^2$$

$$\text{or} \quad T \quad = \quad B \quad + \quad W$$

where there are m groups of observations of size n_k (k=1,m). The mean of the kth group is $\bar{X}_k$ and the overall mean is $\bar{X} = \frac{\Sigma n_k \bar{X}k}{n}$ since $\sum_{k=1}^{m} n_k = n$. Thus the total sum of squares (T) may be decomposed into between group (B) and within group (W) components. The generalisation of this result to p>1 variables is much more succinctly portrayed in matrix form as

$$T = W + B$$

where $$T = \sum_{i=1}^{n} (\underset{\sim}{X}_i - \bar{\underset{\sim}{X}})(\underset{\sim}{X}_i - \underset{\sim}{X})'$$

$$B = \sum_{j=1}^{m} n_k (\bar{\underset{\sim}{X}}_k - \bar{\underset{\sim}{X}})(\bar{\underset{\sim}{X}}_k - \bar{\underset{\sim}{X}})'$$

$$W = \sum_{k=1}^{m} \sum_{i=1}^{nk} (\underset{\sim}{X}_i - \bar{\underset{\sim}{X}}_k)(\underset{\sim}{X}_i - \bar{\underset{\sim}{X}}_k)'$$

where $\underset{\sim}{X}_i$ is a row vector of p- variable values for the ith observation

$\bar{\underset{\sim}{X}}$ is a row vector of overall means of the p variables

$\bar{\underset{\sim}{X}}_k$ is a row vector of means of the p variables in the kth group.

With p = 1 a cluster criterion might be the minimisation of W or the maximisation of T/W. With p>1 such criteria can no longer be quoted directly since T and B are matrices, while a scalar is needed as a measure of the quality of a given partitioning. Several possibilities for the reduction of a matrix to a scalar have been suggested. One may seek to minimise the trace of W (the trace is the sum of the diagonal elements of W). It is easy to calculate tr(W) but the measure does have the disadvantages of depending on the scale of the variables and disregarding the correlations between them.

These disadvantages can be avoided if the relationship of the determinants

$$\frac{|T|}{|W|} = |I - W^{-1} B| = \prod_{j=1}^{p} (1 - \lambda_j)$$

$$\text{or } tr\,(W^{-1} B) = \sum_{j=1}^{p} \lambda_j \quad \text{where } \lambda, \text{ is the eigenvalue of the appropriate matrix}$$

is used instead. Both require a greater amount of calculation. They are, however, invariant under non-singular linear transformation of the original values and as such are independent of the scale of the variables and take into consideration inter-correlations.

A measure known as Wilks lambda

$$\lambda = |W| / |T| = \sum_{j=1}^{p} \frac{1}{1 + \lambda_j}$$

has also been employed as a cluster criterion. It was originally developed by Wilks (1932) for testing the hypothesis that m normally distributed groups with equal variance-covariance matrices have equal mean vectors. Used as a clustering criterion, it does depend on the fulfilment of the distribution requirements and suffers, as do all these measures, from the deficiency that their values are not directly comparable for different numbers of classes. While $|T|$ is constant $|W|$ and $|B|$ change with the number of partitions of the data.

Whichever clustering criterion is employed, there are three outstanding issues to be resolved before clustering commences

(a) How are clusters initiated?

(b) How should observations be allocated to initiated clusters?

(c) How many clusters should there be?

Most techniques begin by finding m points in the p-dimensional space which act as initial estimates of cluster centres. These are termed *crystallising kernels*. These m points are chosen as the first m in the data set (MacQueen, 1967), regularly spaced (Beale, 1969), mutually furthest apart (Thorndike, 1953; Kennard and Stone, 1969), suitably chosen after inspection of the data (Ball and Hall, 1967; Nagy, 1969), or determined *a priori* (Jancey, 1966). Whichever method is used, the remaining observations are allocated to the cluster to which they are nearest (usually in a Euclidean sense), with updates of the cluster centroids after each point has been allocated (eg MacQueen, 1967) or only after all points have been allocated (Ball and Hall, 1967).

Golder and Yeomans (1973) combined steps (a) and (b) by ordering the first component scores for the observations and dividing these into m equal groups.

Once an initial classification has been determined, an iterative search is made for observations which should be further allocated to other groups in order to optimise the cluster criterion employed. MacQueen (1967) and Ball and Hall (1967), by slightly different mechanisms, allow m to change by enforcing the splitting of a cluster with large within cluster sums of squares or by fusing two clusters with small between cluster sums of squares according to two parameters of coarsening or refinement set by the user.

Beale (1969) also suggests starting with a larger value of m than the user anticipates being appropriate. After the optimisation of the cluster criterion with m clusters has been achieved, m-1 clusters are constructed by merging two of the m clusters already formed which, when combined, produce the least increase in the pooled within group variance. The iterative re-allocation of observations is then repeated on the m-1 clusters. Clearly, this cycle may be repeated m-1 times until only one cluster remains.

Beale (1969) has suggested a test which is analogous with, but not equivalent to, an analysis of variance for determining the "best" group of clusters so formed.

It involves the computation of an F ratio

$$F(m_1 m_2) = \frac{R_{m_1} - R_{m_2}}{R_{m_2}} \Bigg/ \left\{ \frac{n - m_1}{n - m_2} \left(\frac{m_2}{m_1}\right)^{2/p} - 1 \right\}$$

with $p(m_2 - m_1)$ and $p(n - m_2)$ degrees of freedom.

R_m is the pooled within group sum of squares obtained when a group of m clusters has been formed (ie $tr|W|$). If the test is significant for any m_2, then representation of the data in terms of m_1 clusters ($m_1 < m_2$) is not entirely adequate. Beale suggests computing the statistic for all $m_1 < m_2 < m_{max}$, but admits that in practice the significance level does not usually depend much on m_2 for $m_2 > (m_1 + 2)$. It should be stressed that this is a highly heuristic criterion and should not be applied mechanically. It does, however, give a guideline on when to stop the clustering process.

Beale's test shows strong similarities with a procedure for determining an adequate number of clusters suggested by Thorndike (1953). In a manner not unlike Cattel's scree test, Thorndike proposed that a plot of $tr|\mathbf{W}|$ against the number of clusters, should reveal a point at which further increase in the number of clusters brings no further significant reduction in dispersion. Alternatives to this are given by Friedman and Rubin (1967), and Ihm (1965), who implies that the number of classes must equate with the number, p*, of significant latent roots of the overall correlation matrix, since with only p* significant dimensions of difference between observation, there can only be p* classes within the data.

All of the methods of clustering are open to criticism. For instance, hierarchical approaches have as their most serious limitation the inability to re-allocate observations which may have been poorly classified at an earlier stage in the analysis. The major problem of optimisation techniques is that sub-optimal solutions are sometimes found because there may be numerous local optima present as well as the true global optimum. Additionally, if the cluster criterion is of a Euclidean type, the clusters are assumed to be either spherical, or if not spherical of the same shape. Thus the choice of optimisation criterion can be problematic in the absence of *a priori* knowledge of the anticipated cluster configuration. Finally, optimisation of a cluster criterion tends to require large amounts of computer time which prohibits their use with very large data sets.

Ultimately, the applied numerical taxonomist, when faced with the very large number of approaches available to him, both in principle[1] and detail, will be forced to take a relatively arbitrary decision about the "tool" to use. Certainly the main assumptions of the different methods should be examined and matched to the problem in hand. Equally, once clusters have been formed, the intuitive reasonableness of these should be critically examined.

Kendall (1971) comes down very firmly in favour of the simplest optimisation technique, rather than hierarchical methods or methods which seek maximisation of $|T|/|W|$ or $tr|W^{-1}B|$. "But when we come to cluster a large number of individuals, the number of pairs of distances between them goes up rapidly as the square of the number of individuals and in that context I would like to put in a strong plea for the use of the ordinary Euclidean metric, for two reasons. First of all, the Euclidean distance is invariant under orthogonal rotation of axes. Hence you can proceed to principal components and reduce the effective dimension number very substantially if you are prepared to sacrifice the lower eigenvalues of the matrix. .... the second advantage is that the average of the squared distance among a set of n points is simply equal to the average squared distance from the centre of gravity, so that instead of having computations of the order of $\frac{1}{2}n(n - 1)$ you have two computations of the order n. Taking these two things into consideration you can, on occasion, reduce the computation involved by something of the order of 100. I should want a lot of persuasion, I think, to

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1 Clumping and density-seeking techniques are discussed in Everitt (1974) but were not considered relevant to this research as the overlapping clusters of the former were not admissable and the assumption of multi-variate normality in the latter was considered suspect.

use other methods. There is an additional advantage that you get rid of collinearities among the variables. There are strong arguments for computational simplicity in practical work ... a number of methods proposed are quite hopeless to apply to more than a comparatively small number of observations."

2.6 Discriminant Analysis

Given the high computer time requirement for most polythetic data based classification procedures, it is inevitable that, when faced with large national or international data sets, with observations running into hundreds of thousands or even millions, the cluster analysis will have to be based on samples of this data. In order to classify the remainder of the population or to classify new observations (eg new companies, new families, new farms), classification or assignment rules must be determined. As has been suggested above, these rules will not be simple ones in the case of polythetic methods but may be built up employing various methods of discriminant analysis.

The broad methodology of assignment may be illustrated with reference to two groups. Let the two groups be designated G_1 or G_2. An observation has measurements on p discriminating variables, X_1, X_2 ... X_p and is to be assigned to G_1 or G_2 using this information. From *Bayes Law* it may be shown

$$P(G_1/\underset{\sim}{X}) = \frac{P(\underset{\sim}{X}/G_1) \times P(G_1)}{P(\underset{\sim}{X}/G_1) \times P(G_1) + P(\underset{\sim}{X}/G_2) \times P(G_2)}$$

where $P(G_1/\underset{\sim}{X})$ is the probability that an observation with a variable vector $\underset{\sim}{X}$[1] is a member of Group 1. This *posterior* probability is

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1 For consistency with earlier data representation $\underset{\sim}{X}$ is a row vector.

computed from the *likelihoods*, $P(\underset{\sim}{X}/G_1)$ and $P(\underset{\sim}{X}/G_2)$ and the *prior* probabilities $P(G_1)$ and $P(G_2)$. The likelihoods show the probability of an observation with the set of variable values in question arising from a particular group while the priors represent facts known about the groups outside the measured variables, which permits the formulation of hypothesised probabilities of group membership for a random observation.

An assignment rule may now be developed. If $P(G_1/\underset{\sim}{X})$ is greater than $P(G_2/\underset{\sim}{X})$ assign the observation with the vector of variable values, $\underset{\sim}{X}$, to Group 1, and conversely to Group 2 if $P(G_2/\underset{\sim}{X}) > P(G_1/\underset{\sim}{X})$.

In this two group case the rule could be stated as, "Assign to Group 1 if $P(G_1/\underset{\sim}{X})>\frac{1}{2}$" since $P(G/\underset{\sim}{X}) + P(G_2/\underset{\sim}{X}) = 1$. An observation must be assigned to one of the two groups even though $P(\underset{\sim}{X}/G_1)$ or $P(\underset{\sim}{X}/G_2)$ or both may be very small, indicating that the observation bears little resemblance to these two populations and may be a member of a third which has not been explicitly considered.

A second alternative rule is to assign the observation to Group 1 if

$$\frac{P(G_1/\underset{\sim}{X})}{P(G_2/\underset{\sim}{X})} > 1$$

otherwise to Group 2.

From Bayes Law

$$\frac{P(G_1/\underset{\sim}{X})}{P(G_2/\underset{\sim}{X})} = \frac{P(\underset{\sim}{X}/G_1) \times P(G_1)}{P(\underset{\sim}{X}/G_2) \times P(G_2)}$$

when the common denominators of the two basic probability equations are cancelled.

Given the assumption that the variables in the two groups have multivariate normal distributions then $P(\underset{\sim}{X}/G_1)$ is proportionate to the density at the points, $\underset{\sim}{X}$, given by

$$\frac{1}{(2\pi)^{p/2}|\Sigma_1|^{-\frac{1}{2}}} e^{-\frac{1}{2}(\underset{\sim}{X}-\underset{\sim}{\eta}_1)\Sigma_1^{-1}(\underset{\sim}{X}-\underset{\sim}{\eta}_1)'}$$

therefore

$$\frac{P(G_1/\underset{\sim}{X})}{P(G_2/\underset{\sim}{X})} = \left(\frac{|\Sigma_1|}{|\Sigma_2|}\right)^{-\frac{1}{2}} \cdot \frac{e^{-\frac{1}{2}(\underset{\sim}{X}-\underset{\sim}{\eta}_1)\Sigma_1^{-1}(\underset{\sim}{X}-\underset{\sim}{\eta}_1)'}}{e^{-\frac{1}{2}(\underset{\sim}{X}-\underset{\sim}{\eta}_2)\Sigma_2^{-1}(\underset{\sim}{X}-\underset{\sim}{\eta}_2)'}} \cdot \frac{P(G_1)}{P(G_2)}$$

after the cancellation of $\frac{1}{(2\pi)^{p/2}}$, where Σ_1, Σ_2, $\underset{\sim}{\eta}_1$ and $\underset{\sim}{\eta}_2$ are population variance-covariance matrices and vectors of means for the two groups.

Now the assignment rule

$$\frac{P(G_1/\underset{\sim}{X})}{P(G_2/\underset{\sim}{X})} > 1 \text{ is equivalent to } \log_e\left[\frac{P(G_1/\underset{\sim}{X})}{P(G_2/\underset{\sim}{X})}\right] > 0$$

since $\log_e(1) = 0$, so that taking natural logarithms, cancelling and rearranging gives

$$\log_e\left[\frac{P(G_1/\underset{\sim}{X})}{P(G_2/\underset{\sim}{X})}\right] = -\frac{1}{2}\left[(\underset{\sim}{X}-\underset{\sim}{\eta}_1)\Sigma_1^{-1}(\underset{\sim}{X}-\underset{\sim}{\eta}_1)' - (\underset{\sim}{X}-\underset{\sim}{\eta}_2)\Sigma_2^{-1}(\underset{\sim}{X}-\underset{\sim}{\eta}_2)'\right] - \frac{1}{2}\log_e\left[\frac{|\Sigma_1|}{|\Sigma_2|}\right] + \log_e\left[\frac{P(G_1)}{P(G_2)}\right]$$

In practice the population variance/covariance matrices and the vectors of true means will be unknown so that the sample estimators, V^* and $\bar{X}_j$ are used instead, where

$$V^* = W/n-m \quad \begin{array}{l}(n = \text{total observations}\\ m = \text{number of groups})\end{array}$$

If, as is common, equal group dispersion matrices are assumed, considerable simplifcation results. Now

$$\log_e\left[\frac{P/G_1/\underset{\sim}{X})}{P(G_2/\underset{\sim}{X})}\right] = \underset{\sim}{X}\,\Sigma^{-1}(\underset{\sim}{\eta}_1-\underset{\sim}{\eta}_2)' - \tfrac{1}{2}(\underset{\sim}{\eta}_1+\underset{\sim}{\eta}_2)\Sigma^{-1}(\underset{\sim}{\eta}_1-\underset{\sim}{\eta}_2)' + \log_e\left[\frac{P(G_1)}{P(G_2)}\right]$$

since $(\underset{\sim}{X}-\underset{\sim}{\eta}_1)\Sigma^{-1}(\underset{\sim}{X}-\underset{\sim}{\eta}_1)' - (\underset{\sim}{X}-\underset{\sim}{\eta}_2)\Sigma^{-1}(\underset{\sim}{X}-\underset{\sim}{\eta}_2)'$

$$= \underset{\sim}{X}\Sigma^{-1}(\underset{\sim}{X}-\underset{\sim}{\eta}_1)' - \underset{\sim}{\eta}_1\Sigma^{-1}(\underset{\sim}{X}-\underset{\sim}{\eta}_1) - \underset{\sim}{X}\Sigma^{-1}(\underset{\sim}{X}-\underset{\sim}{\eta}_2)' + \underset{\sim}{\eta}_2\Sigma-1(\underset{\sim}{X}-\underset{\sim}{\eta}_2)'$$

$$= \underset{\sim}{X}\Sigma^{-1}\underset{\sim}{X}' - \underset{\sim}{X}\Sigma^{-1}\underset{\sim}{\eta}_1' - \underset{\sim}{\eta}_1\Sigma^{-1}\underset{\sim}{X}' + \underset{\sim}{\eta}\,\Sigma^{-1}\underset{\sim}{\eta}_1'$$

$$- \underset{\sim}{X}\Sigma^{-1}\underset{\sim}{X}' + \underset{\sim}{X}\Sigma\underset{\sim}{\eta}_2' + \underset{\sim}{\eta}_2\Sigma^{-1}\underset{\sim}{X} + \underset{\sim}{\eta}_2\Sigma^{-1}\underset{\sim}{\eta}_2'$$

Eliminating the first and fifth terms and noting that

$\underset{\sim}{\eta}_1\Sigma^{-1}\underset{\sim}{X}' = \underset{\sim}{X}\Sigma^{-1}\underset{\sim}{\eta}_1'$ this reduced to

$$-2\ \underset{\sim}{X}\Sigma^{-1}(\underset{\sim}{\eta}_1 - \underset{\sim}{\eta}_2) + \underset{\sim}{\eta}_1\Sigma^{-1}\underset{\sim}{\eta}_1 - \underset{\sim}{\eta}_2\Sigma^{-1}\underset{\sim}{\eta}2'$$

If $\underset{\sim}{\eta}_2$ is added to the last two terms and $\underset{\sim}{\eta}_2'$ subtracted, we obtain

$$-2\ \underset{\sim}{X}\Sigma^{-1}(\underset{\sim}{\eta}_1 - \underset{\sim}{\eta}_2)' + (\underset{\sim}{\eta}_1 + \underset{\sim}{\eta}_2)\Sigma^{-1}(\underset{\sim}{\eta}_1 - \underset{\sim}{\eta}_2)'$$

Finally multiplication by $-\frac{1}{2}$ gives the main part of the result above.

As an alternative to asking whether the natural logarithm of the probability ratio, given by its right hand side, is greater than zero, we may test whether

$$\underset{\sim}{X}\Sigma^{-1}(\underset{\sim}{\eta}_1 - \underset{\sim}{\eta}_2)' + \log_e\left[\frac{P(G_1)}{P(G_2)}\right] > \tfrac{1}{2}(\underset{\sim}{\eta}_1 + \underset{\sim}{\eta}_2)\Sigma^{-1}(\eta_1 - \underset{\sim}{\eta}_2)'$$

where $\Sigma^{-1}(\eta_1 - \eta_2)'$ is the co-efficient vector for the two group discriminant function defined by Fisher (1936) in his pioneering work in this field.

The final alternative, which has been generalised to the multi-group situation by Fisher (1938), Rao (1948) and Rao and Slater (1949), is to determine whether

$$\underset{\sim}{X}\Sigma^{-1}\underset{\sim}{\eta}_1' - \tfrac{1}{2}\underset{\sim}{\eta}_1\Sigma^{-1}\underset{\sim}{\eta}_1' + \log_e P(G_1) >$$

$$\underset{\sim}{X}\Sigma^{-1}\underset{\sim}{\eta}_2' - \tfrac{1}{2}\underset{\sim}{\eta}_2\Sigma^{-1}\underset{\sim}{\eta}_2' + \log_e P(G_2)$$

in which case the observation is assigned to Group 1.

In general, one has as many *classification functions* of the form

$$s_g = \underset{\sim}{X}\,\underset{\sim}{w}_g - c_g$$

$$\text{where } \underset{\sim}{w}_g = \Sigma^{-1}\underset{\sim}{\eta}_g'$$

$$\text{and } c_g = \tfrac{1}{2}\underset{\sim}{\eta}_g\Sigma^{-1}\underset{\sim}{\eta}_g' + \log_e P(G_g)$$

as there are groups. The value of s_g is computed for each function and the group producing the highest score is the one to which the observation is assigned. The probability of group membership may then be obtained from

$$P(G_g/\underset{\sim}{X}) = \frac{e^{-\frac{1}{2}(\underset{\sim}{X}-\underset{\sim}{\eta}_g)'\Sigma^{-1}(\underset{\sim}{X}-\underset{\sim}{\eta}_g)} \times P(G_g)}{\sum_{j=1}^{m} e^{-\frac{1}{2}(\underset{\sim}{X}-\underset{\sim}{\eta}_j)'\Sigma^{-1}(\underset{\sim}{X}-\underset{\sim}{\eta}_j)} \times P(G_j)} \quad j=1, 2 \ldots g \ldots m$$

from which $P(\underset{\sim}{X}/G_g)$ for the maximum $P(G_g/\underset{\sim}{X})$ may be extracted.

A number of issues are raised by the assignment rules defined above. Although the use of unequal prior probabilities appears justified when, for instance, it is known that the sizes of the group populations are very different, it may sometimes be undesirable to follow this course. Suppose that the information contained in the likelihood is very limited; that is to say, the vector of variable values has little predictive power in terms of indicating group membership. A set of powerful prior probabilities in these circumstances can lead to apparently successful classification of observations (on posterior probabilistic grounds) and the illusion of predictive validity. Thus, when the object of research is to display the predictive validity of the measurement system, prior probabilities may be misleading.

At a more pragmatic level, the computation of probabilities or classification scores when a large number of variables, groups and observations are involved, will involve a considerable drain on the most robust research budgets. Although one can do little about the number of groups or the number of observations to be assigned to these groups, there are two strategies which may be employed, singly or in combination, to significantly reduce the variable space dimensions of the data.

Not all hypothesised discriminating variables will possess the discriminating power originally envisaged. As a first step, one-way analysis of variance tests will show whether variables individually have significantly different values between the groups. Inevitably, such tests are of limited value in that they cannot reveal interaction effects between apparently non-significant variables and will not indicate when two or more individually highly significant variables contain exactly the same discriminating information in relationship to group membership. A step-wise multivariate analysis of variance (MANOVA) is clearly the answer to such problems, although like its univariate counterpart it is subject to the restrictive assumptions of normality in the distributions, homoscedastic dispersion matrices and random sampling from the populations under study. Nevertheless, in providing guidelines about the most useful variables for successful discrimination between groups, stepwise MANOVA can frequently reduce the original variable set by up to fifty per cent.

The process begins by choosing that variable which singly has the highest value of the multivariate F ratio in tests of the differences among group centroids. This initial variable is then paired with each of the other potential discriminating variables one at a time and the multivariate F ratios are computed. The new variable, which in conjunction with the initial variable produces the best F value, is chosen as the second best discriminator. The procedure is then repeated until all variables are selected or no new variable produces a partial multivariate F ratio which is significant at a user specified level. It should be pointed out that not all possible variable subsets are considered using this stepwise procedure, so that the results are not fully optimal. Nevertheless, it is an efficient way of approximately locating the best set of discriminating variables.

Of even more importance from a theoretical standpoint is the possibility of reducing the p-variable test space to a m - 1 discriminant function space ($p \geqslant m - 1$). Discriminant functions, like the classification functions, are weighted linear combinations of the p-discriminating variables but constructed so that the groups are forced to be as statistically distinct as possible with observations in groups occupying different positions on the orthogonal dimension(s) defined by the linear equation(s) formed.

The maximum number of functions which may be derived is either one less than the number of groups or equal to the number of discriminating variables, if there are more groups than variables. It should be stressed that where there are more than two groups it may be possible to obtain satisfactory discrimination with fewer than the maximum number of functions. While as a general rule in geometry we may say that k points define (k-1) dimensions, there are the degenerate cases of, for example, three points lying on the same line. The last point is situated such that it does not add a new dimension and merely falls into a space defined by the other points. The identical principle applies to discriminant analysis where the centroids (when $X_{i1} = \bar{X}_1$, $X_{i2} = \bar{X}_2$, $X_{i3} = \bar{X}_3$, etc) of the groups are treated as points and each discriminant function is a unique (orthogonal) dimension describing the location of that group relative to the others. Thus three groups may be quite adequately described by one function if the centroids of those groups lie in the main along the same dimensions, D_1 (See Figure 2.I). Admittedly this one function would not pick up all of the information in the discriminating variables. However, the second potential function D_2 would probably be deemed to be non-statistically significant. It would be ignored on the grounds that its presence merely resulted from sampling and measurement error and that it did not actually exist as a separate dimension in the population.

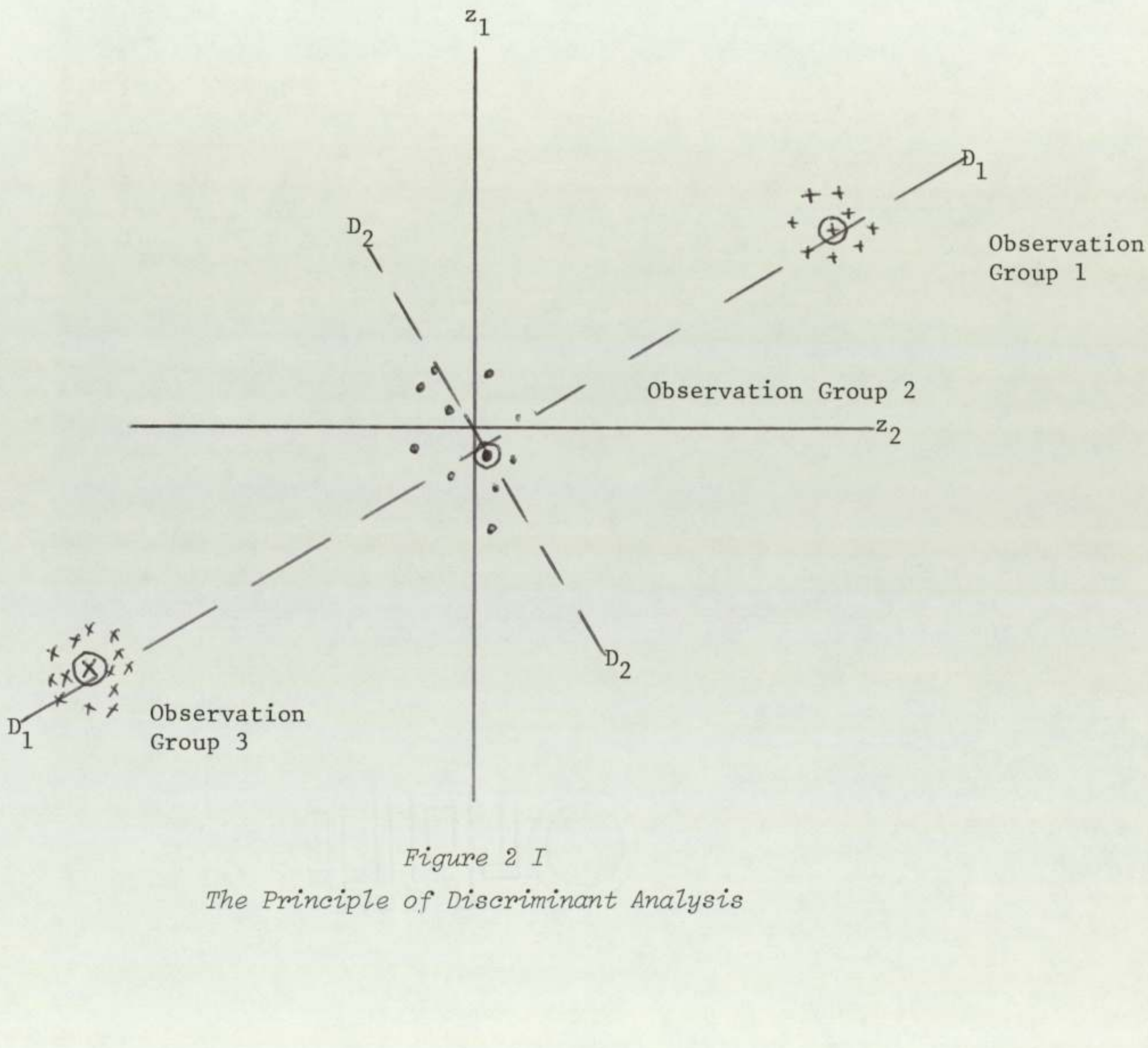

Figure 2 I
The Principle of Discriminant Analysis

A discriminant function is of the form

$$D_{gi} = v_{g1}x_{i1} + v_{g2}x_{i2} + v_{g2}x_{i3} + \; ..... \; v_{gp}x_{ip}$$

where D_g is the discriminant function score for the ith observation on the gth function, $v_{g1}...v_{gp}$ are weights and x_{ij} is as usual the deviation of the ith individual's value round the mean of the jth variable.

In matrix terms the scores for all individuals are given by the vector $\underset{\sim}{d}$

$$\underset{\sim}{d} = X\underset{\sim}{v}$$

where X is an n x p matrix of variate values and $\underset{\sim}{v}$ is a column vector of weights. Consider n observations divided among m groups. With respect to the original variables the pooled within group deviation cross product matrix and between group deviation cross product matrix are as usual designated W and B. The sum of squares between and within groups for the discriminant score vector, $\underset{\sim}{d}$, are respectively

$$\underset{\sim}{v}' B \underset{\sim}{v} \quad \text{and} \quad \underset{\sim}{v}' W \underset{\sim}{v}$$

Now $$\lambda = \underset{\sim}{v}' B \underset{\sim}{v} / \underset{\sim}{v}' W \underset{\sim}{v}$$

if multiplied by $(n-m)/(m-1)$ is an F ratio for a one-way analysis of variance for the discriminant scores, $\underset{\sim}{d}$, in the m groups. Thus if $\underset{\sim}{v}$ is such that λ is at a maximum, then the differences between the group means, with respect of the discriminant score variable will be maximised.

To maximise λ the partial derivative

$$\frac{\delta\lambda}{\delta \underset{\sim}{v}'} = 0$$

which gives $B \underset{\sim}{v} = \lambda W \underset{\sim}{v}$

or $\left[B - \lambda W\right] \underset{\sim}{v} = 0$

or $\left[W^{-1}B - \lambda I\right] \underset{\sim}{v} = 0$

It is clear that λ is a latent root of $W^{-1}B$ and $\underset{\sim}{v}$ is the corresponding latent vector.

As long as the variates are linearly independent and $(n - m) > p$, the matrix W will be of full rank, p, and will be non-singular. The matrix B of order p has a rank of p or $(m - 1)$ whichever is smaller since there are only $m - 1$ independent comparisons between group means Hence the rank of $W^{-1}B$ is also the smaller of p or $(m - 1)$ which confirms the observation made above concerning the number of discriminant functions which may be extracted. Additionally the latent roots of $W^{-1}B$ provide a means of testing for significant discriminant dimensions using tests by Bartlett (1941), Wilks (1932) and Rao (1952).

Wilks lambda criterion is computed as a function of the eigenvalues of $W^{-1}B$ as follows

$$\Lambda = \prod_{j=1}^{m-1} \frac{1}{1 + \lambda_j}$$

Bartlett's χ^2 test for the significance of discrimination afforded by the remaining $m - 1 - k$ functions after the acceptance of the first k, is then calculated as

$$\chi^2 = -\left(n - 1 - \frac{p+m-1}{2}\right) \log_e \Lambda'$$

where $$\Lambda' = \prod_{j=k+1}^{m-1} \frac{1}{1+\lambda_j}$$

with $(p - k)(m - k - 1)$ degrees of freedom.

The proportion of the total discriminating power of the variable set contained in the jth discriminant function may be taken to be

$$\frac{\lambda_j}{\sum_{j=1}^{m-1} \lambda_j}$$

while $\sqrt{\frac{\lambda_j}{1-\lambda_j}}$ may be seen as a canonical correlation co-efficient between the discriminant function and a set of binary variables coded to distinguish the groups. Multiple discriminant analysis is in fact a special case of canonical correlation and was discussed by Bartlett (1938) from this standpoint.

The apparent computational efficiency of employing m - 1 (or fewer) discriminant score variables in the assignment rules described earlier, rather than the p original variables, is illusionary when it is remembered that the total computation has involved the transformation from measured variables to functions and back to function scores prior to assignment. The main justifications for the use of discriminant function scores are that the underlying differences between the groups may be better understood through interpretation of the function co-efficient vectors and that, while original variables may not possess multivariate normality, discriminant functions, being linear combinations of these, are much more likely to conform to this distributional requirement. The further argument that random noise in the system is eliminated by the use of only the more important functions is perhaps less telling when discrimination has been preceded by a stepwise MANOVA phase to eliminate poor discriminating variables. The validity of employing discriminant function scores is indicated by the fact that an observation's position in the original variable space is identical to its position in the full discriminant space as long as the group dispersion matrices are equal.[1] It has been shown that linear discriminant functions only arise from the use of the W matrix of pooled within group deviation cross products which implies such homoscedasticity. Thus only if we assume near homogeneous group variance-covariance matrices is the movement to discriminant space justified. It is evident that the whole procedure through MANOVA, discriminant analysis and the use of discriminant scores in assignment rules, is wedded to the concept of equal group dispersion which accounts for the previously mentioned adherence to this assumption. If one departs from it, either the assignment must be based on original variates or we move into the realms of quadratic discriminant functions (Smith, 1946; Lubin, 1950; Maxwell, 1977) with their added computational complexities. In either case, multivariate normality can no longer be automatically claimed.

As a complete alternative to the methods of discrimination and assignment discussed above, Kendall (1966) and Richards (1972) describe a distribution free discriminant analysis which is essentially monothetic. In it there is no misclassification; rather it ends with some observations unclassified. Others have described attempts at non-parametric discrimination to overcome the restrictive assumptions of the classical model, including Leaverton (1971) and Zimmerman and Brown (1972), who find their method to perform reasonably well on non-normal data.

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1 Lohnes (1961) has conducted a Monte Carlo study of this question and suggests that moderate departures from homogeneity of dispersion do not affect the results greatly.

CHAPTER III

APPROACHES TO THE CLASSIFICATION OF AGRICULTURE

3.1 Developments in Agricultural Classification

Although statistical information on agriculture has been collected by many countries and international organisations for numerous years, it is only in the past decade that interest has been shown in the construction of an agricultural classification comparable with the classifications of industry which are widely available. Reports of agricultural censuses and surveys have been and still are largely presented in terms of simple one and two-way tabulations of investigated variables. Thus, while important global information is readily available on such aspects of agriculture as area cultivated by crop, crop output per acre (hectare) and labour and capital inputs, there is little or no data relating to distinctive groupings of agricultural holdings, representable by a classification, and based on their total production systems. Yet the need for such information is clear. If the structure of the agricultural industry is to be fully understood and a sounder forecasting basis for policy formulation and decision taking obtained, there must be a more systematic approach to the collection and dissemination of agricultural data.

In a European context the Common Agricultural Policy has highlighted the need for appropriate means of presenting the information collected in the very large-scale 1966/7 and 1976/7 E.E.C. Farm Structure Surveys. Over a period of ten years there has emerged from the officers of the European Commission a proposal for an *a priori* classification of agricultural holdings which has a principal activity basis. The "Group of Experts Farm Typology" (1977) is shown in detail in Appendix A and provides a breakdown of holdings according to their output value. In all, the Farm Typology produces 51 detailed classes (Steps 2 and 3 combined) which are merged into either 30 (Step 2) or finally 10 (Step 1) broader groupings as follows:

1. Field Crops (>2/3)
2. Horticulture (>2/3)
3. Permanent Crops (exc. Vineyards) (>2/3)
4. Vineyards (>2/3)
5. Grazing Livestock (exc. Dairy Cows) (>2/3)
6. Dairy Cows (>2/3)
7. Pigs and Poultry (>2/3)
8. Field Crops and Grazing Livestock (both between 1/3 and 2/3)
9. Grazing Livestock II (between 1/3 and 2/3) and others (≤1/3)
10. Others.

While there exists clear evidence that in some cases these 'classes' will represent distinctive production types with holdings having similar technologies and character (eg horticulture), there will be others where farm to farm differences with respect to a range of variables are much more noticeable than the common denominator of principal activity. For instance, the members of Class 6 will vary from highly efficient, fully automated and large dairy herd operations, to tiny peasant holdings with one hand-milked cow, a small subsistence plot and a holder whose main employment may not be in agriculture at all. Additionally, the *a priori* basis of the classification inevitably means that some of the groups will be very large in size with others having a very small and potentially insignificant membership. There may also be the difficulty that the creation of classes for political reasons will not have produced technologically distinctive groups of holdings. The separation of Vineyards from other Permanent Crops is a case in point.

Although subject to these criticisms, it seems likely that the Farm Typology will be adopted by the Statistical Office of the European Communities[1], if for no other reason, because of the simple 2/3 and 1/3 "threshhold" rules for assigning holdings to classes. Nevertheless, concurrently with the discussions leading to this *a priori* scheme, there have been several attempts to examine a data based polythetic approach to the problem. Schäffer (1972) discusses a classification of 100 Belgian agricultural holdings using a clustering method proposed by MacQueen (1967) and refined and programmed by Kammerer (1969). Among Schäffer's conclusions are, that the clustering produced is strongly influenced by the choice of variables, and particularly by the inclusion of binary variables, that 7-8 "genuine" (large in size) and numerous "non-genuine" (small in size) classes were formed, and that much larger samples are needed to assist in the determination of the number of genuine classes. Lenco (1974) reports a much more extensive investigation based on 6000 French agricultural holdings which was later applied to a larger sample of 20,000 holdings. Although not clear from the report of this research, it appears that the classification was mainly based on an examination of the eigenvalues, eigenvectors, and principal component scores of the correlation matrix, from which decisions were taken about the variables most distinguishing farm from farm and the methods of partitioning these to form initial classes. Ultimately, two alternative schemes are presented, one based on the types and amount of labour used by holdings and the other on the principal crops and livestock produced. Although the principle of iterative reallocation of observations to class centres is mentioned, the detailed clustering procedure, if used, is not discussed; nor is the claim for stability justified when the analysis was extended to 20,000 holdings.

1 The final version of the Farm Typology and a simple Holding Size Classification were ratified by the Commission on 7 April 1978, (Official Journal of the E.E.C., Vol. 21, No.L148, 5 June 1978).

The only Europe-wide study of the problem of agricultural classification (Rainelli and Kerbaol, 1975) is based not on farm units but administrative regions in the six founder-member nations of the E.E.C. Both agricultural and economic variables relating to these regions were used in a series of orthogonal factor analyses which were subjectively interpreted to form regional classes. However, these effectively distinguish only Italy from France, from the Benelux countries and Germany, which confirms broad but fairly predictable differences in prevailing agricultural, climatic, economic and social conditions.

It is clear that none of these studies is geographically general enough nor sufficiently established or tested to provide a serious alternative to the Farm Typology. None have been tested for reproducibility and stability and nowhere have rules for the allocation of non-sampled holdings been defined. Equally, no comparisons of the data based with the *a priori* method have been undertaken, in order to examine the relative efficiency of the two approaches. That there is scope for further investigation into the viability of a data based polythetic classification is apparent. The basis for such an investigation is outlined below and developed in the following chapters.

3.2 The Research Design for Classifying Agricultural Holdings

The development of the final proposed classification of European agricultural holdings involved three distinct phases. Experimentally, three multivariate procedures were applied to a small sample of 500 holdings drawn systematically from the 1966/7 E.E.C. Farm Structure Survey. These were aimed at investigating and reducing the dimensionality of a data matrix having over fifty holding characteristics, exploring various numerical taxonomies of observations on the basis of the reduced dimensions and finally determining assignment rules for observations not previously classified and based on the original variable set.

Once acceptable results had been obtained, in statistical, agricultural and comparative terms, the same methods were applied to two further independent samples of the same size to test the reproducibility and predictability of the results. Specifically, the classes to which observations in the second and third samples would be assigned, based upon the assignment rules developed from the first sample, were compared with the independently-determined and cluster analysis based class memberships of these observations. Having evaluated this inter-sample predictability and thus ascertained the stability of the classification, the final scheme was obtained from a fourth independent sample of some 2000 holdings.

Throughout, comparisons have been made between the proposed multivariate classification and a standard principal activity classification based on the Farm Typology. To this end, the proportion of the variance in the data explained by the classification has been calculated in each case. (i.e. trace (B) as a percentage of trace (T)).

3.3 Data and Sample Designs

The data base (population) for this study was provided by the Statistical Office of the European Communities and consisted of information on 132 variables for 22026 farm holdings in Belgium, France, Germany, Holland, Italy and Luxembourg. The magnetic data tape had been compiled by S.O.E.C. from the returns of these countries to the 1966 E.E.C. Farm Structure Survey originally for the purpose of testing the programming of proposed survey tabulations. Because some countries had provided full census information while others only samples of various sizes, and in order to have a reasonably sized sample of holdings from each member nation, the data tape was constructed by systematically sampling national returns using the following sample fractions:

Country	Sampling Fraction	Sample Size
Belgium	1/10	3355
France	1/100	4277
Germany	1/100	4482
Holland	1/10	2705
Italy	1/100	5225
Luxembourg	1/1	1982
		22026

For each holding, the information available comprised binary, manifold classificatory, ranked and quantitative variables on holding location, the holder and manager, land uses, livestock, machinery employed, labour by type, quantity and age, the size of the holding, and other general holding and management characteristics. It was decided at the outset to reduce and redefine the number of variables to be included in subsequent analyses. There were three reasons for the decision. Firstly, information on geographical location (country, region and district) was omitted because it was felt that any classification scheme devised should be based on agricultural, holding and holder practices rather than be influenced or even dominated by the historical accident of political boundaries. Secondly, by combining certain available variables into relevant "activity" group characteristics, there would be significant reductions in computer time requirements. Thirdly, a high proportion of available variables were correlates of the size of the holding so that it was deemed appropriate to 'standardise' these by a measure of size, such as total holding area or the area of used agricultural land. Size measures could then be separately represented and thus appropriately weighted in the classification. The resultant holding characteristics are shown below (Table 3.1) and are defined in detail in Appendix B which also lists the original variables available in the 1966/67 Farm Structure Survey.

It should be stressed that the rationale for the formation of this set of 53 operational variables was that a reasonable balance between main variable groupings should be produced and one which reflected the range and proportion of information originally collected. Equally, these variables were constructed as far as possible to conform to definitions proposed for the Farm Typology and were agreed to be appropriate after discussions with staff of the Agricultural Division of S.O.E.C.

Inevitably, the classification scheme produced, using the final variable set, assumes that the correct weighting of holding characteristics has been used. The ultimate test of the validity of this assumption must rest upon the user who will know the purposes of the classification and therefore the appropriate balance of weights.

On quite arbitrary, but pragmatic, grounds, it was decided that three samples of approximately 500 holdings should be drawn from the population for experimental purposes. It was felt that this sample size was such that representative cross-sections of European holdings would be obtained and that the burden of computer analysis would not be unreasonable. Inspection of the population data tape showed holdings to be in Country, Region, District and Size order. Consequently, two of the samples were selected systematically from a random start, sampling each 44th holding. Given the structure of the sampling frame, this quasi-random sampling scheme would achieve the effect of a standard stratification by holding location and size. In the event, random

Table 3.1

Operational Variables

S01	Total Holding Area (in ares)	
S02	Area of Used Agricultural Land (in ares)	
S03	Total "Standard" Livestock[1] (number)	
S04	Total Labour Input (Annual Work Units[2])	
S05	Total Number of Machinery Accesses[3]	
L01	Cereal	Land used for these purposes as % of S02
L02	Rootcrops	
L03	Industrial Plants	
L04	Horticulture	
L05	Other Arable	
L06	Fallow	
L07	Subsistence	
L08	Pasture	
L09	Vineyards	
L10	Other Permanent Crops	
L11	Unused Agricultural Land as % of S02 + Unused Agricultural Land	
L12	Woodland and Other land as % of S01	
L13	Whether Successive and Intermediate Crops Grown (1=Yes, 0=No)	
L14	Whether Permanent and Associated Crops Grown (1=Yes, 0=No)	

1 See Appendix B for conversion codes from head of livestock to 'standard' animals.

2 See Appendix B for the calculation of Annual Work Units.

3 From ownership, sharing or hiring.

A01	Horses	"Standard" livestock as % of S03
A02	Dairy Cows	
A03	Other Cattle	
A04	Sheep and Goats	
A05	Pigs	
A06	Poultry	
A07	"Standard" livestock per hectare of S01	
W01	Annual Work Units per 10 hectares of S01	
W02	Family A.W.U.'s as % of S04	
W03	Regular Workers under 25 years old	As % of total number of regular (non-casual) workers
W04	Regular Workers between 25 and 35 years old	
W05	Regular Workers between 35 and 45 years old	
W06	Regular Workers between 45 and 65 years old	
W07	Regular Workers 65 years old and over.	
M01	Whether 1 or more tractors owned	(1=Yes, 0=No)
M02	Whether 1 or more cultivators owned	
M03	Whether 1 or more harvesters owned	
M04	Whether 1 or more machines shared or hired	
M05	Whether 1 or more milking machines owned	
M06	Area of Greenhouses as % of S02	
M07	Whether draft animals used (1=Yes, 0=No)	
M08	Machines Access (S05) per 10 hectares of S01.	

H01	Whether the holding has a holder-manager (1=Yes, 0=No)
H02	Manager's Education (1=None, 2=Primary, 3=Secondary, 4=Higher)
H03	Whether Owner Male (1=Yes, 0=No)
H04	Whether Owner Female (1=Yes, 0=No)
H05	Holder's Age (in years)[1]
H06	Whether holder has other non-agricultural gainful employment (1=Yes, 0=No)
G01	Owned Agricultural Land } As % of S02
G02	Rented Agricultural Land } As % of S02
G03	Share Cropped Agricultural Land } As % of S02
G04	Whether Accounts Kept (1=Yes, 0=No)
G05	Co-operative Memberships (Number)
G06	Contracted Crops (Number)

1 Where there is corporate ownership or joint ownership, a default value of 52 years has been used.

starts from the 6th and 30th holdings were made which produced samples of 501 and 500 holdingsrespectively.

The third experimental sample was drawn using simple random sampling without replacement to provide a truly independent replicate of the first two. In addition, it was intended as a check of the superiority (or otherwise) of the implicit stratification in the first two samples.

A 10% sample of holdings was employed in the final classification analyses, and for this, systematic selection was again used from the 4th holding, giving a fourth sample of 2202 holdings in all.

From initial analyses of the data obtained from these samples, it became clear that there were holdings with either no recorded land of any kind, no used agricultural land or no labour inputs. While it may be that these were very small[1], it was decided to eliminate them from the analyses on the grounds that either measurement errors existed or that they were no longer agricultural holdings in any meaningful sense. Their inclusion would have clearly created difficulties over size standardisation of variables, and in any event, would probably have been reflected in the formation of at least one separate class.

Early experimental principal component and cluster analyses highlighted the further problem of 'outliers' in each of the samples. Such outliers were found to be extreme observations with respect to one or more of the operational variables and as such were so 'distant' from other holdings that they consistently formed cluster analysis-based classes of 1, or at most 2, holdings. Their removal frequently reduced variances by fifty percent or more and was justified in terms of their uniqueness as farm types. While such holdings could be classified,

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1 Areas of under 50 square metres are for most purposes declared as zero.

albeit poorly, when the classification scheme has been developed, it was felt inappropriate to allow them to influence and maybe distort the scheme itself.

After the exclusion of spurious and extreme outlier observations, the following usable samples of data were obtained for analysis. Partial comparison with the population shows no major discrepancies.

	Original Size	Spurious Observations		Outlier Observations		Final Size	
	Number	Number	%	Number	%	Number	% of Original Size
Systematic Sample A	501	13	2.6	1	0.2	487	97.2
Systematic Sample B	500	7	1.4	7	1.4	486	97.2
Random Sample C	500	8	1.6	2	0.4	490	98.0
Systematic Sample D	2,202	31	1.4	10	0.5	2,161	98.1
Population	22,026	283	1.3	Not tested		21,743	98.7

In Table 3.2, the means, standard deviations, minimum and maximum values of the 53 operational variables are shown. The effect of outlier exclusions in bringing the four samples into startling similarity is apparent. In no cases are there statistically significant differences in means, and only rarely in variances.

3.4 Methodology and Algorithms

Computer analysis in the research was undertaken both at the University of Aston on an I.C.L. 1904S computer, and at the University of Manchester on their CDC 7600 machine. While the majority of the programs were specifically written and developed in *Fortran* for the research project, use was also made of the I.C.L. Statistical Package (1971) for principal component transformation of the data, and of the Statistical Package for Social Sciences (SPSS) for linear discriminant analysis (Nie *et al*, 1975).

The selection of samples, elimination of spurious observations and transformation of the original data to operational variables was completed simultaneously using the programs, SYSTSAM and RANSAM, which are produced with the other programs in Appendix C. These also assigned to observations classification codes for an *a priori* classification scheme based upon, but not identical to, the Farm Typology. As holding output-value data was unavailable, the *a priori* classification employed for comparative purposes in the research rested on relative land uses and the proportion of standard livestock reared during the survey year.

Seventeen classes were distinguished (Table 3.3), many of which are analogous to those found in Steps 1 and 2 of the Farm Typology. The principle for classifying a holding was that the first of the set of criteria to be satisfied, moving from low to high numbered classes, determined class membership.

Having created EDS files holding the sample data, these were eventually edited to remove outliers and summary characteristics, including a country of origin distribution, were computed for each class of holdings using program STANMEAN. This program also computed the 'explanatory power' of the *a priori* classification as the percentage ratio of between:total sum of squares of standardised variables, namely

$$\frac{\sum_{k=1}^{m} n_k \sum_{j=1}^{p} z_{jk}}{\sum_{j=1}^{p} \sum_{i=1}^{n} z^2_{ij}} \qquad \text{where } m = \text{no. of classes}, \quad n = \Sigma n_k$$

Although not strictly comparable with the samples, a standard classification summary was also obtained for the total population using POPPROG.

The Aston macro UASTATSXDS3 enabled a full set of eigenvalues, latent vectors and principal component scores to be obtained before or

Table 3.3

A Priori Land Use (%) and Standard Livestock (%) Classes

Class	Description
I	Cereal > 66.7% of Used Agricultural Land (UAL)
II	Cereal and Root Crops both > 33.3% of UAL
III	Field Crops > 66.7% of UAL (but excluding Class I and II)
IV	Horticulture > 66.7% of UAL
V	Vineyards > 66.7% of UAL
VI	Permanent Crops > 66.7% of UAL (but excluding Class V)
VII	Permanent Pasture > 66.7% of UAL and Dairy Cows > 66.7% of Total Standard Livestock (TSL)
VIII	Permanent Pasture > 66.7% of UAL and Grazing Livestock > 66.7% of TSL (but excluding Class VII)
IX	Pigs and Poultry > 66.7% of TSL
X	Field Crops and Permanent Pasture > 33.3% of UAL and Grazing Livestock > 33.3% of TSL
XI	Permanent Pasture > 33.3% of UAL and Pigs and Poultry and Grazing Livestock > 33.3% of TSL
XII	Field Crops > 33.3% of UAL and Pigs and Poultry > 33.3% of TSL (but excluding Classes I, II, III and IX)
XIII	Field Crops and Permanent Crops > 33.3% of UAL (but excluding Classes I, II, III and VIII)
XIV	Field Crops and Horticulture > 33.3% of UAL
XV	Field Crops > 33.3% of UAL
XVI	Grazing Livestock > 33.3% of TSL
XVII	Others

after variable standardisation. The output from such runs was held on EDS files and edited using the I.C.L. MOP facilities together with program PRINSORT to produce principal component score input data for program CLUSTPROG. The original form of this cluster analysis algorithm was written by P. A. Golder at the University of Aston in 1971/2 to handle small amounts of data before principal component transformation. It was modified and developed to the present form in consultation with the author to enable the various proposed experiments to be undertaken starting from principal component scores.

Essentially, the method is based on the procedure suggested by Beale (1969) and is an optimisation technique using the ordinary Euclidean metric which seeks to minimise tr(W). The cluster seeding is implemented by a subdivision of observations into a user determined number of groups based on ranked first component scores. Thereafter, the rule for forming clusters is based on the local minimisation of within cluster variances and the maximation of between cluster variances. At each round in the analysis each observation, i, is examined in turn and is allocated to that cluster k for which

$$\sum_{j=1}^{p} (X_{ij} - \bar{X}_{jk})^2$$

is a minimum. Here X_{ij} is the jth variable for the ith observation and $\bar{X}_{jk}$ is the mean of the jth variable in the kth cluster after the inclusion of the ith observation. The procedure continues until no observation is moved to a new cluster in a round or until a user pre-set maximum number of iterations has been reached. Having formed k clusters, the rule for determining k-1 clusters involves finding two (of the k) clusters already formed which, when combined, produce the least increase in the pooled within group variance. The merging of these is followed by a repetition of the iterative reallocation of observations based on the cluster criterion. Because of expected initial instability, the seeding starts at a number of clusters higher than the expected optimum, and the number of iterations allowed is doubled at the k_{max} and k_{max-1} steps compared with later stages in the analysis.

Several other variants on the basic method are possible with the algorithm in its current form; the results of some of these are reported in the next chapter. As an alternative to the subdivision of principal component scores, the initial cluster configuration may be provided by the user as an input list showing the cluster membership code of each observation. Thus the clustering might be started using the *a priori* class codes or might be based on the results from a simpler monothetic hierarchical method of clustering.

Unstandardised, standardised, or user weighted principal component scores may be employed in the analysis by the setting of an input parameter. In the last case, weights are required as an input list and the data is transformed using these. One important form of weighting, which is facilitated in a different manner, is the exclusion of higher numbered components scores from the procedure.

Finally, the range of k, the number of clusters, for which detailed output is to be produced, may be set by the user. The detailed output gives information on each cluster membership, the distance of each observation from its cluster centre, a summary of cluster mean values with respect to the variables employed in the analysis, and an ANOVA-type table of trace(W), trace (B) and trace(T) in absolute and percentage terms. Outside the range of k, for which such detailed output is requested, only the ANOVA table is given, together with information on the number of iterations employed at that stage in the analysis.

Whichever set of options is selected, the results of the test by Beale discussed in Chapter II are produced on the termination of the clustering (i.e. when a single cluster of all observations has been formed).

In order to obtain information on the cluster characteristics in relation to operational variables, rather than their principal component transforms, program CLUSMEAN was written. It takes output produced by CLUSTPROG on cluster membership at each stage in the agglomeration from k_{max} to 1 cluster, and uses this to produce results identical in principal to those from STANMEAN. Thus decisions may be taken on the 'best' group of clusters from which to form the classification using both a statistical criterion based on the Beale test and substantive agricultural evidence about cluster characteristics.

CLUSMEAN also creates a new data file for each sample which shows in addition to the operational variables and the *a priori* classification code, the cluster group membership of each observation at each stage in cluster analysis. From this, SPSS analyses may be set up to examine the nature of the merging of clusters and to produce discriminant analysis assignment rules for new observations. SPSS was chosen for this second purpose because it has considerable flexibility in allowing a step-wise build-up of discriminating variables and the fixing of the maximum percentage trace of $W^{-1}B$. In addition, observations do not have to be in group (class) order and prior probabilities of group membership may be set. Lastly, the SPSS Version 6 available at Manchester, allows observations which are not used in forming the discriminant rules to be assigned automatically. In consequence, the best group of clusters in terms of internal (within sample) and external (between sample) assignment success may be found and discriminant rules of increasing complexity evaluated.

As an alternative to classical linear discriminant analysis, program KENDIS was written to the author's specification by Mrs V Perks of the University of Aston. KENDIS is a multi-group generalisation of the procedure suggested by Kendall (1966) and allows for binary and categorical data as well as quantitative variables. In its most restricted form, this distribution-free method performed very poorly on the peculiarly heterogeneous agricultural data to hand. Although not completed at this time, less restrictive re-specification of the Kendall procedure has taken place and looks more encouraging.

The final program written for the research was BARTTEST. This was employed in initial tests of the eigenvalues of the correlation matrix derived from operational variables. As it consistently showed significant components through to the penultimate one or two, it was deemed to be of little help in decisions about the dimensionality of the data.

Table 3.2 Summary Statistics-Operational Variables

MEANS, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF VARIABLES USED IN ANALYSIS

(Second set of figures show effect of outlier removal)

Label	Variable	Statistic	Systematic A		Systematic B		Random C		Systematic D		Population
	Total Holding Area	$\bar{X}$	1,753	1,754	2,117	1,852	2,266	2,051	1,795	1,757	2,015
S01	(in Ares)	S	2,581	2,583	5,137	2,586	5,773	3,119	2,699	2,398	7,427
		Min	5	5	7	7	4	4	5	7	2
		Max	23,300	23,300	85,700	30,520	110,000	24,920	51,800	27,500	751,300
	Used Agricultural Land	$\bar{X}$	1,550	1,551	1,910	1,666	1,918	1,756	1,580	1,552	1,695
S02	(in Ares)	S	2,356	2,358	4,872	2,399	4,511	2,642	2,253	2,074	4,397
		Min	1	1	1	1	2	2	3	3	1
		Max	23,260	23,260	85,700	28,370	83,000	23,800	31,700	19,710	413,100
	Total "Standard"	$\bar{X}$	15.8	14.8	20.9	16.9	15.8	15.9	17.1	15.8	18.9
S03	Livestock (number)	S	32.4	23.0	59.9	24.4	24.7	24.8	50.9	23.4	96.6
		Min	0	0	0	0	0	0	0	0	0
		Max	518.6	256.9	898.7	323.1	261.0	261.0	2,054.0	341.0	10,960.0
	Total Labour Input	$\bar{X}$	1.83	1.83	2.09	1.92	1.96	1.96	1.92	1.91	1.96
S04	(A.W.U.'s)	S	1.24	1.24	4.13	1.53	1.86	1.86	1.59	1.49	2.16
		Min	0.07	0.07	0.02	0.04	0.07	0.07	0.07	0.07	0.01
		Max	9.73	9.73	87.23	18.27	20.3	20.3	23.55	21.00	134.6
	SAMPLE SIZE		488	487	493	486	492	490	2,171	2,161	21,743

MEANS, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF VARIABLES USED IN ANALYSIS

(Second set of figures show effect of outlier removal)

Label	Variable	Statistic	Systematic A		Systematic B		Random C		Systematic D		Population
	No. of Total Machine	$\bar{X}$	2.43	2.44	2.56	2.54	1.96	2.60	2.55	2.55	2.58
S05	Accesses (through	S	1.86	1.87	2.18	1.93	1.86	2.02	1.98	1.96	2.07
	ownership, sharing or	Min	0	0	0	0	0.07	0	0	0	0
	from agencies)	Max	10.0	10.0	25.0	10.0	46.0	13.00	15.0	15.0	54.0
L01	Cereal area as	$\bar{X}$	26.1	26.1	24.6	24.9	26.0	26.1	25.1	25.2	25.6
	% of S02	S	23.3	23.3	22.7	22.7	23.9	23.9	23.1	23.1	23.6
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
L02	Root Crops area as	$\bar{X}$	7.8	7.8	7.1	7.2	6.9	6.9	7.5	7.5	7.3
	% of S02	S	12.2	12.2	10.4	10.5	11.2	11.2	11.1	11.1	11.2
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	69.2	69.2	80.8	80.8	98.8	98.8	100
L03	Industrial Plants area	$\bar{X}$	0.4	0.4	0.5	0.6	0.6	0.6	0.8	0.8	0.6
	as % of S02	S	2.4	2.4	2.8	2.8	3.0	2.98	5.2	5.2	3.5
		Min	0	0	0	0	0	0	0	0	0
		Max	28.7	28.7	37.5	37.5	36.8	36.8	91.3	91.3	100
	SAMPLE SIZE		488	487	493	486	492	490	2,171	2,161	21,743

MEANS, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF VARIABLES USED IN ANALYSIS

(Second set of figures show effect of outlier removal)

Label	Variable	Statistic	Systematic A		Systematic B		Random C		Systematic D		Population
L04	Horticulture area as % of SO2	$\bar{X}$	2.5	2.5	2.5	2.5	4.1	4.0	3.1	3.0	3.3
		S	13.3	13.3	13.3	13.3	17.5	17.5	15.5	15.2	15.7
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
L05	Other Arable Crops as % of SO2	$\bar{X}$	9.3	9.4	10.3	10.3	10.4	10.5	10.2	10.2	9.6
		S	15.9	15.9	16.7	16.7	17.0	17.0	17.0	17.0	16.2
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
L06	Fallow Land area as % of SO2	$\bar{X}$	1.1	1.1	1.7	1.5	1.4	1.4	1.3	1.3	1.2
		S	5.4	5.4	9.0	8.2	7.7	7.8	6.8	6.8	6.1
		Min	0	0	0	0	0	0	0	0	0
		Max	58.2	58.2	100	100	85.9	85.9	96.0	96.0	100
L07	Subsistence Crops area as % of SO2	$\bar{X}$	1.3	1.3	1.7	1.3	1.5	1.5	1.3	1.2	1.5
		S	6.8	6.8	9.6	7.3	8.1	8.1	6.9	6.9	8.2
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
	SAMPLE SIZE		488	487	493	486	492	490	2,171	2,161	21,743

MEANS, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF VARIABLES USED IN ANALYSIS

(Second set of figures show effect of outlier removal)

Label	Variable	Statistic	Systematic A		Systematic B		Random C		Systematic D		Population
L08	Pasture Land area as	$\bar{X}$	39.5	39.4	41.4	41.7	37.5	37.5	39.9	39.9	40.1
	% of S02	S	34.3	34.2	35.6	35.4	35.3	35.2	35.2	35.1	34.8
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
L09	Vineyards area as	$\bar{X}$	3.8	3.8	4.6	4.5	4.7	4.7	4.0	4.0	4.5
	% of S02	S	15.0	15.0	16.8	16.5	16.7	16.7	14.9	14.9	16.0
		Min	0	0	0	0	0	0	0	0	0
		Max	99.1	99.1	100	100	100	100	100	100	100
L10	Other Permanent Crops area	$\bar{X}$	8.2	8.3	5.5	5.4	6.9	6.8	6.9	6.9	6.2
	as % of S02	S	23.7	23.7	17.9	17.8	22.0	22.0	21.5	21.5	19.8
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
L11	Unused Agriculturual Land	$\bar{X}$	1.7	1.7	2.1	1.9	2.0	2.0	1.9	1.9	2.0
	as % of S02 + Unused	S	7.4	7.5	9.3	8.7	8.5	8.5	9.1	9.0	9.0
	Agricultural Land	Min	0	0	0	0	0	0	0	0	0
	(Marginal Land)	Max	80.0	80.0	79.9	79.9	83.9	83.9	93.6	93.6	99.6
	SAMPLE SIZE		488	487	493	486	492	490	2,171	2,161	21,743

MEANS, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF VARIABLES USED IN ANALYSIS

(Second set of figures show effect of outlier removal)

Label	Variable	Statistic	Systematic A		Systematic B		Random C		Systematic D		Population
L12	Woodland and Other Land	$\bar{X}$	9.7	9.6	9.7	9.5	10.1	10.0	8.9	8.9	9.5
	as % of SO1	S	14.4	14.3	14.8	14.3	16.8	16.8	13.7	13.7	14.6
		Min	0	0	0	0	0	0	0	0	0
		Max	86.7	86.7	96.8	96.8	96.9	96.9	95.5	95.5	99.7
L13	Whether Successive and	$\bar{X}$	11.1	11.1	12.0	11.9	11.6	11.6	11.5	11.4	11.1
	Intermediate Crops grown	S	31.4	31.4	32.5	32.4	32.0	32.1	31.9	31.8	31.4
	(1=Yes, 0=No)	Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
L14	Whether Permanent and	$\bar{X}$	20.7	20.7	24.1	23.4	21.5	21.6	23.0	23.0	22.8
	Associated Crops grown	S	40.5	40.5	42.8	42.9	41.1	41.2	42.1	42.1	41.9
	(1=Yes, 0=No)	Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
A01	Standard Horses as	$\bar{X}$	3.6	3.7	4.7	4.7	5.5	5.5	4.2	4.2	4.4
	% of SO3	S	13.3	13.3	16.6	16.7	18.8	18.9	15.4	15.5	15.8
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
	SAMPLE SIZE		488	487	493	486	492	496	2,171	2,161	21,743

MEANS, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF VARIABLES USED IN ANALYSIS

(Second set of figures show effect of outlier removal)

Label	Variable	Statistic	Systematic A		Systematic B		Random C		Systematic D		Population
A02	Standard Dairy Cows as	$\bar{X}$	29.9	29.9	31.5	31.8	28.6	28.7	30.7	30.8	30.8
	% of SO3	S	29.5	29.5	29.4	29.4	29.6	29.6	29.7	29.7	29.7
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
A03	Standard Other Cattle	$\bar{X}$	25.2	25.2	26.4	26.5	24.6	24.7	24.2	24.3	24.6
	as % of SO3	S	26.9	26.9	26.7	26.6	26.9	26.9	25.9	25.9	26.3
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
A04	Standard Sheep and Goats	$\bar{X}$	2.8	2.8	2.6	2.6	3.6	3.6	3.1	3.0	31.9
	as % of SO3	S	14.3	14.3	12.5	12.6	15.8	15.8	14.5	14.5	14.5
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
A05	Standard Pigs as	$\bar{X}$	14.1	13.9	14.4	14.2	13.2	13.3	14.0	13.9	14.1
	% of SO3	S	24.1	23.9	23.1	22.7	24.0	24.1	23.7	23.5	23.7
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
	SAMPLE SIZE		488	487	493	486	492	490	2,171	2,161	21,743

MEANS, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF VARIABLES USED IN ANALYSIS

(Second set of figures show effect of outlier removal)

Label	Variable	Statistic	Systematic A		Systematic B		Random C		Systematic D		Population
A06	Standard Poultry as % of S03	$\bar{X}$	3.8	3.7	4.5	4.3	5.3	5.3	4.3	4.2	4.6
		S	14.2	14.2	15.4	14.9	18.0	18.1	15.1	14.2	15.8
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
A07	Standard Animals per hectare of S01	$\bar{X}$	1.37	1.30	2.26	1.40	1.38	1.39	1.76	1.51	1.96
		S	3.63	3.28	12.34	2.68	3.66	3.66	7.59	4.57	13.51
		Min	0	0	0	0	0	0	0	0	0
		Max	50.57	50.57	246.3	31.1	42.0	42.0	209.3	108.3	964.3
W01	Annual work units per 10 hectares of S01	$\bar{X}$	3.42	3.42	3.92	3.42	4.22	4.22	3.53	3.33	3.76
		S	7.19	7.19	10.37	7.90	10.27	10.29	10.02	6.91	10.56
		Min	0.11	0.11	0	0.04	0	0.03	0.04	0.04	0.00
		Max	105.30	105.3	113.2	87.6	117.2	117.2	333.3	121.0	604.2
W02	Family AWU as % of S04	$\bar{X}$	85.0	85.2	83.4	83.8	82.9	83.0	84.7	84.9	84.3
		S	28.8	28.6	30.9	30.5	30.8	30.6	28.6	28.4	29.2
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
	SAMPLE SIZE		488	487	493	486	492	490	2,171	2,161	21,743

MEANS, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF VARIABLES USED IN ANALYSIS

(Second set of figures show effect of outlier removal)

Label	Variable	Statistic	Systematic A		Systematic B		Random C		Systematic D		Population
WO3	% of Regular Labour < 25 years old	$\bar{X}$	8.2	8.2	8.9	8.7	7.2	1.3	8.3	8.3	8.5
		S	17.3	17.3	19.0	18.6	16.4	16.5	17.5	17.5	17.7
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
WO4	% of Regular Labour 25 < 35 years old	$\bar{X}$	13.8	13.8	13.2	13.2	13.8	13.8	13.8	13.7	14.0
		S	25.7	25.7	24.9	25.0	25.7	25.8	25.5	25.4	26.1
		Min	0	0	0	0	0	0	0	0	0
WO5	% of Regular Labour 35 < 45 years old	$\bar{X}$	21.8	21.8	20.4	20.2	20.8	20.9	22.1	22.1	21.9
		S	33.8	33.8	31.5	31.4	32.5	32.5	33.8	33.8	33.4
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
WO6	% of Regular Labour 45 < 65 years old	$\bar{X}$	41.2	41.0	42.6	42.9	41.1	41.0	40.8	40.8	41.1
		S	39.1	39.1	38.9	38.8	39.3	39.2	38.9	39.0	38.9
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
	SAMPLE SIZE		488	487	493	486	492	490	2,171	2,161	21,743

MEANS, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF VARIABLES USED IN ANALYSIS

(Second set of figures show effect of outlier removal)

Label	Variable	Statistic	Systematic A		Systematic B		Random C		Systematic D		Population
W07	% of Regular Labour	$\bar{X}$	13.7	13.7	14.0	14.2	15.7	15.8	13.9	13.9	13.2
	≥ 65 years old	S	28.0	28.0	27.4	27.5	30.2	30.2	28.5	28.6	27.9
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
M01	Whether 1 or more	$\bar{X}$	46.5	46.6	49.7	50.2	46.8	46.9	48.6	48.6	48.4
	tractors owned	S	49.9	49.9	50.0	50.0	49.9	49.9	50.0	50.0	50.0
	(1=Yes, 0=No)	Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
M02	Whether 1 or more	$\bar{X}$	12.7	12.5	14.4	14.2	14.2	14.1	13.6	13.6	13.9
	cultivators owned	S	33.3	33.1	35.1	34.9	34.9	34.8	34.3	34.2	34.6
	(1=Yes, 0=No)	Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
M03	Whether 1 or more	$\bar{X}$	14.6	14.6	18.1	18.1	17.3	17.4	17.5	17.5	17.8
	harvesters owned	S	35.3	35.3	38.5	38.5	37.8	37.9	38.0	38.0	38.2
	(1=Yes, 0=No)	Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
	SAMPLE SIZE		488	487	493	486	492	490	2,171	2,161	21,743

MEANS, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF VARIABLES USED IN ANALYSIS

(Second set of figures show effect of outlier removal)

Label	Variable	Statistic	Systematic A		Systematic B		Random C		Systematic D		Population
M04	Whether 1 or more machines shared or hired from agency (1=Yes, 0=No)	$\bar{X}$	68.6	68.8	65.5	66.3	70.9	71.0	68.4	68.7	68.7
		S	46.4	46.3	47.5	47.3	45.4	45.4	46.5	46.4	46.4
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
M05	Milking machines owned (1= Yes, 0=No)	$\bar{X}$	25.8	25.9	29.0	29.2	27.0	27.1	27.6	27.7	28.2
		S	43.8	43.8	45.4	45.5	44.4	44.5	44.7	44.8	45.0
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
M06	Area of Greenhouses as % of S02	$\bar{X}$	0.55	0.55	0.93	0.92	1.22	1.22	0.96	0.90	1.05
		S	5.36	5.36	7.87	7.92	9.61	9.63	7.23	6.87	8.11
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
M07	Whether draft animals used (1= Yes, 0=No)	$\bar{X}$	5.9	5.0	4.9	4.7	7.1	7.1	5.1	5.1	4.8
		S	23.6	23.7	21.5	21.2	25.7	25.8	22.0	22.1	21.4
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
	SAMPLE USED		488	487	493	486	492	490	2,171	2,161	21,743

MEANS, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF VARIABLES USED IN ANALYSIS

(Second set of figures show effect of outlier removal)

Label	Variable	Statistic	Systematic A		Systematic B		Random C		Systematic D		Population
M08	Machines Accessed	$\bar{X}$	3.66	3.66	3.78	3.60	4.90	4.34*	3.81	3.82	3.98
	(S05) per 10 hectares	S	5.29	5.30	7.48	5.94	14.74	7.54*	6.37	6.34	9.16
	of S01	Min	0	0	0	0	0	0	0	0	0
		Max	47.6	47.6	105.30	51.28	285.7	71.43	71.43	71.43	500.0
H01	Whether holder-manager	$\bar{X}$	94.9	95.1	93.5	93.6	94.3	94.5	95.4	95.5	94.8
	(1=Yes, 0=No)	S	22.1	21.7	24.6	24.4	23.2	22.8	21.0	20.8	22.2
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
H02	Manager's Education	$\bar{X}$	1.28	1.28	1.32	1.32	1.26	1.26	1.29	1.28	1.29
	(1=Non, 2=Primary,	S	0.58	0.58	0.62	0.62	0.56	0.56	0.59	0.59	0.59
	3=Secondary, 4=Higher)	Min	1	1	1	1	1	1	1	1	1
		Max	4	4	4	4	4	4	4	4	4
H03	Whether holder male	$\bar{X}$	87.3	87.3	88.0	88.3	87.0	87.1	86.9	87.0	87.2
	(1=Yes, 0=No)	S	33.3	38.1	32.5	32.2	33.6	33.5	33.7	33.7	33.4
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
	SAMPLE SIZE		488	487	493	486	492	490	2,171	2,161	21,743

MEANS, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF VARIABLES USED IN ANALYSIS

(Second set of figures show effect of outlier removal)

Label	Variable	Statistic	Systematic A		Systematic B		Random C		Systematic D		Population
H04	Whether holder female	$\bar{X}$	7.6	7.6	5.5	5.4	7.3	7.3	8.5	8.5	7.6
	(1=Yes, 0=No)	S	26.5	26.5	22.8	22.5	26.0	26.1	27.8	27.9	26.4
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
H05	Age of Holder (in	$\bar{X}$	52.5	52.5	52.1	52.1	52.4	52.4	52.1	52.1	51.9
	years) (Where joint or	S	12.1	12.2	12.3	12.3	13.0	13.1	12.3	12.3	12.5
	coroporate holder = 52)	Min	21	21	21	21	15	15	18	18	15
		Max	84	84	91	91	88	88	87	87	94
H06	Whether holder has	$\bar{X}$	24.0	24.0	21.5	21.2	21.5	21.6	23.2	23.2	21.6
	non-agricultural	S	42.7	42.7	41.1	40.9	41.1	41.2	42.2	42.2	41.1
	gainful work	Min	0	0	0	0	0	0	0	0	0
	(1=Yes, 0=No)	Max	100	100	100	100	100	100	100	100	100
G01	Owned agricultural	$\bar{X}$	61.1	61.0	64.3	64.1	60.9	60.9	61.2	61.2	61.1
	land as % of S01	S	41.1	41.1	41.1	41.1	41.5	41.5	41.3	41.3	41.6
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
	SAMPLE SIZE		488	487	493	486	492	490	2,171	2,161	21,743

MEANS, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF VARIABLES USED IN ANALYSIS

(Second set of figures show effect of outlier removal)

Label	Variable	Statistic	Systematic A		Systematic B		Random C		Systematic D		Population
G02	Rented Agricultural Land as % of S02	$\bar{X}$	34.6	34.7	32.2	32.5	34.0	33.9	34.7	34.8	34.2
		S	39.8	39.8	39.9	40.0	40.1	40.0	40.2	40.3	40.3
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
G03	Share Cropped Agricultural Land as % of S02	$\bar{X}$	4.3	4.3	3.4	34.7	5.1	6.2	4.0	4.0	4.7
		S	20.0	20.0	17.3	17.4	21.2	21.3	18.5	18.4	20.2
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
G04	Whether Accounts kept (1= Yes, 0 = No)	$\bar{X}$	22.1	22.2	22.9	22.4	21.3	21.4	22.2	22.1	22.0
		S	41.5	41.5	42.0	41.7	41.0	41.0	41.5	41.5	41.4
		Min	0	0	0	0	0	0	0	0	0
		Max	100	100	100	100	100	100	100	100	100
G05	No. of Co-operative Memberships	$\bar{X}$	1.49	1.49	1.49	1.50	1.42	1.42	1.53	1.54	1.52
		S	1.54	1.54	1.49	1.49	1.52	1.52	1.52	1.52	1.51
		Min	0	0	0	0	0	0	0	0	0
		Max	4	4	4	4	4	4	4	4	4
	SAMPLE SIZE		488	487	493	486	492	490	2,171	2,161	21,743

MEANS, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM VALUESOF VARIABLES USED IN ANALYSIS

(Second set of figures show effect of outlier removal)

Label	Variable	Statistic	Systematic A		Systematic B		Random C		Systematic D		Population
G06	No. of Contracted Crops	$\bar{X}$	0.074	0.074	0.101	0.099	0.079	0.080	0.083	0.082	0.089
		S	0.269	0.269	0.346	0.337	0.285	0.285	0.302	0.299	0.318
		Min	0	0	0	0	0	0	0	0	0
		Max	2	2	2	2	2	2	3	3	5
	SAMPLE SIZE		488	487	493	486	492	490	2,171	2,161	21,743

CHAPTER IV

EXPERIMENTAL CLASSIFICATION SCHEMES

4.1 The Nature of Experiments Undertaken

The experiments described in the following paragraphs had the clear purpose of finding a meaningful, but efficient and parsimonious classification of agricultural holdings. By their nature they are testing much more generally the characteristics of a broad methodology which might be applied equally to any other classification problem.

There are essentially eleven areas in which experimentation, leading to potentially different classifications, might be undertaken. These are:

1. Selection of variables for principal component analysis.
2. Use of standardised or non-standardised variables in principal component transformation.
3. Number of iterations used in cluster analysis.
4. Number of principal component variables in cluster analysis.
5. Use of standardised or non-standardised component variables in cluster analysis.
6. Number of clusters to "seed" analysis.
7. Effect of subjective initial seeding of cluster analysis.
8. Different classification schemes, particularly number of classes, in discriminant analysis.
9. Different significance levels in decisions about the best discriminating variables or discriminant functions.
10. Effect of prior probability specification in discriminant analysis.
11. Use of distribution free discriminant analysis.

When it is remembered that for some of these there are many different values of experimental parameters possible, it is clear that only a restricted subset of all combinations of experimental factors can be considered.

In Table 4.1 are listed the experimental analyses undertaken. It will be seen that Analysis I is the standard of reference (control) against which all others are compared. This particular experiment was based on the full set of 53 operational variables defined earlier. The component analysis was run on standardised values of these and the clustering on the unstandardised scores of the first 10 component variables. A group of 30 clusters initiated the cluster analysis from a partitioning of ranked first component scores. After the first two steps (30 and 29 clusters), only two iterations were allowed in the reallocation of observations between clusters. Discriminant analysis was based on a group of 10 cluster classes with termination of the MANOVA based step-wise variable selection procedure at the point where the 25 most significant discriminating variables had been selected. Although on usual partial-F statistic criteria a further 25 variables were significant ($\alpha = 0.05$) after this stage in the analysis, it was felt necessary to take a peculiarly severe line as the clustering basis of group membership is the antithesis of randomness assumed in MANOVA. The partial-F statistic at the point of cut-off was in fact more than double the value normally required for tests of group separation at a 0.1% significance level.

For assignment or identification purposes, classification functions were computed, although formal classification of observations to groups was based on discriminant function scores. The number of discriminant functions used for this purpose was determined by the first of the following criteria to be satisfied.

(a) No further function is significantly contributing to the discrimination at a 5% level.

(b) At least 95% of the trace of $W^{-1}B$ is contained within the first g discriminant functions ($g \leq m - 1$).

(c) All 9 discriminant functions are included.

In the event, criterion (a) never operated as all functions were significant at all reasonable levels, and (c) was inoperable since fewer than 9 functions accounted for 95% of the trace of the $W^{-1}B$ matrix. In the assignment phase prior probabilities proportionate to class size were employed while equal class variance-covariance matrices were assumed.

The decision to use this particular set of classification parameters was based partly on *a priori* reasoning, partly on early empirical invest-

Experimental Analysis / Experimental Factor	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	XXI	XXII	XXIII	XXIV	XXV	XXVI	XXVII
Variable Selection	A	A	A	A	A	A	A	A	A	A	A	O	O	E	E	A	A	A	A	A	A	A	A	A	A	A	A
Variable Treatment for PCA	S	S	S	S	S	S	S	S	U	U	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Component Variable Treatment for Clustering	U	U	U	U	U	U	U	S	U	S	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
No. of iterations in Clustering	2	4	6	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
No. of "Seeding" Clusters	30	30	30	25	20	30	30	30	30	30	17*	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
No. of Component Variables used in Clustering	10	10	10	10	10	15	20	10	10	10	10	10	5	10	5	10	10	10	10	10	10	10	10	10	10	10	10
No. of Classes in Discriminant Analysis	10															10	10	10	10	10	10	10	10	10	15	20	10
% Trace of $W^{-1}B$ to determine number of functions	95															100	90	80	100	95	90	80	95	95	95	95	
Prior Probability specification	Si															Si	Si	Si	Si	Si	Si	Si	Eq	Eq	Si	Si	
No. of Discriminating Variables	25															25	25	25	50	50	50	50	25	50	25	25	
Distribution free discrimination																											√

Abreviation	Meaning	Abreviation	Meaning
A	All variables	*	*A priori* class seeding
O	Odd Numbered Variables (1st, 3rd ... 53rd)	Si	Priors proportionate to size of class
E	Even Numbered Variables (2nd, 4th ... 52nd)	Eq	Priors equal
S	Standardised to zero mean and unit variance	√	Non-parametric discrimination
U	Unstandardised		

Table 4.1 Experimental Analyses

igation and was partly arbitrary. In the event, the decision appears not unreasonable.

As will be seen from Table 4.1, not all experimental analyses were conducted over the full range of experimental factors. Particular stress was placed on the principal component and cluster analysis phases as these were deemed the most uncertain and least investigated by other researchers. The separate experiments are listed in Table 4.2.

4.2 Principal Component Interpretation

The four sets of PCA results for Sample A, which are used in the various experimental analyses, are summarised in Table 4.3, Figures 4A and 4B, and Tables 4.4 and 4.5.

The problem of working with unstandardised variables, possessing enormous scale variations, is highlighted in this case. Because of the large variances of the two main farm size measures (S01 and S02), these completely dominate the first two components derived from the variance-covariance matrix. The normalised eigenvector elements associated with total holding area and the area of used agricultural land are many times bigger than the weights attached to any other variable. The consequence is that the first two components account for 99.8 per cent of the total variance in the data. The use in clustering of unstandardised component scores which have been obtained from such an analysis will inevitably mean that holding size will be the main classification variable. Nevertheless, the effect of classifying holdings almost exclusively on a size criterion was thought to be of potential interest and Experimental Analysis IX was completed. Of course, a totally different picture may be expected if these component variables are standardised by the square roots of their very different eigenvalues prior to clustering. In such circumstances size would have an equal weighting with other dimensions

Table 4.2 Experiments Conducted

Experiment	Description	Experimental Analyses
A	Evaluation of changing the number of iterations in clustering	I, II, III
B	Evaluation of changing the 'seeding' number of clusters	I, IV, V
C	Evaluation of changing the number of component variables in clustering	I, VI, VII
D	Effect of standardisation v. unstandardisation of variables	I, VIII, IX, X
E	Effect of using *a priori* classification codes to seed analysis	I, XI
F	Effect of using variable sub-sets	I, XII, XIII, XIV, XV
G	Effect of varying classical discriminant analysis parameters	I, XVI to XXVI
H	Comparison of classical with non-parametric discrimination	I, XXVII

represented by lower numbered components and cluster analyses may produce results not unlike those obtainable when the components of the correlation matrix are involved.

The investigation of dimensionality was based substantially on the latent roots of the 53 variable correlation matrix. It is evident from Table 4.3 that according to Kaiser's criterion, approximately 20 components would be seen as significant, accounting for some 70 per cent of the variance in the 53 standardised variables. However, inspection of 'scree-test' plot of the logarithms of the eigenvalues against component numbers in Figure 4A, suggests at most 10 or so significant components explaining approximately 50 per cent of data variability. For the variable subsets, the corresponding figures would be 10 and 5 components. Although there is some uncertainty over this issue, the author tends to favour scree-test findings, based on a spirit of caution in defining dimensionality. If there is unique variance in later components, this is likely to be sample specific, thus reducing classification stability between different data sets. This point notwithstanding, the effect of using 5, 10, 15 and 20 component variables in clustering is investigated below.

The significant factor loadings shown in Tables 4.4 and 4.5, are derived from eigenvector elements and indicate the simple correlations between operational variables and components. Only loadings found to be significant using the Burt-Banks formula have been tabulated. In the first component, loadings of 0.14 or higher were defined as significant at better than a 0.1 per cent level, by the conventional t-test criterion (485 degrees of freedom).

On grounds of space economy, only the loadings of the first 10 components are shown for the main analysis, and the first 5 in other cases. These should suffice to illustrate the interpretability of the

Table 4.3 Sample A Principal Component Analysis - Eigenvalues

omponent	All Variables Correlation Matrix		All Variables Covariance		Odd Variables Correlation Matrix		Even Variables Correlation Matrix	
umber	Latent Root (λ)	Cum % of Variance	Latent Root (λ)	Cum % of Variance	Latent Root (λ)	Cum % of Variance	Latent Root (λ)	Cum % of Variance
1	6.034	11.4	755.9×10^4	85.6	3.289	12.2	3.536	13.6
2	3.269	17.6	126.0×10^4	99.8	2.260	20.6	2.500	23.2
3	2.442	22.2	3662.1	99.9	1.689	26.8	1.841	30.3
4	2.207	26.3	2070.9	99.9	1.510	32.4	1.527	36.2
5	2.022	30.1	1194.3	99.9	1.410	37.6	1.483	41.9
6	1.902	33.7	987.8	99.9	1.316	42.5	1.376	47.2
7	1.807	37.1	834.1	99.9	1.225	47.0	1.108	51.4
8	1.757	40.5	758.2	99.9	1.209	51.5	1.080	55.6
9	1.649	43.6	740.2	100.0	1.070	55.5	1.056	59.7
10	1.553	46.5	652.6	100.0	1.047	59.4	0.965	63.4
11	1.449	49.2	564.0	100.0	1.034	63.2	0.910	66.9
12	1.363	51.8	451.1	100.0	0.946	66.7	0.891	70.3
13	1.260	54.2	414.2	100.0	0.905	70.0	0.851	73.6
14	1.234	56.5	362.4	100.0	0.844	73.2	0.764	76.5
15	1.173	58.7	270.4	100.0	0.786	76.1	0.729	79.3
16	1.131	60.9	241.0	100.0	0.781	79.0	0.684	81.9
17	1.092	62.9	228.2	100.0	0.759	81.8	0.634	84.4
18	1.076	65.0	204.1	100.0	0.727	84.5	0.622	86.8
19	1.057	66.9	182.0	100.0	0.633	86.8	0.572	89.0
20	1.013	68.9	175.3	100.0	0.607	89.1	0.515	90.9
21	0.977	70.7	151.6	100.0	0.566	91.2	0.481	92.8
22	0.984	72.5	136.9	100.0	0.507	93.0	0.461	94.6
23	0.894	74.2	100.0	100.0	0.482	94.8	0.440	96.3
24	0.860	75.8	84.3	100.0	0.444	96.5	0.401	97.8
25	0.857	77.4	64.9	100.0	0.405	98.0	0.352	99.2
$\sum_{j=1}^{p} \lambda_j$	53		8833872		27		26	

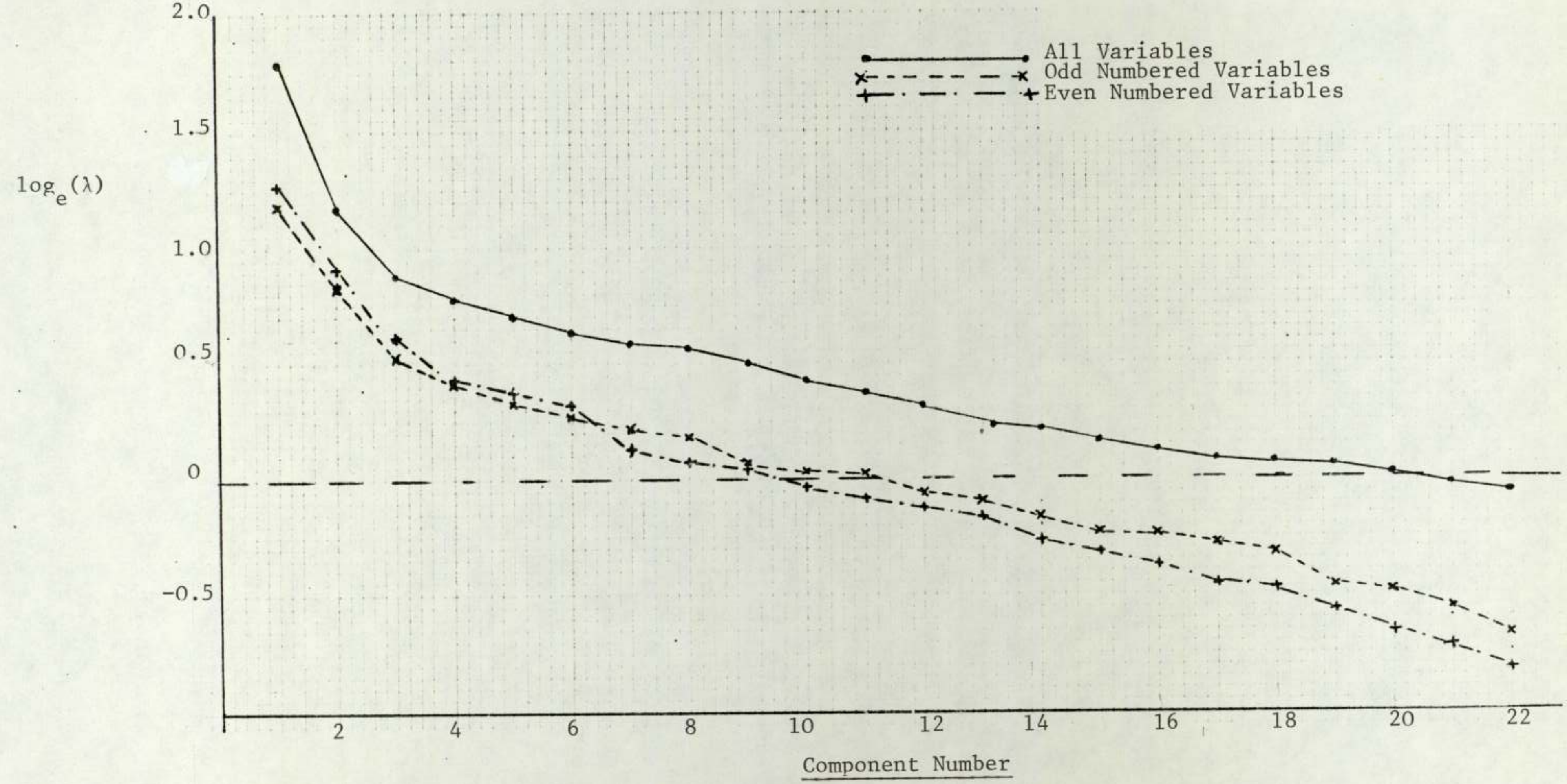

Figure 4.A Scree Test Plot of Eigenvalues of the Correlation Matrix - Sample A.

dimensions or source variables derived and for comparison between the different approaches.

From the first section of Table 4.4, it is evident that Components 1 and 2 are both size/holding technology measures but distinguished by differences in land use, livestock, land tenure, management and labour/capital inputs. Figure 4B shows in vector diagram form the relationship of operational variables to these first two components. Although certain variable numbers are omitted in order to avoid over-printing the general size - related features of Component 1 are clearly shown. In addition to the variables measuring total holding land area, total livestock and total capital and labour inputs, it can be seen that tractor, harvester and other capital goods ownership and the number of co-operative memberships are all positive correlates of component (factor) number one. The inverse relationships of labour inputs per hectare and the proportion of holders with non-holding employment to this component confirms the size syndrome interpretation. That component number two is more related to management practices and control within a size context is revealed by the weighting of H01, H03, and W02, compared with other variables. By and large, the corporately-owned holdings are larger than holder-managed farms and, having no specific holder, show a low proportion of male holders and a low percentage of labour provided by the holder's family.

Component 3 represents a continuum from highly intensive 'horticultural-type' holdings to mixed farms with an emphasis towards dairy herds and cattle rearing. The characteristics of component 4 are shown by the high negative weighting of S03, L07, L08, A05, A07 and H06, and the positive weighting of S04, L01, L05, L13, M02, M04, M07 and G03. The first group suggests small pig farms relying on subsistence plots and a holder with other non-holding employment, while the second

Table 4.4 Eigenvectors of 53 Variable Matrices - Sample A

Variable	53 Variables-Correlation Matrix-Significant Factor Loadings										53 Variables-Covariance Matrix Normalised Eigenvectors					53 Variables-Covariance Matrix Significant Factor Loadings				
	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6	Component 7	Component 8	Component 9	Component 10	Component 1	Component 2	Component 3	Component 4	Component 5	Component 1	Component 2	Component 3	Component 4	Component 5
S01	0.68	0.41	-	-	-	-	-	-	-	-	0.56	0.83	0.00	0.00	0.00	0.60	0.34	-	-	-
S02	0.59	0.45	-	-	-	-	-	0.16	-	-	0.53	-0.56	-0.00	-0.00	-0.00	0.96	-0.26	-	-	-
S03	0.54	-	-	-0.42	-	0.26	-0.19	-	0.19	-0.19	0.00	0.00	-0.05	0.00	-0.02	0.42	0.21	-	-	-
S04	0.58	0.37	-0.18	0.27	-	0.15	-	-	-	-	0.00	0.00	-0.00	-0.00	0.00	0.58	-	-	-	-
S05	0.83	-	-0.22	-	-	-	-	-0.16	-	-	0.00	0.00	-0.01	-0.00	-0.00	0.53	0.16	-0.16	-0.30	-
L01	0.20	-	0.19	0.22	-	-	-	-	-0.17	-	0.00	0.00	-0.00	-0.00	-0.00	-	-	-	-	-
L02	0.19	-0.22	-0.33	-	-	-	-	-	-0.40	-	-0.00	0.00	-0.04	-0.00	0.06	-	-	-0.21	-	0.16
L03	0.18	-	-	-	-	-	-	0.16	-0.24	-	0.00	-0.00	-0.00	-0.00	0.00	0.18	-	-	-	-
L04	-0.14	-	-0.66	-	-	-	-	-	0.36	-	-0.00	-0.00	-0.02	-0.02	0.03	-	-	-	-	-
L05	-	-	-	0.39	-	-	-0.47	-	-	-	0.00	0.00	0.00	-0.02	0.02	-	-	-	-	-
L06	-	0.14	-	-	-	-	-	-	0.28	-	0.00	-0.00	0.01	-0.00	0.00	-	-	0.14	-	-
L07	-0.22	-	-	-0.24	-	0.31	-	-	-	-	-0.00	-0.00	0.01	-0.01	0.00	-	-	-	-	-
L08	-	-	0.20	-0.32	-	-0.21	0.27	0.33	0.21	-	-0.00	0.00	-0.02	-0.01	-0.05	-	-	-	-	-
L09	-0.28	-	-	-	-	0.28	-	-0.21	-	-0.21	-0.00	-0.00	0.05	0.00	0.02	-	-	0.20	-	-
L10	-0.41	0.30	-	-	0.20	-	-	-	-	-	-0.00	-0.00	0.14	0.05	0.19	-	-	0.35	-	0.27
L11	-0.20	0.14	-	-	-	0.23	-	-	-	-	-0.00	-0.00	0.02	-0.00	0.01	-	-	0.16	-	-
L12	-0.15	0.26	-	-	-	0.30	-	-	0.32	-	-0.00	0.00	0.06	0.02	0.00	-	0.17	0.25	-	-
L13	-0.23	0.16	-	0.36	0.23	0.15	-0.27	-	0.26	-0.21	-0.00	0.00	0.00	-0.00	0.00	-	-	-	-	-
L14	0.18	-0.21	-	-	-	-0.17	-0.28	-	-	-0.26	-0.00	0.00	-0.00	-0.00	-0.00	-	-	-0.18	-	-
A01	-	-	-	0.15	-	-	0.16	-	-	-0.49	-0.00	-0.00	-0.00	0.00	0.02	-	-	-	-	-
A02	0.41	-0.22	0.32	-	-0.27	-0.16	-	0.15	0.24	-	0.00	0.00	-0.16	-0.09	-0.32	0.14	-	-0.32	-	-0.38
A03	0.40	-0.20	0.33	0.19	-	-	-	-	-	-	0.00	0.00	-0.12	0.02	-0.11	0.18	-	-0.27	-	-
A04	-	-	-	-	0.15	-	-	0.17	-	0.32	0.00	-0.00	0.03	0.01	0.03	-	-	0.14	-	-
A05	-	-	-0.22	-0.17	-	0.25	-0.30	-0.37	-	-0.19	-0.00	0.00	0.02	0.04	0.08	-	-	-	-	-
A06	-	0.14	-	-	-	-	-	0.15	-0.20	-	-0.00	-0.00	0.03	-0.02	0.02	-	-	-	-	-
A07	-	-	-	-0.59	-0.20	0.19	-0.35	-	-	-0.31	-0.00	0.00	-0.00	-0.00	0.00	-	-	-	-	-
W01	-0.23	-0.15	-0.35	-	-	-	-	-	0.20	-	-0.00	-0.00	-0.00	-0.01	0.01	-0.15	-	-	-	-
W02	-	-0.16	0.22	-	-	-	-	-	-	-	-0.00	0.00	-0.15	-0.01	-0.23	-0.30	-	-0.31	-	-0.27
W03	0.23	-	-	-	-	-	0.16	0.24	0.17	-	0.00	0.00	-0.03	-0.05	-0.04	0.16	-	-	-	-
W04	0.30	-	-	-0.22	0.17	-	-	-	0.16	-	0.00	0.00	-0.07	0.10	-0.31	0.15	-	-0.17	0.18	-0.41
W05	-	-	-	-0.15	0.60	-0.25	-	0.33	-	-	0.00	-0.00	-0.12	0.50	0.59	-	-	-0.21	0.68	0.60
W06	-0.18	-	-	-	-0.37	0.24	-0.30	0.55	-0.27	-	-0.00	-0.00	0.15	-0.80	0.24	-	-	0.24	-0.92	0.21
W07	-0.24	-	-	-	-0.34	-	0.45	-0.45	-	-	-0.00	-0.00	0.04	0.22	-0.50	-0.17	-	-	0.36	-0.62
M01	0.71	0.21	-	-	-	-	-	-	-	-	0.00	0.00	-0.00	0.00	0.00	0.45	0.17	-0.15	-	-
M02	-0.14	-	-0.50	0.28	-	0.19	-	-	-	0.22	-0.00	-0.00	0.00	-0.00	0.00	-	-	-	-	-
M03	0.53	0.15	-	-	-	0.22	0.16	-0.23	-	-	0.00	0.00	-0.00	0.00	-0.00	0.36	0.15	-	-	-
M04	0.39	-0.26	-	0.18	-	-0.17	-0.22	-0.19	-0.27	-	0.00	0.00	-0.00	-0.00	-0.00	-	-	0.25	-	-
M05	0.61	-	0.15	-	-0.17	-	0.16	-	0.18	-	0.00	0.00	-0.00	0.00	-0.00	0.30	0.22	-0.23	-	-0.16
M06	-0.14	-	0.36	-	-	-	-	-	0.41	0.32	-0.00	-0.00	0.00	0.01	0.01	-	-	-	-	-
M07	-0.33	0.23	-	0.20	-	-	0.33	-0.18	-	-0.47	-0.00	0.00	0.00	0.00	0.00	-	-	0.18	-	-
M08	-0.24	-0.30	-	-	-	-	-	-0.24	-0.16	0.18	-0.00	-0.00	-0.00	-0.00	0.01	-0.33	-	-	-	-
H01	-	-0.65	-	-	-	0.28	-	-	-	-	-0.00	0.00	-0.00	-0.00	-0.00	-0.16	-	-0.22	-	-
H02	0.32	0.15	-0.42	-	-	-	0.31	-	-	-0.16	0.00	0.00	-0.00	0.00	0.00	0.21	-	-	-	-
H03	0.18	-0.59	-	0.16	0.23	0.54	0.29	-	-	-	-0.00	0.00	-0.00	-0.00	-0.00	-	-	-0.26	-	-
H04	0.17	0.21	-	-	-0.37	-0.51	-0.26	-0.24	-	-	-0.00	-0.00	0.00	0.00	-0.00	-	-	-0.15	-	-
H05	-0.31	-	-	0.32	-0.14	-	0.22	-	-	-	-0.00	-0.00	0.06	-0.00	-0.13	-0.15	-	0.30	-0.21	-0.36
H06	-0.34	-0.23	-	-0.32	0.34	0.22	-	-	-	-	-0.00	-0.00	0.00	0.00	0.00	-0.27	-	-	-	0.18
G01	-0.46	0.42	-	-0.17	-0.17	0.19	-	-	-0.22	0.21	-0.00	-0.00	0.73	0.13	-0.03	-	-	0.99	-	-
G02	0.39	-0.49	-	-	-	-0.32	-	0.23	-	-	0.00	0.00	-0.57	-0.12	0.11	-	-	-0.86	-	-
G03	-0.15	-	-	0.34	0.24	-	-	-	0.33	-0.33	-0.00	0.00	-0.01	0.02	0.01	-	-	-	-	-
G04	0.23	-	-0.44	-0.15	-0.18	-	0.19	0.24	-	-0.26	0.00	-0.00	-0.00	-0.00	0.00	-	-	-	-	-
G05	0.52	-	-0.18	-	-0.12	-	-	-0.25	-	-	0.00	0.00	-0.00	0.00	-0.00	0.24	-	-0.15	-	-
G06	0.20	-	-0.26	-	-	-	-	-	-	-	0.00	0.00	-0.00	0.00	0.00	0.20	-	-	-	-

Table 4.5 Eigenvectors of Variable Subsets - Sample A

Vari-able	Odd-Numbered Variables Correlation Matrix Significant Factor Loadings					Even-Numbered Variables Correlation Matrix Signficant Factor Loadings				
	Compo-nent 1	Compo-nent 2	Compo-nent 3	Compo-nent 4	Compo-nent 5	Compo-nent 1	Compo-nent 2	Compo-nent 3	Compo-nent 4	Compo-nent 5
S01	0.64	0.21	0.45	-	0.16	-	-	-	-	-
S02	-	-	-	-	-	0.56	0.46	-	0.16	-
S03	0.55	0.18	0.30	-	-	-	-	-	-	-
S04	-	-	-	-	-	0.58	0.36	0.19	0.17	-
S05	0.76	-0.26	-	0.18	0.21	-	-	-	-	-
L01	-	-	-	-	-	0.22	-	0.20	-	0.23
L02	0.24	-0.39	-0.25	0.36	-	-	-	-	-	-
L03	-	-	-	-	-	0.18	-	-	0.18	-
L04	-0.20	-0.68	0.22	-0.32	-	-	-	-	-	-
L05	-	-	-	-	-	-	-	0.36	-0.19	0.20
L06	-0.18	-	-	0.27	-	-	-	-	-	-
L07	-	-	-	-	-	-0.24	-	-0.26	-	-
L08	-	0.27	-	-0.36	0.54	-	-	-	-	-
L09	-	-	-	-	-	-0.30	-	-	0.19	-0.44
L10	-0.47	-	0.20	0.22	-	-	-	-	-	-
L11	-	-	-	-	-	-0.22	-	-	-	-
L12	-0.20	-	0.48	-	-	-	-	-	-	-
L13	-	-	-	-	-	-0.26	0.17	0.43	-0.30	-
L14	0.31	-0.15	-0.23	-	-	-	-	-	-	-
A01	-	-	-	-	-	-	-	0.22	-	-0.50
A02	0.47	0.23	-0.19	-0.44	-	-	-	-	-	-
A03	-	-	-	-	-	0.43	-0.21	0.30	-	0.28
A04	-0.18	-	0.21	0.26	-	-	-	-	-	-
A05	-	-	-	-	-	-	-	-0.61	-	-0.27
A06	-	-	-	-	-	-	-	-	-	-
A07	-	-	-	-	-	-	-0.16	-0.55	-0.19	-
W01	-0.26	-0.40	-	-0.33	-0.15	-	-	-	-	-
W02	-	-	-	-	-	-	-0.87	-	-	-
W03	0.28	-	0.20	-0.16	0.15	-	-	-	-	-
W04	-	-	-	-	-	0.41	-	-0.15	-0.47	-0.20
W05	-	-	-	0.42	-0.31	-	-	-	-	-
W06	-	-	-	-	-	-0.26	-	-	0.49	0.29
W07	-0.23	-	-0.22	-0.27	0.20	-	-	-	-	-
M01	-	-	-	-	-	0.74	0.19	-	-	-
M02	-0.21	-0.50	0.18	-	0.30	-	-	-	-	-
M03	-	-	-	-	-	0.61	-	-	0.20	-0.24
M04	0.49	-0.21	-0.39	-	0.18	-	-	-	-	-
M05	-	-	-	-	-	0.61	-	-	-	-
M06	-0.23	-0.34	0.39	-0.17	-	-	-	-	-	-
M07	-	-	-	-	-	-0.36	0.23	0.21	0.18	-0.61
M08	-0.26	-0.64	-0.28	-	0.15	-	-	-	-	-
H01	-	-	-	-	-	-	-0.80	0.22	0.21	-0.15
H02	0.33	-0.32	0.35	-	-0.27	-	-	-	-	-
H03	-	-	-	-	-	0.19	-0.66	0.27	-	-
H04	-0.14	-	-	-0.24	0.36	-	-	-	-	-
H05	-	-	-	-	-	-0.34	-	-	0.59	-
H06	-0.38	-	-	0.36	-0.47	-	-	-	-	-
G01	-	-	-	-	-	-0.43	0.24	-0.27	0.23	-
G02	0.42	-0.23	-0.35	-	-0.32	-	-	-	-	-
G03	-	-	-	-	-	-0.15	-	0.50	-0.37	-0.27
G04	0.32	-0.38	0.26	-0.16	-0.35	-	-	-	-	-
G05	-	-	-	-	-	0.53	-	-	0.20	-0.24
G06	0.25	-0.21	0.15	0.21	-	-	-	-	-	-

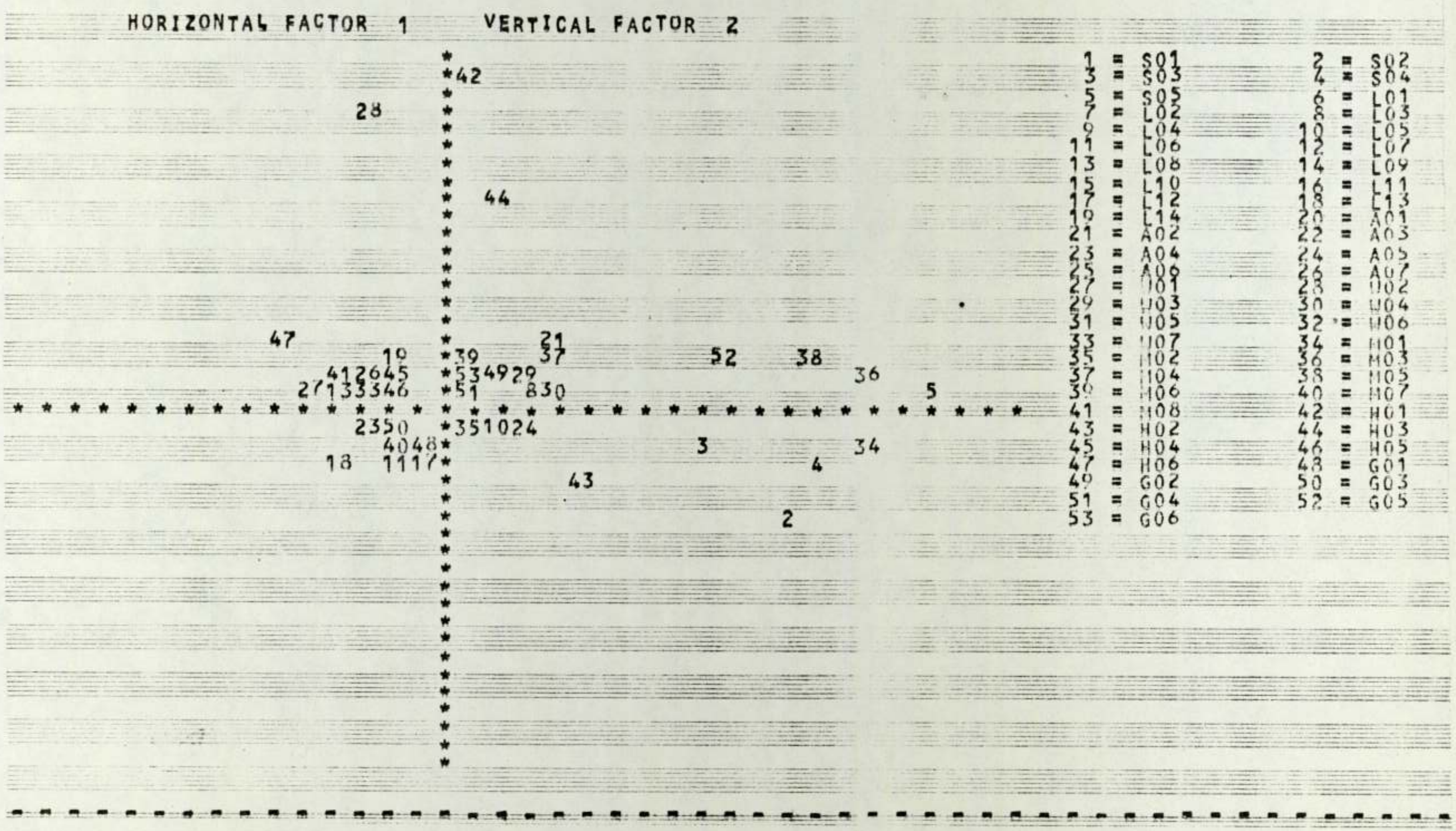

Fig. 4B Vector Representation of Variable Location in the Planes of Components 1 and 2 tends towards share cropping production of arable and successive and intermediate crops with cultivators and draft animals, rather than tractors or harvesters and a limited amount of non-intensive cattle rearing. Component 5 appears to separate older holder - owners concerned with dairy herd operations on a fairly traditional basis, from sheep and goat rearing sharecropping operations run by younger holders many of whom also have outside work. Components 6 to 10 emphasise variously subsistence holdings with higher proportions of unused agricultural land and other land combined with the cultivation of vines, several combinations of livestock rearing, and age differences in the holder and the regular farm labour used on the land.

Comparison of factor loadings between the analysis on all variables with the two analyses using alternate variable sub-sets, reveals remarkable similarity, not only in the pattern of loadings but also their magnitude. This in itself suggests stability in the underlying dimensions of farm-to-farm resemblances/differences present in the data which are reflected in a variety of measurable characteristics. Although not as noticeable in detail, the set of five factor loadings obtained from the component analysis of unstandardised operational variables also highlight the main size, tenure, land use, and age distribution dimensions, which confirms the earlier observation that upon standardisation the analysis of components of the covariance matrix may produce not radically different clustering results.

4.3 Experimental Analysis I - Clustering Results

The clustering results for Analysis I are summarised in Tables 4.6 to 4.9, while an example of the typical output from CLUSTPROG is given in Appendix D. From Table 4.6 it may be observed that with the seeding number of 30 clusters, the within class sum of squares represents 30.6 per cent of the total variance contained in the first 10 components, so that the classification into 30 groups *explains* 69.4% of these components' variability. At 20 and 10 clusters, the corresponding figures are 65.0 per cent and 51.9 per cent respectively, showing that the explanatory power falls much more slowly than the number of classes.

When it is remembered that the first 10 components of the correlation matrix themselves account only for 50 per cent of the variances of the standardised operational variables, the meaning of the figures in the third column of Table 4.6 become more apparent. They show the explanatory power of the cluster configurations determined from the 10 component variables but with respect to the full set of 53 operational variables. Although only between approximately a third and a quarter of the total sample variance is explained by the classification of farms into 20 to 10 groups, these figures should be compared with the *a priori* scheme described in Chapter III. For this sample, the explanatory power of the 17 class, *a priori* method was only a little over 20%. With the same number of classes the cluster classification gives an explanatory power of nearly 34 per cent which represents a two-thirds improvement over the *a priori* approach. It seems that the data based method performs significantly better than the much debated system suggested by the "Group of Experts Farm Typology". That the two are quite fundamentally different in allocating holdings to classes, is illustrated in Table 4.7, which cross-tabulates 20 cluster classes against the 17 *a priori* classes. Only in the case of Horticulture (Cluster Class 7 and A Priori Class IV) do the classifications approximately correspond.

The Beale F-tests reported in Table 4.6 would indicate that from a statistical viewpoint 16 clusters of holdings are better than 15, 11 are better than 10, and 9 are better than 8. Remembering, however that the test is not rigorously based, it is preferable to rely more on the trends

Table 4.6 Summary of Cluster Analysis Results - Analysis I

No. of Clusters (Classes)	Within Group Sum of Squares	Beales F Test	Explanatory Power of Classification (%)
30	3633	-	
29	3635	1.79	
28	3695	1.51	
27	3748	1.39	
26	3799	1.57	
25	3859	1.92	
24	3936	1.44	
23	3997	0.74	
22	4030	2.03	
21	4124	1.36	
20	4191	1.40	35.5
19	4264	1.62	35.1
18	4354	1.95	34.3
17	4470	1.93	33.6
16	4594	2.44*	32.6
15	4764	2.29	31.5
14	4939	1.80	31.1
13	5091	1.92	30.3
12	5270	2.04	29.4
11	5482	2.40*	27.9
10	5763	2.25	26.5
9	6067	2.33*	
8	6434	2.25	
7	6856	1.77	
6	7261	1.62	
Total Sum of Squares	11980	*Significant at 1% level	

Rows: Experimental Analysis I - Class Number; Columns: *A Priori* Classification - Class Number

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVII	Total
1	1	1	6					1	1	11		3					24
2	1		13				2	4		16	1	1				1	39
3		2	7			1								4	1		15
4	1		5			6		2	3						2	5	24
5	5	1	4			3		5	3	3	1	1	2		4	1	33
6	4		13					3		3			1		2	2	28
7				8		1										1	10
8					6	5			1				2		1	2	17
9	3		1				3	5		4	2	2				5	25
10	1		8			1				1			2				13
11			2			1							2			2	7
12	1		10				5	11		16	1	3			1		48
13							10	4			1						15
14		5	5														10
15	1	1	14				2	5	1	15		3			3		45
16			8				1	6		16	1					4	36
17	1	2	5			4	3	8	1	4		1			2	2	33
18			1		3	8		2	3	1		1	4			7	30
19	1		4			4	6	3	3	4			1		1	2	29
20					1				5								6
Total	20	12	106	8	10	34	32	59	21	94	7	15	14	4	17	34	487

Table 4.7 Comparison of Cluster and A Priori Schemes

in the F-values rather than specific test results. Approached in this way one would look for useful classifications at around 15 and/or around 10 groups of holdings. This is confirmed from an examination of Table 4.8 which shows the nature of the class fusions and the redistribution of observations as merging from 20 to 10 classes occurs. It is immediately clear that certain clusters are quite distinctive and stable in terms of their observation composition; they remain largely unaltered at successive steps in the agglomeration. This is particularly true for the four last classes together with the classes originally lettered F and G. In other cases, the long runs of relatively stable classes begin to break down after a group of 15 clusters, and re-emerge at 12 or 11 clusters.

Ultimately, the decision about the *best* classification rests upon the meaningfulness agriculturally of the groups defined by the clustering. To illustrate the ways in which the fifteen cluster classes of farms may be interpreted, the following *pen-portraits* are presented, being based on the group centroids set out in Table 4.9. It should be stressed at the outset that there is noticeable heterogeneity in the classes depicted and that the levels of variables quoted are averages, with all their inherent drawbacks. Nevertheless, Table 4.10 demonstrates that, with only one or two exceptions the classes do exhibit significant differences between mean values for the operational variables. Consequentially, the brief class nomenclatures provided only pick out the more important, distinctive and interpretable characteristics of the groups of holdings discussed.

Class 1 Larger, Dairying/Cattle/Cereal Farms - Intensive
(48 holdings)

In this class are found larger holdings in all respects (44 hectares, 37 standard head of livestock, 3 annual work units, 4.8 machine accesses). The holdings are mixed with a slight emphasis from a land use viewpoint towards cereal production in particular (41%) and arable crops in general

*Table 4.8 The Nature of Cluster Fusions**

No. of Clusters	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
20	24	39	15	24	33	28	10	17	25	13	7	48	15	10	45	36	33	30	29	6
19	24	42	15	24	53	28	10	17	26	13	7	51	15	10	45	33	39	29	6	
18	24	43	16	24	52	29	10	15	26	10	55	15	10	45	36	42	29	6		
17	54	16	24	52	29	10	15	26	10	63	15	12	47	37	41	29	7			
16	51	17	24	60	29	10	30	10	65	15	12	48	37	43	29	7				
15	48	61	24	28	10	33	10	72	16	13	48	41	47	29	7					
14	57	57	25	28	10	36	10	72	13	53	43	47	29	7						
13	58	60	25	31	10	37	10	71	23	74	52	29	7							
12	76	105	24	34	10	34	10	28	80	48	29	7								
11	91	98	27	36	10	34	29	77	51	27	7									
10	107	108	27	37	12	34	76	52	27	7										

* Only the strongest links between clusters are shown in this simplified diagram.

(57% in total) rather than permanent pasture (41%). Dairy herd operations (43% of livestock) and other cattle rearing (39%), are dominant among the livestock pattern. Labour and capital inputs per hectare are low compared with the total sample but this is not unusual with larger holdings which reap expected economies of scale through more intensive use of capital equipment. In fact, all holdings in the group own at least one tractor, 83 per cent own their own harvesters, and 94 per cent have milking machines, making this the most capital intensive of all the classes. All the farms in the group are holder-managed by mainly male holders (94%) of almost sample average age (53 years). The holder and his family provide 90 per cent of the regular farm labour and only 4 per cent of holders have employment other than on the holding. The median educational level of the holder-manager is primary, which possibly explains why only 21 per cent keep farm accounts. Nevertheless the value of co-operative membership is appreciated by the group which has the highest value of this variable (3 co-operative memberships). Of the agricultural land, 72% is owned and 27% rented. The regional distribution of these holdings is limited, 54% being in Luxembourg and a further 21% in Germany.

Class 2 Small Arable/Mixed Livestock Farms
(61 holdings)

Smaller holdings (4 hectares) appear in this group. 58 per cent of the land use is for a reasonable variety of arable crops and 36 per cent is devoted to permanent pasture. With 16 per cent of the land producing rootcrops, these farms are well above average for the sample as a whole. Although only a small area of permanent crops exists (2.3%), some 30 per cent of holdings grow other crops in association with their plantations or orchards. Livestock is inconspicuously spread between the various types although dairy and other cattle represent nearly 50 per cent of the total. 98% of the farm labour derives from the holder or his family and

73 per cent are in the 45-65 age group, which reflects the age of holders at 57 years. Again the holdings are exclusively holder-managed by male holders, 26 per cent of whom have other gainful work. There is an almost even split between owned and rented agricultural land and none is held as a sharecropper. At first sight, capital intensitivity appears quite low with only 21 per cent owning a tractor, 13 per cent with cultivators and none with owned harvesters or milking machines. However, 89 per cent make use of shared or rented equipment, and for their size machine accesses per 10 hectares are high at 7.4. 67 per cent of the holdings in the class are in the Benelux countries.

Class 3 Large, Corporately Owned, Unintensive Farms (24 holdings)

The conspicuous features of these large holdings (54 hectares) are that they are mainly corporately owned (83%), they have a higher proportion of other land (18%) and appear unintensively worked with only 17.5 standard head of livestock and an average of 2.4 machine accesses per holding. With the biggest single land use being pasture (40%), the absence of intensive husbandry appears evident. Of course, the quality of the pasture determines the density of livestock and from the relative importance of sheep and goats (11.6% of total standard livestock), it might be inferred that rougher grazing figures significantly in their pasture area. The two other largest land uses on these holdings are for permanent crops (27%) and cereal production (17%). Although large, only 70% of these holdings own a tractor, 17% a cultivator and 8% any type of harvester. While 54 per cent use shared or agency machinery, 12.5 per cent still employ draft animals in working the land. All in all, a picture of rather unsophisticated farming emerges. The holdings which are almost exclusively owned by the corporate holders are mainly found in Italy (46%).

Class 4 Medium Cereal/Arable Farms - Sharecropping
(28 holdings)

All of these medium sized holdings (14 hectares) are in Italy. Livestock rearing is insignificant with only 13 per cent of agricultural land being permanent pasture. Like Class 3 holdings, they have a relatively high proportion of marginal land (4%) and other land (19%). Cereal production is the single major activity (40% of land) with other arable production taking up a further 36 per cent and vineyards and other permanent crops 8.5% together. A notable feature of the class is that 82% of holdings grow successive and intermediate crops, and 43% permanent and associate crops. Dairy cows and other cattle rearing represent 76% of their limited livestock. Once again, capital intensivity is low on all counts, with the exception of cultivator ownership at 29 per cent of holdings. The exclusively male, agriculturally uneducated, holder-managers own 54% of their land and share-crop a further 39%. Only 7% keep accounts, 18% have other employment, and very little commercial activity exists in terms of contracted crops or co-operative membership.

Class 5 Very Small Horticultural Holdings
(10 holdings)

Horticultural activities completely separate this class of market-gardening operations (1.2 hectares) from other holdings. 78 per cent of land is used for horticulture while a further 12 per cent is under permanent crops. With the exception of a small amount of "other arable crops", none of the traditional farm crops (eg cereal, roots) are grown. The total production system with high labour inputs in total (2.5 A.W.U.'s) and per 10 hectares (30 A.W.U.'s), high capital inputs (12.7 machine accesses per 10 hectares), 24 per cent of used agricultural land under glass and 80 per cent of holdings owning cultivators, is consistent with this type of agricultural activity. As would be expected, all the holdings in this horticulture class are holder-managed, by above averagely-educated managers, 60 per cent of whom keep accounts. The holdings are evenly distributed among the six EEC countries in 1966.

Class 6 Small Mixed Arable/Cattle/Permanent Crops - Elderly Holders (33 holdings)

The outstanding characteristics of this class are the high proportion of vineyards (26% of land) and the fact that almost all the labour is provided by older (69 years) owner-holder-managers. In practice, these are small, mixed farms (3.3 hectares) with on average 39 per cent permanent pasture, 40 per cent arable land and 12 per cent of other permanent crops in addition to the vineyard area. Within this summary picture there are many variations in land use. However, there does appear to be generally a low level of capital inputs with only 12 per cent owning tractors, 27 per cent cultivators, 3 per cent harvesters and milking machines, and 27 per cent relying on draft animals. Completing the impression of tired and old-fashioned land husbandry is the fact that only 18 per cent keep accounts, there is no contracted production, and the agricultural education of the holders is typically low or non-existent. Holdings of this type are found in all countries and are representative of the low productivity units with older holders reported in Britain by the Agricultural EDC (1973).

Class 7 Small Permanent Crop Farms - Unintensive Sharecropping (10 holdings)

70 per cent of the agricultural land of these farms is held as a sharecropper and only 20 per cent is owned. All show a startling absence of any owned capital equipment. 90 per cent use draft animals and indeed horses represent 40 per cent of the total standard livestock. The predominant land use is the growing of vines and permanent crops (together 52%). Cereal production represents a further 28% of land use,

while 9 per cent of total agricultural land is unused and 16 per cent of the total holding area is woodland and other land. None of the managers has any relevant education, only 10 per cent keep accounts, and there is no co-operative membership or contracting of crops at all. 30 per cent of holders have work in addition to the holding. Italy is again the main location of such holdings.

Class 8 Medium Dairy/Cattle/Cereal Farms
(72 holdings)

This large class of typical medium sized mixed arable/dairy holdings has 20 hectares of land on average. Nearly half the land is under grass, 30 per cent produces various cereals, and a further 20 per cent is used for other arable crops. Of the livestock, 47 per cent are dairy cows, 35 per cent other cattle, and 13 per cent pigs. 60 per cent of the labour is in the 45-65 age group, as are the majority of holders. Capital equipment ownership, sharing and renting is moderately high, and land tenure a mixture of ownership and renting. In general, a group of "average" holdings found in most countries of the EEC.

Class 9 Medium Dairy/Cattle Farms
(16 holdings)

Of a similar size to Class 8, these holdings have 19 hectares of land, 99.1 per cent of which is under permanent pasture. Consistent with this land use situation is the fact that 71 per cent of livestock is dairy cows and a further 18 per cent other cattle. Because of the cattle rearing nature of these farms, there is little ownership of tractors, cultivators and harvesters. 56 per cent of holdings do own milking machines and 63 per cent make use of shared or rented machinery. Land is mainly rented (83%) by the holder-managers of these farm units, who have a higher-than-average educational level. Accounts are kept in 75 per cent of cases, and only 6 per cent of holders have off-farm employment. 11 of these 16 holdings are in Holland.

Class 10 Large Arable Farms
(13 holdings)

With over 60 hectares of land this class of holdings is made up of the biggest farms and the most committed to arable crop production. (Cereal 44%, Root Crops 34%, Other Arable 6.4%, and Industrial Plants 4.2%). Of the 3.9 annual work units' labour input, only 40 per cent is family labour on exclusively holder-managed farms. As might be expected, capital equipment levels are high with 92% of farms owning tractors, 62% harvesters, and 100% making use of shared and rented appliances. The low emphasis on dairy cattle (13%) is reflected in a low ownership of milking machines (7.7% of holdings). Most managers have at least secondary level education and are younger than the sample average at 48 years. 85 per cent keep accounts for their mainly rented farms (67% rented), and make considerable use of co-operatives (3 on average) and contracting arrangements for produce (62%). Again, a high proportion (69%) are in Holland.

Class 11 Medium Dairy/Cereal Farms - Young Holders
(48 holdings)

The youth of the holders (37 years) characterises these mixed cattle/cereal producing farms of medium size (21 hectares). Cereal production (34%) and permanent pasture (43%) are the main land uses. Of the 24 head of standard livestock, 80 per cent are dairy cows and other cattle, and 17 per cent pigs. Reflecting the holders' age, the regular labour is mainly under 45 years of age. More of the land is rented (70%) than owned (29%). Educational levels of holders are not especially high nor are the number of holdings keeping accounts (23%). Tractor ownership is high at 83 per cent and 50 per cent own milking machines, although in other respects there is obvious heavy reliance on sharing and renting capital equipment (94% doing this). With the exception of Italy, the geographical distribution of these holdings is even and widespread.

Class 12 Small/Medium Mixed - Young Holders
(41 holdings)

In many respects this class is similar to Class 11 in being mixed arable/pasture with young holders. The major differences are the holding size (6 hectares) and the consequential lower level of machine ownership and access, a much higher proportion of outside work by the holders (68%) and a lower level of holdings with accounts (7%). The land holding is more evenly distributed between ownership and tenancy than in Class 11, although the holdings have a similar geographical spread.

Class 13 Small/Medium Livestock/Permanent Crops/Arable
(47 holdings)

Of not dissimilar average size to Class 11 and 12, the farms in this class have a lower emphasis on pasture (32.6%) and much more concentration on vineyards and other permanent crops (9.4% and 28% of land use respectively). Arable crops amount to only 23 per cent of used agricultural land. As is noticeable in certain other classes with a high Italian representation (59% in this case), cattle rearing is relatively less important than sheep and goats (at 14% the highest of all groups) and in this case poultry (also 14%). The land is mainly owned (93%) and the male holder-managers are older than in the previous two classes at 55 years. Again, a high proportion of holders work in addition to running the holding (62%), which is perhaps associated with the 6 per cent keeping holding accounts. Both membership of co-operatives and the contracting of crops is low, as is somewhat unexpectedly the growing of permanent and associated crops.

Class 14 Small/Medium Cattle/Arable/Farms - Female Holders

27 of the 29 holdings in this group are held by women with no agricultural education at all. Only 3 per cent keep accounts (the lowest proportion in any class) which together with an average age of 58 suggests that a high proportion may be widows who have taken over the running of these 7 hectare farms on the death of their husbands. Representation of holdings in the class across the European countries is consistent with this interpretation as is the predominance of permanent pasture (49%) over other land uses. Although cattle rearing (48% of livestock) is important, pigs and poultry (together 16%) are also significant here. Land is 83 per cent owned by holders in this class.

Class 15 Small/Medium Pig/Subsistence Farms
(7 holdings)

Averaging only 7.7 hectares these holdings are noteworthy in having 93 standard livestock (22.4 per hectare), 91.6 per cent of which are pigs. This suggests that the 47 per cent of permanent pasture is not intensively used for cattle rearing and that other than subsistence plots (18.1% of land) and vineyards (14.2%) cultivation is a fairly peripheral activity. This is reinforced when one observes that 71 per cent of the holder managers have employment outside the holdings. Nevertheless, 57 per cent (ie four holdings) keep accounts and two of the seven have contracted their output. In this group, characterised by the special importance of pigs, there is undoubtedly a mixture of subsistence peasant holdings and intensive pig units producing bacon and pork commercially (eg the 4 in Holland).

That the clustering has achieved a meaningful and useful partitioning of holdings is evident. Quite distinctively different production units have emerged in terms of a range of operational variables. Size land use, animal husbandry, land tenure and management types and

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS — VARIABLES

GROUP	S01	S02	S03	S04	S05	L01	L02	L03	L04	L05	SIZE
1	0.4349E 04	0.3733E 04	0.3728E 02	0.2961E 01	0.4812E 01	0.4136E 02	0.5808E 01	0.2840E 00	0.4063E-01	0.1048E 02	48
2	0.4091E 03	0.3911E 03	0.4422E 01	0.1313E 01	0.2016E 01	0.2737E 02	0.1563E 02	0.1106E 01	0.4710E 01	0.1058E 02	61
3	0.5396E 04	0.4672E 04	0.1745E 02	0.2748E 01	0.2375E 01	0.1709E 02	0.4065E 01	0.5654E 00	0.4500E-01	0.7895E 01	24
4	0.1401E 04	0.1034E 04	0.5704E 01	0.2418E 01	0.1821E 01	0.4037E 02	0.2890E 01	0.0000E 00	0.1625E 00	0.3312E 02	28
5	0.1217E 03	0.9610E 02	0.6000E-01	0.2484E 01	0.1500E 01	0.0000E 00	0.0000E 00	0.0000E 00	0.7812E 02	0.2867E 01	10
6	0.3262E 03	0.3125E 03	0.2711E 01	0.1054E 01	0.1324E 01	0.1630E 02	0.2104E 01	0.0000E 00	0.0000E 00	0.2279E 01	33
7	0.3896E 03	0.2736E 03	0.5400E 00	0.1113E 01	0.7000E 00	0.2743E 02	0.2798E 01	0.0000E 00	0.0000E 00	0.4031E 01	10
8	0.1999E 04	0.1821E 04	0.2005E 02	0.2275E 01	0.3486E 01	0.3036E 02	0.7666E 01	0.2432E 00	0.4514E-01	0.1236E 02	72
9	0.1908E 04	0.1782E 04	0.2332E 02	0.1558E 01	0.1687E 01	0.0000E 00	0.2994E 00	0.0000E 00	0.4675E 00	0.0000E 00	16
10	0.6023E 04	0.5558E 04	0.2044E 02	0.3875E 01	0.6154E 01	0.4407E 02	0.3359E 02	0.4151E 01	0.3879E 01	0.6445E 01	13
11	0.2052E 04	0.1970E 04	0.2422E 02	0.1843E 01	0.3708E 01	0.3410E 02	0.1068E 02	0.5725E 00	0.4048E 00	0.9309E 01	48
12	0.5979E 03	0.4953E 03	0.5436E 01	0.1049E 01	0.1390E 01	0.2584E 02	0.9379E 01	0.0000E 00	0.1300E 00	0.7066E 01	41
13	0.7410E 03	0.6034E 03	0.3282E 01	0.1062E 01	0.3830E 00	0.1562E 02	0.4426E 01	0.0000E 00	0.3404E-02	0.2126E 01	47
14	0.6877E 03	0.6051E 03	0.4527E 01	0.1144E 01	0.1345E 01	0.1729E 02	0.6489E 01	0.0000E 00	0.8621E-01	0.1003E 02	29
15	0.7687E 03	0.6747E 03	0.9310E 02	0.1246E 01	0.1000E 01	0.1841E 01	0.3850E 01	0.0000E 00	0.8929E 01	0.6303E 01	7
TOTAL	0.1754E 04	0.1551E 04	0.1475E 02	0.1826E 01	0.2435E 01	0.2610E 02	0.7848E 01	0.3976E 00	0.2520E 01	0.9352E 01	487

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS — VARIABLES

GROUP	L06	L07	L08	L09	L10	L11	L12	L13	L14	A01	SIZE
1	0.4469E 00	0.2050E 00	0.4115E 02	0.0000E 00	0.2185E 00	0.2794E 00	0.1198E 02	0.0000E 00	0.1250E 00	0.3571E 00	48
2	0.1104E 01	0.1070E 01	0.3603E 02	0.1142E 01	0.1260E 01	0.5323E 00	0.5652E 01	0.6557E-01	0.2951E 00	0.7059E 01	61
3	0.2712E 01	0.5979E 00	0.3959E 02	0.3312E 00	0.2711E 02	0.1707E 01	0.1827E 02	0.1667E 00	0.0000E 00	0.1429E 00	24
4	0.9543E 00	0.4654E 00	0.1340E 02	0.3259E 01	0.5385E 01	0.4032E 01	0.1904E 02	0.8214E 00	0.4286E 00	0.1872E 01	28
5	0.6210E 00	0.0000E 00	0.6211E 01	0.6250E 00	0.1156E 02	0.5966E 01	0.2065E 02	0.1000E 00	0.0000E 00	0.0000E 00	10
6	0.8470E 00	0.1783E 01	0.3865E 02	0.2566E 02	0.1239E 02	0.6088E 00	0.6223E 01	0.9091E-01	0.6061E-01	0.6030E 00	33
7	0.5222E 01	0.6910E 00	0.7846E 01	0.1201E 02	0.3967E 02	0.9155E 01	0.1550E 02	0.5000E 00	0.0000E 00	0.4000E 02	10
8	0.3754E 00	0.3224E 00	0.4708E 02	0.7162E 00	0.8326E 00	0.7601E 00	0.6710E 01	0.1389E-01	0.2917E 00	0.2284E 01	72
9	0.0000E 00	0.1437E-01	0.9910E 02	0.0000E 00	0.1169E 00	0.0000E 00	0.6651E 01	0.0000E 00	0.0000E 00	0.2855E 01	16
10	0.9231E-01	0.1392E 00	0.7628E 01	0.0000E 00	0.0000E 00	0.0000E 00	0.7674E 01	0.0000E 00	0.3846E 00	0.1179E 02	13
11	0.6331E 00	0.3848E 00	0.4256E 02	0.8090E 00	0.5471E 00	0.7729E-01	0.3634E 01	0.4167E-01	0.3125E 00	0.1281E 01	48
12	0.7090E 00	0.1301E 01	0.4548E 02	0.6827E 00	0.9406E 01	0.6629E 00	0.7439E 01	0.4878E-01	0.2439E 00	0.2816E 01	41
13	0.3549E 01	0.4716E 01	0.3259E 02	0.9415E 01	0.2756E 02	0.6384E 01	0.1645E 02	0.1277E 00	0.2128E-01	0.4049E 01	47
14	0.4352E 00	0.6997E 00	0.4902E 02	0.1358E 01	0.1459E 02	0.1755E 01	0.5509E 01	0.6897E-01	0.3103E 00	0.4261E 01	29
15	0.0000E 00	0.1812E 02	0.4679E 02	0.1416E 02	0.0000E 00	0.4977E 01	0.1645E 02	0.1429E 00	0.2857E 00	0.4657E 00	7
TOTAL	0.1097E 01	0.1302E 01	0.3938E 02	0.3781E 01	0.8225E 01	0.1734E 01	0.9600E 01	0.1109E 00	0.2074E 00	0.3657E 01	487

Table 4.9 Operational Variable Means - 15 Cluster Classes - Sample A

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS — VARIABLES

GROUP	A02	A03	A04	A05	A06	A07	W01	W02	W03	W04	SIZE
1	0.4314E 02	0.3900E 02	0.1846E 00	0.1483E 02	0.2485E 01	0.9754E 00	0.9629E 00	0.8951E 02	0.1080E 02	0.2733E 02	48
2	0.2442E 02	0.2527E 02	0.1434E 01	0.1491E 02	0.3924E 01	0.1059E 01	0.4053E 01	0.9776E 02	0.8716E 01	0.3115E 01	61
3	0.1058E 02	0.7425E 01	0.1164E 02	0.1553E 02	0.8841E 01	0.7113E 00	0.9475E 00	0.5380E 01	0.3819E 01	0.1486E 02	24
4	0.3240E 02	0.4375E 02	0.2085E 01	0.7093E 01	0.2080E 01	0.5486E 00	0.3602E 01	0.8564E 02	0.1292E 02	0.8274E 01	28
5	0.0000E 00	0.0000E 00	0.1000E 02	0.1000E 02	0.0000E 00	0.3800E-01	0.3006E 02	0.7687E 02	0.9166E 01	0.1250E 02	10
6	0.2056E 02	0.1329E 02	0.6303E-01	0.1730E 02	0.2729E 01	0.9191E 00	0.4261E 01	0.9116E 02	0.0000E 00	0.4978E 01	33
7	0.6667E 01	0.3333E 01	0.0000E 00	0.0000E 00	0.0000E 00	0.1450E 00	0.4065E 01	0.5295E 02	0.6667E 01	0.0000E 00	10
8	0.4735E 02	0.3472E 02	0.3262E 00	0.1319E 02	0.2127E 01	0.1239E 01	0.1521E 01	0.9486E 02	0.1665E 02	0.1062E 02	72
9	0.7070E 02	0.1843E 02	0.6437E 00	0.6989E 01	0.3825E 00	0.2072E 01	0.2100E 01	0.8762E 02	0.1042E 02	0.1458E 02	16
10	0.1361E 02	0.2032E 02	0.0000E 00	0.1209E 02	0.2825E 01	0.3515E 00	0.1002E 01	0.4043E 02	0.5458E 01	0.3079E 02	13
11	0.4092E 02	0.3947E 02	0.5000E-02	0.1714E 02	0.1186E 01	0.1391E 01	0.1244E 01	0.9747E 02	0.9722E 01	0.2778E 02	48
12	0.2812E 02	0.3158E 02	0.2746E 01	0.1461E 02	0.6105E 00	0.1203E 01	0.3964E 01	0.9762E 02	0.1220E 01	0.2541E 02	41
13	0.7012E 01	0.5806E 01	0.1416E 02	0.6850E 01	0.1319E 02	0.5257E 00	0.4173E 01	0.8356E 02	0.3191E 01	0.6206E 01	47
14	0.3241E 02	0.1579E 02	0.1157E 01	0.1031E 02	0.5033E 01	0.1140E 01	0.3705E 01	0.8379E 02	0.4023E 01	0.5747E 01	29
15	0.1744E 01	0.2939E 01	0.1557E 00	0.9157E 02	0.3129E 01	0.2239E 02	0.1230E 02	0.8482E 02	0.1667E 02	0.1429E 02	7
TOTAL	0.2994E 02	0.2523E 02	0.2840E 01	0.1392E 02	0.3671E 01	0.1301E 01	0.3423E 01	0.8518E 02	0.8207E 01	0.1378E 02	487

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS — VARIABLES

GROUP	W05	W06	W07	M01	M02	M03	M04	M05	M06	M07	SIZE
1	0.1618E 02	0.2781E 02	0.1788E 02	0.1000E 01	0.6250E-01	0.8333E 00	0.6250E 00	0.9375E 00	0.0000E 00	0.0000E 00	48
2	0.6339E 01	0.7172E 02	0.1011E 02	0.2131E 00	0.1311E 00	0.0000E 00	0.8852E 00	0.0000E 00	0.1652E 00	0.0000E 00	61
3	0.2133E 02	0.4006E 02	0.3264E 01	0.7083E 00	0.1667E 00	0.8333E-01	0.5417E 00	0.1250E 00	0.0000E 00	0.1250E 00	24
4	0.3214E 02	0.4369E 02	0.2976E 01	0.3214E 00	0.2857E 00	0.7143E-01	0.6429E 00	0.7143E-01	0.0000E 00	0.0000E 00	28
5	0.2500E 02	0.3417E 02	0.1917E 02	0.0000E 00	0.8000E 00	0.0000E 00	0.2000E 00	0.0000E 00	0.2397E 02	0.2000E 00	10
6	0.6948E 01	0.1446E 02	0.7361E 02	0.1212E 00	0.2727E 00	0.3030E-01	0.6667E 00	0.3030E-01	0.0000E 00	0.2727E 00	33
7	0.1000E 02	0.2333E 02	0.4000E 02	0.0000E 00	0.0000E 00	0.0000E 00	0.5000E 00	0.0000E 00	0.0000E 00	0.9000E 00	10
8	0.7222E 01	0.5979E 02	0.5734E 01	0.7917E 00	0.8333E-01	0.1389E 00	0.8889E 00	0.5278E 00	0.4861E-02	0.0000E 00	72
9	0.1875E 02	0.4375E 02	0.1250E 02	0.2500E 00	0.6250E-01	0.0000E 00	0.6250E 00	0.5625E 00	0.4137E 00	0.0000E 00	16
10	0.2784E 02	0.3592E 02	0.0000E 00	0.9231E 00	0.1538E 00	0.6154E 00	0.1000E 01	0.7692E-01	0.0000E 00	0.7692E-01	13
11	0.5347E 02	0.1736E 01	0.7291E 01	0.8333E 00	0.2083E-01	0.1667E 00	0.9375E 00	0.5000E 00	0.0000E 00	0.0000E 00	48
12	0.6504E 02	0.5488E 01	0.2846E 01	0.2927E 00	0.9756E-01	0.0000E 00	0.6341E 00	0.0000E 00	0.0000E 00	0.0000E 00	41
13	0.9929E 01	0.7500E 02	0.5674E 01	0.6383E-01	0.8511E-01	0.0000E 00	0.2340E 00	0.0000E 00	0.0000E 00	0.6383E-01	47
14	0.1724E 02	0.4655E 02	0.2299E 02	0.2069E 00	0.1034E 00	0.0000E 00	0.6552E 00	0.6897E-01	0.0000E 00	0.6897E-01	29
15	0.1429E 02	0.5476E 02	0.0000E 00	0.2857E 00	0.0000E 00	0.0000E 00	0.4286E 00	0.1429E 00	0.1786E 01	0.0000E 00	7
TOTAL	0.2184E 02	0.4104E 02	0.1370E 02	0.4661E 00	0.1243E 00	0.1458E 00	0.6879E 00	0.2587E 00	0.5529E 00	0.5955E-01	487

Table 4.9 (Continued)

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS — VARIABLES

GROUP	A02	A03	A04	A05	A06	A07	W01	W02	W03	W04	SIZE
1	0.4314E 02	0.3900E 02	0.1846E 00	0.1483E 02	0.2485E 01	0.9754E 00	0.9629E 00	0.8951E 02	0.1080E 02	0.2733E 02	48
2	0.2442E 02	0.2527E 02	0.1434E 01	0.1401E 02	0.3944E 01	0.1059E 01	0.4053E 01	0.9776E 02	0.8716E 01	0.3115E 01	61
3	0.1058E 02	0.7425E 01	0.1104E 02	0.1553E 02	0.8841E 01	0.7113E 00	0.9475E 00	0.5380E 01	0.3619E 01	0.1486E 02	24
4	0.3240E 02	0.4375E 02	0.2085E 01	0.7003E 01	0.2080E 01	0.5486E 00	0.3602E 01	0.8564E 02	0.1292E 02	0.8274E 01	28
5	0.0000E 00	0.0000E 00	0.1000E 02	0.1000E 02	0.0000E 00	0.3800E-01	0.3006E 02	0.7687E 02	0.9166E 01	0.1250E 02	10
6	0.2056E 02	0.1329E 02	0.6303E-01	0.1730E 02	0.2729E 01	0.9191E 00	0.4261E 01	0.9116E 02	0.0000E 00	0.4978E 01	33
7	0.6667E 01	0.3333E 01	0.0000E 00	0.0000E 00	0.0000E 00	0.1450E 00	0.4065E 01	0.5293E 02	0.6667E 01	0.0000E 00	10
8	0.4735E 02	0.3472E 02	0.3262E 00	0.1319E 02	0.2127E 01	0.1239E 01	0.1521E 01	0.9486E 02	0.1665E 02	0.1062E 02	72
9	0.7070E 02	0.1843E 02	0.6437E 00	0.6989E 01	0.3825E 00	0.2072E 01	0.2100E 01	0.8762E 02	0.1042E 02	0.1458E 02	16
10	0.1361E 02	0.2032E 02	0.0000E 00	0.1299E 02	0.2825E 01	0.3515E 00	0.1002E 01	0.4043E 02	0.5458E 01	0.3079E 02	13
11	0.4092E 02	0.3947E 02	0.5000E-02	0.1714E 02	0.1186E 01	0.1391E 01	0.1244E 01	0.9747E 02	0.9722E 01	0.2778E 02	48
12	0.2812E 02	0.3158E 02	0.2746E 01	0.1461E 02	0.6105E 00	0.1203E 01	0.3964E 01	0.9762E 02	0.1220E 01	0.2541E 02	41
13	0.7012E 01	0.5806E 01	0.1416E 02	0.6850E 01	0.1319E 02	0.5257E 00	0.4173E 01	0.8356E 02	0.3191E 01	0.6206E 01	47
14	0.3241E 02	0.1579E 02	0.1157E 01	0.1031E 02	0.5033E 01	0.1140E 01	0.3705E 01	0.8379E 02	0.4023E 01	0.5747E 01	29
15	0.1744E 01	0.2939E 01	0.1557E 00	0.9157E 02	0.3129E 01	0.2239E 02	0.1230E 02	0.8482E 02	0.1667E 02	0.1429E 02	7
TOTAL	0.2994E 02	0.2523E 02	0.2840E 01	0.1392E 02	0.3671E 01	0.1301E 01	0.3423E 01	0.8518E 02	0.8207E 01	0.1378E 02	487

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS — VARIABLES

GROUP	W05	W06	W07	M01	M02	M03	M04	M05	M06	M07	SIZE
1	0.1618E 02	0.2781E 02	0.1788E 02	0.1000E 01	0.6250E-01	0.8333E 00	0.6250E 00	0.9375E 00	0.0000E 00	0.0000E 00	48
2	0.6339E 01	0.7172E 02	0.1011E 02	0.2131E 00	0.1311E 00	0.0000E 00	0.8852E 00	0.0000E 00	0.1652E 00	0.0000E 00	61
3	0.2135E 02	0.4006E 02	0.3604E 01	0.7083E 00	0.1667E 00	0.8333E-01	0.5417E 00	0.1250E 00	0.0000E 00	0.1250E 00	24
4	0.3214E 02	0.4369E 02	0.2976E 01	0.3214E 00	0.2857E 00	0.7143E-01	0.6429E 00	0.7143E-01	0.0000E 00	0.0000E 00	28
5	0.2500E 02	0.3417E 02	0.1917E 02	0.0000E 00	0.8000E 00	0.0000E 00	0.2000E 00	0.0000E 00	0.2397E 02	0.2000E 00	10
6	0.6948E 01	0.1446E 02	0.7301E 02	0.1212E 00	0.2727E 00	0.3030E-01	0.6667E 00	0.3030E-01	0.0000E 00	0.2727E 00	33
7	0.1000E 02	0.2333E 02	0.4000E 02	0.0000E 00	0.0000E 00	0.0000E 00	0.5000E 00	0.0000E 00	0.0000E 00	0.9000E 00	10
8	0.7222E 01	0.5979E 02	0.5734E 01	0.7917E 00	0.8333E-01	0.1389E 00	0.8889E 00	0.5278E 00	0.4861E-02	0.0000E 00	72
9	0.1875E 02	0.4375E 02	0.1250E 02	0.2500E 00	0.6250E-01	0.0000E 00	0.6250E 00	0.5625E 00	0.4137E 00	0.0000E 00	16
10	0.2784E 02	0.3592E 02	0.0000E 00	0.9231E 00	0.1538E 00	0.6154E 00	0.1000E 01	0.7692E-01	0.0000E 00	0.7692E-01	13
11	0.5347E 02	0.1736E 01	0.7291E 01	0.8333E 00	0.2083E-01	0.1667E 00	0.9375E 00	0.5000E 00	0.0000E 00	0.0000E 00	48
12	0.6504E 02	0.5488E 01	0.2846E 01	0.2927E 00	0.9756E-01	0.0000E 00	0.6341E 00	0.0000E 00	0.0000E 00	0.0000E 00	41
13	0.9929E 01	0.7500E 02	0.5674E 01	0.6383E-01	0.8511E-01	0.0000E 00	0.2340E 00	0.0000E 00	0.0000E 00	0.6383E-01	47
14	0.1724E 02	0.4655E 02	0.2299E 02	0.2069E 00	0.1034E 00	0.0000E 00	0.6552E 00	0.6897E-01	0.0000E 00	0.6897E-01	29
15	0.1429E 02	0.5476E 02	0.0000E 00	0.2857E 00	0.0000E 00	0.0000E 00	0.4286E 00	0.1429E 00	0.1786E 01	0.0000E 00	7
TOTAL	0.2184E 02	0.4104E 02	0.1370E 02	0.4661E 00	0.1283E 00	0.1458E 00	0.6879E 00	0.2587E 00	0.5529E 00	0.5955E-01	487

Table 4.9 (Continued)

Table 4.10 Univariate F-test of Differences in 15 Class Means - Sample A

WILKS LAMBDA (U-STATISTIC) AND UNIVARIATE F-RATIO

VARIABLE	WILKS LAMBDA	F
S01	.6134	21.2490
S02	.6373	19.1859
S03	.5879	23.6334
S04	.6350	19.3797
S05	.4054	49.4390
L01	.7732	9.8876
L02	.7555	10.9092
L03	.9095	3.3561
L04	.3017	78.0257
L05	.8118	7.8144
L06	.9542	1.6199
L07	.8749	4.8219
L08	.7854	9.2143
L09	.7972	8.5765
L10	.8042	8.2085
L11	.9063	3.4855
L12	.8682	5.1198
L13	.6262	20.1277
L14	.8883	4.2380
A01	.8065	8.0911
A02	.7044	14.1451
A03	.7588	10.7172
A04	.8960	3.9123
A05	.8188	7.4624
A06	.9346	2.3575
A07	.3830	54.3016
W01	.6518	18.0095
W02	.4410	42.7285
W03	.9086	3.3897
W04	.8600	5.4877
W05	.6835	15.6129
W06	.5948	22.9636
W07	.5966	22.7994
M01	.5343	29.3797
M02	.8625	5.3731
M03	.4894	35.1748
M04	.7761	9.7283
M05	.4902	35.0568
M06	.5981	22.6522
M07	.6330	19.5461
M08	.7791	9.5582
H01	.2978	79.4898
H02	.7579	10.7707
H03	.2208	118.9643
H04	.3153	73.2295
H05	.5486	27.7370
H06	.7268	12.6741
G01	.6898	15.1622
G02	.6441	18.6264
G03	.5714	25.2883
G04	.8111	7.8527
G05	.7159	13.3763
G06	.8556	5.6889

WITH 14 AND 472 DEGREES OF FREEDOM

$F_{0.01} = 2.64$

practices are all contributing to the classification. That these variables in some cases appear to be correlates of the country of origin, climatic variations and consequential soil types, is not surprising even though these were never included as factors in the clustering. The preponderance of sharecropping in Italy with its associated production system is clearly due to historical, economic and legal forces peculiar to that country. Similar observations apply to Luxembourg and Germany in relation to Class 1, with its much more capital intensive farms.

The evidence overall supports the view that a 15-fold categorisation of European holdings is both statistically and agriculturally valid. This is not to say that schemes with more or less classes would be any less valid for describing the pattern of agriculture for specific purposes.[1] However, the *raison d'etre* of this research is to demonstrate the feasibility and superiority of classification construction by an analytic procedure rather from a totally subjective approach. These early results provide at least a partial vindication of this fundemantal hypothesis.

4.4 Experiments A to F

Before drawing further conclusions about the classification described above, it is necessary to know how sensitive it is to variations in the clustering parameters and variable treatment employed. To this end Experiments A to F were conducted, the detailed results of which are reported in Appendix F. In each case the within class sum of squares, Beale test results and explanatory power, are shown and compared with the corresponding results from the control experiment. Additionally, the distribution of holdings between each experimental classification and the control group is shown by two sample cross-tabulations, the first for 15 classes and the second for 10. Inevitably,

1 Appendix E gives the means of variables for 20 and 10 groups.

the class numbering is arbitrary in each cluster analysis, being a function of the manner in which the algorithm has redistributed observations and fused classes. Therefore, to show more forcefully the similarities between a number of the experimental analyses, these arbitrary class numbers are sometimes rearranged to maximise the magnitude of the elements on the principal diagonal of the contingency tables.

Experiment A shows that increasing the number of iterations at each round in the clustering makes virtually no difference to the within group sum of squares, and even less to the explanatory power of the classification. With 10 classes of holdings only one observation is in a different class between the 2 iteration and the 4 and 6 iteration analyses. Admittedly the picture is somewhat less conclusive when one looks at the 15 class contingency table. Nevertheless, the volatility of a maximum of 20% of holdings in no significant way improves the classification, and indicates that in such heterogeneous data as this some holdings are likely to be very marginal to several classes and may be allocated validly to any one of these without great injustice or error arising. It may, of course, be that the increase in iterations has occasioned movement of observations from class to class because the criterion for justifying movement in the clustering program has been set too finely. Whichever explanation is correct, the criticism of this type of optimisation-partition technique as being too expensive to employ is at least partially answered by the already rapid and potentially more rapid convergence of the algorithm to a near optimal solution after two iterations.

Almost identical conclusions are reached from Experiments B and E. Whether one starts with 30, 25 or 20 initial seeding classes, based on subdivision of principal component scores, very similar results are obtained in all criteria once a fusion to 15 or fewer clusters has taken place. It is remarkable that this observation is equally valid when the *a priori* class codes are used to seed the procedure. As was seen from Table 4.7, there is very little resemblance between the *a priori* classification and the cluster classification. Nevertheless, the algorithm quickly converges to the same solution as before, which points both to its efficiency and the class structure stability in the data.

Experiments C, D and F are all concerned with modifying the variable pattern used in clustering and it is here that the most noticeable differences in the clustering results arise. The least pronounced changes are associated with the movement from 10 to 15 and 20 component variables in clustering. When it is remembered that the computation rises exponentially with the increase in the number of variables entering the cluster analysis, the benefits of such a doubling of the number of components seems dubious. With a group of 15 clusters, the explanatory power of the classification has risen from 31.5% to only 33.3%. Inevitably, this small improvement is due in part to subdivision into separate classes of observations which are more extreme with respect to the higher numbered components. However, the earlier arguments concerning the uniqueness and specificity of the data variance measured by such components would suggest that such small classes lack generality and are not of use in a multi-purpose classification scheme. Their presence undoubtedly explains the apparent significance in the Beale-tests of higher numbers of clusters when 15 or 20 components are used.

From Experiment D one finds that standardisation of component scores to unit variance prior to clustering has not radically changed the classification efficiency. The explanatory power of both Analysis I and VIII are identical with 15 to 18 classes, and Analysis VIII results are only slightly lower in each other case. There are more obvious differences in class composition but this is to be expected when one recalls that the weighting of the first component to the tenth has changed from a ratio of nearly 4 : 1 to 1 : 1 with standardisation of the component variables. Relatively more weight is given to the lower numbered components on the grounds of the factor analyst that these represent equally important dimensions. One has an alternative classification in this case, rather than a less efficient one, so that pen-portraits could be drawn for these and evaluated.[1]

The effect of using unstandardised variables in principal component analysis to provide data for clustering is much more dramatic. The total and agricultural land area-dominated unstandardised component scores produce a classification of considerable inferiority to both the principal-activity *a priori* scheme and the cluster classification. Even with 20 classes, only 6.8% of the data variance is accounted for by the farm holding groups. As anticipated, the situation is greatly improved when component standardisation is initiated, but nevertheless the explanatory power of the model is substantially lower (only 25% with 15 classes) than in Analyses I and VIII.

Experiment F, which evaluates the consequences of starting with two arbitrary variable sub-sets, is quite encouraging. Whether one starts with the 27 odd-numbered variables or the 26 even-numbered variables, the explanatory powers of the classification with respect to all 53 operational variables is only moderately reduced. With 15 classes and 10 component variables, the 27 variable analysis explains 27.3% of total sample variance and the 26 variable analysis 29.0%. The corresponding figures for 5 components are 23.2% and 27.4%. This leads to the inference that underlying dimensionality in the farm data may be revealed by various combinations of variables and that a less crude and more

1 Appendix G presents the means of variables for 20, 15 and 10 classes based on clustering of standardised component score data.

thoughtful reduction and redefinition of variables might be undertaken. Savings in computer time and cost requirements would certainly accrue from this.

4.5 Experimental Analysis I - Discrimination and Assignment Results

The 10-fold clustering of agricultural holdings was taken as the discriminant analysis standard of reference for Experimental Analysis I in order to illustrate the use of this particular classification structure which the Beale Tests had indicated to be statistically valid. In addition, in the several experimental analyses to be undertaken within Experiment G, computing costs would be minimised by testing for the effect of changes in numbers of discriminating variables, discriminating functions, etc. on a 10 rather than 15 or 20 class problem. Inferences drawn from the 10 class experiments (Analyses I, XVI to XXIV) could then be applied to the finer class breakdowns of holdings for evaluation (Analyses XXV and XXVI).

Table 4.11 provides the evidence from the stepwise MANOVA concerning the relative value of discriminating variables. It should be reiterated that the F statistics tabulated there are multivariate-partial F ratios and show the extent of group or class differences with respect to the new variable, after the effect of the existing discriminating variables has been taken into account. Thus the only entry in Table 4.11 which is identical to the univariate F-test results reported in Appendix E for 10 groups, is the first where for H01 the F value is 223.7. Comparison of these two tables further confirms the danger of relying on univariate evidence in the selection of discriminating variables. For example, both H03 and H04 have very high univariate F values, yet H03 is one of the three variables completely discarded by the MANOVA procedure as possessing

Table 4.11 Stepwise MANOVA Summary

- Sample A - 10 Classes

SUMMARY TABLE

Step Number	Variable Entered	Variable Removed	F to Enter or Remove
1	H01		223.70748
2	L04		144.91954
3	H04		124.70991
4	A07		84.70395
5	S05		49.50360
6	M06		36.15727
7	H05		29.94654
8	L13		20.12186
9	W06		19.63952
10	M07		18.00195
11	G02		13.68184
12	S04		11.41612
13	M03		11.02311
14	G01		10.05497
15	W07		10.06679
16	L09		10.13267
17	L10		10.36490
18	A04		7.09436
19	M05		6.68328
20	H06		6.34003
21	S02		5.95541
22	L07		5.94250
23	A03		4.82440
24	M08		4.90360
25	A02		4.70840
26	W03		4.01706
27	W02		3.80822
28	G05		3.75773
29	M01		3.00986
30	L12		2.80723
31	S03		2.90924
32	M02		2.65389
33	L08		2.30654
34	A01		1.95503
35	M04		1.78946
36	A06		1.54982
37	M02		1.46831
38	A05		1.37829
39	L11		1.34800
40	G06		1.32747
41	W01		1.22119
42	L02		1.17498
43	W05		1.12570
44	W04		2.74501
45	S01		.84289
46	L14		.67538
47	L05		.61062
48	L06		.55096
49	L01		.53992
50	G04		.28402

no additional discriminating information once H01 and H04 have been allowed for. The reason is clear when it is remembered that H03 = H01 - H04. On these three binary variables the possible values are as follows:

	H01	H03	H04
Male Holder Manager	1	0	1
Female Holder Manager	1	1	0
Corporate Holder	0	0	0

so that no extra information about a holding is provided by the third once any two are included. On the same reasoning one of the land use variables (in this case L03) and one of the land tenure variables (G01, G02 and G03) must be discarded leaving the fifty variables listed in Table 4.11.

The actual order in which variables have been selected for their discriminating power reflects major class differences revealed from the earlier pen portraits of 15 groups of farms, and those which could be produced for 10 and 20 classes from Appendix E. One class is separated from the others by virtue of having only corporately owned holdings (H01 discriminates on this), another because of the high proportion of horticultural land (L04), and a third which has mainly female holders (H04). Thus the most distinctive class differences produced by clustering are represented by the most "significant" discriminatory variables. The more subtle class differences are revealed in a less pronounced manner by variables which have consequentially lower multivariate partial F values.

The decision to include the 25 most discriminating variables in Analysis I was based on the realisation that the data to hand was neither random nor multivariate-normal in certain planes. As the product of clustering no group of holdings could be deemed a random sample from a defined population while binary variables by their nature cannot be distributed normally. In view of these difficulties, the MANOVA F tests had to be treated as indicative and could not be rigorously interpreted from the standpoint of statistical significance. Seen in this way the cut-off at 25 discriminatory variables must be considered to be largely arbitrary and pragmatic, although it was partly based on the desirability of having representatives of each operational variable subset. Thus, of the twenty-five variables, three are size measures (S02, S04, S05), five are parameters of land use (L04, L07, L09, L10, L13), four indicate livestock husbandry practices (A02, A03, A04, A07), two are related to labour inputs (W06, W07), five are indices of capital intensitivity (M03, M05, M06, M07, M08), four pertain to the holder or manager (H01, H04, H05, H06), and two reflect general holding characteristics (G01 and G02). Ultimately, the performance of this set of variables, compared with alternative sets, in successfully assigning observations to groups, provides the acid test of acceptability of the decision.

Table 4.12 summarises the results of the discriminant analysis applied to the ten groups of farms and utilising the information on the 25 discriminating variables. It is evident that, although by the Wilks test criterion all functions are significant, only eight out of nine possible functions are needed to account for over 95 per cent of the variance of $W^{-1}B$. The nature of these functions is shown by the standardised function co-efficients which measure the relative importance of each operational variable to the dimensions defined. Not surprisingly, the first two functions are dominated by H01 and L04, which quite reasonably appear to be at extreme ends of a measurement

NUMBER REMØVED	EIGENVALUE	CANØNICAL CØRRELATIØN	PERCENT ØF TRACE	WILKS LAMBDA	CHI-SQUARE	D.F.	SIGNIFICANCE
0	6,54838	,93141	29,1	,00005	4667,07668	225	0,000
1	5,34259	,91779	23,7	,00036	3718,06092	192	0,000
2	3,22517	,87372	14,3	,00231	2850,75933	161	0,000
3	2,12249	,82447	9,4	,00975	2174,07118	132	0,000
4	1,87131	,80730	8,3	,03044	1639,48357	105	0,000
5	1,11478	,72604	5,0	,08740	1144,26993	80	0,000
6	,93368	,69488	4,1	,18484	792,63759	57	0,000
7	,80757	,66841	3,6	,35742	483,03674	36	0,000
8	,54783	,59492	2,4	,64607	205,10151	17	0,000

8 FUNCTIØNS WILL BE USED IN REMAINING ANALYSES

STANDARDIZED DISCRIMINANT FUNCTIØN CØEFFICIENTS

	1	2	3	4	5	6	7	8
S02	-,28650	,04712	-,12403	-,06775	,21565	,32518	-,18427	-,16610
S04	-,14274	-,26164	-,16203	-,18643	-,00001	-,30205	-,19045	,02383
S05	,24152	-,12343	-,14914	-,36507	,06367	,30424	-,04211	,16228
L04	,78721	-1,83938	,35259	-,24659	-,00108	,00353	,03146	-,10741
L07	-,05032	-,04829	,20627	-,07606	,31450	-,05770	,02994	-,11428
L09	,00387	-,00261	,26148	,28446	,20516	,37807	-,06374	,19776
L10	-,17987	-,13600	,05838	,32025	,13203	,15144	,26905	-,30123
L13	-,02322	-,03289	-,12250	,01036	,15440	-,50116	-,53927	,19389
A02	,16867	,05683	-,11609	-,20560	-,21485	-,07312	-,02885	,20085
A03	,15199	,06207	-,22597	-,15986	-,07826	-,33945	-,14995	,22545
A04	-,09387	-,19658	,02766	,18055	,00192	-,10573	,16954	-,15489
A07	-,15655	,09095	,69285	-,31022	1,34161	,05542	-,28926	,04094
W06	-,08644	,01254	,18895	,22329	-,25087	-,09076	-,11902	-,72935
W07	-,09735	-,01598	,40241	,32456	-,28317	,53537	-,20394	,24473
M03	,09299	,09423	-,26212	-,21995	,09605	,38224	-,10993	-,32776
M05	,00323	,05167	-,26260	-,18326	,16656	,25972	-,06994	-,23918
M06	,55170	-,81807	-,07011	-,00711	,03279	,06600	-,05768	,05052
M07	-,07553	-,11262	-,12352	,23118	-,04910	,47475	-,31683	,47369
M08	-,07704	,19804	,00381	-,04605	-,18595	-,05520	-,21161	,30852
H01	2,11567	,99016	,41821	,16530	,01383	,05095	-,16954	-,21897
H04	-,88873	,20928	1,22298	-,97053	-,63158	-,09327	,03068	,09279
H05	,06148	-,01698	,03667	,08451	-,09610	,07570	-,40684	-,54203
H06	,02040	,00357	,11383	,21617	,16279	-,10498	,35683	,10813
G01	-,17000	-,03859	,20296	-,03154	,00675	,81602	1,01193	-,09874
G02	,03088	-,00406	,22409	-,19980	-,07467	,81299	1,37483	,02976

CENTRØIDS ØF GRØUPS IN REDUCED SPACE

	1	2	3	4	5	6	7	8
GRØUP 1	,78263	,56911	-1,53605	-1,37015	,29940	,99773	-,31511	-,56565
GRØUP 2	,90481	,48333	,03119	,30243	-,51425	-,33281	,02104	-,44335
GRØUP 3	-8,87228	-3,87187	-2,16920	,17896	,39296	-,05674	,16717	,19317
GRØUP 4	,61508	,34087	-1,00780	,51390	,04425	-2,45717	-2,12479	,38136
GRØUP 5	6,27437	-12,80296	1,97150	-,69821	-,86754	,12430	,07282	,08905
GRØUP 6	-,34146	,54520	1,61122	2,69526	-,51736	2,23701	-1,37646	1,29710
GRØUP 7	,97290	,78234	-,49935	-,39590	,38275	-,36722	1,27850	1,53038
GRØUP 8	-,16359	,35815	,78968	2,39299	,32566	-,32333	1,16956	-1,29502
GRØUP 9	-3,16667	1,34901	4,66443	-2,73196	-2,69056	-,35603	,01902	-,12110
GRØUP 10	-1,18332	-,08173	7,05053	-1,96393	9,41111	-,22594	-1,00337	-,25527

Table 4.12 Discriminant Analysis – 10 Classes

continuum. Later functions give relatively more importance to H04, A07, etc. although these are less easy to interpret and 'name' as source dimensions of class differences.

The centroids of the functions are simply the mean values of discriminant function scores for each group. Because for all observations each function's score vector is standardised to zero mean and unit variance, the group centroid values show how many standard deviations from the overall mean each group lies. The use of the eight discriminant function scores to assign to classes the farms in SAMPLE A, produced the *hits and misses* pattern of Table 4.13.

Overall, 84.4 per cent of farms are correctly assigned to their cluster classes by the assignment rules developed from discriminant function scores. On a class by class breakdown, the prediction success rate varies from 71 per cent (class 10) to 100 per cent (class 5). While examination of $P(\underset{\sim}{X}/G_i)$ for max $\left[P(G_i/\underset{\sim}{X})\right]$ suggests that some 14% of holdings fit into this class structure rather poorly $\left[P(\underset{\sim}{X}/G_i) < 0.25\right]$ the general results are encouraging. Over 70 per cent of the 67 cases cited above were correctly predicted and nearly half the misses had as their second highest group probability the group in which they were actually located. It seemed probable that such a misallocation of observations as portrayed here would be of little significance to the explanatory power of the classification of new observations. This is substantiated by the fact that for the SAMPLE A data the explanatory power of the classification for predicted group membership is 26.7 per cent, which compares with the earlier cited figure for actual group membership of 26.5 per cent. Support is therefore provided for the argument developed from the cluster analysis results which suggest that quite a high proportion of observations might equally well be classified into any one of several classes.

Table 4.13 Experimental Analysis I
Discriminant Analysis Hits and Misses

PREDICTED GROUP

ACTUAL GROUP	1	2	3	4	5	6	7	8	9	10	TOTAL	% HITS
1	87	9					8		3		107	81
2	8	94		1	1	2		2			108	87
3		1	23					2	1		27	85
4	1	4		30		1	1				37	81
5					12						12	100
6		3				25	1	2	3		34	74
7	6	2		1			65	1	1		76	86
8		6		1			1	44			52	85
9			1						26		27	96
10							1		1	5	7	71
											487	84

NB 37 out of 76 misses correctly predicted by second highest probability.

The assignment rules used for Table 4.13 were based on discriminant function scores which may reasonably be expected to have approximately normal distributions. The alternative is to assign observations directly, using the classification functions presented in Table 4.14. However, these employ the operational variables, some of which are certainly non-normal. This means that the distributional theory underpinning the assignment rules is contravened, so that the probabilities of group membership cannot be calculated. Nonetheless, the position of observations in p-variate space and m-1 discriminant function space is identical *vis à vis* the group centroids, so that the *nearness* of an observation to the centres of each group is invariant between these alternative data representations. If, as is the case in this research, one is primarily concerned with the efficient assignment of observations not previously classified, then the classification functions using the original variables will indicate just as well the class to which an observation is *nearest*. This is shown by the hits and misses position in Table 4.15 which is in principle[1] identical to corresponding results from Experimental Analysis XVI. The saving in computing cost in the production of Table 4.15 is, however, significant.

Experiments G and H

The reported results from the majority of the experimental analyses which constitute Experiment G are confined to hits and misses tables in each case and these are shown as Appendix H.

From Analyses XVI to XVIII it is clear that an appropriate decision was originally taken about the number of discriminant functions to employ in the assignment rules. If all nine functions are employed

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1 Two observations are assigned differently which is due solely to rounding errors.

Table 4.14 Classification Functions - 10 Groups

FUNCTION WEIGHTS*

Variable	1		2		3		4		5		6		7		8		9		10	
S02	0.100	-3	-0.434	-3	0.901	-3	-0.370	-3	-0.134	-2	-0.174	-4	-0.467	-3	-0.231	-3	-0.199	-3	0.517	-3
S04	-0.117	+1	-0.128	+1	0.946	0	-0.330	0	0.622	0	-0.214	+1	-0.138	+1	-0.182	+1	-0.120	+1	-0.138	+1
S05	0.178	+1	0.119	+1	0.493	0	0.895	0	0.283	+1	0.964	0	0.145	+1	0.409	0	0.686	0	0.121	+1
L04	0.558	-1	0.545	-1	0.340	-1	0.503	-1	0.231	+1	-0.228	-1	0.289	-1	0.404	-1	-0.958	-1	0.240	0
L07	-0.406	-1	-0.616	-1	0.182	-1	-0.443	-1	0.562	-1	-0.710	-1	-0.391	-1	0.354	-1	0.560	-1	0.652	0
L09	0.485	-1	0.528	-1	0.431	-1	0.253	-1	0.947	-1	0.227	0	0.711	-1	0.115	0	0.601	-1	0.279	0
L10	-0.146	-1	-0.183	-1	0.844	-1	-0.372	-1	0.217	-1	0.205	-1	-0.212	-1	0.746	-1	-0.174	-1	0.343	-1
L13	0.212	+1	0.170	0	0.447	+1	0.113	+2	0.230	+1	0.148	+1	0.233	+1	0.922	0	0.374	0	0.597	+1
A02	0.707	-1	0.784	-1	0.122	-1	0.695	-1	0.730	-1	0.432	-1	0.791	-1	0.209	-1	0.609	-1	-0.207	-1
A03	0.637	-1	0.640	-1	0.138	-1	0.108	0	0.482	-1	0.159	-1	0.771	-1	0.166	-1	0.263	-1	-0.187	-1
A04	-0.904	-1	-0.783	-1	0.462	-1	0.622	-1	0.757	-1	-0.724	-1	-0.777	-1	0.144	-1	-0.690	-1	-0.791	-1
A07	0.355	0	0.306	0	0.477	0	0.263	0	-0.114	0	0.527	0	0.401	0	0.321	0	0.716	0	0.619	+1
W06	-0.507	-1	-0.142	-1	-0.321	-1	-0.428	-1	-0.499	-1	-0.360	-1	-0.796	-1	-0.902	-2	-0.810	-2	-0.570	-1
W07	-0.139	0	-0.108	0	-0.108	0	-0.152	0	-0.938	-1	0.151	-1	-0.132	0	-0.104	0	-0.472	-1	-0.117	0
M03	0.669	+1	0.115	+1	-0.165	0	0.122	+1	-0.476	0	0.944	0	0.131	+1	0.161	+1	-0.530	0	-0.302	-2
M05	0.393	+1	-0.131	0	0.144	0	0.684	0	-0.140	+1	0.334	0	0.576	0	0.731	0	-0.126	+1	0.737	0
M06	0.346	0	0.361	0	0.424	-1	0.331	0	0.289	+1	0.234	0	0.310	0	0.194	0	-0.296	0	0.209	0
M07	-0.495	0	-0.157	+1	0.565	+1	-0.150	+1	0.224	+1	0.102	+2	-0.818	0	-0.401	+1	-0.591	+1	-0.681	+1
M08	0.593	-1	0.171	0	0.951	-1	0.189	0	-0.448	0	0.228	0	0.140	0	-0.868	-1	0.284	0	-0.117	0
H01	0.125	+3	0.126	+3	0.768	+1	0.125	+3	0.123	+3	0.122	+3	0.126	+3	0.122	+3	0.100	+3	0.117	+3
H04	-0.219	+2	-0.211	+2	-0.225	+1	-0.236	+2	-0.339	+2	-0.170	+2	-0.203	+2	-0.208	+2	0.335	+2	0.295	+1
H05	0.746	0	0.794	0	0.668	0	0.248	0	0.771	0	0.755	0	0.608	0	0.732	0	0.713	0	0.725	0
H06	0.773	0	0.156	+1	0.141	+1	0.151	+1	0.244	+1	0.242	+1	0.366	+1	0.491	+1	0.122	+1	0.533	+1
G01	0.266	0	0.265	0	0.300	0	0.150	0	0.263	0	0.279	0	0.278	0	0.287	0	0.292	0	0.286	0
G02	0.318	0	0.335	0	0.309	0	0.173	0	0.339	0	0.312	0	0.352	0	0.325	0	0.344	0	0.325	0
Constant	-102.7 -1.5156		-103.7 -1.5061		-37.5 -2.8932		-93.2 -2.5773		-210.8 -3.7035		-104.5 -2.6618		-95.4 -1.8573		-97.2 -2.2370		-101.4 -2.8932		-169.9 -42425	

* Each co-efficient should be multiplied by 10^x where x is shown in the column following the weight, eg. 0.100|-2|= 0.000100.

Table 4.15 Hits and Misses based on the Classification Functions in Table 4.14

PREDICTED GROUP

ACTUAL GROUP	1	2	3	4	5	6	7	8	9	10	TOTAL	% HIT
1	87	11					6		3		107	81
2	6	99			1	1		1			108	92
3			23					3	1		27	85
4	2	4		29			2				37	78
5					12						12	100
6		3				26	1	2	2		34	76
7	5	3		1			65	1	1		76	87
8		7		1			1	43			52	83
9							1		26		27	96
10								1		6	7	86
											487	85

(100% trace), the proportion of hits goes up from the 84.4 per cent in Analysis I to only 85.4 per cent in Analysis XVI. The small increase is almost exclusively due to an improvement in the prediction of Class 10 which is now perfect. In the other direction, the use of only seven functions (90% trace) reduces the proportion of hits by nearly 2 per cent to 82.5 per cent, Class 7 being the only one materially affected. Once a further drop to five functions (80% trace) occurs, a quite rapid deterioration in prediction success results, particularly in Classes 4, 6 and 7, the overall rate falling to 69.4 per cent. Evidently the sixth and seventh functions must be the important discriminator dimensions in relationship to these classes.

Analyses XIX to XXII reveal that the inclusion of all possible discriminating variables does improve the prediction power of the model. However, the level of increase at approximately five per cent (for 9, 8 and 7 functions) hardly justifies the enormous increase in computing time which is entailed by moving from a discriminant analysis of 25 to one of 50 variables.

While the specification of equal prior probabilities in Analyses XXIII and XXIV produces changes in anticipated directions, the overall effect is very marginal. Some deterioration in the correct prediction of larger groups is nearly offset (in Analysis XXIV fully offset) by the increased success in correctly identifying observations to the medium or small sized classes.

The application of strategies vindicated for 10 classes, to the 15 and 20-fold partitioning of farms, appears to give quite reasonable results with 79 and 77 per cent of hits respectively. In both cases only one class is poorly predicted. Class 13 in the 20 class breakdown is, with the exception of one farm, identical to Class 9 of the 15-fold classification. It is this group which is predictable only from the higher numbered discriminant functions or from the inclusion of further discriminating variables. It is noticeable that after the fusion to 14 classes in the cluster analysis, the group in question disappears as a separate entity. What is more, SAMPLE C does not produce a corresponding class at all, and in SAMPLE B it has been merged with others before 15 classes are formed.

The attempt to apply a distribution-free discrimination algorithm, based on a generalisation of the Kendall (1966) method, proved conspicuously unsuccessful on the agricultural data to hand. The rule used requires that classes should possess exclusive sub-ranges of some discriminating variable values, ie sub-ranges not shared by any other group. Because of conceptual problems of incorporating the binary variables, these were omitted from the analysis run and only 6 farms were discriminated, the remainder being left unclassified. Such a result is obviously unacceptable and further work is proceeding on what is a potentially most usable methodology.

4.7 Summary and Conclusions

The experiments involving clustering parameters and variable numbers and treatment have revealed a general underlying stability in the classification of agriculture holdings. Although non-substantive differences in the distribution of observations to classes do occur when more iterations, different seeding patterns and additional components are incorporated, the explanatory power of the resultant classifications is little altered. This is equally true when standardised component scores are used in clustering.

The use of the latent vectors of the covariance matrix to define the component variables for clustering is confirmed to be undesirable and unsatisfactory.

Evidence is provided that further computational efficiency is possible from a careful reduction - through elimination or redefinition - in the number of operational variables used throughout the procedure.

Stepwise multivariate analysis of variance confirms this finding in indicating the major sources of difference between the various cluster group configurations. Successful assignment may either be made from a reduced operational variable set or from discriminant functions numbering fewer than the maximum possible.

The particular specification of prior probability information does not appear to materially affect overall prediction in this case.

While the broad principles underlying the distribution-free discriminant analysis method employed are intuitively appealing, the method is too demanding of the heterogeneous data pertaining to agriculture and was at this point in time less than useful.

CHAPTER V

REPLICABILITY AND PREDICTABILITY OF THE CLASSIFICATION

5.1 Introduction

The univariate resemblances between the first and second systematic samples (SAMPLE A and SAMPLE B) and the simple random sample (SAMPLE C) have been demonstrated in Chapter III. The extent to which SAMPLES B and C are replicates of SAMPLE A in a covariance sense is investigated in this chapter. If evidence exists to confirm that the underlying dimensionality of farm data is equally revealed by each sample, that each produces from clustering approximately the same classification of holdings, and that class membership for one such classification is substantially predictable from knowledge of the classification structure of another, then reasonable grounds exist for the claim that the results obtained from the control experiment are stable and general rather than being sensitive to data changes and consequently sample specific. Final reservations concerning the magnitude of sampling error may be answered by basing the proposed classification scheme(s) on a significantly larger sample size (SAMPLE D) than that used for experimentation.

5.2 A Priori Classification

As a first check on the inter-sample data stability, the results of the *a priori* classification of agricultural holdings for the three experimental samples are produced in Table 5.1. While full comparability between the sample results and the population is impossible due to the presence of uneliminated outliers in the population

Table 5.1

A Priori Classification
Distribution of Agricultural Holdings

CLASS	SAMPLE A	SAMPLE B	SAMPLE C	POPULATION
I	20 (4.1)	16 (3.3)	23 (4.7)	1130 (5.2)
II	12 (2.5)	8 (1.6)	7 (1.4)	399 (1.8)
III	106 (21.8)	114 (23.5)	131 (26.7)	4733 (21.8)
IV	8 (1.6)	8 (1.6)	15 (3.1)	556 (2.6)
V	10 (2.1)	14 (2.9)	13 (2.7)	523 (2.4)
VI	34 (7.0)	19 (3.9)	26 (5.3)	1068 (4.9)
VII	32 (6.6)	39 (8.0)	32 (6.5)	1466 (6.7)
VIII	59 (12.1)	63 (13.10	57 (11.6)	2670 (12.3)
IX	21 (4.3)	19 (3.9)	21 (4.3)	1079 (5.0)
X	94 (19.3)	102 (21.0)	74 (15.1)	4058 (18.7)
XI	7 (1.4)	16 (3.3)	10 (2.0)	563 (2.6)
XII	15 (3.1)	16 (3.3)	18 (3.7)	834 (3.8)
XIII	14 (2.9)	9 (1.9)	13 (2.7)	447 (2.1)
XIV	4 (0.8)	1 (0.2)	2 (0.4)	69 (0.3)
XV	17 (3.5)	12 (2.5)	15 (3.1)	666 (3.1)
XVI	0 (0)	1 (0.2)	0 (0)	15 (0.1)
XVII	34 (7.0)	29 (6.0)	33 (6.7)	1467 (6.7)
TOTAL	487 (100.0)	486 (100.0)	490 (100.0)	21,743 (100.0)
Explanatory Power	20.3%	20.6%	19.4%	16.3%

The percentage of observations in each class is shown in parentheses.

data set, it is nonetheless clear that the samples vary from the population only within the limits of expected sampling error. Differences in the distribution of observations between classes in the three samples are possibly most pronounced for the random sample which has a higher proportion of horticultural establishments (Class IV) and arable farms (Class III), with a lower percentage of general mixed farms (Class X). Nevertheless the overall impression of broad similarity between the samples with respect to this *a priori* classification is reinforced by the near identical explanatory power of the scheme for each.

5.3 Comparison of Principal Components

Comparison of Tables 5.2 and 5.3 with Tables 4.3 and 4.4 demonstrates the close correspondence between the principal components solutions obtained for the three experimental samples. The eigenvalues are of much the same size and show similar patterns of change. For example, 48.1 per cent and 48.7 per cent of data variance is accounted for by the first 10 components of SAMPLES B and C which compares with 46.5% for SAMPLE A. The equivalent figures for 20 components are 71.1, 71.2 and 68.9 per cent respectively.

Examination of the significant factor loadings confirms that the earlier interpretation of the first two component variables is equally valid for SAMPLES B and C, although small differences in the magnitudes of size-measure loadings, particularly in SAMPLE B, suggest some slight variation in the precise dimensions revealed. The third component of SAMPLE B also has a noticeably different weight or correlation with variable L04, the percentage of used agricultural land devoted to horticulture. At -0.46 it is somewhat lower in absolute terms than for SAMPLE A (-0.66) and SAMPLE C (-0.70). The correlates of horticultural

Table 5.2

Principal Component Analysis
Latent Roots Samples B and C

Comp. No.	SAMPLE B Eigenvalues	SAMPLE B Cumulative %	Comp. No.	SAMPLE C Eigenvalues	SAMPLE C Cumulative %
1	6.50	12.3	1	6.34	12.0
2	3.15	18.2	2	3.40	18.4
3	2.51	22.9	3	2.88	23.8
4	2.23	27.2	4	2.51	28.6
5	2.16	31.2	5	2.06	32.4
6	2.00	35.0	6	1.84	35.9
7	1.93	38.6	7	1.78	39.3
8	1.81	42.1	8	1.73	42.6
9	1.65	45.2	9	1.68	45.7
10	1.58	48.1	10	1.56	48.7
11	1.52	51.0	11	1.41	51.3
12	1.44	53.7	12	1.39	53.9
13	1.35	56.3	13	1.30	56.4
14	1.31	58.8	14	1.27	58.8
15	1.22	61.0	15	1.23	61.1
16	1.16	63.2	16	1.18	63.3
17	1.11	65.3	17	1.11	65.4
18	1.07	67.4	18	1.06	67.4
19	1.01	69.3	19	1.00	69.3
20	1.00	71.1	20	0.98	71.2
21	0.93	72.9	21	0.94	72.9
22	0.92	74.6	22	0.93	74.7
23	0.89	76.3	23	0.92	76.4
24	0.85	77.9	24	0.87	78.1
25	0.80	79.4	25	0.82	77.9
$\sum_{i=1}^{p} \lambda_i$	53.0	100	$\sum_{i=1}^{p} \lambda_i$	53.00	100

Table 5.3 Significant Factor Loadings
Samples B and C

Var-iable	SAMPLE B					SAMPLE C				
	COMPONENT NUMBER									
	1	2	3	4	5	1	2	3	4	5
S01	0.77	0.23	-	-	0.21	0.57	0.55	-	0.19	-
S02	0.71	0.32	-	-	0.15	0.64	0.46	-	0.17	-
S03	0.66	-	-	0.15	0.19	0.71	-	-	0.26	-
S04	0.61	0.32	-	-0.25	-	0.54	0.48	-0.18	-	-
S05	0.84	-	-0.18	-	-	0.82	-	-0.18	-	0.19
L01	0.22	-	0.16	-	-0.20	0.38	-	0.17	-0.53	0.21
L02	-	-0.16	-0.21	-	-	-	-0.20	-	-0.24	0.28
L03	0.22	0.17	-0.17	-	-	0.20	-	-	-0.20	-
L04	-0.23	-	0.46	-0.45	-	-0.20	-	-0.70	-	-
L05	-	0.28	0.16	-0.22	-0.18	0.19	0.20	-	-0.40	-
L06	-	-	-	-	-	-	0.30	-	-	-
L07	-0.23	-	-0.32	-0.32	-	-0.23	-	-	0.18	0.24
L08	-	-0.18	-	0.28	0.19	-	-0.29	0.31	0.66	-0.25
L09	-0.26	0.27	-	-	-	-0.29	-	-	-	-
L10	-0.27	0.17	-	-	-	-0.34	0.16	-	-	-
L11	-0.18	-	-	-	0.23	-	0.16	0.14	-	-
L12	-0.23	-	-0.19	-	0.27	-0.22	0.23	-	0.28	0.16
L13	-	0.19	-	-0.22	-	-	0.32	-	-0.29	-
L14	0.23	-	-	-	-0.15	0.33	-	-	-	-
A01	-0.18	0.15	0.28	-	-	-0.18	0.24	0.15	-0.38	-
A02	0.34	-0.35	0.22	-	0.15	0.49	-0.27	-	0.22	-
A03	0.37	-	0.33	-	-	0.44	-	0.23	-	-
A04	-	-	-	-	-	-0.18	-	-	0.14	-
A05	-	-0.18	-0.30	0.18	-	-	-0.17	-	-	0.28
A06	-	-	-0.32	0.24	-	-	-	-	-	0.36
A07	-	-0.30	-0.37	0.48	-	-	-0.23	-	0.26	0.22
W01	-0.55	-	-0.36	-0.22	-	-0.33	-	-0.58	-	-
W02	-0.15	-0.76	-	-0.19	0.24	-	-0.73	0.24	-	-
W03	0.28	-	-0.26	-0.19	0.15	0.16	-	-	-	-
W04	0.25	-	-	-	-0.29	0.25	-	-0.29	-	-0.21
W05	-	-	-	-	-0.41	-	-	-0.17	-	-0.41
W06	-0.18	-	-	-	0.57	-	-	0.18	-	0.42
W07	-0.20	-	0.21	-	-	-0.24	-	0.20	-	-
M01	0.71	-	-	-	-	0.72	-	-	-	-
M02	-	0.31	-	-0.47	-	-	0.25	-0.48	-	-
M03	0.60	0.17	-	-	0.17	0.55	-	-	-	0.34
M04	0.20	-0.16	-	-	-0.25	0.28	-0.15	-	-0.44	-
M05	0.61	-0.23	-	0.15	-	0.67	-	-	0.20	-
M06	-0.16	-	-0.44	-0.45	-	-	-	-0.58	-	-
M07	-0.25	0.31	0.29	-	-	-0.25	0.34	-	-0.38	-
M08	-0.33	-	-0.49	-0.35	-	-0.28	-0.18	-0.53	-0.22	-
H01	-	-0.62	-	-0.32	0.31	-	-0.62	-	-0.18	-
H02	0.44	-	-0.45	0.20	-	0.31	-	-0.41	-	-
H03	-	-0.64	0.16	-0.46	0.18	0.18	-0.52	-	-0.35	0.24
H04	-0.22	0.25	-0.15	0.30	-	-0.18	-	-	0.30	-0.19
H05	-0.26	0.18	-	-	0.47	-0.24	-	0.41	-	0.34
H06	-0.33	-0.25	-	-	-	-0.33	-0.23	-	-	-
G01	-0.42	0.33	-	-	0.42	-0.47	0.19	-	0.25	0.51
G02	0.32	-0.37	-	-	-0.40	0.47	-0.36	-	-0.14	-0.14
G03	-	0.15	-	-0.16	-0.30	-	0.30	-	-0.22	-0.17
G04	0.31	-	-0.39	0.24	-0.16	0.23	-	-0.37	-	-
G05	0.42	-	-0.25	-	-	0.44	-0.20	-0.19	-	0.19
G06	0.20	0.16	-0.21	-	-	0.26	0.16	-	-	-

activity (eg W01, M02, G04 and M08) produce consistent and parallel differences in component loadings between the samples. The explanation is that component 4 in SAMPLE B, which alone has a significant loading on L04, is evidently contributing with component 3 to the measurable continuum from more traditional mixed arable/livestock farms to the more labour and capital intensive, smaller market gardening operations. Between them the two components should provide an equivalent weighting of this type of difference in farm units to that obtained from component 3 in SAMPLES A and C.

Indeed, other observable discrepancies in loadings between the samples are found to be of less substantive importance when a number of components are viewed together. One finds that essentially the same major dimensions are revealed in slightly different ways by the three data sets.

5.4 Clustering Results and Inter-Sample Predictability

The outline clustering results for SAMPLES B and C are produced in Table 5.4, while the means of the operational variables for groups of 15 and 10 clusters are shown in Appendix I. Once again the points of similarity between Table 5.4 and Table 4.6 are more marked than the small, inconsequential differences. Within group sums of squares after the various clustering stages are of the same relative orders of magnitude, as are the explanatory powers of the classifications. If anything, the second and third experimental samples of holdings are better classified by the clustering than is SAMPLE A, although all three indicate that between 10 and 16 clusters are the best basis for classification construction.

Table 5.4

Cluster Analysis Results : Samples B and C
(seeding at 30 clusters, 10 components, 2 iterations)

	SAMPLE B			SAMPLE C		
No. of Classes	tr[W]	Beale F-test	Explan. Power(%)	tr[W]	Beale F-test	Explan. Power %
30	3479	0.54		3761	0.41	
29	3496	1.39		3775	1.55	
28	3541	1.04		3829	1.43	
27	3576	1.63		3881	1.61	
26	3633	1.83		3942	2.27	
25	3700	1.72		4032	1.87	
24	3766	1.48		4110	1.66	
23	3826	1.74		4183	1.98	
22	3900	1.62		4275	1.63	
21	3973	1.56		4355	1.71	
20	4047	2.02	39.6	4444	1.84	37.6
19	4149	1.74	39.1	4546	1.45	36.7
18	4243	2.05	38.4	4632	1.84	36.2
17	4362	2.16	37.8	4748	1.59	35.4
16	4497	2.50*	37.4	4856	1.51	34.7
15	4667	1.99	35.8	4967	1.82	34.1
14	4816	2.37*	35.1	5112	2.44*	33.3
13	5011	2.15	32.9	5325	2.71*	32.3
12	5208	2.29	31.8	5589	2.44*	31.0
11	5443	2.66*	30.2	5857	1.68	28.4
10	5753	2.24	28.4	6067	1.92	27.9
9	6055	2.31		6340	2.24	
8	6419	1.91		6708	2.19	
7	6777	2.43*		7137	1.98	
6	7327	2.19		7610	1.97	
Total sum of squares	12380	* Sig at 1% level	25760	12610	* Sig at 1% level	25970

For both the 15-fold and the 10-fold classifications of holdings, the most distinctive classes are replicated in all of the samples. Comparison of Appendix I with Table 4.9 illustrates the marked similarities of the following groups of holdings in the fifteen class partition.

	SAMPLE A	SAMPLE B	SAMPLE C
Larger Capital Intensive	Class 1	Class 4	Class 5
Corporately Owned	Class 3	Class 8	Class 1
Horticulture	Class 5	Class 7	Class 12
Female Holder	Class 14	Class 6	Class 9
Pig Rearing	Class 15	Class 11	Class 14

In addition, Class 2 in SAMPLE A is largely reproduced by Class 10 in SAMPLE C, while Class 7 in SAMPLE A finds a counterpart in SAMPLE B's Class 3. In other cases it does appear that some re-arrangement of class configuration occurs in the three analyses and that at least one class in each case is sample specific (eg Class 9 in SAMPLE A, Class 5 in SAMPLE B and Class 6 in SAMPLE C).

This interpretation, based on the inspection of class centroids in the three sample classification schemes produced by independent clustering, is confirmed by Tables 5.5 and 5.6. These show the results of the assignment of observations in SAMPLES B and C using the discriminant function based assignment rules developed for SAMPLE A. As in earlier cases, the ordering of the arbitrarily numbered classes has been changed to highlight the predictability of the clustering of SAMPLES B and C from a knowledge of the cluster-class structure of SAMPLE A. Both sets of assignments are based on the 25 most important discriminating variables and on the number of functions required to account for 95 per cent of trace $(W^{-1}B)$, ie. 8 functions in the 10 class problem and 10 functions in the 15 class situation.

Table 5.5

Prediction of SAMPLE B Class Membership from SAMPLE A Assignment Rules

SAMPLE A : PREDICTED CLASS (rows: SAMPLE B : ACTUAL CLASS)

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	Total	% Hits
B4	42			2				3			2			1		50	84
B13		17		1		1		13				2	9			40	43
B8			28													28	100
B2	1	2		19		1		5			2	5	1			36	53
B7		1			7											8	88
B15		11		1		26	1	1				5	8			53	49
B3		2	1				8							1		13	62
B12	4	17						36			2	3	2			64	56
B10		11											12		1	24	0
B1	8	1	2							9				1		21	43
B9	4	3						20		4	17	1				49	35
B14		1									18	23		1		43	54
B5		4		3		8	1					3	10	1		30	33
B6					1									18	1	20	90
B11															4	4	100
																486	54

SAMPLE A : PREDICTED CLASS (rows: SAMPLE B : ACTUAL CLASS)

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	Total	% Hits
B4	89	7					4		1		101	88
B9	6	56		1		2	4	9	4		82	68
B7			28						2		30	93
B2		17		33		9	4	16	2		81	41
B6					9						9	100
B3		1	1		1	12		1	1		17	71
B10	2	1					54		1		58	93
B5		40		1	2	13	4	14	8	2	84	17
B1	17		2						1		20	5
B8										4	4	100
											486	62

Table 5.6

Prediction of SAMPLE C Class Membership from SAMPLE A Assignment Rules

SAMPLE A : PREDICTED CLASS

SAMPLE C : ACTUAL CLASS	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	Total	% Hits
C5	47		1					10		3				2		63	75
C10		21						1				1	7			30	70
C1			20		1		2							1		24	83
C8	1		2	14							2	1	1	2		23	61
C12		1			16							1		1		19	84
C7		4				29	1	5				1	3			43	67
C2		8		4		4	12						4.	1		33	36
C3	1	12		1				34			2	3	2			55	62
C6	4		2	1									1			8	0
C11	10							8		7	8			1		34	21
C13	2							3			28	17				50	56
C4	3			1	1	9					3	16	8			41	39
C15		13		1	1			1				2	17			35	49
C9														24		24	100
C14												1		1	6	8	75
																490	59

SAMPLE A : PREDICTED CLASS

SAMPLE C : ACTUAL CLASS	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	Total	% Hits
C5	90	10	1	2			2		2		107	84
C8		46					5	4			55	84
C1			25						2		27	93
C2		10		21		17	1				49	43
C9		2			16	2	1	1	1		23	70
C6	7		1	2					3		13	0
C3	12	11					51		3		77	66
C4	2	18		3	2	9	9	26	1		70	37
C7		16		1		16		8	20		61	33
C10									1	7	8	88
											490	62

Inevitably the proportion of 'hits' in these analyses is lower than was found for the internal assignment of observations in SAMPLE A. Let us assume that assignment rules developed separately from the data of SAMPLES B and C would predict class membership at the same internal rates as SAMPLE A (approximately 80% for 15 classes and 85% for 10 classes). Of the 390 (415) or so 'hits' expected from these internally generated rules, no more than 80% (85%) are likely to be predictable from the assignment rules of SAMPLE A. Thus the theoretically anticipated upper limit for 'hits' in Tables 5.5 and 5.6 is approximately 64% (15 classes) and 72% (10 classes). Judged in this light, the findings are very encouraging. The probability of independent cluster analyses producing such levels of inter-sample predictability as observed, given no systematic classification structure, is very small.

Even the pattern of misses in Tables 5.5 and 5.6 corroborates the non-randomness of the classifications produced by the three samples. Many of the classes in the SAMPLE B and C analyses are reasonable composites of two or three classes found from SAMPLE A. For instance, of the 15 classes in each case

B13 = A2 + A8 + A13
B12 = A2 + A8
B10 = A2 + A13
B9 = A8 + A11
B14 = A11 + A12
C5 = A1 + A8
C10 = A2 + A13
C2 = A2 + A7
C3 = A2 + A8
C13 = A11 + A12
C15 = A2 + A13

SAMPLE A classes which appear in these illustrative examples are, in the main, the much more 'general' classes of mixed activity farms. These can clearly be clustered in a number of marginally different ways without greatly affecting the efficiency or explanatory power of the classification. The point is made by reference to the 10 class tabulations in Tables 5.5 and 5.6. By merging the more general classes, the following situations obtain.

Table 5.7
The Effect of Merging the 'General' Classes - SAMPLE B

SAMPLE A PREDICTED CLASS

	Class Code	A1	A2+A4+A6 + A8+A9	A3	A5	A7	A10	Total	% Hits
SAMPLE B ACTUAL CLASS	B1+B4	106	9	2		4		121	88
	B2+B3 +B5+B9	6	240	1	3	12	2	264	91
	B7	-	2	28	-	-	-	30	93
	B6	-	-	-	9	-	-	9	100
	B10	2	2			54		58	93
	B8	-	-	-	-	-	4	4	100
							Total	486	91

Table 5.8
The Effect of Merging the 'General' Classes - SAMPLE C

	SAMPLE A PREDICTED CLASS								
	Class Code	A1	A2+A4+A6 +A8+A9	A3	A5	A7	A10	Total	% Hits
	C5+C6	97	19	2		2		120	81
SAMPLE C	C8+C2 +C4+C7	2	216		2	15		235	92
ACTUAL	C1		2	25				27	93
CLASS	C9		6		16	1		23	70
	C3	12	14	-		51		77	66
	C10		1				7	8	88
							Total	490	84

The correspondence between the classification schemes produced by the three samples is now much more evident. There are two large classes of holdings, which may be subdivided in a number of ways according to the vicissitudes in the data obtained from the three samples of 500 observations, and four specific classes which are equally identified by the three data sets. The differences in clustering results between the samples may be put down to the presence of sampling error, which should be halved when a sample of over 2000 observations is used for final classification. Even without this increase in sample size, it should be stressed that the marginal differences in the definitions of the several 'general' classes of holdings are of no great significance. In the fifteen class pattern, the predictions of class membership for SAMPLE B and C observations made from SAMPLE A assignment rules, explain respectively 30.4% and 29.1% of the total data variance in these samples. Although some five per cent lower than the equivalent figures in Table 5.4 for 15 classes, there are two important factors to be borne in mind. Firstly, only 14 different classes are predicted since Class A9 finds no counterpart in SAMPLES B or C. Secondly, it should be remembered that about 40 per cent of observations in SAMPLES B and C are assigned to different classes by the original internal clustering and the predictions made from SAMPLE A. That such a small decrease in explanatory power should be associated with such large differences in class distributions can only reinforce the assertion of substantial stability in, and predictability of, the classification structure revealed by clustering.

5.5 Summary

The examination of the principal components and cluster analysis results for the final two experimental samples has pinpointed certain discrepancies in comparison with SAMPLE A. Some variation in the structure of the higher numbered components was observed, particularly for SAMPLE B. Paradoxically, the random SAMPLE C, which had been felt to be potentially inferior to the systematic sampling of SAMPLES A and B, produced results more in line with SAMPLE A than did SAMPLE B.

In clustering, sample specificity in the formation of groups of farms was rare, although some blurring in the precise definition of more heterogeneous classes was noticeable. The uniform performance of each sample in identifying the more extreme and homogeneous classes was, however, encouraging.

Although the predictability of the independently determined cluster-class membership of observations in SAMPLES B and C, from assignment rules computed from SAMPLE A, was far from perfect, it was nevertheless reassuringly high. The likelihood of some 60 per cent of observations being correctly assigned in this manner, if there were no stable underlying class structure, was felt to be very small. A substantial proportion of the 40 per cent of inter-sample prediction "misses" were evidently farms which are marginal to two or more classes since their mis-assignment reduced the explanatory power of the classification by only five per cent.

The reduction in sampling error represented by the four-fold increase in sample size discussed in Chapter VI, is expected to improve the classification stability, particularly with respect to the more heterogeneous classes.

CHAPTER VI

FINAL CLASSIFICATION SCHEMES FOR EUROPEAN AGRICULTURAL HOLDINGS

6.1 The Background to Final Classification

The cumulative evidence of the last two chapters has led to the firm conclusion that on both theoretical and practical grounds a scheme for classifying agricultural holdings may be validly developed from limited multivariate sample data. Although not entirely conclusive in every respect, the findings have supported the view that

(a) principal component transformation of the original data does enable cluster analysis to be undertaken efficiently and thus at reasonable cost using the most important dimensions underlying the observed variables;

(b) essentially the same component solutions and cluster configurations are produced by different samples of data; and

(c) a relatively simple procedure may be prescribed for the assignment of non-sampled observations to classes.

Such inconsistencies as have been observed in the various experimental analyses are taken to be a function more of sampling error than of instability in the data structure or the total algorithm. As such they should be substantially reduced by the replication of proposed procedures on the ten per cent sample of observations to be discussed in this chapter.

Examination of principal components and clustering results for SAMPLE D will hopefully confirm earlier conclusions. Ultimately, the total population should be classifiable from the assignment rules obtained from SAMPLE D data so that full comparison with the *a priori* Farm Typology can be made and the relative merits of the two systems evaluated.

6.2 Principal Components and Cluster Analysis - SAMPLE D

In terms of the proportion of total data variance accounted for by the components of the correlation matrix, SAMPLE D with 2161 observations produces startlingly parallel results to those reported for the 500 observation SAMPLE A in Table 4.3. Furthermore, no radical differences are found when comparison with the eigenvalue patterns of SAMPLES B and C are made (Table 5.2). From Table 6.1 it will be seen that the first ten components of the SAMPLE D data explain 46.9 per cent of the total data variance (cf. 46.5% in SAMPLE A), fifteen components 59.2 per cent (cf. 58.7%) and twenty components 69.1 per cent (cf. 68.9%). Thus the inferences made earlier concerning the number of components to employ in clustering should be equally valid for the larger sample.

The latent vector interpretation is also much the same when Table 6.2 is compared with Tables 4.4 and 5.3. The stability of the lower numbered components between the different samples is exemplified by the evidence of Table 6.3 which retabulates in sample order the most significant factor loadings for Components 1 and 2. Admittedly, there is an increasingly lower degree of correspondence when comparison is extended to the higher numbered source dimensions. SAMPLE D should, however, reflect the population better than the smaller experimental samples.

Based on the results of Chapter IV experiments, the cluster analysis for SAMPLE D was undertaken on ten component variables and allowed only two iterations in the observation reallocation phase which follows each fusion from k to k-1 cluster classes. As the experimental evidence had further suggested that the algorithm converges quickly to the same solution whether seeding at 30, 25 or 20 clusters occurred, it was decided to initiate this last analysis at 25 clusters. This was

Table 6.1

Eigenvalues - Sample D

Component Number	Eigenvalue (λ)	Cumulative % of Variance
1	6.07	11.5
2	3.18	17.5
3	2.73	22.6
4	2.34	27.0
5	2.09	31.0
6	1.86	34.5
7	1.85	38.0
8	1.67	41.1
9	1.56	44.1
10	1.52	46.9
11	1.48	49.7
12	1.34	52.3
13	1.26	54.6
14	1.24	57.0
15	1.15	59.2
16	1.11	61.3
17	1.11	63.3
18	1.06	65.3
19	1.01	67.2
20	1.00	69.1
21	0.96	70.9
22	0.95	72.7
23	0.92	74.5
24	0.89	76.1
25	0.87	77.8
Total	53	100

Table 6.2

Significant Factor Loading - Sample D

Varia-ble	Compo-nent 1	Compo-nent 2	Compo-nent 3	Compo-nent 4	Compo-nent 5	Varia-ble	Compo-nent 1	Compo-nent 2	Compo-nent 3	Compo-nent 4	Compo-nent 5
S01	0.67	0.44	0.08	0.18	-	W01	-0.37	-	-0.65	0.18	0.09
S02	0.72	0.40	-	0.15	-	W02	-0.08	-0.73	-	-0.17	0.30
S03	0.61	-	-	0.30	0.12	W03	0.23	-	-0.14	-	0.19
S04	0.59	0.44	-0.13	-	0.11	W04	0.22	-	-0.18	0.11	-0.15
S05	0.82	0.12	-0.18	-0.15	0.09	W05	0.09	-0.15	-	-	-0.48
L01	0.38	0.15	-	-0.59	-	W06	-0.12	-	-	-	0.41
L02	0.19	-0.11	-0.22	-0.38	-	W07	-0.24	-	0.22	-	0.11
L03	-	0.14	-	-0.10	-	M01	0.70	-	-	-	0.13
L04	-0.21	-	-0.73	0.23	-	M02	-0.08	0.20	-0.35	-	0.14
L05	0.09	0.20	-	-0.31	0.13	M03	0.49	0.19	-0.08	-0.08	0.16
L06	-0.12	0.16	-	-	-	M04	0.28	-0.16	-	-0.34	-
L07	-0.22	-	-0.98	0.08	0.16	M05	0.62	-0.16	-	0.24	0.12
L08	0.12	-0.50	0.40	0.61	-	M06	-0.19	-	-0.61	0.26	-
L09	-0.27	0.22	-	-0.16	-	M07	-0.27	0.26	0.07	-0.20	-0.11
L10	-0.35	0.30	-	-	-0.11	M08	-0.27	-0.14	-0.50	-0.20	-
L11	-0.19	0.15	0.08	-	0.11	H01	-	-0.54	-0.07	-0.21	0.33
L12	-0.18	0.17	-	0.18	0.25	H02	0.35	-	-0.35	0.17	-
L13	-0.11	0.26	0.09	-0.24	-	H03	0.21	-0.45	-0.15	-0.31	0.37
L14	0.29	-0.14	-	-0.26	-	H04	-0.23	0.15	0.13	0.22	-0.20
A01	-0.15	0.12	-	-0.19	-0.12	H05	-0.23	0.17	0.24	-	0.48
A02	0.38	-0.38	0.26	0.22	-	H06	-0.33	-0.25	-	-0.10	-0.08
A03	0.38	-0.07	0.21	-0.08	0.10	G01	-0.38	0.26	0.17	0.18	0.54
A04	-	0.11	-	-	-	G02	0.39	-0.38	-0.20	-0.09	-0.50
A05	-	-0.14	-0.12	-0.14	0.15	G03	-	0.25	-	-0.20	-0.10
A06	-	-	-0.08	-	0.11	G04	0.24	-0.07	-0.36	0.28	-0.08
A07	-	-0.21	-0.11	-0.15	0.12	G05	0.43	-0.12	-0.17	0.13	0.28
						G06	0.18	0.16	-0.10	-	-

With 2160 degrees of freedom loadings of 0.065 or above are significant at the 0.1% level.

Table 6.3

Sample Comparison of the Most Significant Factor Loadings

	COMPONENT 1				COMPONENT 2				
	SAMPLE				SAMPLE				
Variable	A	B	C	D	Variable	A	B	C	D
S01	0.68	0.77	0.57	0.67	S01	0.41	0.23	0.55	0.44
S02	0.59	0.71	0.64	0.72	S02	0.45	0.32	0.46	0.40
S03	0.54	0.66	0.71	0.61	S04	0.37	0.32	0.48	0.44
S04	0.58	0.61	0.54	0.59	A02	-0.22	-0.35	-0.27	-0.38
S05	0.83	0.84	0.82	0.82	W02	-0.76	-0.76	-0.73	-0.73
M01	0.71	0.71	0.72	0.70	H01	-0.65	-0.62	-0.62	-0.54
M03	0.53	0.60	0.55	0.49	H03	-0.59	-0.64	-0.52	-0.45
M05	0.63	0.61	0.67	0.62	G02	-0.49	-0.37	-0.36	-0.38
G02	0.39	0.32	0.47	0.39					
G05	0.52	0.42	0.44	0.43					

a cautious compromise but one producing significant computer time savings for over 2000 observations. As before, the seeding clusters were obtained from an equal segmentation of observations according to their first component scores. With these parameters the analysis was completed both for unstandardised and standardised component variates on the grounds that alternative but equally acceptable classifications had been produced from the SAMPLE A experiments using such cluster-variable definitions.

The summary results from these clusterings are presented in Table 6.4. As in the cases of SAMPLES A and B, they indicate that for unstandardised components 16 clusters are significantly better than a lower number. For standardised components the first significant Beale F-test is at 11 clusters which is in line with the comparable Experimental Analysis VIII findings.

In view of the consistency in these results and because no other substantive evidence was available on the 'best' number of classes, these two patterns are used for further evaluation and for the assignment of non-sampled population members.

Table 6.4

Cluster Analysis Results : Sample D

No. of Classes	Unstandardised Components			Standardised Components		
	tr (W)	Beale F-test	Explan. Power (%)	trace (W)	Beale F-test	Explan. Power (%)
25	18560	1.99		8299	1.29	
24	18880	1.76		8402	1.00	
23	19180	1.66		8468	1.66	
22	19480	1.67		8600	1.71	
21	19800	1.77		8744	1.58	
20	20160	2.16	34.1	8886	1.73	32.9
19	20630	1.75	33.3	9052	1.26	32.3
18	21040	1.63	32.9	9181	1.26	31.7
17	21450	1.51	32.0	9319	1.89	31.3
16	21860	2.45*	31.6	9542	1.81	30.6
15	22580	1.85	30.7	9774	1.75	29.3
14	23180	1.76	30.0	10020	1.88	28.8
13	23810	1.95	29.2	10310	2.10	28.1
12	24580	2.46*	28.1	10670	1.92	27.2
11	25670	1.70	26.3	11040	2.43*	25.9
10	26530	2.32*	25.4	11570	2.62*	23.9
9	27870	2.36*		12230	2.09	
8	29470	2.01		12850	2.06	
7	31100	1.64		13580	2.08	
6	32720	1.48		14480	1.67	
Total Sum of Squares	53730	* Sig at 1% level	114533	21610	* Sig at 1% level	114533

The explanatory power of these two classifications, which will be referred to as *Classifications I* and *II*, is slightly lower than obtained for corresponding numbers of clusters in earlier analyses. This is to be expected for the larger sample which inevitably shows greater data variation. However, compared with the 17-class *a priori* classification of SAMPLE D data, which also produces a smaller explanatory power at 18.0 per cent, the 16- and 11- class polythetic systems are again far superior, explaining respectively 31.6 per cent and 25.9 per cent of standardised operational variables variances. Tables 6.5 and 6.6 confirm that the cluster analyses of standardised and unstandardised components do produce some important differences. Certain classes contain a majority of identical holdings whichever data treatment takes place. The largely unaltered classes are

Classification I		Classification II	
Unstandardised Components	Standardised Components	Standardised Components	Unstandardised Components
3	2	2	3
5	14	6	4
6	4	3	6
8	6	8	7
13	7	11	11
16	16		

For the remaining groups, where rearrangement of observation clusters is found, this is not associated with radical differences in the explanatory powers of equivalent models.

The specific nature of each class in Classifications I and II is revealed by their centroids as shown in Appendix J. Extensive replication of the pen-portraits of Chapter IV is observable in the 16-class structure, except for the emergence of a class of very large holdings. Consequently, such pen-portraits will not be repeated in detail here.

Table 6.5

Comparison of 16 Clusters of Observations produced using Standardised and Unstandardised Component Variables

UNSTANDARDISED COMPONENTS (rows) × STANDARDISED COMPONENTS (columns)

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
1	130		19		1			7	20		1	6		5	5		194
2			22			7											29
3	1	156					2						2		2		163
4	3	2	3	2				89	28		1				7		135
5		4				2							1	126			133
6	2	7	1	127	3		2		9	1			11				163
7										60							60
8				1		98		1						1			101
9		3			1				41		1	4	114		44		208
10	33	3		1	1		11	7			85	1		1	91		234
11	3	4		4	68		8		24		2			1	2		116
12	35	4			1				109		1	60	2	3	13		228
13	2		5			3	68	2	3					1	6		90
14	16		3		1						39	72	1				132
15	6	2	2	2	8			2			116	3	3	1		1	146
16					4								1			24	29
Total	231	185	55	137	88	110	91	108	234	61	246	146	135	139	170	25	2161

Table 6.6

Comparison of 11 Clusters of Observations produced using Standardised and Unstandardised Component Variables

STANDARDISED COMPONENTS

UNSTANDARDISED COMPONENTS	Group	1	2	3	4	5	6	7	8	9	10	11	Total
	1	248		1		4	3	59		26	8		349
	2	19		1	24	47	10	1		2	2		106
	3		165			4		2			5		176
	4	10	4	4	1	1	126	3		1	1		151
	5		5		86						121		212
	6	2	8	199		3	1	14		3			230
	7			1					62		1		64
	8	28	3	9		6	3	311		3			363
	9	18	2	5		62	20	36		121			264
	10	7	3	3			2	7		178	10	1	211
	11											35	35
	Total	333	190	223	111	127	165	433	62	334	148	36	2161

Nevertheless the problem of nomenclature remains. Because classes are formed by clustering on the basis of overall multivariate similarities and dissimilarities between holdings, it is dangerous to employ names which reference only a few distinctive characteristics. For example, in Classification I, Class 7 is characterised by holdings with a very high proportion of horticultural land, yet at least one observation in that class has no horticultural land at all. It is of the same size and has an equivalent proportion of "other arable land" cultivated as intensively as in the horticultural holdings. The obvious solution is to talk of Classes IA, IB, IC ... or Class IIi, IIii, IIiii ... . Unfortunately, this is unlikely to be acceptable to most classification users who require something more immediately 'tangible' and interpretable. Thus the following nomenclature for Classification I is only tentatively suggested. (Table 6.7). If used in official tabulations, the attention of readers must be drawn to its inherent limitations and the nature and basis of multivariate classifications.

Examination of the univariate F ratios in Appendix J reinforces the expectation that classes formed by clustering from standardised component scores have a lower emphasis on holding size factors and give relatively more weight to the variables contributing to the higher numbered components. In Table 6.8, the relative distribution of observations between the two classifications is presented. While the classes of horticultural establishments, farms operated by female holders, corporately or jointly held undertakings and the small subsistence and pigs/poultry holdings remain unaltered to any degree between the two schemes, in other cases differences are consistent with the explanation above. For instance, in Class 9 of Classification II more importance is attached to parallels in the age of the holder, land tenure and crop

Table 6.7

Classification I Suggested Nomenclature

Class Number	Suggested Nomenclature
1	LARGE/ARABLE-DAIRYING/CAPITAL INTENSIVE/
2	VERY LARGE /ARABLE-GRAZING LIVESTOCK/CAPITAL INTENSIVE/ GOOD MANAGEMENT PRACTICES/
3	SMALL/GENERAL MIXED/LOW CAPITAL INTENSITIVITY/OLDER HOLDERS/
4	MEDIUM/ARABLE-PERMANENT CROPS/LOW CAPITAL INTENSITIVITY/ LABOUR INTENSIVE SHARECROPPING IMPORTANT/
5	SMALL/GENERAL MIXED/LOW CAPITAL INTENSITIVITY/FEMALE HOLDER/
6	SMALL/PERMANENT CROPS-ARABLE/DRAFT ANIMALS IMPORTANT/ HOLDER PART-TIME/
7	VERY SMALL/HORTICULTURE/LABOUR AND CAPITAL INTENSIVE/GOOD MANAGEMENT PRACTICES
8	MEDIUM/ARABLE-PERMANENT CROPS/LOW CAPITAL INTENSITIVITY/ CORPORATE AND JOINT HOLDERS/
9	SMALL/DAIRYING-ARABLE/LOW CAPITAL INTENSITIVITY/HOLDER PART-TIME/
10	MEDIUM/ARABLE-DAIRY/CAPITAL INTENSIVE/SUCCESSIVE AND INTERMEDIATE CROPS/MAINLY RENTED/
11	VERY SMALL/ARABLE-PERMANENT CROPS-PIGS AND POULTRY/HOLDER PART-TIME/
12	MEDIUM/DAIRY-ARABLE/CAPITAL INTENSIVE/
13	LARGE/ARABLE/SUCCESSIVE AND INTERMEDIATE CROPS/CAPITAL INTENSIVE/GOOD MANAGEMENT PRACTICES/MAINLY RENTED/
14	LARGE/DAIRYING/CAPITAL INTENSIVE/GOOD MANAGEMENT PRACTICES/ MAINLY RENTED/
15	SMALL / GRAZING LIVESTOCK-ARABLE/LOW CAPITAL INTENSITIVITY/ YOUNG HOLDERS PART-TIME/MAINLY RENTED/
16	VERY SMALL/SUBSISTENCE-PIGS AND POULTRY/PART-TIME HOLDERS/

Table 6.8

Observation Distribution
Classification I by Classification II

CLASSIFICATION II

CLASSIFICATION I Class Numbers	1	2	3	4	5	6	7	8	9	10	11	Total
1	172		1			12	2		2	5		194
2	6			15	4	3	1					29
3		161			2							163
4	3	3	3		1	118	5		1	1		135
5		4								129		133
6		11	145		1		5	1				163
7								60				60
8		1	1	93						6		101
9							207		1			208
10	14	3	2		24	21	49		120	1		234
11	4	1	60		15	3	17	1	9	1	5	116
12	106	5	3			2	107		2	3		228
13				3	80	4			2	1		90
14	25						38		69			132
15	2	1	8			2	2		128	1	2	146
16											29	29
Total	332	190	223	111	127	165	433	62	334	148	36	2161

Table 6.9

Classification II Suggested Nomenclature

Class Number	Suggested Nomenclature
1	ARABLE-DAIRYING/CAPITAL INTENSIVE/ABOVE AVERAGE SIZE/
2	GENERAL MIXED/CAPITAL UNINTENSIVE/OLDER HOLDERS/BELOW AVERAGE SIZE/
3	PERMANENT CROPS-ARABLE/DRAFT ANIMALS IMPORTANT/HOLDER PART-TIME/BELOW AVERAGE SIZE/
4	ARABLE-PERMANENT CROPS/CAPITAL UNINTENSIVE/CORPORATE-JOINT HOLDER/ABOVE AVERAGE SIZE/
5	ARABLE/CAPITAL INTENSIVE/GOOD MANAGEMENT PRACTICES/ ABOVE AVERAGE SIZE/
6	ARABLE-PERMANENT CROPS/CAPITAL UNINTENSIVE/LABOUR INTENSIVE/SHARECROPPING IMPORTANT/AVERAGE SIZE/
7	DAIRYING-ARABLE/CAPITAL UNINTENSIVE/AVERAGE SIZE/
8	HORTICULTURE/LABOUR AND CAPITAL INTENSIVE/GOOD MANAGEMENT PRACTICES/WELL BELOW AVERAGE SIZE/
9	DAIRYING-ARABLE/YOUNG HOLDERS/AVERAGE SIZE/MAINLY RENTED/
10	GENERAL MIXED/CAPITAL UNINTENSIVE/FEMALE HOLDER/BELOW AVERAGE SIZE/
11	SUBSISTENCE-PIGS AND POULTRY/VERY CAPITAL UNINTENSIVE/ LABOUR INTENSIVE/HOLDER PART-TIME/WELL BELOW AVERAGE SIZE/

distribution than to holding size factors. The same is true of Class 1 in Classification II which represents a merger of two distinctively different size groups in Classification I. The similarities of these holdings in capital goods ownership and crop and livestock patterns is more important than size differences after the equalisation of the weighting of source dimensions achieved through component standardisation.

Unfortunately, the differences between the classifications are more a question of shading than black-white contrasts. Summary nomenclature cannot adequately describe such subtle variations so that the only substantial changes between Tables 6.7 and 6.9 are in terms of the order in which the wording of class titles are provided.

6.3 Assignment Rules

In both Chapters II and IV it was seen that the most straightforward and computationally efficient method of assigning non-sampled observations to classes involves the use of classification functions. There are as many of these linear functions of discriminating variables as there are classes. The function producing the highest score from an observation's variate vector identifies the class membership of that observation.

Experimental evidence supported the view that not all variables possess equal discriminatory power to distinguish between classes. However, the experiments of Chapter IV had examined only two possibilities, namely the best 25 and 50 variables. Prior to the classification of the entire data set, it was felt to be desirable to pursue this issue further. Therefore, the internal prediction success rates were computed from classification functions of increasing numbers of variables. The summary results are given for Classification I in Table 6.10 and for Classification

Table 6.10

The Effect of Variations in the Number of Discriminating Variables - Classification I

% HITS
NUMBER OF VARIABLES IN CLASSIFICATION FUNCTIONS

Class	25	29	34	39	50
1	76	79	79	79	79
2	72	72	79	83	83
3	87	87	91	90	93
4	78	78	79	82	83
5	99	99	99	99	99
6	74	79	83	83	83
7	93	93	93	93	97
8	82	82	82	82	82
9	87	91	91	91	91
10	74	81	86	88	87
11	67	69	72	71	72
12	66	70	76	81	82
13	79	82	88	86	87
14	80	81	82	83	84
15	79	80	82	84	85
16	76	76	76	76	76
Total	78.8	81.2	83.9	84.9	85.6

Table 6.11

The Effect of Variations in the Number of Discriminating Variables - Classification II

% HITS
NUMBER OF VARIABLES IN CLASSIFICATION FUNCTIONS

Class	22	25	29	34	39	50
1	81	83	84	83	84	85
2	87	87	87	87	88	88
3	70	69	67	71	74	76
4	86	86	86	86	86	86
5	76	75	77	77	80	80
6	69	75	77	78	80	82
7	90	91	93	95	97	96
8	89	90	90	92	94	95
9	87	87	87	91	92	93
10	99	99	99	99	99	99
11	64	64	72	78	78	78
Total	83.3	83.9	85.1	86.4	87.7	88.5

II in Table 6.11. The chosen numbers of discriminating variables for these trials appear idiosyncratic at first sight. They are, in fact, largely arbitrary, the decisions being dictated by programming considerations and the intention to increase the discriminating variable set in steps of about five.

For both classifications, functions of 34 discriminating variables were chosen. For the SAMPLE D data, on which the trials were conducted, this was the point at which every class had at least 70 per cent of its observations correctly identified. The overall proportions of 'hits' in Classifications I and II were 83.9 per cent and 86.4 per cent respectively. Even with the full set of possible discriminating variables the corresponding figures rise by only a small amount to 85.6 per cent and 88.5 per cent.

The classification functions of the 34 variables in each case are shown in Tables 6.12 and 6.13. Their use in the assignment to classes of the 21743 non-spurious agricultural holdings comprising the population of this study is discussed below.

6.4 Classifying the Population

The assignment of each agricultural holding in the population was accomplished using a variant of POPPROG. Program POPCLASS[1] was designed to read in the classification functions and, having converted survey variables to operational variables, to compute the value of each function. Having found the highest function value for each observation and thus identified the class to which the observation should be assigned, summary class characteristics were compiled and the explanatory power of the classification eventually ascertained.

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1 Produced in Appendix C.

It will have been noticed from Tables 6.12 and 6.13 that the constant term for each classification function is shown in two parts. The second is the adjustment for prior probabilities proportionate to class size. If this is ignored then prior probabilities are assumed to be equal and an alternative assignment of observations is possible. The results of assigning observations using unequal and equal priors for both Classifications I and II are shown in outline in Table 6.14. The corresponding distribution between the classes of the *a priori* scheme are also repeated in the same table for comparison purposes. Confirmation is provided from these analyses that different assumptions concerning priors little affect the distribution of observations or the explanatory power of the individual models, that SAMPLE D and the population are very similar, and that the data based polythetic classifications are 50-75 per cent better than the *a priori* approach with fewer classes. The SAMPLE D distributions, of course, relate to predicted class membership and are therefore a little different to the class sizes shown in Table 6.8. However, once again it is found that the explanatory power of these predicted class distributions is very close to actual class distributions produced by clustering and shown in Table 6.4.

To complete the picture of population classification the mean, standard deviation, minimum and maximum value of each operational variable is shown in Appendix K for each class of the *a priori* classification and Classifications I and II[1]. Inevitably, the centroids in Appendix J and K are very similar. The population classes do, however, exhibit greater variation in some cases. Although spurious holdings have been ignored in the three classifications, 'outliers' which were eliminated for purposes of defining classes are now classified. Consequentially, the variances of some variables in certain classes are 'stretched' by their presence.

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1 Using priors proportionate to class size.

Table 6.12

Classification Functions - Classification I

POPULATION ASSIGNMENT BY CLASSIFICATION I

CLASSIFICATION FUNCTION NUMBER

VARIABLE	1	2	3	4	5	6
S02	0,00176410	0,00733120	0,00037826	0,00034907	0.00047963	0.00036831
S03	-0,00824400	-0,03458000	-0,05169300	-0,07251900	-0,05192600	-0.04069900
S04	2,46200000	3,35260000	1,67880000	2,60760000	2,03980000	1.86380000
S05	0,99891000	0,78268000	0,44581000	0,43824000	0,27022000	0.55786000
L01	0,22185000	0,19353000	0,20536000	0,22377000	0,20895000	0.12109000
L02	0,19093000	0,24227000	0,19399000	0,13470000	0,19090000	0.06973700
L04	0,20174000	0,17239000	0,21882000	0,20109000	0,21603000	0.13202000
L05	0,23536000	0,19366000	0,22126000	0,31239000	0,23215000	0.10829000
L07	0,30337000	0,32143000	0,23830000	0,23094000	0,23866000	0.15933000
L08	0,22804000	0,18082000	0,25196000	0,21415000	0,25868000	0.12199000
L13	5,95180000	5,64830000	5,55670000	11,10800000	5,38510000	6.29710000
L14	-0,64913000	0,46218000	-0,71942000	0,62428000	-0,18242000	-1.16010000
A01	-0,05812200	-0,04757400	-0,02951300	-0,03965700	-0,03539400	-0.05587800
A03	0,03589400	0,00981010	0,02153300	0,06839700	0,02800000	0.00481120
A05	0,05761200	0,08106200	0,05766600	0,07981000	0,06544900	0.05211900
A07	0,02686200	0,17468000	-0,00527250	0,01572700	0,18062000	-0.04881500
W02	0,18337000	0,11499000	0,17853000	0,16606000	0,16264000	0.12049000
W06	-0,03714600	-0,02100300	-0,03606200	-0,02294700	-0,01661700	-0.02143200
W07	-0,02875000	-0,03593000	0,12721000	-0,04454200	-0,00417030	-0.03476300
M01	2,59370000	0,77141000	0,40612000	1,66140000	0,92055000	0.83711000
M03	6,42600000	6,61720000	-0,14872000	0,59084000	-0,60697000	-0.49440000
M05	6,53320000	3,74760000	0,48700000	0,78597000	0,70812000	1.27710000
M06	0,21504000	0,19620000	0,21427000	0,21862000	0,10506000	0.18107000
M07	2,64800000	4,16290000	1,04440000	1,69520000	-0,89519000	13.72000000
M08	0,16330000	0,32164000	0,20073000	0,16939000	0,29925000	0.13604000
H02	9,69310000	10,71600000	8,23170000	8,08570000	8,12830000	8.04640000
H03	109,58000000	66,05700000	109,43000000	110,17000000	71,39700000	109.24000000
H04	76,89700000	55,36000000	75,54700000	75,25300000	95,77800000	72.31300000
H05	0,61477000	0,61006000	0,70829000	0,62797000	0,62045000	0.60761000
H06	4,71920000	7,14820000	4,51110000	4,19280000	4,06420000	6.90370000
G01	0,38615000	0,41944000	0,40067000	0,26492000	0,39042000	0.41763000
G02	0,36575000	0,39338000	0,38506000	0,24709000	0,39105000	0.39008000
G04	-1,56260000	0,84722000	-1,65410000	-0,38792000	-2,03120000	-1.01330000
G05	0,54748000	-0,29675000	-0,16547000	-0,46943000	0,13441000	-0.26586000
CONSTANT	-131,96000000	-136,03000000	-129,18000000	-111,62000000	-108,91000000	-109.06000000
	-2,41050000	-4,31101000	-2,58455000	-2,77307000	-2,78791000	-2.58455000

CLASSIFICATION FUNCTION NUMBER

VARIABLE	7	8	9	10	11	12
S02	0,00063351	0,00090495	0,00030003	0,00062854	0,00069441	0.00057780
S03	-0,05210200	-0,06062400	-0,05045900	-0,04632000	-0,04606600	-0.04255200
S04	2,21970000	1,65450000	2,00340000	2,15190000	1,91890000	2.16420000
S05	0,84152000	0,01158700	0,40211000	1,07840000	0,49932000	0.74378000
L01	0,18577000	0,15951000	0,20942000	0,23056000	0,19625000	0.22321000
L02	0,17995000	0,12201000	0,19661000	0,22258000	0,23560000	0.19683000
L04	1,64020000	0,11623000	0,20882000	0,20698000	0,25146000	0.19326000
L05	0,22114000	0,16456000	0,22835000	0,21720000	0,21325000	0.23546000
L07	0,36015000	0,14608000	0,25674000	0,24841000	0,31672000	0.27643000
L08	0,23354000	0,15772000	0,28574000	0,23102000	0,20567000	0.25816000
L13	5,06850000	5,18520000	4,95780000	5,18100000	6,25890000	5.57130000
L14	-2,00070000	0,00110240	-0,43408000	1,22740000	-1,30080000	0.11993000
A01	0,04179000	-0,02487500	-0,01976900	-0,03912100	-0,03070700	-0.03354800
A03	0,02381800	0,01653800	0,01947600	0,02758100	0,01474500	0.02775900
A05	0,08259100	0,04235700	0,05812700	0,06504600	0,15794000	0.06117300
A07	-0,06323500	0,10171000	0,04313800	0,01019500	-0,01246600	0.05037200
W02	0,18271000	0,00946390	0,17702000	0,18050000	0,17595000	0.18560000
W06	-0,02716300	-0,02713300	0,02185300	-0,03972600	-0,01616100	-0.00568630
W07	-0,02084900	-0,04379700	-0,03304300	-0,02948600	-0,03678000	-0.03149800
M01	0,41799000	0,65388000	0,07993600	2,91510000	1,37090000	3.34300000
M03	-0,45531000	0,57881000	-0,31607000	0,47744000	-0,93698000	-0.28565000
M05	0,50791000	1,63690000	0,06082900	2,40280000	0,39740000	4.18310000
M06	2,00200000	0,07809900	0,22665000	0,24375000	0,30030000	0.21654000
M07	4,53330000	7,09890000	1,85020000	2,55770000	3,94020000	2.54530000
M08	0,58243000	0,18733000	0,17528000	0,12188000	0,53798000	0.17106000
H02	10,21000000	6,94170000	8,29850000	8,39690000	8,50020000	8.80270000
H03	111,99000000	18,65300000	110,19000000	109,75000000	110,44000000	110.29000000
H04	77,32600000	24,53300000	74,81100000	75,58400000	75,17700000	76.21800000
H05	0,54390000	0,60984000	0,61554000	0,54912000	0,59588000	0.62601000
H06	6,05890000	3,09210000	6,32730000	4,72200000	8,30370000	5.15280000
G01	0,38034000	0,32811000	0,37619000	0,38217000	0,38905000	0.38722000
G02	0,37865000	0,31958000	0,37266000	0,41870000	0,36389000	0.36418000
G04	-2,82710000	-0,93125000	-1,35490000	-1,59020000	-1,42100000	-0.50054000
G05	-0,85324000	-0,03353700	-0,07804700	0,00151900	0,08308300	0.54050000
CONSTANT	-204,72000000	-44,13000000	-120,87000000	-119,32000000	-123,12000000	-125.58000000
	-3,58416000	-3,06315000	-2,34081000	-2,22303000	-2,92471000	-2.24895000

Table 6.12
(continued)

CLASSIFICATION FUNCTION NUMBER

VARIABLE	13	14	15	16
S02	0.00248510	0.00138410	0.00033278	0.00069087
S03	-0.08945900	0.01275300	-0.04261100	0.15446000
S04	1.78780000	1.77110000	1.95850000	1.15840000
S05	2.31920000	0.47595000	0.47586000	0.19385000
L01	0.20604000	0.19438000	0.19771000	0.20232000
L02	0.35374000	0.18417000	0.17615000	0.23564000
L04	0.17420000	0.17677000	0.21366000	0.35880000
L05	0.20437000	0.21053000	0.21404000	0.23781000
L07	0.24374000	0.31884000	0.26954000	2.40110000
L08	0.19981000	0.27058000	0.27871000	0.22251000
L13	5.61180000	5.99620000	5.78740000	6.03480000
L14	1.20380000	-1.73870000	-1.23160000	-4.01550000
A01	-0.02548500	-0.03223500	-0.02354500	-0.02508200
A03	0.02982000	0.01675500	0.02164400	-0.02801200
A05	0.04312200	0.04048600	0.06285200	0.06730800
A07	0.09113300	-0.00240980	0.00713610	3.46600000
W02	0.11263000	0.17137000	0.17566000	0.16102000
W06	-0.02801700	-0.04117700	-0.06869400	0.01105400
W07	-0.04786800	-0.04508000	-0.06199900	-0.01929100
M01	2.92590000	4.46410000	0.30223000	3.37040000
M03	6.70080000	-0.71820000	-0.35501000	0.33614000
M05	-0.41176000	7.18770000	0.13023000	-2.76290000
M06	0.25748000	0.23647000	0.23801000	0.23744000
M07	4.13020000	3.29830000	2.32400000	3.55210000
M08	-0.00041943	0.17160000	0.16592000	0.09326000
H02	11.75400000	10.06800000	8.35500000	8.20530000
H03	108.67000000	112.11000000	111.07000000	104.41000000
H04	76.60600000	77.69000000	75.66900000	79.21900000
H05	0.60485000	0.55112000	0.53338000	0.62349000
H06	5.03490000	4.31940000	7.56410000	8.44440000
G01	0.38998000	0.37841000	0.38719000	0.37794000
G02	0.41890000	0.40717000	0.39952000	0.33712000
G04	2.16480000	1.42290000	-1.50940000	-0.37188000
G05	0.10863000	0.16275000	-0.12514000	-0.31804000
CONSTANT	-136.54000000	-128.04000000	-115.11000000	-205.04000000
	-3.17845000	-2.79557000	-2.69474000	-4.31101000

Table 6.13

Classification Functions - Classification II

POPULATION ASSIGNMENT BY CLASSIFICATION II

CLASSIFICATION FUNCTION NUMBER

VARIABLE	1	2	3	4	5	6
S02	-0.00103320	-0.00096555	-0.00101050	0.00021296	-0.00047960	-0.00137090
S03	0.01691700	-0.01182700	0.00611610	-0.04732500	-0.04220500	-0.00510700
S04	1.44660000	0.96127000	1.12980000	1.55510000	0.87105000	2.39930000
S05	0.98886000	0.95479000	0.90349000	0.09523800	1.68320000	0.81564000
L01	0.22454000	0.19269000	0.17023000	0.16490000	0.21932000	0.24457000
L02	0.14625000	0.15280000	0.07025700	0.13815000	0.35555000	0.10560000
L03	0.19635000	0.21548000	0.20527000	0.20346000	0.46381000	0.20998000
L04	0.14243000	0.15525000	0.10696000	0.09249800	0.14466000	0.13960000
L05	0.18888000	0.18336000	0.11339000	0.15592000	0.17676000	0.28698000
L07	0.18064000	0.12822000	0.11998000	0.08630500	0.14474000	0.16873000
L08	0.22763000	0.23117000	0.14405000	0.15690000	0.21873000	0.21480000
L13	5.57590000	5.67460000	6.65360000	5.79480000	5.87730000	9.70590000
A02	-0.02111400	-0.03431400	-0.04468100	-0.03212400	-0.04717800	-0.02052200
A03	0.01709400	0.00928100	-0.01555700	-0.00250220	0.00038571	0.04132700
A07	-0.30684000	-0.32276000	-0.34521000	0.03490500	-0.30420000	-0.27254000
W01	0.42338000	0.40322000	0.41088000	0.09205400	0.39382000	0.39934000
W02	0.12040000	0.11994000	0.10087000	0.02420500	0.06647800	0.11642000
W04	0.22475000	0.23974000	0.24527000	0.23130000	0.23367000	0.20315000
W05	0.21735000	0.21872000	0.24827000	0.21640000	0.22382000	0.19148000
W06	0.12692000	0.12319000	0.15769000	0.15756000	0.14347000	0.12037000
W07	0.17094000	0.34286000	0.17504000	0.12700000	0.16062000	0.12838000
M02	-0.96872000	-1.82340000	-0.07740700	0.86059000	-2.18100000	1.75220000
M03	3.55670000	0.31701000	-0.50064000	0.75381000	3.74970000	0.29958000
M05	4.94270000	1.31960000	2.12370000	1.36880000	-0.43917000	1.58910000
M06	0.17406000	0.18000000	0.18468000	0.05065200	0.24540000	0.19665000
M07	10.86800000	10.24300000	18.50700000	7.14490000	11.53500000	9.92770000
H01	126.94000000	128.53000000	123.42000000	20.39600000	127.20000000	126.17000000
H03	80.19300000	75.85500000	82.44400000	-5.00050000	79.96000000	78.98600000
H05	0.58565000	0.70599000	0.55915000	0.66182000	0.60624000	0.59247000
H06	3.52500000	2.52050000	5.77290000	3.09890000	4.15140000	3.28720000
G01	0.38202000	0.40250000	0.40757000	0.30638000	0.37004000	0.28865000
G02	0.35321000	0.39310000	0.38699000	0.30193000	0.39899000	0.28950000
G04	0.66993000	0.77746000	1.45380000	2.44850000	5.00350000	1.83600000
G05	0.80035000	0.07374600	0.20851000	0.14979000	0.25132000	-0.36672000
CONSTANT	-167.88000000	-176.19000000	-160.58000000	-47.75800000	-169.98000000	-158.70000000
	-1.87321000	-2.43133000	-2.27118000	-2.96870000	-2.83412000	-2.57243000

CLASSIFICATION FUNCTION NUMBER

VARIABLE	7	8	9	10	11
S02	-0.00103390	-0.00088245	-0.00107210	-0.00102230	-0.00104740
S03	-0.00118990	-0.00920670	-0.01141500	-0.00908480	0.14047000
S04	1.33890000	0.88885000	1.12280000	1.10080000	1.00090000
S05	0.79018000	1.66410000	0.95932000	0.92310000	0.61334000
L01	0.21990000	0.19082000	0.20993000	0.23231000	0.22595000
L02	0.17694000	0.12070000	0.15563000	0.18534000	0.18383000
L03	0.20512000	0.21845000	0.19700000	0.22053000	0.18957000
L04	0.14465000	1.55080000	0.14117000	0.17156000	0.24784000
L05	0.19200000	0.19169000	0.17187000	0.22190000	0.20114000
L07	0.15996000	0.13091000	0.18918000	0.12016000	1.95530000
L08	0.25025000	0.21502000	0.23602000	0.25773000	0.23571000
L13	5.35680000	4.84060000	5.74710000	6.39130000	5.74040000
A02	-0.00800720	-0.03442400	-0.01687500	-0.00667200	-0.06078500
A03	0.01655200	0.00965770	0.01467100	0.01933800	-0.04259000
A07	-0.26399000	-0.46731000	-0.30110000	-0.00379270	2.78790000
W01	0.41352000	0.83461000	0.42492000	0.35891000	0.24585000
W02	0.11332000	0.10344000	0.11681000	0.10847000	0.10119000
W04	0.21324000	0.23677000	0.25701000	0.23025000	0.23537000
W05	0.20826000	0.18558000	0.27139000	0.21265000	0.23395000
W06	0.17664000	0.11823000	0.13729000	0.14522000	0.15993000
W07	0.15725000	0.16025000	0.18377000	0.17347000	0.16419000
M02	-1.41520000	1.10720000	-1.50050000	-0.28283000	0.33280000
M03	-0.53130000	-0.38464000	-0.29366000	-0.26174000	1.28890000
M05	2.06780000	1.14340000	2.41620000	0.79596000	-1.18980000
M06	0.19631000	1.70930000	0.20118000	0.01224400	0.22671000
M07	10.63400000	13.24300000	11.25900000	5.85260000	11.89900000
H01	126.37000000	130.40000000	127.09000000	136.04000000	127.08000000
H03	79.33000000	80.62400000	81.03800000	-15.87300000	67.82900000
H05	0.58719000	0.53068000	0.48833000	0.66739000	0.55299000
H06	4.10130000	4.86870000	4.32340000	2.72200000	5.19850000
G01	0.37384000	0.37361000	0.37678000	0.36506000	0.37574000
G02	0.38001000	0.37425000	0.40248000	0.37137000	0.35655000
G04	1.93560000	1.97490000	0.87551000	1.29910000	1.85170000
G05	0.18440000	-0.41256000	0.28587000	0.20249000	0.00961370
CONSTANT	-165.51000000	-245.77000000	-164.52000000	-129.56000000	-220.44000000
	-1.60759000	-3.55121000	-1.86717000	-2.68107000	-4.09474000

Class Number	A Priori Classification		Classification I				Classification II			
			Priors Proportionate to Size		Priors Equal		Priors Proportionate to Size		Priors Equal	
	Sample D	Population	Sample D	Population	Sample D	Population	Sample D	Population	Sample D	Population
1	93 (4.3)	1130 (5.2)	201 (9.3)	2260 (9.5)	201 (9.3)	2246 (10.3)	345 (16.0)	3533 (16.2)	343 (15.9	3520 (16.2)
2	52 (2.4)	399 (1.8)	31 (1.4)	290 (1.2)	32 (1.5)	307 (1.4)	181 (8.4)	1821 (8.4)	192 (8.9)	1920 (8.8)
3	498 (23.0)	4733 (21.8)	169 (7.8)	1653 (6.9)	173 (8.0)	1682 (7.7)	171 (7.9)	1738 (8.0)	183 (8.5)	1825 (8.4)
4	50 (2.3)	556 (2.6)	117 (5.4)	1248 (5.2)	122 (5.6)	1317 (6.1)	98 (4.5)	1117 (5.1)	98 (4.5)	1117 (5.1)
5	45 (2.1)	523 (2.4)	175 (8.1)	1569 (6.6)	175 (8.1)	1567 (7.2)	111 (5.1)	1079 (5.0)	121 (5.6)	1220 (5.6)
6	119 (5.5)	1068 (4.9)	136 (6.3)	1295 (5.4)	137 (6.3)	1291 (5.9)	148 (6.8)	1576 (7.2)	171 (7.9)	1739 (8.0)
7	163 (7.5)	1466 (6.7)	63 (2.9)	702 (2.9)	63 (2.9)	705 (3.2)	508 (23.5)	5048 (23.2)	457 (21.1)	4582 (21.1)
8	268 (12.4)	2670 (12.3)	91 (4.2)	1004 (4.2)	91 (4.2)	1002 (4.6)	65 (3.0)	702 (3.2)	65 (3.0)	704 (3.2)
9	101 (4.7)	1079 (5.0)	241 (11.2)	2540 (10.6)	233 (10.8)	2438 (11.2)	325 (15.0)	3185 (14.6)	322 (14.9)	3163 (14.5)
10	380 (17.6)	4058 (18.7)	240 (11.1)	2334 (9.8)	223 (10.3)	2114 (9.7)	178 (8.2)	1590 (7.3)	178 (8.2)	1590 (7.3)
11	52 (2.4)	563 (2.6)	97 (4.5)	924 (3.9)	103 (4.8)	1012 (4.7)	31 (1.4)	354 (1.6)	31 (1.4)	363 (1.7)
12	85 (3.9)	834 (3.8)	231 (10.7)	2153 (9.1)	213 (9.9)	2026 (9.3)	N.a.	N.a.	N.a.	N.a.
13	50 (2.3)	447 (2.1)	82 (3.8)	789 (3.3)	83 (3.8)	836 (3.8)	"	"	"	"
14	5 (0.2)	69 (0.3)	127 (5.9)	1335 (5.6)	141 (6.5)	1484 (6.8)	"	"	"	"
15	63 (2.9)	666 (3.1)	135 (6.2)	1291 (5.4)	145 (6.7)	1388 (6.4)	"	"	"	"
16	0 (0)	15 (0.1)	25 (1.2)	326 (1.4)	26 (1.2)	328 (1.5)	"	"	"	"
17	137 (6.3)	1467 (6.7)	N.a.	N.a.	N.a.	N.a.	"	"	"	"
	2161	21743	2161	21743	2161	21743	2161	21743	2161	21743
Explanatory Power	18.0%	16.3%	31.5%	28.3%	31.5%	28.3%	25.8%	24.6%	25.8%	24.6%

% of observations shown in parentheses.

Table 6.14
Classifications of the Population of Agricultural Holdings
Distributions and Explanatory Powers

6.5 Cost Considerations

The developmental and experimental stages of this approach to multivariate classification have quite obviously consumed substantial amounts of computer time and many man-hours. Having provided a validation of the total procedure a potential user will be interested in the costs associated with its implementation for new problems or data sets. The following information is for guidance only. It relates to the sampling of ten per cent of a population of 22000 members, the analysis of that sample in the manner described in this and earlier chapters, and the application of final assignment rules in classifying the population. Manpower costs are ignored and computer time and costs are based on the use of an I.C.L. 1904S machine of the configuration currently operating at the University of Aston Computer Centre. The further assumption is that the programs and packages listed in this text are employed without modification. It is quite certain that these programs could be made somewhat more efficient by a professional computer systems analyst and programmer. The costs are shown in terms of *central processor units* (CPU's) or *mill time* and in value terms at the present rate of charging at Aston for external commercial users (9p per CPU).

With the information from Table 6.15 and allowing for cluster analyses of both standardised and unstandardised component scores, the computation of six sets of classification functions and two population classification runs, the total cost would be a little over £3500. Even though this represents a fifteen-fold increase over the *a priori* classification of the same population, it nevertheless represents a trivial sum in comparison with data collection and analysis costs for large scale surveys.

Table 6.15

Implementation Costs for Multivariate Classification

Analysis Description	Program or Package	CPU's (in cc's)	Cost (in £'s)
Selection of Sample, Conversion from Survey to Operational Variables	SYSTSAM or RANSAM	15	135
Full Principal Components Analysis	UASTATSXDS3	20	180
Preparation of Principal Component Scores for Cluster Analysis	PRINSORT	5	45
Cluster Analysis (per run)	CLUSTPROG	60	540
Computation of Classification Functions[1] (per classification)	SPSS MK 6.5	25	225
Classification of all observations (per classification)	POPCLASS	40	360
Classification of all observations using *a priori* classification scheme	POPPROG	25	225

1 SPSS MK 6.5 was not available at Aston and was implemented at Manchester University. The Manchester CDC 7600 is approximately 40-50 times more powerful than the ICL 1904S and this conversion factor has been employed to obtain an equivalent 'Aston Cost'.

CHAPTER VII

CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY

7.1 General Conclusions

This research study has represented an initial pilot investigation of the feasibility and practicability of moving from a relatively simple, largely arbitrary and totally untested method of classifying agricultural holdings by principal activity to a more complex multivariate procedure which allows the incorporation of any number of classifying variables. An operational approach has been suggested which, although more costly to apply than the *a priori* method, produces much more distinctive classes of holdings with regard to their 'total production systems'. The relative improvement in the explanatory power of the polythetic data based classification more than justifies the cost increase, which is, in any event, marginal to the total costs involved in the exercise of conducting, analysing and publishing agricultural census data on an international scale.

The two alternative classification schemes which are proposed are in fact two of many available from the analysis. While they are in a statistical sense the 'best' classifications, there may be good agricultural, administrative or political reasons for preferring schemes with more classes or based on alternative patterns of classification parameters. Such factors are outside the competence of the author but may be validly allowed for by end-users in the final decisions about the precise form the classification should take. Further breakdown of the cluster-classes is also possible to the same end. For instance, the class characterised by high 'standard' livestock per hectare, small overall size and a larger proportion of non-agricultural land is made up of both very small peasant holdings of a mainly subsistence type, and small but intensive pig and poultry producers. These could clearly be distinguished in separate sub-classes.

The enlarging of the European Economic Community to include the U.K., Eire and Denmark means that farms from these countries are included in the 1975/76 Farm Structure Survey. While it would appear necessary to re-estimate the classification scheme with data from these important agricultural producers included, there are few grounds for believing either that the structure of agriculture has changed within the founder members over the 1966 to 1975 decade, or that the classification based on 1966 data cannot accommodate the patterns of agriculture in the new member nations.

7.2 Remarks on the Classifactory Variables

The availability and selection of variables for analysis has been seen to be crucial insofar that the ultimate decisions taken here will dictate the weighting of the classification. The reported investigation contained fewer aggregated variables than were available in detail from the 1966 Farm Structure Survey. In practice, all survey variables were represented in some way in one or other of the operational variables which were constructed to reflect the balance of collected information. In so doing, the classifications arrived at were fairly heavily influenced by holding size considerations. This was as much due to the regular correlations in some classes between holding size and such variables as the ownership of capital equipment and the educational level of the holding managers as to the inclusion of five explicit measures of farm size.

The other dominant influence on the classification was the presence of binary variables. For at least two classes these represent the most distinctive characteristic. In both instances the binary variables in question had a small minority of observations with unity values so that upon standardisation such observations were shown to be several standard deviation units from the overall sample mean. Inevitably their similarity in this respect may have outweighed less marked differences between them on other variables. However, the groups of female holders and corporate and joint holders do show other consistent patterns over a range of variates suggesting broad syndromes constituting genuine classes. This interpretation is supported by the fact that not all female holders or corporate and joint holders are in the two classes in question. Where a holding has other distinguishing features these have a greater influence than does its extremity on the relevant standardised binary scale.

Eventually the decision about the variables to incorporate in classification must depend upon the purpose(s) which the final scheme must serve. If there are numerous potential users there will need to be a large number of classifying variables built in, and the classes so formed will inevitably be sub-optimal in relationship to a specific use.

The classification study has also highlighted certain deficiencies in the data collected in the Farm Structure Surveys. The wording and nature of some questions has made analysis of results more difficult than necessary. The separation of 'agricultural land' and 'other land' appears sensible at first sight. It does, unfortunately, create difficulties when it is remembered that 'other land' includes farm buildings such as milking sheds, pig sties and battery hen houses. For some holdings there will be little or no 'agricultural land' and yet the holdings are very legitimately and significantly part of the commercial agricultural sector. Another problem occurs over the information available for the holding manager compared with the holder. In the majority of cases these are one and the same person. In the few exceptional cases of joint or corporate holders they are not, and yet the only information provided for the managers of these holdings is their educational background. Knowledge of their sex and age, the proportion of time spent managing the holding and whether they have any non-holding employment, would be invaluable. It would also eradicate the need for "not applicable" answer codes to such questions when the holder is not an individual *natural person*.

Incompatibilities between the area of land under glass and the sum of the areas of heated and unheated greenhouses for certain horticultural holdings is illustrative of a further set of data deficiencies. It is either associated with ambiguities in definitions about the treatment of multi-storied greenhouses, or is purely response error. In either case, remedial action is possible. Other internal consistency checks should eliminate spurious holdings (no land at all) and those where the component land used declarations are at variance with the total land areas recorded.

Of potentially more signifiance is the absence of questions in the surveys on crops and livestock yields, input and output values, the proportion of output marketed, capital investment levels and capital equipment values. Without such data the validity of the classification produced in terms of the 'efficiency' and 'productivity' of holdings must be in doubt. The inputing of such values using, for example, 'average' yields is no remedy. Treating all hectares of wheat production or all dairy cows as homogeneous entities is clearly fallacious. It totally ignores differences in natural fertility and husbandry practices. Perhaps the solution is to reduce the number of questions asked at present to allow the incorporation of these new elements. The evidence of principal component analysis has certainly suggested many fewer dimensions of difference between holding and holding than the 132 variables obtained from the survey in its current form.

7.3 Technical Considerations

There are clearly opportunities to refine and develop the computational procedures employed in the research. While a number of issues have been resolved in the preceding chapters, many others are in need of further investigation. Subjectivity rather than objectivity is still the order of the day in ultimate decisions about the number of 'significant' component dimensions, the 'best' number of clusters or the most 'discriminating' variables. Such statistical tests as are available either provide contradictory evidence, are suspect because of assumption contraventions, or are valueless in being designed within the constraints of small sample theory. Analytical methods are unlikely to provide solutions to these problems. Monte Carlo simulation studies of both synthesised and real data seem much more fruitful paths for future research in these areas.

Criticisms of the optimisation-partition techniques have been partly answered in the experiments with the Golder-Yeomans algorithm. That the clustering procedures may be made more efficient is not in doubt. Opportunities exist to speed the solution by coarsening the parameter which determines whether observations should be reallocated between clusters. It is apparent that such a move will no more than marginally affect the explanatory power of the classification. The possibility of splitting the most heterogeneous cluster and merging the two 'nearest' clusters at the termination of a round in the algorithm has been suggested by other writers and seems worthy of experimentation. The inclusion of an assignment phase at the end of each round of clustering, employing classification functions of either component or original variables, also provides a potential basis for fine tuning in respect of the allocation of observations to classes. Such a step should counter any arguments concerning the use of only two iterations in the algorithm or the coarsening of the reallocation parameter described above. Finally, the development of the computer package to operate in two phases, firstly on quantitative and secondly on ranked and binary variables, is of interest. Observations would be clustered on such factors as size, land use and livestock levels, and each cluster so formed would be subdivided according to the values of the binary variable set. This may overcome some of the problems associated with the inclusion of binary variables mentioned earlier.

In addition to cluster analysis modifications, there are other potential improvements. Assignment rules may be better defined if observations at the periphery of cluster swarms are excluded. Such observations will, of course, be allocated to classes once the rules have been computed but will not have influenced the rules themselves. Further work on the distribution-free discrimination method discussed in Chapter IV will make it more applicable to a range of assignment tasks. It holds, it is believed, an appeal to non-statistically minded users of a classification who will be able to comprehend more easily the nature and meaning of assignment rules produced from the algorithm.

All of these areas, together with the synthesis of component analysis, clustering and assignment rule determination stages into one program suite, are the subject of ongoing research.

7.4 Other Applications

Agriculture has provided the detailed background against which this operational approach to multivariate classification has been evaluated. There are equally many other economic or social scenarios which could have been used. It has been suggested that in the classification of industry, commodities, distribution, social class and occupations, benefit should accrue from the application of the proposed methodology. In fact, for any large scale census or survey, the need to present results succinctly leads inevitably to the requirement that the subjects of the enquiry should be classified. While there are numerous bases for such classification, the one which produces the maximum multivariate similarity in observations within classes and the greatest overall differences between classes must have the highest information content and be preferred.

APPENDIX A

"The Group of Experts' Farm Typology"

COMMISSION OF THE
EUROPEAN COMMUNITIES

Luxembourg, 4th February 1977

DG VI - SOEC

CLASSEX 81

GROUP OF EXPERTS "FARM TYPOLOGY"

Community farm classification scheme :
proposal by the services of the Commission.

COMMUNITY FARM CLASSIFICATION SCHEME : PROPOSAL BY THE SERVICES OF THE COMMISSION

INTRODUCTION

1. This paper sets out proposals by the services of the Commission for the Community farm classification scheme. These are at Appendix 1. Appendix 2 defines the various headings in terms of the characteristics of the 1975 Farm Structure Survey. The proposals reflect the detailed discussions in the farm classification working group in particular those at the most recent meeting on 24th and 25th November; they also reflect the French proposals set out in Classex 43.

2. The paper sets out for each of the various headings of the scheme the considerations relevant to that heading (para. 3 to 21). Paragraph 22 gives a general comment on the step 2 threshold.

STEP 1 (assumed threshold 2/3)

3. Field crops pose no particular problem in stage 1.

4. Horticulture has been maintained as an independent main heading and not merged with permanent crops. This meets the wishes of certain delegations, wishes having regard partly to the regional importance of certain permanent crops. Also since the combination of horticulture and permanent crops appears relatively unimportant there is not the argument for merging these two headings that there is for dairy and other grazing livestock (see para. 6 below).

5. Permanent crops - vineyards : showing vineyards as a separate heading satisfies the wishes of certain wine growing countries and reflects the political importance of this crop.
One disadvantage is the introduction of a step one heading for which less than half the 9 Member states are concerned. More important however, showing vineyards as a completely independent heading at step 1 would mean that combinations between vineyards and other permanent crops would be transferred to the class of mixed holdings, also the numbers of combinations for mixed classes would be undesirably increased while the total group "all permanent crops" would not anywhere be available. Accordingly there has been adopted the procedure proposed also for grazing livestock and dairy cows i.e. to give vineyards separately in step 1, but as an "of which" of permanent crops.

6. Grazing livestock I[1] and dairy cows : The approach proposed has the following advantages. It enables the totality of grazing livestock to be shown in one group, thus meeting the strongly expressed wishes of the German delegation and conceding with the French proposals in Classex 43. If the heading grazing livestock is simply split up into "dairycows" and "other" a large number of holdings which combine dairying with other ruminants (and in particular rearing of dairy cow replacements) fall into the mixed group. This seems undesirable. This split has further complications when examining mixed field crop/livestock farms as proposed by the French in Classes 43. Firstly one has two headings or a

(1) Category 5 "grazing livestock over 2/3 "has been labelled "grazing livestock I" to distinguish it from the other grazing livestock category (9) (grazing livestock between one-third and two-thirds, all other main activities being less than one-third) which has been labelled "grazing livestock II".

need to choose between "field crop/dairy cows" and "field crops/other grazing livestock". Secondly certain holdings which would meet the requirements for this mixed group if both their dairy cows and their other grazing livestock be taken into account would not have sufficient of either taken separately. For these reasons the pragmatic solution proposed is to include the heading "of which dairy" as a separate heading in the first step.

7. Pigs and poultry : pose no particular problems here.

8. The combination of field crops and grazing livestock follows from the consideration set out in paragraph 6. Further analysis to isolate the dairy aspect is proposed in step 2.

9. Grazing livestock (between 1/3 and 2/3): involves the same comments as in the previous paragraph.

10. Others : is a rather heterogeneous group the main elements of which are shown separately in step 2 and discussed in more detail in paragraph 20.

11. No separate class of "unclassifiable" is included but it should not be forgotten that there are holdings where the information available is not sufficient to allow the farm type to be calculated, e.g. a holding producing only rabbits.

STEP 2

12. For field crops a simple break-down into 3 broad groups is proposed. This takes into account the rotational constraints

which prevent any marked degree of specialisation. (The general argument for a threshold at 2/3 is set out in paragraph 22). It also takes account of the wish to see the combination* at the last meeting though not in Classex 43. The definition proposed for the group (1.2) adopts the 1/3 to 2/3 approach proposed for mixed holdings. "Roots" are taken to include E 12 "forage roots" in the cases where these contribute a gross margin.

13. The breakdown for <u>horticulture</u> shows market garden vegatables at 2.1. At 2.2 is floriculture plus combinations of market garden vegetables and floriculture. It is necessary to pool the very small combination item with some other heading and if the telescopic principle is followed this has to be one of the enterprises within the main activity horticulture. Whether it would be better to pool with 2.1 could be discussed.

14. For <u>permanent crops - wine</u> the breakdown proposed by France in Classex 43 has been taken over. Table grapes are not however shown separately until step 3. Although the 1975 farm structure survey offers no possibility of distinguishing sub-categories of 4 (except under special arrangements for France) the Farm Accounts Data Network will allow the split.

15. A further major split is between fruit, olives and citrus fruit. If there were important combinations of these it would be possible to maintain a combined "group" in step 2, e.g. of fruit and olives and only split into the individual headings in step 3. The allocation of nurseries to this heading has aroused comment from some delegations.

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*"cereals/roots" shown separately, expressed by the French delegation ....

16. The break-down proposed for grazing livestock and dairy cows shows non-dairy livestock separately and then in combination with dairying. Step 1 and 2 for grazing livestock thus have the advantage of showing all the major magnitudes, of treating dairying separately and with dairy cows* have to be repeated from step 1 in order to maintain the exhaustive character of step 2 and in fact are split into the two classes 5.1 (dairy milk) and 5.2 (dairy other). 5.1 consists of those holdings where the purely milk element within the overall dairy cow gross margin is at least half of the total s.g.m. of the holding.

17. For pigs and poultry an analogous procedure to that for horticulture has been adopted. The negligible class of combined pig/poultry holdings has been included with the specialised poultry holdings for reasons analogous to those set out in paragraph 13.

18. The combined group field crops/grazing livestock is split up into "dairy cows" and "other g. 1.", each combined with field crops. The category "others" thus includes those holdings where both dairy cows and other grazing livestock are found in combination with field crops. Just as step 1 and 2 of category 5 show all the major magnitudes for grazing livestock, dairying and other g.l. (as independent headings) so step 1 and 2 of category 8 show these magnitudes in combination with field crops. The only difference is that the dairying aspect is not brought forward to the first step since this would increase undesirably the number of headings.

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*being shown in step 1. Dairy cows .....

19. A similar approach is adopted for the item <u>grazing livestock</u> between 1/3 and 2/3. Items 6, 8.1 and 9.1 should give the majority of holdings where dairying is over 1/3. The remaining possibilities for dairying over 1/3 involve dairying in combination with other main activities. These are in the residual category 10 "others", and can be isolated, if numerically significant, in analysing that category (of 10.6.1).

20. The category 10 "<u>others</u>" contains holdings of various types. Firstly there are the holdings where there are two main activities each between 1/3 and 2/3 (other than the important combination "field crops and grazing livestock" shown separately in Step 1 at category 8). Of the remaining possible combinations four are set out explicitly in 10.1, 10.2, 10.3, 10.4, the remaining five are included in 10.6 "others". A further set of holdings are those where on main activity lies between 1/3 and 2/3 (all other main activities being less than 1/3), other than the main activity "grazing livestock" shown separately at category 9. Of the four remaining possibilities one, field crop, is shown separately at 10.5, the rest are included in 10.6. The remaining item in 10.6 is the small number of holdings where all the main activities are under 1/3.

<u>STEP 3</u>

21. The proposals for step 3 take account of (i) the groups of holdings currently used in the classification scheme for the Farm Accounts Data Network (ii) the desire expressed in the working group to highlight sheep and dairying. Step 3 differs from steps 1 and 2 in not being exhaustive. Member states can of course augment step 3 for their own purposes.

GENERAL

Step 2 threshold

22. In the choice of threshold the working assumption of the last meeting of a Step 1 threshold of 2/3 for specialised classes has been maintained. In Step 2 the same approach has been proposed (except for dairy milk) for the following reason. A lower value would imply adding the condition for specialisations that one was only considering holdings from the relevant main activity (in order to safeguard the telescopic principle). This would have the undesirable feature of distinguishing between holdings which reached a certain level of specialisation, in function of the other activities on that holding.

Example : threshold in Step 2 is less than the 2/3 of Step 1, say 60%. A holding which has 63% market garden vegetables but no other horticulture crops would not count as a specialised horticultural holding (category 2.1 in the appendix 1) since it would not fulfil the condition for inclusion under main activity 2. Another holding with not merely 63% of market gardening vegetables but also 4% of other horticultural crops would so count.

STEP 1	STEP 2	STEP 3
1 Field crops (>2/3)	1.1 Cereals (incl. rice (>2/3)	1.1.1 Cereals (excl.rice) (>2/3) 1.1.2 Rice (>2/3)
	1.2 Cereals and roots (both between 1/3 and 2/3)	
	1.3 Others (field scale vegetables (>2/3), industrial crops (>2/3), seeds (>2/3) and combinations from these cereals/roots)	
2 Horticulture (>2/3)	2.1 Market gardening vegetables (>2/3)	2.1.1 Open-air (>2/3) 2.1.2 Under glass (>2/3)
	2.2 Others (Flowers and ornamental plants (>2/3) and combinations of these with market garden vegetables)	2.2.1 Flowers etc - open-air (>2/3) 2.2.2 Flowers etc - under glass (>2/3)
3 Permanent crops (>2/3) <u>of which</u>	3.1 Quality wine of controlled vintage (>2/3)	
	3.2 Ordinary wine (>2/3)	
4 Vineyards (>2/3)	3.3 Other vineyards	3.3.1 Table grapes (>2/3)
	3.4 Fruit (>2/3)	
	3.5 Citrus (>2/3)	
	3.6 Olives (>2/3)	
	3.7 Others (nurseries (>2/3), other permanent crops (>2/3), permanent crops under glass (>2/3) and combinations from these vineyards/fruit/citrus/olives	3.7.1 Nurseries (>2/3)
5 Grazing livestock I (>2/3)	5.1 Dairy milk (milk>1/2)	
<u>of which</u>	5.2 Dairy other (milk (milk≤1/2)	
6 Dairy cows (>2/3)(= 5.1+5.2)	5.3 Other grazing livestock (>2/3)	5.3.1 Cattle other than dairy cows (>2/3) 5.3 2 Sheep (>2/3)
	5.4 Others (Combinations from dairy cows and other grazing livestock (both between 1/3 and 2/3)	5.4.1 Dairy cows and cattle other than dairy (both between 1/3 and 2/3)
7 Pigs and poultry (>2/3)	7.1 Pigs (>2/3)	7.1.1 Pigs rearing (>2/3) 7.1.2 Pigs fattening (>2/3)
	7.2 Others (poultry (>2/3) and combinations of pigs and poultry)	7.2.1 Eggs (>2/3) 7.2.2 Table fowl (>2/3)
8 Field crops and grazing livestock (both between 1/3 and 2/3)	8.1 Field crops and dairy cows (both >1/3) 8.2 Field crops and other g.l. (both >1/3) 8.3 Others	
9 Grazing livestock II (1/3<g.l. ≤2/3, all other main headings ≤1/3)	9.1 Dairy cows (>1/3)	
	9.2 Other g.l. (>1/3)	9.2.1 Cattle other than dairy cows (>1/3) 9.2.2 Sheep (>1/3)
	9.3 Others	
10 Others	10.1 Grazing livestock and pigs and poultry (both between 1/3 and 2/3)	10.1.1 Dairy cows and pigs and poultry (both between 1/3 and 2/3)
	10.2 Field crops and pigs and poultry (both between 1/3 and 2/3)	
	10.3 Field crops and permanent crops (both between 1/3 and 2/3)	10.3.1 Field crops and wine (both between 1/3 and 2/3)
	10.4 Field crops and horticulture (both between 1/3 and 2/3)	
	10.5 Field crops (1/3 field<crops≤2/3, all other main headings≤1/3)	
	10.6 Others	10.6.1 Dairy cows (>1/3)
		10.6.2 Permanent crops and horticulture (both between 1/3 and 2/3)

Appendix 2

Headings 1 - 7 of appendix 1 defined by characteristics in the 1975 Farm Structure Survey (1)

1	2	3
1 E/01 ...E/11, E/12*, E/13, E/14a, E/18*, E/19	1.1 E/01, ... E/08	1.1.1 E/01 ... E/06, E/08 1.1.2 E/07
	1.2 E/01, ... E/06, E/08, E/10, E/11, E/12*	
	1.3 E/09, E/13, E/14a, E/18*, E/19 and combinations of these with items from 1.1 and 1.2	
2 E/14b, E/15, E/16, E/17	2.1 E/14b, E/15	2.1.1 E/14b 2.1.2 E/15
	2.2 E/15, E/17 and combinations with items from 2.1	2.2.1 E/16
3 H/01, ... H/07 4 H/04	3.1 } 3.2 } H/04 3.3 } 3.4 H/01 3.5 H/02 3.6 H/03	
	3.7 H/05, H/06, H/07 plus combinations	3.7.1 H/05
5 G/01*, K/01, ...K/10 6 K/07	5.1 } 5.2 } 2 K/07	
	5.3 G/01*, K/01 ..K/06, K/08 ... K/10	5.3.1 K/01 ... K/06, K/08 5.3.2 K/09
	5.4 combinations from items in 5	5.4.1 combinations of 5.3.1 and 5.3.2
7 K/11, ... K/16	7.1 K/11, ... K/13	7.1.1 K/11*, K/12 7.1.2 K/13
	7.2 K/14, ... K/16 plus combinations of these with items in 7.1	7.2.1 K/15 7.2.2 K/14, K/16

* Only come into play in special circumstances

(1) Headings 8 - 10 follow from the definitions for headings 1 - 7

(2) Uses the share of standard gross margin for K/07 resulting from milk.

APPENDIX B

Operational Variables and the 1966/7 EEC Farm Structure Survey Variables

The following operational variable definitions should be used in conjunction with the annotated summary of variables included in the 1966 Farm Structure Survey (Appendix B1). The survey variable numbers are as shown there.

Land use variables originally measured in square metres were converted to ares prior to the computation of the operational measures. The variables so modified were E15, E17, F, H07, L10 and L11 (survey variable codes). It should be noticed that the weighting factors for the construction of Annual Work Unit labour inputs and "standard" livestock are those proposed for the 1975/6 survey and are listed in Appendix B2.

Operational Variable	Survey Variable	Notes
SO1	CO1 + CO2 + CO3 + IO1 + IO2 + IO3	
SO2	CO1 + CO2 + CO3	
SO3	0.6 * KO1 + 0.4 * KO2 + 0.5 * KO6 + KO7 + 0.8 * KO8 + 0.1 * KO9 + 0.1 * K10 + 0.027 * K11 + 0.5 * K12 + 0.3 * K13 + 0.007 * K14 + 0.014 * K15 + 0.03 * K16	
SO4	((MO1C - 1) * 0.25 + 0.125) + 0.125* (MO3C1 + MO4C1) + 0.375 * (MO3C2 + MO4C2) + 0.625 * (MO3C3 + MO4C3) + 0.875 * (MO3C4 + MO4C4) + MO3C5 + MO4C5 + (MO5 + MO6)/2200	1
SO5	LO2A + LO2B * LO2C + LO22 + LO23 + LO31 + LO32 + LO33 + LO41 + LO42 + LO43 + LO51 + LO52 / LO53 + LO61 + LO62 + LO63 + LO71 + LO72 + LO73 * LO81	2
LO1	(EO1 + EO2 * EO3 + EO4 + EO5 + EO6 + EO7 + EO8 * EO9) * 100/SO2	
LO2	(E10 + E11 + E12) * 100/SO2	
LO3	E13 * 100/SO2	
LO4	(E14B + E15 + E16 + E17) * 100/SO2	
LO5	(E14A + E18 + E19 + E20) * 100/SO2	
LO6	E21 * 100/SO2	
LO7	F * 100/SO2	
LO8	GO1 * 100/SO2	
LO9	HO4 * 100/SO2	
L10	(HO1 + HO2 + HO3 + HO5 + HO6 + HO7)* 100/SO2	
L11	(IO1/(OP1 + SO2) * 100	
L12	(IO2 + IO3)/SO1 * 100	
L13	JO1A	3
L14	JO2A	3
AO1	KO1 * 0.6 * 100/SO3	
AO2	KO7 * 100/SO3	
AO3	(0.4 * KO2 + KO5 + 0.5 * KO6 + 0.8 * KO8 * 100/SO3	
AO4	(0.1 * KO9 + 0.1 * K10) * 100/SO3	
AO5	0.027 * K11 + 0.5 * K12 + 0.3* K13) * 100/SO3	
AO6	(0.007 * K14 + 0.014 * K15 + 0.03 * K16)* 100/SO3	
AO7	SO3 * 100/SO1	

Operational Variable	Survey Variable	Notes
WO1	SO4 * 1000/SO1	
WO2	((MO1C - 1) * 0.25 + 0.125) + 0.125 * MO3C1 + 0.375 * MO3C2 + 0.625 * MO3C3 + 0.875 * MO3C4 + MO3C5 *100/SO4	1
WO3	(P + MO3B1 + MO4B1) * 100/T	4
WO4	(P + MO3B2 + MO4B2) * 100/T	4
WO5	(P + MO3B3 + MO4B2) * 100/T	4
WO6	(P + MO3B4 + MO4B4) * 100/T	4
WO7	(P + MO3B5 + MO4B5) * 100/T	4
MO1	If (LO2A + LO2B + LO2C + LO2D) ≥ 1 then MO1=1, otherwise MO1=0.	
MO2	If LO31≥1 then MO2=1, otherwise MO2=0	
MO3	If (LO41 + LO51 + LO61 + LO71) ≥ 1 then MO3=1, otherwise MO3=0	
MO4	If (LO22 + LO23 + LO32 + LO33 + LO42 + LO43 + LO52 + LO53 + LO62 + LO63 + LO72 +LO73) ≥1 then MO4=1, otherwise MO4=0	
MO5	If LO81 ≥ 1 then MO5=1, otherwise MO5=0	
MO6	(E15 + E17 + HO7) * 100/SO2	
MO7	LO1	
MO8	SO5 * 1000/SO1	
HO1	BO1 * BO2	
HO2	DO5	
HO3	If MOIA=1 then HO3=1, otherwise HO3=0	
HO4	If MOIA=2 then HO4=1, otherwise HO4=0	
HO5	MO1B	7
HO6	NO1	8
GO1	CO1 * 100/SO2	
GO2	CO2 * 100/SO2	
GO3	CO3 * 100/SO2	
GO4	DO1	
GO5	DO4A1 + DO4A2 + DO4A3 + DO4A4	
GO6	DO4B1 + DO4B2 + DO4B3 + DO4B4 + DO4B5 + DO4B6 + DO4B7	9

Notes: 1. This complicated expression to obtain the total Annual Work Units required the following recoding of MOIC. Code "5" was replaced by "4.5" and code "9" by "0.5". The assumption in the second step is that corporate and other non-natural person holders do not work on the holding. In the event there are relatively few of these so that the simplifying assumption should not affect the results greatly.

2. This is a fairly crude estimate of capital equipment use and includes the number of machines owned plus the number of machines shared or rented at least once per year.

3. J01A and J02A were originally coded "T Yes". Both were re-coded "1 = Yes".

4. P takes a value "1" if the holder works regularly on the holding and is in the specified age range. T is the total number of regular workers (as opposed to casual labour) employed by the holding.

5. B02 code "9" altered to code "0".

6. M01A code "9" ignored.

7. Where there is a non-natural or joint holder a default age of 52 years has been employed.

8. Codes "8" and "9" are treated as "0".

9. "Yes" answers to D04B1-D04B7 were originally coded "7". This was re-coded "1".

APPENDIX B1

Outline definition of Variables included in 1966 Farm Structure Survey

A. GEOGRAPHICAL SITUATION OF THE HOLDING

A01* Country

A02* Region

A03* District

A04* Holding Number

A05* Raising factor (5 decimals)

The codes of headings A01, A02, A03 are established jointly by the SOEC and the Member State concerned.

B. LEGAL PERSONALITY OF THE HOLDING

B01 Is the legal and economic responsibility ....

Codes:

Answer	Code
yes	1
no	0

B02 If yes, ...

Codes:

Answer	Code
yes	1
no	0
not applicable because B/01 answered as 'no'	9

C. TYPE OF TENURE

C01 for owner farming

C02 for tenant farming

C03 for share cropping and other modes

D. MANAGEMENT OF THE HOLDING AND MANAGER'S EDUCATION

D01 Are accounts kept?

Codes:

Answer	Code
yes	1
no	0

04 a) Is the holding...for the purposes of

D04 a1)* its supplies

D04 a2)* marketing its produce

D04 a3)* use of agricultural equipment...

D04 a4)* supplies and/or marketing and/or use of equipment

member of a cooperative or other similar agr. organisation

Codes for the headings of D04 a1, D04 a2, D04 a3, D04 a4 in each case:

Answer	Code
yes	1
no	0

04 b) Whether production under contract

D04 b1)* cereals

D04 b2)* fruit and vegetables

O=No D04 b3)* bovine animals

Y=Yes D04 b4)* milk and milk products

D04 b5)* pigs

D04 b6)* poultry

D04 b7)* eggs

D05 Manager's education and agricultural training

Codes:

Answer	Code
none	1
primary	2
secondary	3
higher	4

LAND USE

E. ARABLE LAND

E01 Common wheat and spelt

E02 Durum wheat

E03 Rye

E04 Barley

E05 Oats

E06 Grain maize

E07 Rice

E08 Other cereals

E09 Dried vegetables (...)

E10 Potatoes (...)

E11 Sugar beet (...)

E12 Fodder roots and brassicas (...)

E13 Industrial plants (...)

Fresh vegetables, melons, strawberries:

14 - outdoor

E14 a) open field

E14 b) market gardening

E15 - under glass (units are m^2)

Flowers and ornamental plants:

E16 - outdoor

E17 - under glass (units are m^2)

E18 Forage crops

E19 Horticultural seeds ....

E20 Other arable crops

E21 Fallow

F. SUBSISTENCE PLOTS (units are m^2)

G. PERMANENT PASTURE

G01 Permanent pasture including mountain grazing

H. PERMANENT CROPS

H01 Fruit and berry plantations

H02 Citrus plantations

H03 Olive plantations

H04 Vineyards

H05 Nurseries

H06 Other permanent crops

H07 Permanent crops under glass (units are m^2)

I. OTHER LAND

I01 Unutilised agricultural area (...)

I02 Woodland

I03 Other land (...)

J. COMBINED AND SUCCESSIVE CROPS (excluding...)

01 Land under crops combined with permanent crops

J01 a)* Are answers being furnished for this question?

Code:

Answer	Code
yes	7
no	0

K. LIVESTOCK (as of...)(...)

K01 Equidae

Bovine animals

K02 under 1 year old

2 years old and over:

K05 Male animals*

K06 Heifers

K07 Dairy cows

K08 Other cows

K09 Sheep (all ages)

K10 Goats (all ages)

K11 Piglets of live weight...

K12 Breeding sows weighing...

K13 Other pigs

K14 Broilers

K15 Laying hens

K16 Other poultry (...)

* includes some cattle, mostly males under 2 years old.

L. TRACTORS, CULTIVATORS, MACHINERY AND EQUIPMENT

L01 Are draught animals used on the holding?

Codes:

Answer	Code
yes	1
no	0

02 4-wheeled tractors

(1) number belonging to the holding

L02 a) $X < 25$ HP

L02 b) $25 \leq X < 35$ HP

L02 c) $35 \leq X < 51$ HP

L02 d) 51 HP $\leq X$

(X = Horse-power rating)

L02 (2) used by several ....

L02 (3) belonging to a service supply agency

L03 Cultivators, hoeing machines

L03 (1) number belonging to the holding

L03 (2) used by several ....

L03 (3) belonging to a service supply agency

L04 Combine harvesters

L04 (1) number belonging to the holding

L04 (2) used by several holdings

L04 (3) belonging to a service supply agency

L05 Forage harvesters

L05 (1) number belonging to the holding

L05 (2) used by several holdings

L05 (3) belonging to a service supply agency

L06 Potato-harvesters (...)

L06 (1) number belonging to the holding

L06 (2) used by several holdings

L06 (3) belonging to a service supply agency

L07 Sugar-beet harvesters (...)

L07 (1) number belonging to the holding

L07 (2) used by several holdings

L07 (3) belonging to a service supply agency

L08 Milking machinery (...)

L08 (1) belonging to the holding

L10 - without heating installation

L11 - with heating installation

M. FARM LABOUR FORCE

01 Holder

M01 a)* Sex

Code:

Answer	Code
male	1
female	2
not applicable because the holder is not a natural person	9

M01 b)* Age
(number of years)
If M01 answered '9' put '0' in answer to this question

M01 c)* Time worked (classes)

Codes:

Answer	Code
$X < 25\%$	1
$25\% \leq X < 50\%$	2
$50\% \leq X < 75\%$	3
$75\% \leq X < 100\%$	4
$X = 100\%$	5
not applicable because the holder is not a natural person	9

X = hours worked expressed as a percentage of annual time worked by a full-time worker.

03 Other members of the holder's family

a)* Number

M03 a1) male

M03 a2) female

b)* Number in 5 classes of age:

M03 b1) $X < 25$

M03 b2) $25 \leq X < 35$

M03 b3) $35 \leq X < 45$

M03 b4) $45 \leq X < 65$

M03 b5) $65 \leq X$

(X = age in years)

c)* Number in 5 classes of time worked:

M03 c1) $X < 25\%$

M03 c2) $25\% \leq X < 50\%$

M03 c3) $50\% \leq X < 75\%$

M03 c4) $75\% \leq X < 100\%$

M03 c5) $X = 100\%$

(X = hours worked expressed as a percentage of annual time worked by a full-time worker).

04 Non-family labour regularly employed

a)* Number:

M04 a1) male

M04 a2) female

b)* Number in 5 age groups:

M04 b1) $X < 25$

M04 b2) $25 \leq X < 35$

M04 b3) $35 \leq X < 45$

M04 b4) $45 \leq X < 65$

M04 b5) $65 \leq X$

(X = age in years)

c)* Number in 5 classes of time worked:

M04 c1) $X < 25\%$

M04 c2) $25\% \leq X < 50\%$

M04 c3) $50\% \leq X < 75\%$

M04 c4) $75\% \leq X < 100\%$

M04 c5) $X = 100\%$

(X = hours worked expressed as a percentage of annual time worked by a full-time worker)

Non-family labour force not regularly employed.

Number of working days of:

M05 Males

M06 Females

07 Other members of the holder's family (item 03) working on the holding for at least 75% of annual working time

a)* up to 25 years old

M07 a1)* males

M07 a2)* females

b)* up to 35 years old

M07 b1)* males

M07 b2)* females

N. HOLDER'S GAINFUL ACTIVITIES OTHER THAN THE ACTIVITY REFERRED TO IN M.

N01 Does the holder engage in any other gainful activity

Codes for N01, N02a, N02b, N03a), N03b), N04:

Answer	Code
yes	1
no	0
not applicable because holder is not the same person as the manager, or is not a natural person	8
for N04 no information is being provided	9

APPENDIX B2

Conversion Codes for Annual Work Units and Standard Livestock

1975 FARM STRUCTURE SURVEY

Calculation of Annual Work Units

M.01 - M.04

Class of time worked	Mid Point for calculation of Annual Work Units
X < 25%	0.125
25% ≤ X < 50%	0.375
50% ≤ X < 75%	0.625
75% ≤ X < 100%	0.875
X = 100%	1.0

(X = hours worked expressed as a percentage of full time worked by a full-time worker).

M.05 - M.06

Number of working days $\frac{8}{2200}$ Annual Work Units

100 working days 0.36363 a.w.u.'s

S.O.E.C. APPENDIX 12

1966/67 LIVESTOCK COEFFICIENTS ADJUSTED TO CONFORM TO 1975 FARM STRUCTURE SURVEY HEADINGS

		K
01	Equidae	0.8
	BOVINE ANIMALS	
02	Under one year old	0.4
	Over one but under two years old	
03	Male	0.7
04	Female	0.7
	Two years old and over	
05	Male	1.0
06	Heifers	0.5
07	Dairy cows	1.0
08	Other cows	0.8
09	Sheep (all ages)	0.1
10	Goats (all ages)	0.1
	PIGS	
11	Piglets of live weight under 20 kg (100 head)	2.7
12	Breeding sows weighing 50 kg and over	0.5
13	Other pigs	0.3
	POULTRY	
14	Table fowl (100 head)	0.7
15	Laying hends (100 head)	1.4
16	Other poultry (ducks, turkeys, geese, guinea-fowl)(100 head)	3.0

APPENDIX C

Computer Programs Written for the Research

```
      PROGRAM(SYST)
      INPUT 1=MT0/FORMATTED(EECDATA)/512
      OUTPUT 2=CP0
      OUTPUT 3=CP1
      OUTPUT 4=CP2
      COMPRESS INTEGER AND LOGICAL
      TRACE 1
      END
      MASTER SYST
      DIMENSION Y(200),X(200),W(5),NW(5),NX(200)
      NV=127
      IND=1
      DO 7 I=1,2202
      IF(I.NE.1) GOTO 8
      J=3
      GOTO 9
    8 J=9
    9 DO 10 K=1,J
   10 READ(1,301) ID
  301 FORMAT(I3,//////////)
      READ(1,200) (W(K),K=1,5 ),(X(J),J=1,127)
  200 FORMAT(F1.0,F3.0,F2.0,2F10.0,2F1.0,3F10.0,F1.0,2X,12F1.0/
     18F10.0/8F10.0/8F10.0/
     210X,7F10.0/3F10.0,F1.0,9X,F1.0,9X,2F10.0,10X/10X,7F10.0/5F10.0,F1.
     30,4F4.0,2F1.0,F4.0,2F1.0/4(F4.0,2F1.0),F4.0,5X,2F10.0,10X,F1.0,F4.
     40,F1.0,3X/19F4.0/5F4.0,2F10.0,4F4.0,F1.0)
      DO 307 K9=1,3
  307 NW(K9)=IFIX(W(K9))
      NW(4)=IFIX(W(4)/10000)
      NW(5)=IFIX(W(5)/10000)
      DO 308 K9=1,NV
  308 NX(K9)=IFIX(X(K9))
      WRITE(3,209)(NW(K),K=1,5),(NX(J),J=1,127)
  209 FORMAT(I1,I3,I2,2I10,2I1,3I10,I1,2X,12I1/
     18I10/8I10/8I10/
     210X,7I10/3I10,I1,9X,I1,9X,2I10,10X/10X,7I10/5I10,I1
     3,4I4,2I1,I4,2I1/4(I4,2I1),I4,5X,2I10,10X,I1,I4,
     4I1,3X/19I4/5I4,2I10,4I4,I1)
      DO 20 M=1,200
      Y(M)=0.0
   20 CONTINUE
      X(34)=X(34)/100
      X(36)=X(36)/100
      X(41)=X(41)/100
      X(49)=X(49)/100
      TOT=0.0
      DO 30 K=19,49
   30 TOT=TOT+X(K)
      Y(45)=X(3)+X(4)+X(5)
      Y(46)=Y(45)+X(50)+X(51)+X(52)
      IF(TOT.NE.Y(45))GOTO 40
      IF(Y(45).EQ.0.0)GOTO 40
      IF(X(96).EQ.9.0)X(96)=0.5
      IF(X(96).EQ.5.0)X(96)=4.5
      Y(48)=((X(96)-1)*0.25+0.125+0.125*(X(104)+X(116))+0.375*(X(105)+X(
```

```
  1117))+0,625*(X(106)+X(118))+0,875*(X(107)+X(119))+X(108)+X(120)+(8
  2*(X(121)+X(122))/2200))
   IF(Y(48).EQ.0)GOTO 40
   IF (Y(46).NE.0.0)GOTO 501
 40 CALL OUT(W,X,NV,IND)
   GOTO 7
501 IF(X(2).EQ.9.0)X(2)=0
   Y(1)=X(2)*X(1)
   Y(2)=X(3)/(Y(45)*0.01)
   Y(3)=X(4)/(Y(45)*0.01)
   Y(4)=X(5)/(Y(45)*0.01)
   Y(5)=X(6)
   Y(6)=X(7)+X(8)+X(9)+X(10)
   Y(7)=X(11)/7+X(12)/7+X(13)/7+X(14)/7+X(15)/7+X(16)/7+X(17)/7
   Y(8)=X(18)
   Y(9)=(X(19)+X(20)+X(21)+X(22)+X(23)+X(24)+X(25)+X(26)
  1+X(27))/(Y(45)*0.01)
   Y(10)=(X(28)+X(29)+X(30))/(Y(45)*0.01)
   Y(11)=X(31)/(Y(45)*0.01)
   Y(12)=(X(33)+X(34)+X(35)+X(36))/(Y(45)*0.01)
   Y(13)=(X(37)+X(38)+X(32)+X(39))/(Y(45)*0.01)
   Y(14)=X(40)/(Y(45)*0.01)
   Y(15)=(X(41))/(Y(45)*0.01)
   Y(16)=X(42)/(Y(45)*0.01)
   Y(17)=(X(43)+X(44)+X(45)+X(47)+X(48)+X(49))/(Y(45)*0.01)
   Y(52)=X(46)/(Y(45)*0.01)
   Y(18)=X(50)/((Y(45)+X(50))*0.01)
   Y(19)=(X(51)+X(52))/(Y(46)*0.01)
   IF(X(53).EQ.7.0)X(53)=1.0
   IF(X(54).EQ.7.0)X(54)=1.0
   Y(20)=X(53)
   Y(21)=X(54)
   Y(22)=0.6*X(55)
   Y(53)=X(59)
   Y(23)=0.4*X(56)+X(57)+0.5*X(58)+0.8*X(60)
   Y(24)=0.1*(X(61)+X(62))
   Y(25)=0.027*X(63)+0.5*X(64)+0.3*X(65)
   Y(26)=X(66)*0.007+X(67)*0.014+X(68)*0.03
   Y(47)=Y(22)+Y(23)+Y(24)+Y(25)+Y(26)+Y(53)
   IF(Y(47).EQ.0.0)GOTO 50
   Y(22)=Y(22)*100/Y(47)
   Y(23)=Y(23)*100/Y(47)
   Y(24)=Y(24)*100/Y(47)
   Y(25)=Y(25)*100/Y(47)
   Y(26)=Y(26)*100/Y(47)
   Y(53)=Y(53)*100/Y(47)
 50 Y(50)=Y(47)*100/Y(46)
   Y(27)=X(69)
   IF((X(70)+X(71)+X(72)+X(73)).GT.0)Y(28)=1
   IF(X(76).GT.0)Y(29)=1
   IF((X(79)+X(82)+X(85)+X(88)).GT.0)Y(30)=1
   IF((X(74)+X(75)+X(77)+X(78)+X(80)+X(81)+X(83)+X(84)+
  1 X(86)+X(87)+X(89)+X(90)).GT.0)Y(31)=1
   DO 51 K=70,91
 51 Y(49)=Y(49)+X(K)
   Y(51)=Y(49)/(Y(46)*0.001)
```

```
      IF(X(91).GT.0.0) Y(32)=1
      Y(33)=(X(36)+X(34)+X(49))/(Y(45)*0.01)
      IF(X(94).EQ.1)Y(34)=1
      IF(X(94).EQ.2)Y(35)=1
      IF(X(95).EQ.0.0)X(95)=52.0
      Y(36)=X(95)
      Y(38)=((X(96)-1)*0.25+0.125+0.125*X(104)+0.375*X(105)+0.625*X(106)
     1+0.875*X(107)+X(108))
      Y(37)=Y(48)/(Y(46)*0.001)
      Y(38)=Y(38)*100/Y(48)
      IF(X(96).EQ.0.5)P=0.0
      IF(X(96).NE.0.5)P=1.0
      T=P+X(97)+X(98)+X(109)+X(110)
      IF(T .NE. 0.0) GO TO 502
      T = 0.00001
  502 IF(X(95).LT.25.0.AND.P.EQ.1.0)Y(39)=1.0
      Y(39)=(Y(39)+X(99)+X(111))/(T*0.01)
      IF((X(95).GE.25.0.AND.X(95).LT.35.0).AND.P.EQ.1.0)Y(40)=1.0
      Y(40)=(Y(40)+X(100)+X(112))/(T*0.01)
      IF((X(95).GE.35.0.AND.X(95).LT.45.0).AND.P.EQ.1.0)Y(41)=1.0
      Y(41)=(Y(41)+X(101)+X(113))/(T*0.01)
      IF((X(95).GE.45.0.AND.X(95).LT.65.0).AND.P.EQ.1.0)Y(42)=1.0
      Y(42)=(Y(42)+X(102)+X(114))/(T*0.01)
      IF((X(95).GE.65.0).AND.P.EQ.1)Y(43)=1
      Y(43)=(Y(43)+X(103)+X(115))/(T*0.01)
      IF(X(127).EQ.8.0)X(127)=0
      Y(44)=X(127)
      C1=0.0
      C2=0.0
      C3=0.0
      C4=0.0
      C5=0.0
      C6=0.0
      C7=0.0
      C8=0.0
      C9=0.0
      CLASS=17
      IF((Y(9)+Y(10)+Y(11)+Y(13)).GT.66.6)CLASS=3
      IF(Y(9).GT.66.6)CLASS=1
      IF(Y(9).LE.66.6.AND.Y(9).GT.33.3.AND.Y(10).LE.66.6.AND.
     1Y(10).GT.33.3)CLASS=2
      IF(Y(12).GT.66.6)CLASS=4
      IF((Y(52)+Y(17)).GT.66.6)CLASS=6
      IF(Y(52).GT.66.6)CLASS=5
      IF(CLASS.NE.17) GOTO 70
      IF(Y(16).GT.66.6)C1=1
      IF(Y(16).LE.66.6.AND.Y(16).GT.33.3)C2=1
      A=Y(22)+Y(53)+Y(23)+Y(24)
      IF(A.GT.66.6)C3=1
      IF(A.LE.66.6.AND.A.GT.33.3)C4=1
      A=Y(25)+Y(26)
      IF(A.GT.66.6)C5=1
      IF(A.LE.66.6.AND.A.GT.33.3)C6=1
      A=Y(9)+Y(10)+Y(11)+Y(13)
      IF(A.LE.66.6.AND.A.GT.33.3)C7=1
      IF(Y(12).LE.66.6.AND.Y(12).GT.33.3)C8=1
```

```
      IF((Y(52)+Y(17)).LE.66.6.AND.(Y(52)+Y(17)).GT.33.3)C9=1
      IF(C1*C3.EQ.1)CLASS=8
      IF(C1.EQ.1.AND.Y(53).GT.66.6)CLASS=7
      IF(C5.EQ.1)CLASS=9
      IF(CLASS.NE.17)GOTO 70
      IF(C2*C4*C7.EQ.1.OR.C3*C2*C7.EQ.1.OR.C4*C1*C7.EQ.1)CLASS=10
      IF(C2*C4*C6.EQ.1.OR.C3*C2*C6.EQ.1.OR.C4*C1*C6.EQ.1)CLASS=11
      IF(C7*C6.EQ.1)CLASS=12
      IF(C7*C9.EQ.1)CLASS=13
      IF(C7*C8.EQ.1)CLASS=14
      IF(CLASS.NE.17)GOTO 70
      IF(C7.EQ.1)CLASS=15
      IF(CLASS.NE.17)GOTO 70
      IF(C4.EQ.1)CLASS=16
   70 CONTINUE
      WRITE(2,300) IND,Y(46),Y(45),Y(47),Y(48),Y(49)
  300 FORMAT(2X,1HD,I4,8(1X,F8.2))
      WRITE(2,300)IND,(Y(J),J=9,15 )
      WRITE(2,300)IND,Y(16),Y(52),(Y(J),J=17,21)
      WRITE(2,300)IND,Y(22),Y(53),(Y(J),J=23,26),Y(50)
      WRITE(2,300)IND,(Y(J),J=37,43)
      WRITE(2,300)IND,(Y(J),J=28,33),Y(27),Y(51)
      WRITE(2,300)IND,Y(1),Y(8),Y(34),Y(35),Y(36),Y(44)
      WRITE(2,300)IND,(Y(J),J=2,7)
      WRITE(2,300)IND,W(1),CLASS
      IND=IND+1
    7 CONTINUE
      STOP
      END
```

```
      SUBROUTINE OUT(W,X,NV,IND)
      DIMENSION X(200),W(5)
      WRITE(4,104)IND
  104 FORMAT(////,9H BEFORE D,I4)
      DO 100 I = 1,5
      WRITE(4,101)W(I)
  101 FORMAT(10X,F16.2)
  100 CONTINUE
      DO 102 I = 1,NV
      IF(X(I).EQ.0.0)GOTO 102
      WRITE(4,103)I,X(I)
  102 CONTINUE
  103 FORMAT(3H X(,I3,2H)=,F16.2)
      RETURN
      END
      FINISH
```

```
      PROGRAM(RANSAM)
      INPUT 1=MT0/FORMATTED(EECDATA)/512
      OUTPUT 2=CP1
      OUTPUT 5=CP2
      OUTPUT 3=LP0
      OUTPUT 4=CP0
      COMPRESS INTEGER AND LOGICAL
      TRACE 1
      END
      MASTER RANSAM
      DIMENSION IX(500),Y(200),NX(500),X(200),NIX(200),W(5),NW(5)
      NV=127
      IND=1
      DO 1 I=1,500
      NX(I)=0
   18 XM=G05ABF(1.0,22026,0)
      MX=IFIX(XM)
      IX(I)=MX
      IF(I.EQ.1)GOTO 1
      DO 17 K=1,I-1
      IF (IX(I).EQ.IX(K)) GOTO 18
   17 CONTINUE
    1 CONTINUE
      DO 2 J=1,500
      ICOUNT =0
      DO 3 I=1,500
    3 IF(IX(J).GE.IX(I))ICOUNT =ICOUNT+1
      IEND=ICOUNT
      DO 4 I=1,IEND
      IF(NX(ICOUNT).EQ.0) GOTO 5
    4 ICOUNT=ICOUNT-1
    5 NX(ICOUNT)=IX(J)
    2 CONTINUE
      WRITE(3,100)
  100 FORMAT(1X,'SAMPLE MEMBER POPULATION MEMBER')
      DO 6 I=1,500
    6 WRITE(3,207)I,NX(I)
  207 FORMAT(5X,I3,12X,I5)
      DO 7 I=1,500
      IF(I.NE.1) GOTO 8
      J=NX(I)-1
      GOTO 9
    8 J=NX(I)-NX(I-1)-1
      IF(J.EQ.0)GOTO 727
    9 DO 10 K=1,J
   10 READ(1,305) ID
  305 FORMAT(I3,//////////)
  727 READ(1,200) (W(K),K=1,5 ),(X(J),J=1,127)
  200 FORMAT(F1.0,F3.0,F2.0,2F10.0,2F1.0,3F10.0,F1.0,2X,12F1.0/
     18F10.0/8F10.0/8F10.0/
     210X,7F10.0/3F10.0,F1.0,9X,F1.0,9X,2F10.0,10X/10X,7F10.0/5F10.0,F1.
     30,4F4.0,2F1.0,F4.0,2F1.0/4(F4.0,2F1.0),F4.0,5X,2F10.0,10X,F1.0,F4.
     40,F1.0,3X/19F4.0/5F4.0,2F10.0,4F4.0,F1.0)
      DO 307 K9=1,3
  307 NW(K9)=IFIX(W(K9))
```

```
      NW(4)=IFIX(W(4)/10000)
      NW(5)=IFIX(W(5)/10000)
      DO 308 K9=1,NV
  308 NIX(K9)=IFIX(X(K9))
      WRITE(5,209)(NW(K),K=1,5),(NIX(J),J=1,127)
  209 FORMAT(I1,I3,I2,2I10,2I1,3I10,I1,2X,12I1/
     18I10/8I10/8I10/
     210X,7I10/3I10,I1,9X,I1,9X,2I10,10X/10X,7I10/5I10,I1
     3,4I4,2I1,I4,2I1/4(I4,2I1),I4,5X,2I10,10X,I1,I4,
     4I1,3X/19I4/5I4,2I10,4I4,I1)
      DO 20 M=1,200
      Y(M)=0.0
   20 CONTINUE
      X(34)=X(34)/100
      X(36)=X(36)/100
      X(41)=X(41)/100
      X(49)=X(49)/100
      TOT=0.0
      DO 30 K=19,49
   30 TOT=TOT+X(K)
      Y(45)=X(3)+X(4)+X(5)
      Y(46)=Y(45)+X(50)+X(51)+X(52)
      IF(TOT.NE.Y(45))GOTO 40
      IF(Y(45).EQ.0.0)GOTO 40
      IF(X(96).EQ.9.0)X(96)=0.5
      IF(X(96).EQ.5.0)X(96)=4.5
      Y(48)=((X(96)-1)*0.25+0.125+0.125*(X(104)+X(116))+0.375*(X(105)+X(
     1117))+0.625*(X(106)+X(118))+0.875*(X(107)+X(119))+X(108)+X(120)+(8
     2*(X(121)+X(122))/2200))
      IF(Y(48).EQ.0)GOTO 40
      IF (Y(46).NE.0.0)GOTO 501
   40 CALL OUT(W,X,NV,IND)
      GOTO  7
  501 IF(X(2).EQ.9.0)X(2)=0
      Y(1)=X(2)*X(1)
      Y(2)=X(3)/(Y(45)*0.01)
      Y(3)=X(4)/(Y(45)*0.01)
      Y(4)=X(5)/(Y(45)*0.01)
      Y(5)=X(6)
      Y(6)=X(7)+X(8)+X(9)+X(10)
      Y(7)=X(11)/7+X(12)/7+X(13)/7+X(14)/7+X(15)/7+X(16)/7+X(17)/7
      Y(8)=X(18)
      Y(9)=(X(19)+X(20)+X(21)+X(22)+X(23)+X(24)+X(25)+X(26)
     1+X(27))/(Y(45)*0.01)
      Y(10)=(X(28)+X(29)+X(30))/(Y(45)*0.01)
      Y(11)=X(31)/(Y(45)*0.01)
      Y(12)=(X(33)+X(34)+X(35)+X(36))/(Y(45)*0.01)
      Y(13)=(X(37)+X(38)+X(32)+X(39))/(Y(45)*0.01)
      Y(14)=X(40)/(Y(45)*0.01)
      Y(15)=(X(41))/(Y(45)*0.01)
      Y(16)=X(42)/(Y(45)*0.01)
      Y(17)=(X(43)+X(44)+X(45)+X(47)+X(48)+X(49))/(Y(45)*0.01)
      Y(52)=X(46)/(Y(45)*0.01)
      Y(18)=X(50)/((Y(45)+X(50))*0.01)
      Y(19)=(X(51)+X(52))/(Y(46)*0.01)
      IF(X(53).EQ.7.0)X(53)=1.0
```

```
      IF(X(54).EQ.7.0)X(54)=1.0
      Y(20)=X(53)
      Y(21)=X(54)
      Y(22)=0.6*X(55)
      Y(53)=X(59)
      Y(23)=0.4*X(56)+X(57)+0.5*X(58)+0.8*X(60)
      Y(24)=0.1*(X(61)+X(62))
      Y(25)=0.027*X(63)+0.5*X(64)+0.3*X(65)
      Y(26)=X(66)*0.007+X(67)*0.014+X(68)*0.03
      Y(47)=Y(22)+Y(23)+Y(24)+Y(25)+Y(26)+Y(53)
      IF(Y(47).EQ.0.0)GOTO 50
      Y(22)=Y(22)*100/Y(47)
      Y(23)=Y(23)*100/Y(47)
      Y(24)=Y(24)*100/Y(47)
      Y(25)=Y(25)*100/Y(47)
      Y(26)=Y(26)*100/Y(47)
      Y(53)=Y(53)*100/Y(47)
   50 Y(50)=Y(47)*100/Y(46)
      Y(27)=X(69)
      IF((X(70)+X(71)+X(72)+X(73)).GT.0)Y(28)=1
      IF(X(76).GT.0)Y(29)=1
      IF((X(79)+X(82)+X(85)+X(88)).GT.0)Y(30)=1
      IF((X(74)+X(75)+X(77)+X(78)+X(80)+X(81)+X(83)+X(84)+
     1 X(86)+X(87)+X(89)+X(90)).GT.0)Y(31)=1
      DO 51 K=70,91
   51 Y(49)=Y(49)+X(K)
      Y(51)=Y(49)/(Y(46)*0.001)
      IF(X(91).GT.0.0) Y(32)=1
      Y(33)=(X(36)+X(34)+X(49))/(Y(45)*0.01)
      IF(X(94).EQ.1)Y(34)=1
      IF(X(94).EQ.2)Y(35)=1
      IF(X(95).EQ.0.0)X(95)=52.0
      Y(36)=X(95)
      Y(38)=((X(96)-1)*0.25+0.125*0.125*X(104)+0.375*X(105)+0.625*X(106)
     1+0.875*X(107)+X(108))
      Y(37)=Y(48)/(Y(46)*0.001)
      Y(38)=Y(38)*100/Y(48)
      IF(X(96).EQ.0.5)P=0.0
      IF(X(96).NE.0.5)P=1.0
      T=P+X(97)+X(98)+X(109)+X(110)
      IF(T .NE. 0.0) GO TO 502
      T = 0.00001
  502 IF(X(95).LT.25.0.AND.P.EQ.1.0)Y(39)=1.0
      Y(39)=(Y(39)+X(99)+X(111))/(T*0.01)
      IF((X(95).GE.25.0.AND.X(95).LT.35.0).AND.P.EQ.1.0)Y(40)=1.0
      Y(40)=(Y(40)+X(100)+X(112))/(T*0.01)
      IF((X(95).GE.35.0.AND.X(95).LT.45.0).AND.P.EQ.1.0)Y(41)=1.0
      Y(41)=(Y(41)+X(101)+X(113))/(T*0.01)
      IF((X(95).GE.45.0.AND.X(95).LT.65.0).AND.P.EQ.1.0)Y(42)=1.0
      Y(42)=(Y(42)+X(102)+X(114))/(T*0.01)
      IF((X(95).GE.65.0).AND.P.EQ.1)Y(43)=1
      Y(43)=(Y(43)+X(103)+X(115))/(T*0.01)
      IF(X(127).EQ.8.0)X(127)=0
      Y(44)=X(127)
      C1=0.0
      C2=0.0
```

```
      C3=0.0
      C4=0.0
      C5=0.0
      C6=0.0
      C7=0.0
      C8=0.0
      C9=0.0
      CLASS=17
      IF((Y(9)+Y(10)+Y(11)+Y(13)).GT.66.6)CLASS=3
      IF(Y(9).GT.66.6)CLASS=1
      IF(Y(9).LE.66.6.AND.Y(9).GT.33.3.AND.Y(10).LE.66.6.AND.
     1Y(10).GT.33.3)CLASS=2
      IF(Y(12).GT.66.6)CLASS=4
      IF((Y(52)+Y(17)).GT.66.6)CLASS=6
      IF(Y(52).GT.66.6)CLASS=5
      IF(CLASS.NE.17) GOTO 70
      IF(Y(16).GT.66.6)C1=1
      IF(Y(16).LE.66.6.AND.Y(16).GT.33.3)C2=1
      A=Y(22)+Y(53)+Y(23)+Y(24)
      IF(A.GT.66.6)C3=1
      IF(A.LE.66.6.AND.A.GT.33.3)C4=1
      A=Y(25)+Y(26)
      IF(A.GT.66.6)C5=1
      IF(A.LE.66.6.AND.A.GT.33.3)C6=1
      A=Y(9)+Y(10)+Y(11)+Y(13)
      IF(A.LE.66.6.AND.A.GT.33.3)C7=1
      IF(Y(12).LE.66.6.AND.Y(12).GT.33.3)C8=1
      IF((Y(52)+Y(17)).LE.66.6.AND.(Y(52)+Y(17)).GT.33.3)C9=1
      IF(C1*C3.EQ.1)CLASS=8
      IF(C1.EQ.1.AND.Y(53).GT.66.6)CLASS=7
      IF(C5.EQ.1)CLASS=9
      IF(CLASS.NE.17)GOTO 70
      IF(C2*C4*C7.EQ.1.OR.C3*C2*C7.EQ.1.OR.C4*C1*C7.EQ.1)CLASS=10
      IF(C2*C4*C6.EQ.1.OR.C3*C2*C6.EQ.1.OR.C4*C1*C6.EQ.1)CLASS=11
      IF(C7*C6.EQ.1)CLASS=12
      IF(C7*C9.EQ.1)CLASS=13
      IF(C7*C8.EQ.1)CLASS=14
      IF(CLASS.NE.17)GOTO 70
      IF(C7.EQ.1)CLASS=15
      IF(CLASS.NE.17)GOTO 70
      IF(C4.EQ.1)CLASS=16
   70 CONTINUE
      WRITE(2,300) IND,Y(46),Y(45),Y(47),Y(48),Y(49)
  300 FORMAT(2X,1HC,I4,8(1X,F8.2))
      WRITE(2,300)IND,(Y(J),J=9,15 )
      WRITE(2,300)IND,Y(16),Y(52),(Y(J),J=17,21)
      WRITE(2,300)IND,Y(22),Y(53),(Y(J),J=23,26),Y(50)
      WRITE(2,300)IND,(Y(J),J=37,43)
      WRITE(2,300)IND,(Y(J),J=28,33),Y(27),Y(51)
      WRITE(2,300)IND,Y(1),Y(8),Y(34),Y(35),Y(36),Y(44)
      WRITE(2,300)IND,(Y(J),J=2,7)
      WRITE(2,300)IND,W(1),CLASS
      IND=IND+1
    7 CONTINUE
      STOP
      END
```

```
      PROGRAM(CLASS)
      INPUT 3=MTO/FORMATTED(EECDATA)/512
      OUTPUT 6=CPO
      OUTPUT 4=LPO
      OUTPUT 7=LP1
      INPUT 1=CRO
      INPUT 2=CR1
      COMPRESS INTEGER AND LOGICAL
      TRACE 1
      END
      MASTER CLASS
      DIMENSION Z(60),NO(30),SUMZ(30,60),SUMZ2(30,60),ZMIN(30,60)
      DIMENSION ZMAX(30,60),TSUMZ(60),TSUMZ2(60),TZMIN(60),TZMAX(60)
      DIMENSION SMEAN(30,60),SMIN(30,60),SMAX(30,60)
      DIMENSION LABEL(80),LABELA(440),NLAND(30,6),NTLAND(6)
      REAL LABEL,LABELA
      COMMON LABEL,LABELA
      READ(2,59)(LABEL(I),I=1,10)
      READ(2,59)(LABELA(I),I=1,53)
   59 FORMAT(10A8)
      READ(2,119) NOBS,NV,NCLASS,NCV
  119 FORMAT(4I0)
      DO 1 J=1,NV-2
      TSUMZ(J)=0
      TSUMZ2(J)=0
      TZMIN(J)=100000
      TZMAX(J)=-100000
      DO 1 K=1,NCLASS
      NO(K)=0
      DO 14 L=1,6
   14 NLAND(K,L)=0
      SUMZ(K,J)=0
      SUMZ2(K,J)=0
      ZMIN(K,J)=100000
      ZMAX(K,J)=-100000
    1 CONTINUE
      DO 13 L=1,6
   13 NTLAND(L)=0
      DO 2 I=1,NOBS
      READ(1,200) (Z(J),J=1,NV)
  200 FORMAT(7X,5F0.0/4(7X,7F0.0/),7X,8F0.0/2(7X,6F0.0/),7X,2F0.0)
      K=Z(NCV)
      NO(K)=NO(K)+1
      L=Z(54)
      NTLAND(L)=NTLAND(L)+1
      NLAND(K,L)=NLAND(K,L)+1
      DO 3 J=1,NV-2
      SUMZ(K,J)=SUMZ(K,J)+Z(J)
      SUMZ2(K,J)=SUMZ2(K,J)+Z(J)**2
      IF(Z(J).GE.ZMIN(K,J))GOTO 7
      ZMIN(K,J)=Z(J)
    7 IF(Z(J).LE.ZMAX(K,J))GO TO 6
      ZMAX(K,J)=Z(J)
    6 TSUMZ(J)=TSUMZ(J)+Z(J)
      TSUMZ2(J)=TSUMZ2(J)+Z(J)**2
```

```
      IF(Z(J).GE.TZMIN(J)) GOTO 9
      TZMIN(J)=Z(J)
    9 IF(Z(J).LE.TZMAX(J)) GOTO 8
      TZMAX(J)=Z(J)
    8 CONTINUE
    3 CONTINUE
    2 CONTINUE
      DO 4 J=1,NV-2
      IF(TSUMZ2(J).EQ.0)GOTO 4
      TSUMZ(J)=TSUMZ(J)/NOBS
      TSUMZ2(J)=SQRT(TSUMZ2(J)/NOBS-TSUMZ(J)**2)
      DO 4 K=1,NCLASS
      IF(NO(K).EQ.0)GOTO 4
      SUMZ(K,J)=SUMZ(K,J)/NO(K)
      SUMZ2(K,J)=SQRT(SUMZ2(K,J)/NO(K)-SUMZ(K,J)**2)
      SMEAN(K,J)=(SUMZ(K,J)-TSUMZ(J))/TSUMZ2(J)
      SMIN(K,J)=(ZMIN(K,J)-TSUMZ(J))/TSUMZ2(J)
      SMAX(K,J)=(ZMAX(K,J)-TSUMZ(J))/TSUMZ2(J)
    4 CONTINUE
      WRITE(4,309)(LABEL(M),M=1,10)
  309 FORMAT(1X///,10A8/)
      WRITE(4,300)NOBS
  300 FORMAT(1X/' TOTAL SAMPLE'/' NO. OF OBSERVATIONS =',I5//
     1' VARIABLE     MEAN      STAN.DEV.    MINIMUM     MAXIMUM'/)
      DO 10 J=1,NV-2
      WRITE(4,400)LABELA(J),TSUMZ(J),TSUMZ2(J),TZMIN(J),TZMAX(J)
  400 FORMAT(1X,A8,4(1X,E10.4))
   10 CONTINUE
      WRITE(4,700)
  700 FORMAT(//' FRANCE BELGIUM HOLLAND GERMANY ITALY LUXEMBOURG'/)
      WRITE(4,800)(NTLAND(L),L=1,6)
  800 FORMAT(2X,I4,4X,I4,3X,I4,4X,I4,4X,I4,4X,I4)
      DO 11 K=1,NCLASS
      WRITE(4,309)(LABEL(M),M=1,10)
      WRITE(4,500)K,NO(K)
  500 FORMAT(1X/' CLASS ',I3,/' NO. OF OBSERVATIONS =',I5//
     1' VARIABLE     MEAN      STAN.DEV.    MINIMUM     MAXIMUM        SMEAN
     2 SMINIMUM   SMAXIMUM '/)
      DO 12 J=1,NV-2
      WRITE(4,600)LABELA(J),SUMZ(K,J),SUMZ2(K,J),ZMIN(K,J),ZMAX(K,J),
     1SMEAN(K,J),SMIN(K,J),SMAX(K,J)
  600 FORMAT(1X,A8,4(1X,E10.4),3(1X,F10.2))
   12 CONTINUE
      WRITE(4,700)
      WRITE(4,800)(NLAND(K,L),L=1,6)
   11 CONTINUE
      CALL ANOVA(SUMZ,TSUMZ2,TSUMZ,NO,NOBS,NCLASS,NV-2)
      STOP
      END
```

```
      SUBROUTINE ANOVA(GM,SD,ZMEAN,NOBSG,NOBTOT,NG,NVAR)
      REAL LABEL,LABELA
      DIMENSION GM(30,60),SD(60),ZMEAN(60),NOBSG(30)
      DIMENSION LABEL(80),LABELA(440)
      COMMON LABEL,LABELA
      TSS=NOBTOT*NVAR
      BSS=0.0
      DO 2 I=1,NVAR
      DO 3 J=1,NG
      SS=NOBSG(J)*((GM(J,I)-ZMEAN(I))/SD(I))**2
    3 BSS=BSS+SS
    2 CONTINUE
      K=1
      L=9
      DO 98 M=1,6
      WRITE(7,70)(LABEL(I),I=1,10)
   70 FORMAT(1H1,10A8//1X,'GROUP MEANS',46X,'VARIABLES',50X,'SIZE')
      WRITE(7,500)(LABELA(I),I=K,K+L)
      IF(M.EQ.6)GOTO 103
      DO 101 J=1,NG
  101 WRITE(7,600) J,(GM(J,I),I=K,K+L),NOBSG(J)
      WRITE(7,605)(ZMEAN(I),I=K,K+L),NOBTOT
  605 FORMAT(/1X,'TOTAL',1X,9(E10.4,1X),E10.4,I5)
      K=K+10
      GOTO 97
  103 DO 104 J=1,NG
  104 WRITE(7,700)J,(GM(J,I),I=K,K+L),NOBSG(J)
      WRITE(7,705)(ZMEAN(I),I=K,K+L),NOBTOT
  705 FORMAT(/1X,'TOTAL',1X,3(E10.4,1X),76X,I5)
  700 FORMAT(2X,I2,3X,3(E10.4,1X),77X,I4)
   97 IF(M.EQ.5)L=2
   98 CONTINUE
  500 FORMAT(1X,'GROUP',1X,10(A8,3X))
  600 FORMAT(2X,I2,3X,10(E10.4,1X),I4)
      WSS=TSS-BSS
      P1=WSS*100/TSS
      P2=BSS*100/TSS
      P3=P1+P2
      WRITE(7,60)(LABEL(I),I=1,10),NG,NVAR,NOBTOT
   60 FORMAT(1H1,10A8//5X,'NO. OF GROUPS= ',I3/5X,'NO. OF VARIABLES= ',
     1I3/5X,'NO. OF OBSERVATIONS= ',I5)
      WRITE(7,901)WSS,P1
  901 FORMAT(//,30X,7HSUMMARY,//20X,15H SUM OF SQUARES ,5X,
     110HPERCENTAGE,/,5X,13HWITHIN GROUPS,3X,E12.4,4X,E11.4)
      WRITE(7,902)BSS,P2,TSS,P3
  902 FORMAT(5X,14HBETWEEN GROUPS,2X,E12.4,4X,E11.4,/,5X,5HTOTAL,11X,
     1E12.4,4X,E11.4)
      RETURN
      END
      FINISH
```

```
      PROGRAM(POPU)
      INPUT 1=MTO/FORMATTED(EECDATA)/512
      OUTPUT 4=CP2
      OUTPUT 5=LP0
      OUTPUT 6=LP1
      INPUT 8=CR0
      COMPRESS INTEGER AND LOGICAL
      TRACE 1
      END
      MASTER POPU
      DIMENSION Z(60),NO(30),SUMZ(30,60),SUMZ2(30,60),ZMIN(30,60)
      DIMENSION ZMAX(30,60),TSUMZ(60),TSUMZ2(60),TZMIN(60),TZMAX(60)
      DIMENSION SMEAN(30,60),SMIN(30,60),SMAX(30,60)
      DIMENSION LABEL(80),LABELA(440),NLAND(30,6),NTLAND(6)
      DIMENSION Y(200),X(200),W(5)
      REAL LABEL,LABELA
      COMMON LABEL,LABELA
      READ(8,59)(LABEL(I),I=1,10)
      READ(8,59)(LABELA(I),I=1,53)
   59 FORMAT(10A8)
      READ(8,119) NV,NCLASS,NCV
  119 FORMAT(3I0)
      NOUT=0
      DO 1 J=1,NV-2
      TSUMZ(J)=0
      TSUMZ2(J)=0
      TZMIN(J)=100000
      TZMAX(J)=-100000
      DO 1 K=1,NCLASS
      NO(K)=0
      DO 14 L=1,6
   14 NLAND(K,L)=0
      SUMZ(K,J)=0
      SUMZ2(K,J)=0
      ZMIN(K,J)=100000
      ZMAX(K,J)=-100000
    1 CONTINUE
      DO 13 L=1,6
   13 NTLAND(L)=0
      DO 17 I=1,22026
      READ(1,200) (W(K),K=1,5 ),(X(J),J=1,127)
  200 FORMAT(F1.0,F3.0,F2.0,2F10.0,2F1.0,3F10.0,F1.0,2X,12F1.0/
     18F10.0/8F10.0/8F10.0/
     210X,7F10.0/3F10.0,F1.0,9X,F1.0,9X,2F10.0,10X/10X,7F10.0/5F10.0,F1.
     30,4F4.0,2F1.0,F4.0,2F1.0/4(F4.0,2F1.0),F4.0,5X,2F10.0,10X,F1.0,F4.
     40,F1.0,5X/19F4.0/5F4.0,2F10.0,4F4.0,F1.0)
       X(34)=X(34)/100
       X(36)=X(36)/100
       X(41)=X(41)/100
       X(49)=X(49)/100
       DO 20 M=1,200
       Y(M)=0.0
   20 CONTINUE
      TOT=0.0
      DO 30 K=19,49
```

```
 30 TOT=TOT+X(K)
    Y(45)=X(3)+X(4)+X(5)
    Y(46)=Y(45)+X(50)+X(51)+X(52)
    IF(TOT.NE.Y(45))GOTO 40
    IF(Y(45).EQ.0.0)GOTO 40
    IF(X(96).EQ.9.0)X(96)=0.5
    IF(X(96).EQ.5.0)X(96)=4.5
    Y(48)=((X(96)-1)*0.25+0.125+0.125*(X(104)+X(116))+0.375*(X(105)+X(
   1117))+0.625*(X(106)+X(118))+0.875*(X(107)+X(119))+X(108)+X(120)+(8
   2*(X(121)+X(122))/2200))
    IF(Y(48).EQ.0)GOTO 40
    IF (Y(46).NE.0.0)GOTO 501
 40 CALL OUT(W,X,NV,IND)
    NOUT=NOUT+1
    GOTO 17
501 IF(X(2).EQ.9.0)X(2)=0
    Y(1)=X(2)+X(1)
    Y(2)=X(3)/(Y(45)*0.01)
    Y(3)=X(4)/(Y(45)*0.01)
    Y(4)=X(5)/(Y(45)*0.01)
    Y(5)=X(6)
    Y(6)=X(7)+X(8)+X(9)+X(10)
    Y(7)=X(11)/7+X(12)/7+X(13)/7+X(14)/7+X(15)/7+X(16)/7+X(17)/7
    Y(8)=X(18)
    Y(9)=(X(19)+X(20)+X(21)+X(22)+X(23)+X(24)+X(25)+X(26)
   1+X(27))/(Y(45)*0.01)
    Y(10)=(X(28)+X(29)+X(30))/(Y(45)*0.01)
    Y(11)=X(31)/(Y(45)*0.01)
    Y(12)=(X(33)+X(34)+X(35)+X(36))/(Y(45)*0.01)
    Y(13)=(X(37)+X(38)+X(32)+X(39))/(Y(45)*0.01)
    Y(14)=X(40)/(Y(45)*0.01)
    Y(15)=(X(41))/(Y(45)*0.01)
    Y(16)=X(42)/(Y(45)*0.01)
    Y(17)=(X(43)+X(44)+X(45)+X(47)+X(48)+X(49))/(Y(45)*0.01)
    Y(52)=X(46)/(Y(45)*0.01)
    Y(18)=X(50)/((Y(45)+X(50))*0.01)
    Y(19)=(X(51)+X(52))/(Y(46)*0.01)
    IF(X(53).EQ.7.0)X(53)=1.0
    IF(X(54).EQ.7.0)X(54)=1.0
    Y(20)=X(53)
    Y(21)=X(54)
    Y(22)=0.6*X(55)
    Y(53)=X(59)
    Y(23)=0.4*X(56)+X(57)+0.5*X(58)+0.8*X(60)
    Y(24)=0.1*(X(61)+X(62))
    Y(25)=0.027*X(63)+0.5*X(64)+0.3*X(65)
    Y(26)=X(66)*0.007+X(67)*0.014+X(68)*0.03
    Y(47)=Y(22)+Y(23)+Y(24)+Y(25)+Y(26)+Y(53)
    IF(Y(47).EQ.0.0)GOTO 50
    Y(22)=Y(22)*100/Y(47)
    Y(23)=Y(23)*100/Y(47)
    Y(24)=Y(24)*100/Y(47)
    Y(25)=Y(25)*100/Y(47)
    Y(26)=Y(26)*100/Y(47)
    Y(53)=Y(53)*100/Y(47)
 50 Y(50)=Y(47)*100/Y(46)
```

```
      Y(27)=X(69)
      IF((X(70)+X(71)+X(72)+X(73)).GT.0)Y(28)=1
      IF(X(76).GT.0)Y(29)=1
      IF((X(79)+X(82)+X(85)+X(88)).GT.0)Y(30)=1
      IF((X(74)+X(75)+X(77)+X(78)+X(80)+X(81)+X(83)+X(84)+
     1 X(86)+X(87)+X(89)+X(90)).GT.0)Y(31)=1
      DO 51 K=70,91
   51 Y(49)=Y(49)+X(K)
      Y(51)=Y(49)/(Y(46)*0.001)
      IF(X(91).GT.0.0) Y(32)=1
      Y(33)=(X(36)+X(34)+X(49))/(Y(45)*0.01)
      IF(X(94).EQ.1)Y(34)=1
      IF(X(94).EQ.2)Y(35)=1
      IF(X(95).EQ.0.0)X(95)=52.0
      Y(36)=X(95)
      Y(38)=((X(96)-1)*0.25+0.125+0.125*X(104)+0.375*X(105)+0.625*X(106)
     1+0.875*X(107)+X(108))
      Y(37)=Y(48)/(Y(46)*0.001)
      Y(38)=Y(38)*100/Y(48)
      IF(X(96).EQ.0.5)P=0.0
      IF(X(96).NE.0.5)P=1.0
      T=P+X(97)+X(98)+X(109)+X(110)
      IF(T .NE. 0.0) GO TO 502
      T = 0.00001
  502 IF(X(95).LT.25.0.AND.P.EQ.1.0)Y(39)=1.0
      Y(39)=(Y(39)+X(99)+X(111))/(T*0.01)
      IF((X(95).GE.25.0.AND.X(95).LT.35.0).AND.P.EQ.1.0)Y(40)=1.0
      Y(40)=(Y(40)+X(100)+X(112))/(T*0.01)
      IF((X(95).GE.35.0.AND.X(95).LT.45.0).AND.P.EQ.1.0)Y(41)=1.0
      Y(41)=(Y(41)+X(101)+X(113))/(T*0.01)
      IF((X(95).GE.45.0.AND.X(95).LT.65.0).AND.P.EQ.1.0)Y(42)=1.0
      Y(42)=(Y(42)+X(102)+X(114))/(T*0.01)
      IF((X(95).GE.65.0).AND.P.EQ.1)Y(43)=1
      Y(43)=(Y(43)+X(103)+X(115))/(T*0.01)
      IF(X(127).EQ.8.0)X(127)=0
      Y(44)=X(127)
      C1=0.0
      C2=0.0
      C3=0.0
      C4=0.0
      C5=0.0
      C6=0.0
      C7=0.0
      C8=0.0
      C9=0.0
      CLASS=17
      IF((Y(9)+Y(10)+Y(11)+Y(13)).GT.66.6)CLASS=3
      IF(Y(9).GT.66.6)CLASS=1
      IF(Y(9).LE.66.6.AND.Y(9).GT.33.3.AND.Y(10).LE.66.6.AND.
     1Y(10).GT.33.3)CLASS=2
      IF(Y(12).GT.66.6)CLASS=4
      IF((Y(52)+Y(17)).GT.66.6)CLASS=6
      IF(Y(52).GT.66.6)CLASS=5
      IF(CLASS.NE.17) GOTO 70
      IF(Y(16).GT.66.6)C1=1
      IF(Y(16).LE.66.6.AND.Y(16).GT.33.3)C2=1
```

```
      A=Y(22)+Y(53)+Y(23)+Y(24)
      IF(A.GT.66.6)C3=1
      IF(A.LE.66.6.AND.A.GT.33.3)C4=1
      A=Y(25)+Y(26)
      IF(A.GT.66.6)C5=1
      IF(A.LE.66.6.AND.A.GT.33.3)C6=1
      A=Y(9)+Y(10)+Y(11)+Y(13)
      IF(A.LE.66.6.AND.A.GT.33.3)C7=1
      IF(Y(12).LE.66.6.AND.Y(12).GT.33.3)C8=1
      IF((Y(52)+Y(17)).LE.66.6.AND.(Y(52)+Y(17)).GT.33.3)C9=1
      IF(C1*C3.EQ.1)CLASS=8
      IF(C1.EQ.1.AND.Y(53).GT.66.6)CLASS=7
      IF(C5.EQ.1)CLASS=9
      IF(CLASS.NE.17)GOTO 70
      IF(C2*C4*C7.EQ.1.OR.C3*C2*C7.EQ.1.OR.C4*C1*C7.EQ.1)CLASS=10
      IF(C2*C4*C6.EQ.1.OR.C3*C2*C6.EQ.1.OR.C4*C1*C6.EQ.1)CLASS=11
      IF(C7*C6.EQ.1)CLASS=12
      IF(C7*C9.EQ.1)CLASS=13
      IF(C7*C8.EQ.1)CLASS=14
      IF(CLASS.NE.17)GOTO 70
      IF(C7.EQ.1)CLASS=15
      IF(CLASS.NE.17)GOTO 70
      IF(C4.EQ.1)CLASS=16
   70 CONTINUE
      Z(42)=Y(1)
      Z(43)=Y(8)
      DO 77 K1=2,7
   77 Z(46+K1)=Y(K1)
      DO 78 K1=9,16
   78 Z(K1-3)=Y(K1)
      Z(14)=Y(52)
      DO 79 K1=17,22
   79 Z(K1-2)=Y(K1)
      Z(21)=Y(53)
      DO 80 K1=23,26
   80 Z(K1-1)=Y(K1)
      Z(40)=Y(27)
      DO 81 K1=28,33
   81 Z(K1+6)=Y(K1)
      DO 82 K1=34,36
   82 Z(K1+10)=Y(K1)
      DO 83 K1=37,43
   83 Z(K1-10)=Y(K1)
      Z(47)=Y(44)
      Z(2)=Y(45)
      Z(1)=Y(46)
      DO 84 K1=47,49
   84 Z(K1-44)=Y(K1)
      Z(26)=Y(50)
      Z(41)=Y(51)
      Z(54)=W(1)
      Z(55)=CLASS
      K=Z(NCV)
      NO(K)=NO(K)+1
      L=Z(54)
      NTLAND(L)=NTLAND(L)+1
```

```
      NLAND(K,L)=NLAND(K,L)+1
      DO 3 J=1,NV-2
      SUMZ(K,J)=SUMZ(K,J)+Z(J)
      SUMZ2(K,J)=SUMZ2(K,J)+Z(J)**2
      IF(Z(J).GE.ZMIN(K,J))GOTO 7
      ZMIN(K,J)=Z(J)
    7 IF(Z(J).LE.ZMAX(K,J))GO TO 6
      ZMAX(K,J)=Z(J)
    6 TSUMZ(J)=TSUMZ(J)+Z(J)
      TSUMZ2(J)=TSUMZ2(J)+Z(J)**2
      IF(Z(J).GE.TZMIN(J)) GOTO 9
      TZMIN(J)=Z(J)
    9 IF(Z(J).LE.TZMAX(J)) GOTO 8
      TZMAX(J)=Z(J)
    8 CONTINUE
    3 CONTINUE
   17 CONTINUE
      NOBS=22026-NOUT
      DO 4 J=1,NV-2
      IF(TSUMZ2(J).EQ.0)GOTO 4
      TSUMZ(J)=TSUMZ(J)/NOBS
      TSUMZ2(J)=SQRT(TSUMZ2(J)/NOBS-TSUMZ(J)**2)
      DO 4 K=1,NCLASS
      IF(NO(K).EQ.0)GOTO 4
      SUMZ(K,J)=SUMZ(K,J)/NO(K)
      SUMZ2(K,J)=SQRT(SUMZ2(K,J)/NO(K)-SUMZ(K,J)**2)
      SMEAN(K,J)=(SUMZ(K,J)-TSUMZ(J))/TSUMZ2(J)
      SMIN(K,J)=(ZMIN(K,J)-TSUMZ(J))/TSUMZ2(J)
      SMAX(K,J)=(ZMAX(K,J)-TSUMZ(J))/TSUMZ2(J)
    4 CONTINUE
      WRITE(5,309)(LABEL(M),M=1,10)
  309 FORMAT(1X///10A8/)
      WRITE(5,300)NOBS
  300 FORMAT(1X/' TOTAL SAMPLE'/' NO. OF OBSERVATIONS =',I5//
     1' VARIABLE     MEAN     STAN.DEV.    MINIMUM     MAXIMUM'/)
      DO 10 J=1,NV-2
      WRITE(5,400)LABELA(J),TSUMZ(J),TSUMZ2(J),TZMIN(J),TZMAX(J)
  400 FORMAT(1X,A8,4(1X,E10.4))
   10 CONTINUE
      WRITE(5,700)
  700 FORMAT(//' FRANCE BELGIUM HOLLAND GERMANY ITALY LUXEMBOURG'/)
      WRITE(5,800)(NTLAND(L),L=1,6)
  800 FORMAT(2X,I4,4X,I4,3X,I4,4X,I4,4X,I4,4X,I4)
      DO 11 K=1,NCLASS
      WRITE(5,309)(LABEL(M),M=1,10)
      WRITE(5,500)K,NO(K)
  500 FORMAT(1X/' CLASS ',I3,/' NO. OF OBSERVATIONS =',I5//
     1' VARIABLE     MEAN     STAN.DEV.    MINIMUM     MAXIMUM      SMEAN
     2 SMINIMUM    SMAXIMUM '/)
      DO 12 J=1,NV-2
      WRITE(5,600)LABELA(J),SUMZ(K,J),SUMZ2(K,J),ZMIN(K,J),ZMAX(K,J),
     1SMEAN(K,J),SMIN(K,J),SMAX(K,J)
  600 FORMAT(1X,A8,4(1X,E10.4),3(1X,F10.2))
   12 CONTINUE
      WRITE(5,700)
      WRITE(5,800)(NLAND(K,L),L=1,6)
```

```
11 CONTINUE
   CALL ANOVA(SUMZ,TSUMZ2,TSUMZ,NO,NOBS,NCLASS,NV-2)
   STOP
   END
```

```
      PROGRAM(TEMP)
      USE 1=MT0/UNFORMATTED(SCRATCH1)
      USE 2=MT1/UNFORMATTED(SCRATCH2)
      INPUT 3=CR0
      OUTPUT 4=CP0
      TRACE 2
      COMPRESS INTEGER AND LOGICAL
      END
      MASTER TEMP
      DIMENSION X(8)
      REAL IND
      READ(3,100)NOBS
  100 FORMAT(I0)
      DO 1 I=1,NOBS
      READ(3,200)IND,INO,(X(J),J=1,8)
  200 FORMAT(A8,I0,8F0.0)
    1 WRITE(1)IND,(X(J),J=1,8)
      ENDFILE 1
      REWIND 1
      DO 2 I=1,NOBS
      READ(3,200)IND,INO,(X(J),J=1,8)
      WRITE(2)IND,(X(J),J=1,8)
    2 CONTINUE
      ENDFILE 2
      REWIND 2
      DO 3 I=1,NOBS
      READ(1)IND,(X(J),J=1,8)
      WRITE(4,300)IND,(X(J),J=1,8)
  300 FORMAT(A8,8(1X,F8.4))
      READ(2)IND,(X(J),J=1,8)
      WRITE(4,300)IND,(X(J),J=1,8)
      READ(3,200)IND,INO,(X(J),J=1,8)
      WRITE(4,300)IND,(X(J),J=1,8)
    3 CONTINUE
      STOP
      END
      FINISH
```

```
      PROGRAM (ANYL)
      COMPRESS INTEGER AND LOGICAL
      INPUT 3 = TRO
      INPUT 1 = CRO
      OUTPUT2 = LPO
      OUTPUT4 = CPO
      OUTPUT5=CP1
      TRACE1
      END
      MASTER ANYL
      INTEGER  XDIAG
      DIMENSION COMMENT(10)  ,FORM(100)
      DIMENSION TD(3),W(40)
      COMMON /A/ XTX(1600),XDIAG(40)  /B/XMEAN(40) ,XSTD(40),NM(40)
      COMMON /E/ CONST,BETA(40),STER(40),TVAL(40),F,RR,SS,RSS,SIGMAT
      COMMON  /C/ LVAR(40), TITLE(40)  /D/ N1,N2
      COMMON/F/X(40000)
      COMMON /G/NX(2500),WSSQ(40)
      DATA TD(1) / 24HCOMP 1  COMP 2  COMP 3        /
      WRITE(2,300)
300   FORMAT(1H1,////,20X,34HUNIVERSITY OF ASTON IN BIRMINGHAM   /19X,
     1 39H        MANAGEMENT CENTRE                        /22X,8HCLUSTER  ,
     1 23HANALYSIS OCTOBER 1976    /31X:25HP.A.GOLDER & K.A.YEOMANS    )
       NC = 1
      NY = 1
      CALL COMIN(NV,NOBS,COMMENT,FORM,1)
      CALL DATAFO(X,NOBS,NV,FORM,1)
      CALL ADATA(X,NV,NOBS)
      CALL MOUT(NV,NOBS)
100    FORMAT(40I1)
      READ(NC,100)  (LVAR (I),I=1,NV)
      NVAR=0
      DO 1201 KL=1,NV
1201  NVAR=NVAR+LVAR(KL)
      READ(NC,400) NW
      IF(NW.LE.1) GO TO 10
      DO 10 I=1,NV
      IF(LVAR(I).EQ.0) GO TO10
      READ(NC,500) W(I)
 500  FORMAT(F0.0)
 10   CONTINUE
      IF(NW.EQ.0.OR.NW.EQ.2)GO TO 11
      CALL CORR(X,NV,NOBS,0)
      CALL COUT(NV,1,NV,NV)
      CALL ADATA(X,NV,NOBS)
      CALL MOUT(NV,NOBS)
11    IF(NW.LE.1)GO TO 13
      DO 12 I=1,NV
      IF(LVAR(I).EQ.0) GO TO 12
      WI=W(I)
      KJ=(I-1)*NOBS
      XSTD(I)=XSTD(I)*WI
      XMEAN(I)=XMEAN(I)*WI
      DO 12 J=1,NOBS
      KJ=KJ+1
```

```
      X(KJ)=X(KJ)*WI
12    CONTINUE
      CALL MOUT(NV,NOBS)
13    CONTINUE
      READ(NC,200) N1,N2,N3,MZ
400   FORMAT(I0)
200    FORMAT(4I0)
      IF(N1.LE.0) GO TO 19
      NXBS=NOBS+1
      CALL RANK(X(NXBS),NOBS,NX(NXBS),NXBS)
      JB = NOBS
      XNGR=(1.0+FLOAT(NOBS))/FLOAT(N1)
      DO 30 I=1,NOBS
      JB = JB + 1
      XNX=FLOAT(NX(JB))/XNGR
      NX(I)=INT(XNX)+1
30    CONTINUE
       GO TO 20
19    N1 = -N1
      READ(NC,299) (NX(I),I=1,NOBS)
 209 FORMAT(20I0)
 20   NZ=N1+1
      N7A=N1
      NAC = 1
      CALL XMSS(NOBS,NV,X,1,NZ-1)
      DO 40  I= 1,N1
      NZ=NZ-1

      NR = 0
      IF(NZ.LE.N2.AND.NZ.GE.N3) NR =1
      IF(I.LE.2)GOTO 77
      CALL CLUST(NZ,NOBS,NV,X,MZ,1)
      GOTO 78
   77 CALL CLUST(NZ,NOBS,NV,X,MZ*2,1)
   78 CALL ANOUT(NZ,NOBS,NV,X,1,NR)
      CALL KLESS(NZ,NOBS,NV,X,1)
   40 CONTINUE
      CALL ADATA(X,NV,NOBS)
      CALL MOUT(NV,NOBS)
      CALL BEALE(NOBS,NVAR,N7A)
       STOP
      END
```

```
      SUBROUTINE NULL
      COMMON /A/ XM(1600),NX(40)
       DO 10 I=1,40
10    NX(I) = 0
      DO 20 I=1,1600
20    XM(I) = 0,0
      RETURN
      END
```

```
      SUBROUTINE XMSS(NOBS,NV,X,NG,NZ)
      DIMENSION X(NOBS,NV)
      COMMON /C/LVAR(40),TITLE(40)
      COMMON /A/ XM(40,40),NX(40)
      COMMON /G/NK(2500),WSSQ(40)
      CALL NULL
      DO 20 J=1,NOBS
      K = NK(J)
      DO 50 IA=NG,NV
      IF(LVAR(IA).NE.1) GO TO 50
      XT = X(J,IA)
      XM(IA,K) = XM(IA,K) + XT
50    CONTINUE
      NX(K) = NX(K) + 1
20    CONTINUE
      RETURN
      END
```

```
      SUBROUTINE ANOUT(KLUST,NOBS,NV,X,NG,NZ)
      DIMENSION X(NOBS,NV),JCOUNT(2500),YSS(2500)
       DIMENSION Z(40)
      COMMON /C/LVAR(40),TITLE(40)
      COMMON /A/ XM(40,40),NX(40)  /B/XMEAN(40),XSTD(40),NM(40)
      COMMON /G/NK(2500),WSSQ(40)
      WRITE(2,301)
      WRITE(5,775)(NK(J),J=1,NOBS)
  775 FORMAT(20(1X,I3))
      WRITE(5,776)
  776 FORMAT(//,'****',//)
 301  FORMAT(1H1)
      TSSK=0.0
      DO  20   K=1,KLUST
      DO 27 MA=1,NOBS
      JCOUNT(MA)=0
      YSS(MA)=0.0
  27  CONTINUE
      IF(NZ.NE.1)GOTO 58
 300  FORMAT(///, 8H  GROUP ,I2 ,/, 40H OBSERVATION  DISTANCE FROM GROUP
     1 MEAN  ,40H OBSERVATION  DISTANCE FROM GROUP MEAN  ,40H OBSERVATIO
     2N  DISTANCE FROM GROUP MEAN  ,//)
      WRITE(2,300)  K
   58 SSK=0.0
      NNK=0
      DO  30   J=1,NOBS
      IF(NK(J).NE.K) GO TO 30
      NNK=NNK+1
      SS= 0.0
      DO 40 I=NG,NV
      IF(LVAR(I).NE.1) GO TO 40
      XT = X(J,I)-XM(I,K)/NX(K)
       SS =  SS+ XT*XT
40    CONTINUE
      SSK=SSK+SS
      JCOUNT(NNK)=J
      YSS(NNK)=SS
30    CONTINUE
      IF(NZ.NE.1)GOTO 59
      WRITE(2,400)(JCOUNT(I),YSS(I),JCOUNT(I+1),YSS(I+1),JCOUNT(I+2),
     1YSS(I+2),I=1,NNK,3)
400   FORMAT(3(5X,I3,10X,E10.4,12X))
      WRITE(2,401)
 401 FORMAT(' OBSERVATIONS IN GROUP &WITHIN GROUP S.S.')
 402 FORMAT(34H FINAL COL. SHOWS CONTRIBUTION TO  ,
    146H TOTAL SUM OF SQUARES EXPLAINED BY CLUSTERING   )
      WRITE(2,400) NNK,SSK
      WRITE(4,737)NNK
 737 FORMAT(3X,I4)
      WRITE(4,739)(JCOUNT(I),JCOUNT(I+1),JCOUNT(I+2),I=1,NNK,3)
 739 FORMAT(2X,3(2X,I4))
   59 TSSK=TSSK+SSK
20    CONTINUE
      WSSQ(KLUST)=TSSK
      IF(NZ.NE.1)GOTO 61
      WRITE(2,500)
```

```
00  FORMAT(1H0, 5X, 23H ANALYSIS BY VARIABLE    ,/, 5X, 8HVARIABLE, 5X,
   120H GROUP MEANS                          //)
    WRITE(2,402)
 61 SST = 0
    DO 70 I=NG,NV
    IF(LVAR(I) .NE.1) GO TO 70
    RSS = 0
    DO80K=1,KLUST
    IF(NX(K).EQ.0) GO TO 80
    Z(K) = XM(I,K)/NX(K)
    RSS = RSS+Z(K)*Z(K)*NX(K)
30  CONTINUE
    SST =SST+RSS
    IF(NZ.NE.1)GOTO 70
    WRITE(2,600)  TITLE(I),(Z(K),K=1,KLUST),RSS
500 FORMAT(5X,A8,8(2X,E11.4))
70  CONTINUE
    K = K -1
    WRITE(2,700) K,SST
    K = K + 1
700 FORMAT(//,10X,I2,2X,10HCLUSTERS              /
   1 ,48H TOTAL SUM OF SQUARES EXPLAINED BY CLUSTERING    ,3H = ,E10.4)
    TSS=0.0
    DO 900 I=1,NV
    IF(LVAR(I).NE.1)GOTO 900
    TSS=TSS+XSTD(I)**2*NOBS
900 CONTINUE
    P1=TSSK*100.0/TSS
    P2=SST*100.0/TSS
    P3=P1+P2
    WRITE(2,901)TSSK,P1
901 FORMAT(///,30X,7HSUMMARY,//20X,15H SUM OF SQUARES ,5X,
   110HPERCENTAGE,/,5X,13HWITHIN GROUPS,3X,E12.4,4X,E11.4)
    WRITE(2,902)SST,P2,TSS,P3
902 FORMAT(5X,14HBETWEEN GROUPS,2X,E12.4,4X,E11.4,/,5X,5HTOTAL,11X,
   1E12.4,4X,E11.4)
    RETURN
    END
```

```
      SUBROUTINE KLESS(KLUST,NOBS,NV,X,NG)
      DIMENSION X(NOBS,NV)
      COMMON /C/LVAR(40),TITLE(40)
      COMMON /A/ XM(40,40),NX(40)
      COMMON /G/NK(2500),WSSQ(40)
      DELTA(AX,BX,NA,NB) = AX*AX/NA + BX*BX/NB-(AX+BX)*(AX+BX)/(NA+NB)
      DMIN = 100000
      DO  20   K=1,KLUST
      DO  30   K2 = K,KLUST
      IF(K.EQ.K2) GO TO 30
      DE  = 0,0
      IF(NX(K).LT.1) GO TO 40
       IF(NX(K2).LT.1) GO TO 40
      DO 40 I=NG,NV
      IF(LVAR(I) .NE.1) GO TO 40
      DE=DE+DELTA(XM(I,K),XM(I,K2),NX(K),NX(K2))
40    CONTINUE
      IF(DE.GT.DMIN) GO TO 30
      DMIN = DE
      I1 = K
      I2 = K2
30    CONTINUE
20    CONTINUE
      DO 50  J=1,NOBS
      IF(NK(J)-I2) 50,51,52
51    NK(J)= I1
      GO TO 50
52    NK(J)= NK(J)-1
50    CONTINUE
      IF(KLUST-1.EQ.0)RETURN
      KL=KLUST-1
      CALL XMSS(NOBS,NV,X,NG,KL)
      RETURN
      END
```

```
      SUBROUTINE CLUST(KLUST,NOBS,NV,X,NDMAX,NG)
      DIMENSION X(NOBS,NV)
      COMMON /G/NK(2500),WSSQ(40)
      COMMON /A/ XM(40,40),NX(40)
      COMMON /C/LVAR(40),TITLE(40)
      CUTOFF=0.001
      ND = 0
      DMIN= 100000
8     NC = 0
      DO 70  J=1,NOBS
      DMIN = 100000
      DO 80  K=1,KLUST
      L =  1
      IF(NK(J).NE.K) GO TO 81
      L = -1
81    NXT = NX(K) +(L-1)/2
      DE=CUTOFF
      IF(NXT.LE.0) GO TO 90
      DO 90 I=NG,NV
       IF(LVAR(I).NE.1) GO TO 90
      XT = X(J,I)
      XMT = XM(I,K) + XT*(L-1)/2
      DE=DE+XT*XT+XMT*XMT/NXT-(XMT+XT)*(XMT+XT)/(NXT+1)
90    CONTINUE
      IF(DE.GT.DMIN) GO TO 80
      KC =  K
      DMIN = DE
80    CONTINUE
      IF(DMIN.LT.CUTOFF)GOTO 70
      IF(NK(J).EQ.KC)GO TO 70
      NC = NC + 1
      KD = NK(J)
      NK(J) = KC
      NX(KD) = NX(KD) - 1
      NX(KC) = NX(KC) + 1
      DO 100 I=NG,NV
      IF(LVAR(I).NE.1) GO TO 100
      XM(I,KD) = XM(I,KD) - X(J,I)
      XM(I,KC) = XM(I,KC) + X(J,I)
100   CONTINUE
70    CONTINUE
      IF(NC.EQ.0) RETURN
      ND = ND + 1
      WRITE(2,200)ND
 200  FORMAT(10X,3HND=,I5)
      IF(ND.EQ.NDMAX) RETURN
      GO TO  8
      END
```

```
      SUBROUTINE  ADATA(X,NV,NOBS)
      INTEGER     XDIAG
      DIMENSION   X(NOBS,NV)
      COMMON/A/ XTX(1600),XDIAG(40) /B/XMEAN(40),XSTD(40),NM(40)
      COMMON /D/ N1, N2                /C/ LVAR(40), TITLE(40)
      XDIAG(1) = 0
      DO 20 I=2,NV
       XDIAG(I)  =  XDIAG(I-1)  +  NV   -  I  +  1
 20   CONTINUE
      XTX(1)=0.0
      CALL     FMOVE(XTX(1),XTX(2),1599)
      DO 30  KI=1 ,NOBS
      DO 30  I=1,NV
      L= XDIAG(I)
      DO 40  J=I,NV
      K= L+J
      XTX(K) = XTX(K)  +  X(KI,I) * X(KI,J)
40    CONTINUE
30    CONTINUE
      DO 50  I=1,NV
      L= XDIAG(I)
      XMEAN(I) = XTX(I)/NOBS
      XSTD(I)= XTX(L+I)/NOBS  - XMEAN(I)* XMEAN(I)
      XSTD(I) =   SQRT (XSTD(I))
50    CONTINUE
      N1    =    -1
      N2    =    NOBS
      RETURN
      END
```

```
      SUBROUTINE MOUT(NV,NOBS)
       COMMON/B/XMEAN(40),XSTD(40),NM(40) /C/LVAR(40),TITLE(40)
      WRITE(2,100)  NOBS  , NV
100   FORMAT (1H1 , 10X, 34H MEANS AND STANDARD DEVIATIONS OF  ,I4,16H O
     1BSERVATIONS ON  , I4 , 11H VARIABLES        ///  23X, 30H MEAN
     2   STANDARD                       ,/,36X,9HDEVIATIoN       /)
      DO 10 I=1,NV
200   FORMAT(1H ,3X,I2,3X,A8,5X,E10.4,4X,E10.4)
      WRITE(2,200) I,TITLE(I),XMEAN(I),XSTD(I)
10    CONTINUE
      RETURN
      END
```

```
      SUBROUTINE CORR(X,NV,NOBS,IN)
      INTEGER XDIAG
      DIMENSION X(NOBS,NV)
      COMMON/A/ XTX(1600),XDIAG(40) /B/XMEAN(40),XSTD(40),NM(40)
      DO 60   I=2,NV
      L= XDIAG(I)
      DO  59  J=I,NV
      K=L+J
      XTX(K)  =  XTX(K)/NOBS
      XTX(K) = XTX(K)-XMEAN(I)*XMEAN(J)
      XTX(K) = XTX(K)/(XSTD(I)*XSTD(J))
59    CONTINUE
      XMN = XMEAN(I)
      XSD = XSTD(I)
      IF(IN.EQ.1) GO TO 60
      XMEAN(I) = 0.0
      XSTD(I) = 1.0
      DO 30 J=1,NOBS
      X(J,I) = (X(J,I)-XMN)/XSD
30    CONTINUE
60    CONTINUE
      RETURN
      END
```

```
      SUBROUTINE COMIN(NV,NOBS,COMMENT,FORM,N)
      DIMENSION FORM(100),COMMENT(10)
      COMMON  /C/ LVAR(40), TITLE(40)
      READ(N,200) NC
      READ(N,300)(FORM(I),I=1,10)
      WRITE(2,400)(FORM(I),I=1,10)
  400 FORMAT(////10A8)
      IF(NC.EQ.1) GO TO 10
      DO 10 K=2,NC
      READ(N,300) COMMENT
  300 FORMAT(10A8)
      WRITE(2,500) COMMENT
  500 FORMAT(      10A8)
   10 CONTINUE
      CALL COPY(80,COMMENT(1),1,FORM(1),1)
      READ(N,200) NV,NOBS
  200 FORMAT(2I0)
      WRITE(2,600)  NOBS,NV
  600 FORMAT( 20X, I4,17H OBSERVATIONS ON ,I2,11H VARIABLES      )
      NV = NV + 1
      CALL COPY8(TITLE(1),8HCONSTANT      )
      READ(N,800) (TITLE(I),I=2,NV)
  800 FORMAT(8( 1X,A8))
      READ(N,200) NC
      NC = 10*NC
      READ(N,300)(FORM(I),I=1,NC)
      RETURN
      END
```

```
      SUBROUTINE DATAFO(X,NOBS,NV,FORM,N)
      DIMENSION X(NOBS,NV),FORM(100)
      DO 10 J=1,NOBS
      X(J,1)= 1.0
      READ(N,FORM)(X(J,I),I=2,NV)
   10 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE  RANK(X,NOBS,NX,NXBS)
      DIMENSION   X(NOBS), NX(NOBS)
      DO 10  I=1,NOBS
10    NX(I) = I
      DO 30 I=1,NOBS
      DO 30 J = I,NOBS
      NA = NX(I)
      NB = NX(J)
      IF(X(I).GE.X(J)) GO TO 30
      NX(I) = NB
      NX(J) = NA
30    CONTINUE
      RETURN
      END
```

```
      SUBROUTINEDOUT(X,NV,NOBS,IA,IB)
      DIMENSION X(NOBS,NV)
      COMMON  /C/ LVAR(40), TITLE(40)
      ID = IA + 1
      IC = NV
      IF(IB.EQ.2) GO TO 4
      ID=1
      IC = IA
4     CONTINUE
      DO  10  K=ID,IC,6
      IF(K.GT.IC) GO TO 10
      NK = K + 5
      IF(NK.LT.IC) GO TO 5
      NK = IC
5     CONTINUE
      WRITE(2,100) (TITLE(I),I=K,NK )
100   FORMAT(1H1,////,6H DATA   ///, 11X,6(A8,8X))
300   FORMAT(/)
      WRITE(2,300)
      DO 20 J=1,NOBS
      WRITE(2,200) J,(X(J,I),I=K,NK)
200   FORMAT(4X,I3,3X,6(E13.6 ,3X))
20    CONTINUE
10    CONTINUE
      RETURN
      END
```

```
      SUBROUTINE COUT(NV,ND,NY,NZ)
      INTEGER XDIAG
      COMMON /C/ LVAR(40),TITLE(40)
      COMMON /A/ XTX(1600) ,XDIAG(40)
      COMMON /E/ XA, XTEMP(40)
      NA = NY
      NB = NZ
      GO TO (1,2,3,4),ND
1     IA=2
      IB=2
      GO TO 10
2     IA=2
      IB = NB
      IB = IB+1
      NB = NV
      GO TO 10
3     IB=2
      IA = NA
      IA = IA +1
      NA = NV
      GO TO 10
4     IA = NA
      IA = IA +1
      IB = NB
      IB = IB+1
      NA = NV
      NB = NV
10    WRITE(2,100)(I,I=IB,NB)
100   FORMAT(1H1,9X,20(I2,3X))
      DO 20 J=IA,NA
      K = XDIAG(J)
      SQ= XTX(K+J)
      DO 30 I=IB,NB
      SR = XTX(I+XDIAG(I))
      IF(J.LT.I) GO TO 25
      XTEMP(I) = XTX( J+ XDIAG(I))
      GO TO 29
 25    CONTINUE
      XTEMP(I) = XTX(I+K)
 29   XTEMP(I) = XTEMP(I)/SQRT(SQ*SR)
30    CONTINUE
      WRITE(2,200) J,(XTEMP(I),I=IB,NB)
200   FORMAT(3X,I2,3X,20(1X,F4.2))
20    CONTINUE
      RETURN
      END
```

```
      SUBROUTINE BEALE(NOBS,NV,N1)
      COMMON/G/NX(2500),WSSQ(40)
      DIMENSION RVAR(40)
      DO 1 J=1,N1
    1 RVAR(J)=WSSQ(J)
      DO 2 I=1,N1
      L1=2
      IF(I.EQ.1)L1=0
      IF (I.EQ.2)L1=1
      CALL BEALETEST(I,NOBS,NV,RVAR,L1)
    2 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE BEALETEST(I,NOBS,NV,RVAR,L1)
      DIMENSION RVAR(40)
      IF(L1.EQ.0)RETURN
      ANOBS=FLOAT(NOBS)
      ANV=FLOAT(NV)
      NTEST=0
      DO 10 J=1,I-1
      F=(RVAR(I-J)-RVAR(I))/RVAR(I)
      A=(ANOBS-I+J)/(ANOBS-I)
      AI=FLOAT(I)
      B=(AI/(AI-J))**(2.0/ANV)
      F=F/(A*B-1.0)
      DF1=NV*J
      DF2=NV*(NOBS-I)
      IF (F.GE.0)GOTO 909
      PF=0.0
      GOTO 900
  909 PF=PRBF(DF1,DF2,F)
  900 IF (L1.GT.1)GOTO 203
      WRITE(2,100)
  100  FORMAT(///,10X,11HBEALES TEST,//,5X,25HHYPOTHESES: K2  CLUSTERS ,
     11X,27HNO BETTER THAN K1 CLUSTERS      )
      WRITE(2,201)
  201 FORMAT(5X,2HK2,3X,2HK1,4X,1HF,5X,16HPROBABILITY OF F    ,
     112H  RVAR(K2)  ,10H  RVAR(K1)       )
  203 IJ=I-J
      WRITE(2,202)I,IJ,F,PF,RVAR(I),RVAR(I-J)
  202 FORMAT(5X,I2,3X,I2,3X,F5.2,7X,F6.4,8X,F7.1,4X,F7.1)
      NTEST=NTEST+1
      IF(NTEST.GT.6)RETURN
   10 CONTINUE
      RETURN
      END
      FUNCTION PRBF(DA,DB,FR)
      PRBF=1.0
      IF(DA*DB*FR.EQ.0.0)RETURN
      IF(FR.LT.1.0)GO TO 5
      A=DA
      B=DB
      F=FR
      GO TO 10
    5 A=DB
      B=DA
      F=1.0/FR
   10 AA=2.0/(9.0*A)
      BB=2.0/(9.0*B)
      Z=ABS(((1.0-BB)*F**0.333333-1.0+AA)/SQRT(BB*F
     1**0.666667+AA))
      IF(B.LT.4.0)Z=Z*(1.0+0.08*Z**4/B**3)
      PRBF=0.5/(1.0+Z*(0.196854+Z*(0.115194+Z*
     1(0.000344+Z*0.019527))))**4
      IF(FR.LT.1.0)PRBF=1.0-PRBF
      RETURN
      END
      FINISH
```

```
      PROGRAM(CLASS)
      OUTPUT 6=CP0
      OUTPUT 4=LP0
      OUTPUT 7=LP1
      INPUT 1=CR0
      INPUT 2=CR1
      INPUT 8=CR2
      USE 9=MT1/UNFORMATTED(SCRATCH1)
      USE 5=MT0/UNFORMATTED(SCRATCH2)
      USE 3=MT2/UNFORMATTED(SCRATCH3)
      COMPRESS INTEGER AND LOGICAL
      TRACE 1
      END
      MASTER CLASS
      DIMENSION Z(300),NO(30),SUMZ(30,60),SUMZ2(30,60),ZMIN(30,60)
      DIMENSION ZMAX(30,60),TSUMZ(60),TSUMZ2(60),TZMIN(60),TZMAX(60)
      DIMENSION SMEAN(30,60),SMIN(30,60),SMAX(30,60)
      DIMENSION LABEL(30),LABELA(440),NLAND(30,6),NTLAND(6)
      DIMENSION W(2200,11)
      REAL LABEL,LABELA
      COMMON LABEL,LABELA
      READ(2,59)(LABEL(I),I=1,10)
      READ(2,59)(LABELA(I),I=1,53)
   59 FORMAT(10A8)
      READ(2,119) NOBS,NV,NCLASS,NCV,NSTEP,NSAM,NEXTRA
  119 FORMAT(7I0)
      DO 333 K1=1,NSTEP
      N2=NCLASS-K1+1
      DO 334 IN=1,N2
      READ(8,1001) K2
      K21=K2/3
      AK21=FLOAT(K2)/3.0
      IF(FLOAT(K21)-AK21.LT.0.0)K21=K21+1
      DO 335 L=1,K21
      READ(8,1002)I1,I2,I3
 1001 FORMAT(I0)
 1002 FORMAT(3I0)
      W(I1,K1)=IN+(NSAM-1)*20
      IF(I2.EQ.0)GOTO 335
      W(I2,K1)=IN+(NSAM-1)*20
      IF(I3.EQ.0)GOTO 335
      W(I3,K1)=IN+(NSAM-1)*20
  335 CONTINUE
  334 CONTINUE
  333 CONTINUE
      DO 2 I=1,NOBS
      READ(1,200) (Z(J),J=1,NV)
  200 FORMAT(7X,5F0.0/4(7X,7F0.0/),7X,8F0.0/2(7X,6F0.0/),
     17X,2F0.0)
      IB=9
      IF (I.GT.800)IB=5
      IF(I.GT.1600)IB=3
      WRITE(IB)(Z(J),J=1,NV)
      WRITE(6,1003)I,(Z(J),J=1,5)
 1003 FORMAT(2X,1HA,I4,8(1X,F8.2))
```

```
      WRITE(6,1003)I,(Z(J),J=6,12)
      WRITE(6,1003)I,(Z(J),J=13,19)
      WRITE(6,1003)I,(Z(J),J=20,26)
      WRITE(6,1003)I,(Z(J),J=27,33)
      WRITE(6,1003)I,(Z(J),J=34,41)
      WRITE(6,1003)I,(Z(J),J=42,47)
      WRITE(6,1003)I,(Z(J),J=48,53)
      WRITE(6,1003)I,(Z(J),J=54,55)
 1004 FORMAT(2X,1HA,I4,11(1X,F4.1))
      IF(NEXTRA.EQ.0)GOTO 342
      DO 517 K7=1,NEXTRA
      READ(1,204)(Z(J1),J1=NV+1,NV+11)
  204 FORMAT(7X,11(1X,F4.1))
      WRITE(IB)(Z(J1),J1=NV+1,NV+11)
      WRITE(6,1004)I,(Z(J1),J1=NV+1,NV+11)
  517 CONTINUE
  342 DO 337 K1=1,NSTEP
  337 Z(NV+K1)=W(I,K1)
      WRITE(IB)(Z(J1),J1=NV+1,NV+NSTEP)
      WRITE(6,1004)I,(Z(J1),J1=NV+1,NV+NSTEP)
    2 CONTINUE
      ENDFILE 9
      REWIND 9
      ENDFILE 5
      REWIND 5
      ENDFILE 3
      REWIND 3
      DO 17 K1=1,NSTEP
      N2=NCLASS-K1+1
      DO 1 J=1,NV-2
      TSUMZ(J)=0
      TSUMZ2(J)=0
      TZMIN(J)=100000
      TZMAX(J)=-100000
      DO 1 K=1,N2
      NO(K)=0
      DO 14 L=1,6
   14 NLAND(K,L)=0
      SUMZ(K,J)=0
      SUMZ2(K,J)=0
      ZMIN(K,J)=100000
      ZMAX(K,J)=-100000
    1 CONTINUE
      DO 13 L=1,6
   13 NTLAND(L)=0
      DO 12 I=1,NOBS
      IB=9
      IF(I.GT.800)IB=5
      IF(I.GT.1600)IB=3
      READ(IB)(Z(J),J=1,NV)
      DO 79 K11=1,NEXTRA+1
      NX1=K11*11-10
      NX2=K11*11
   79 READ(IB)(Z(J),J=NV+NX1,NV+NX2)
      K=Z(NV+(NEXTRA*NSTEP)+K1)-20*(NSAM-1)
      NO(K)=NO(K)+1
```

```
      L=Z(54)
      NTLAND(L)=NTLAND(L)+1
      NLAND(K,L)=NLAND(K,L)+1
      DO 3 J=1,NV-2
      SUMZ(K,J)=SUMZ(K,J)+Z(J)
      SUMZ2(K,J)=SUMZ2(K,J)+Z(J)**2
      IF(Z(J).GE.ZMIN(K,J))GOTO 7
      ZMIN(K,J)=Z(J)
    7 IF(Z(J).LE.ZMAX(K,J))GO TO 6
      ZMAX(K,J)=Z(J)
    6 TSUMZ(J)=TSUMZ(J)+Z(J)
      TSUMZ2(J)=TSUMZ2(J)+Z(J)**2
      IF(Z(J).GE.TZMIN(J)) GOTO 9
      TZMIN(J)=Z(J)
    9 IF(Z(J).LE.TZMAX(J)) GOTO 8
      TZMAX(J)=Z(J)
    8 CONTINUE
    3 CONTINUE
   12 CONTINUE
      DO 4 J=1,NV-2
      IF(TSUMZ2(J).EQ.0)GOTO 4
      TSUMZ(J)=TSUMZ(J)/NOBS
      TSUMZ2(J)=SQRT(TSUMZ2(J)/NOBS-TSUMZ(J)**2)
      DO 4 K=1,N2
      IF(NO(K).EQ.0)GOTO 4
      SUMZ(K,J)=SUMZ(K,J)/NO(K)
      SUMZ2(K,J)=SQRT(SUMZ2(K,J)/NO(K)-SUMZ(K,J)**2)
      SMEAN(K,J)=(SUMZ(K,J)-TSUMZ(J))/TSUMZ2(J)
      SMIN(K,J)=(ZMIN(K,J)-TSUMZ(J))/TSUMZ2(J)
      SMAX(K,J)=(ZMAX(K,J)-TSUMZ(J))/TSUMZ2(J)
    4 CONTINUE
      WRITE(4,309)(LABEL(M),M=1,10)
  309 FORMAT(///10A8/)
      WRITE(4,300)NOBS
  300 FORMAT(1X/' TOTAL SAMPLE'/' NO. OF OBSERVATIONS =',I5//
     1' VARIABLE     MEAN     STAN.DEV.     MINIMUM     MAXIMUM'/)
      DO 10 J=1,NV-2
      WRITE(4,400)LABELA(J),TSUMZ(J),TSUMZ2(J),TZMIN(J),TZMAX(J)
  400 FORMAT(1X,A8,4(1X,E10.4))
   10 CONTINUE
      WRITE(4,700)
  700 FORMAT(//' FRANCE BELGIUM HOLLAND GERMANY ITALY LUXEMBOURG'/)
      WRITE(4,800)(NTLAND(L),L=1,6)
  800 FORMAT(2X,I4,4X,I4,3X,I4,4X,I4,4X,I4,4X,I4)
      DO 11 K=1,N2
      WRITE(4,309)(LABEL(M),M=1,10)
      WRITE(4,500)K,NO(K)
  500 FORMAT(1X/' CLASS ',I3,/' NO. OF OBSERVATIONS =',I5//
     1' VARIABLE     MEAN     STAN.DEV.     MINIMUM     MAXIMUM     SMEAN
     2 SMINIMUM   SMAXIMUM '/)
      DO 15 J=1,NV-2
      WRITE(4,600)LABELA(J),SUMZ(K,J),SUMZ2(K,J),ZMIN(K,J),ZMAX(K,J),
     1SMEAN(K,J),SMIN(K,J),SMAX(K,J)
  600 FORMAT(1X,A8,4(1X,E10.4),3(1X,F10.2))
   15 CONTINUE
      WRITE(4,700)
```

```
      WRITE(4,800)(NLAND(K,L),L=1,6)
   11 CONTINUE
      CALL ANOVA(SUMZ,TSUMZ2,TSUMZ,NO,NOBS,N2,NV-2)
      REWIND 9
      REWIND 5
      REWIND 3
   17 CONTINUE
      STOP
      END
```

```
      PROGRAM(BART)
      COMPRESS INTEGER AND LOGICAL
      INPUT 1=CR0
      OUTPUT 2=LP0
      INPUT 4=CR1
      TRACE 2
      END
      MASTER BART
      REAL LABEL
      DIMENSION LABEL(80)
      DIMENSION XLAMDA(100)
      READ(1,50)(LABEL(I),I=1,10)
   50 FORMAT(10A8)
      WRITE(2,70)(LABEL(I),I=1,10)
   70 FORMAT(1H1,10A8)
      WRITE(2,400)
  400 FORMAT(1X,//,'  K          L          R          DF          PROB')
      READ(1,100)NP,NOBS
  100 FORMAT(2I0)
      READ(1,200)(XLAMDA(I),I=1,NP)
  200 FORMAT(F0.0)
      K=-1
      DO 1 I=1,NP
      SIGL=0.0
      PRDL=1.0
      K=K+1
      DO 2 J=K+1,NP
      SIGL=SIGL+XLAMDA(J)
      PRDL=PRDL*XLAMDA(J)
    2 CONTINUE
      SIGL=(SIGL/(NP-K))**(NP-K)
      XL=SIGL/PRDL
      STAT=((NOBS-K-0.5)*(ALOG(XL)))
      DF=((NP-K-1)*(NP-K+2))*0.5
      P=PRBF(DF,1000.0,STAT/DF)
      WRITE(2,500)K,XL,STAT,DF,P
  500 FORMAT(1X,I2,2X,F10.1,2X,F10.1,2X,F10.1,2X,F5.4)
    1 CONTINUE
      STOP
      END
      FUNCTION PRBF(DA,DB,FR)
      PRBF=1.0
      IF(DA*DB*FR.EQ.0.0)RETURN
      IF(FR.LT.1.0)GO TO 5
      A=DA
      B=DB
      F=FR
      GO TO 10
    5 A=DB
      B=DA
      F=1.0/FR
   10 AA=2.0/(9.0*A)
      BB=2.0/(9.0*B)
      Z=ABS(((1.0-BB)*F**0.333333-1.0+AA)/SQRT(BB*F
     1**0.666667+AA))
```

```
      IF(B.LT.4.0)Z=Z*(1.0+0.08*Z**4/B**3)
      PRBF=0.5/(1.0+Z*(0.196854+Z*(0.115194+Z*
     1(0.000344+Z*0.019527))))**4
      IF(FR.LT.1.0)PRBF=1.0-PRBF
      RETURN
      END
      FINISH
```

```
      PROGRAM(POPU)
      INPUT 1=CR1
      OUTPUT 2=CP1
      OUTPUT 7=LP2
      INPUT 8=CR0
      COMPRESS INTEGER AND LOGICAL
      TRACE 1
      END
      MASTER POPU
      DIMENSION Z(60),NO(30),SUMZ(30,60),SUMZ2(30,60),ZMIN(30,60)
      DIMENSION ZMAX(30,60),TSUMZ(60),TSUMZ2(60),TZMIN(60),TZMAX(60)
      DIMENSION SMEAN(30,60),SMIN(30,60),SMAX(30,60)
      DIMENSION LABEL(10),LABELA(60),NLAND(30,6),NTLAND(6)
      DIMENSION X(200),W(5),N7(30)
      DIMENSION SC(30),COEF(30,60),CONST1(30),CONST2(30),N(60)
      REAL LABEL,LABELA
      COMMON LABEL,LABELA
      READ(8,59)(LABEL(I),I=1,10)
      READ(8,59)(LABELA(I),I=1,53)
   59 FORMAT(10A8)
      READ(8,119) NV,NCLASS,NCV,NDISVR
  119 FORMAT(4I0)
      DO 118 K=1,NCLASS
      CONST1(K)=0.0
      CONST2(K)=0.0
      DO 118 J=1,NV-2
  118 COEF(K,J)=0.0
      READ(8,120)(N(I),I=1,NDISVR)
  120 FORMAT(20I0)
      KL=1
      KU=6
      TEST=FLOAT(NCLASS)/6.0
      ITEST=NCLASS/6
      IF(TEST.GT.FLOAT(ITEST)) GOTO 124
      K3=ITEST
      GOTO 126
  124 K3=ITEST+1
  126 DO 137 K=1,NCLASS
  137 N7(K)=K
      WRITE(7,399)(LABEL(M),M=1,10)
  399 FORMAT(1X,///,10A8,//)
      DO 123 J=1,K3
      WRITE(7,132)(N7(K),K=KL,KU)
  132 FORMAT(25X,'CLASSIFICATION FUNCTION NUMBER'/
     11X,'VARIABLE',6X,5(I2,12X),I2)
      DO 122 I=1,NDISVR
      READ(8,121)(COEF(K,N(I)),K=KL,KU)
  122 WRITE(7,129)LABELA(N(I)),(COEF(K,N(I)),K=KL,KU)
  129 FORMAT(1X,A8,6F14.8)
      READ(8,121)(CONST1(K),K=KL,KU)
      WRITE(7,130)(CONST1(K),K=KL,KU)
  130 FORMAT(1X,'CONSTANT',6F14.8)
      READ(8,121)(CONST2(K),K=KL,KU)
      WRITE(7,131)(CONST2(K),K=KL,KU)
  131 FORMAT(9X,6F14.8)
```

```
      KL=KL+6
      IF((KU+6).GE.NCLASS) GOTO 125
      KU=KU+6
      GOTO 123
  25  KU=NCLASS
  23  CONTINUE
  21  FORMAT(8F0.0)
      NOUT=0
      DO 1 J=1,NV-2
      TSUMZ(J)=0
      TSUMZ2(J)=0
      TZMIN(J)=100000
      TZMAX(J)=-100000
      DO 1 K=1,NCLASS
      NO(K)=0
      DO 14 L=1,6
  14  NLAND(K,L)=0
      SUMZ(K,J)=0
      SUMZ2(K,J)=0
      ZMIN(K,J)=100000
      ZMAX(K,J)=-100000
   1  CONTINUE
      DO 13 L=1,6
  13  NTLAND(L)=0
      DO 17 I=1,22026
      DO 18 K2=1,60
  18  Z(K2)=0.0
      READ(1,200) (W(K),K=1,5 ),(X(J),J=1,127)
 200  FORMAT(F1.0,F3.0,F2.0,2F10.0,2F1.0,3F10.0,F1.0,2X,12F1.0/
     18F10.0/8F10.0/8F10.0/
     210X,7F10.0/3F10.0,F1.0,9X,F1.0,9X,2F10.0,10X/10X,7F10.0/5F10.0,F1.
     30,4F4.0,2F1.0,F4.0,2F1.0/4(F4.0,2F1.0),F4.0,5X,2F10.0,10X,F1.0,F4.
     40,F1.0,5X/19F4.0/5F4.0,2F10.0,4F4.0,F1.0)
      X(34)=X(34)/100
      X(36)=X(36)/100
      X(41)=X(41)/100
      X(49)=X(49)/100
      TOT=0.0
      DO 30 K=19,49
  30  TOT=TOT+X(K)
      Z(2)=X(3)+X(4)+X(5)
      Z(1)=Z(2)+X(50)+X(51)+X(52)
      IF(TOT.NE.Z(2))GOTO 40
      IF(Z(2).EQ.0.0)GOTO 40
      IF(X(96).EQ.9.0)X(96)=0.5
      IF(X(96).EQ.5.0)X(96)=4.5
      Z(4)=((X(96)-1)*0.25*0.125+0.125*(X(104)+X(116))+0.375*(X(105)+X(
     1117))+0.625*(X(106)+X(118))+0.875*(X(107)+X(119))+X(108)+X(120)+(8
     2*(X(121)+X(122))/2200))
      IF(Z(4).EQ.0)GOTO 40
      IF (Z(1).NE.0.0)GOTO 501
  40  CONTINUE
      NOUT=NOUT+1
      GOTO 117
 501  IF(X(2).EQ.9.0)X(2)=0
      Z(42)=X(2)*X(1)
```

```
      Z(48)=X(3)/(Z(2)*0.01)
      Z(49)=X(4)/(Z(2)*0.01)
      Z(50)=X(5)/(Z(2)*0.01)
      Z(51)=X(6)
      Z(52)=X(7)+X(8)+X(9)+X(10)
      Z(53)=X(11)/7+X(12)/7+X(13)/7+X(14)/7+X(15)/7+X(16)/7+X(17)/7
      Z(43)=X(18)
      Z(6)=(X(19)+X(20)+X(21)+X(22)+X(23)+X(24)+X(25)+X(26)
     1+X(27))/(Z(2)*0.01)
      Z(7)=(X(28)+X(29)+X(30))/(Z(2)*0.01)
      Z(8)=X(31)/(Z(2)*0.01)
      Z(9)=(X(33)+X(34)+X(35)+X(36))/(Z(2)*0.01)
      Z(10)=(X(37)+X(38)+X(32)+X(39))/(Z(2)*0.01)
      Z(11)=X(40)/(Z(2)*0.01)
      Z(12)=(X(41))/(Z(2)*0.01)
      Z(13)=X(42)/(Z(2)*0.01)
      Z(15)=(X(43)+X(44)+X(45)+X(47)+X(48)+X(49))/(Z(2)*0.01)
      Z(14)=X(46)/(Z(2)*0.01)
      Z(16)=X(50)/((Z(2)+X(50))*0.01)
      Z(17)=(X(51)+X(52))/(Z(1)*0.01)
      IF(X(53).EQ.7.0)X(53)=1.0
      IF(X(54).EQ.7.0)X(54)=1.0
      Z(18)=X(53)
      Z(19)=X(54)
      Z(20)=0.6*X(55)
      Z(21)=X(59)
      Z(22)=0.4*X(56)+X(57)+0.5*X(58)+0.8*X(60)
      Z(23)=0.1*(X(61)+X(62))
      Z(24)=0.027*X(63)+0.5*X(64)+0.3*X(65)
      Z(25)=X(66)*0.007+X(67)*0.014+X(68)*0.03
      Z(3)=Z(20)+Z(22)+Z(23)+Z(24)+Z(25)+Z(21)
      IF(Z(3).EQ.0.0)GOTO 50
      Z(20)=Z(20)*100/Z(3)
      Z(22)=Z(22)*100/Z(3)
      Z(23)=Z(23)*100/Z(3)
      Z(24)=Z(24)*100/Z(3)
      Z(25)=Z(25)*100/Z(3)
      Z(21)=Z(21)*100/Z(3)
   50 Z(26)=Z(3)*100/Z(1)
      Z(40)=X(69)
      IF((X(70)+X(71)+X(72)+X(73)).GT.0)Z(34)=1
      IF(X(76).GT.0)Z(35)=1
      IF((X(79)+X(82)+X(85)+X(88)).GT.0)Z(36)=1
      IF((X(74)+X(75)+X(77)+X(78)+X(80)+X(81)+X(83)+X(84)+
     1 X(86)+X(87)+X(89)+X(90)).GT.0)Z(37)=1
      DO 51 K=70,91
   51 Z(5)=Z(5)+X(K)
      Z(41)=Z(5)/(Z(1)*0.001)
      IF(X(91).GT.0.0) Z(38)=1
      Z(39)=(X(36)+X(34)+X(49))/(Z(2)*0.01)
      IF(X(94).EQ.1)Z(44)=1
      IF(X(94).EQ.2)Z(45)=1
      IF(X(95).EQ.0.0)X(95)=52.0
      Z(46)=X(95)
      Z(28)=((X(96)-1)*0.25+0.125+0.125*X(104)+0.375*X(105)+0.625*X(106)
     1+0.875*X(107)+X(108))
```

```
      Z(27)=Z(4)/(Z(1)*0.001)
      Z(28)=Z(28)*100/Z(4)
      IF(X(96).EQ.0.5)P=0.0
      IF(X(96).NE.0.5)P=1.0
      T=P+X(97)+X(98)+X(109)+X(110)
      IF(T .NE. 0.0) GO TO 502
      T = 0.00001
02    IF(X(95).LT.25.0.AND.P.EQ.1.0)Z(29)=1.0
      Z(29)=(Z(29)+X(99)+X(111))/(T*0.01)
      IF((X(95).GE.25.0.AND.X(95).LT.35.0).AND.P.EQ.1.0)Z(30)=1.0
      Z(30)=(Z(30)+X(100)+X(112))/(T*0.01)
      IF((X(95).GE.35.0.AND.X(95).LT.45.0).AND.P.EQ.1.0)Z(31)=1.0
      Z(31)=(Z(31)+X(101)+X(113))/(T*0.01)
      IF((X(95).GE.45.0.AND.X(95).LT.65.0).AND.P.EQ.1.0)Z(32)=1.0
      Z(32)=(Z(32)+X(102)+X(114))/(T*0.01)
      IF((X(95).GE.65.0).AND.P.EQ.1)Z(33)=1
      Z(33)=(Z(33)+X(103)+X(115))/(T*0.01)
      IF(X(127).EQ.8.0)X(127)=0
      Z(47)=X(127)
      Z(54)=W(1)
      DO 177 K=1,NCLASS
      SC(K)=0.0
      DO 178 J=1,NV-2
78    SC(K)=SC(K)+COEF(K,J)*Z(J)
      SC(K)=SC(K)+CONST1(K)+CONST2(K)
      IF(K.EQ.1)GOTO 179
      IF(SC(K).LT.SCMAX)GOTO 177
      KMAX=K
      SCMAX=SC(K)
      GOTO 177
79    KMAX=1
      SCMAX=SC(1)
77    CONTINUE
      Z(55)=KMAX
      K=Z(NCV)
      NO(K)=NO(K)+1
      L=Z(54)
      NTLAND(L)=NTLAND(L)+1
      NLAND(K,L)=NLAND(K,L)+1
      DO 3 J=1,NV-2
      SUMZ(K,J)=SUMZ(K,J)+Z(J)
      SUMZ2(K,J)=SUMZ2(K,J)+Z(J)**2
      IF(Z(J).GE.ZMIN(K,J))GOTO 7
      ZMIN(K,J)=Z(J)
 7    IF(Z(J).LE.ZMAX(K,J))GO TO 6
      ZMAX(K,J)=Z(J)
 6    TSUMZ(J)=TSUMZ(J)+Z(J)
      TSUMZ2(J)=TSUMZ2(J)+Z(J)**2
      IF(Z(J).GE.TZMIN(J)) GOTO 9
      TZMIN(J)=Z(J)
 9    IF(Z(J).LE.TZMAX(J)) GOTO 8
      TZMAX(J)=Z(J)
 8    CONTINUE
 3    CONTINUE
17    IF(I.NE.20000)GOTO 17
      WRITE(2,340)NOUT
```

```
340 FORMAT(I6)
    WRITE(2,349)(NTLAND(L),L=1,6)
    DO 347 J=1,NV-2
347 WRITE(2,345)TSUMZ(J),TSUMZ2(J),TZMIN(J),TZMAX(J)
345 FORMAT(4(E20.11))
    DO 348 K=1,NCLASS
    WRITE(2,340)NO(K)
    WRITE(2,349)(NLAND(K,L),L=1,6)
    DO 348 J=1,NV-2
348 WRITE(2,345)SUMZ(K,J),SUMZ2(K,J),ZMIN(K,J),ZMAX(K,J)
349 FORMAT(6I5)
 17 CONTINUE
    NOBS=22026-NOUT
    DO 4 J=1,NV-2
    IF(TSUMZ2(J).EQ.0)GOTO 4
    TSUMZ(J)=TSUMZ(J)/NOBS
    TSUMZ2(J)=SQRT(TSUMZ2(J)/NOBS-TSUMZ(J)**2)
    DO 4 K=1,NCLASS
    IF(NO(K).EQ.0)GOTO 4
    SUMZ(K,J)=SUMZ(K,J)/NO(K)
    SUMZ2(K,J)=SQRT(SUMZ2(K,J)/NO(K)-SUMZ(K,J)**2)
    SMEAN(K,J)=(SUMZ(K,J)-TSUMZ(J))/TSUMZ2(J)
    SMIN(K,J)=(ZMIN(K,J)-TSUMZ(J))/TSUMZ2(J)
    SMAX(K,J)=(ZMAX(K,J)-TSUMZ(J))/TSUMZ2(J)
  4 CONTINUE
    WRITE(5,309)(LABEL(M),M=1,10)
309 FORMAT(1X///10A8/)
    WRITE(5,300)NOBS
300 FORMAT(1X/' TOTAL SAMPLE'/' NO. OF OBSERVATIONS =',I5//
   1' VARIABLE     MEAN     STAN.DEV.    MINIMUM     MAXIMUM'/)
    DO 10 J=1,NV-2
    WRITE(5,400)LABELA(J),TSUMZ(J),TSUMZ2(J),TZMIN(J),TZMAX(J)
400 FORMAT(1X,A8,4(1X,E10.4))
 10 CONTINUE
    WRITE(5,700)
700 FORMAT(//' FRANCE BELGIUM HOLLAND GERMANY ITALY LUXEMBOURG'/)
    WRITE(5,800)(NTLAND(L),L=1,6)
800 FORMAT(2X,I4,4X,I4,3X,I4,4X,I4,4X,I4,4X,I4)
    DO 11 K=1,NCLASS
    WRITE(5,309)(LABEL(M),M=1,10)
    WRITE(5,500)K,NO(K)
500 FORMAT(1X/' CLASS ',I3,/' NO. OF OBSERVATIONS =',I5//
   1' VARIABLE     MEAN     STAN.DEV.    MINIMUM     MAXIMUM      SMEAN
   2 SMINIMUM   SMAXIMUM '/)
    DO 12 J=1,NV-2
    WRITE(5,600)LABELA(J),SUMZ(K,J),SUMZ2(K,J),ZMIN(K,J),ZMAX(K,J),
   1SMEAN(K,J),SMIN(K,J),SMAX(K,J)
600 FORMAT(1X,A8,4(1X,E10.4),3(1X,F10.2))
 12 CONTINUE
    WRITE(5,700)
    WRITE(5,800)(NLAND(K,L),L=1,6)
 11 CONTINUE
    CALL ANOVA(SUMZ,TSUMZ2,TSUMZ,NO,NOBS,NCLASS,NV-2)
    STOP
    END
```

APPENDIX D

Output from CLUSTPROG

SAMPLE A - 15 Groups
10 Component Variables

GROUP 1

OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN
7	0.1491E 02	9	0.8049E 01	26	0.1462E 02
49	0.6425E 01	58	0.7446E 01	157	0.9840E 01
161–	0.5493E 01	177	0.1234E 02	217	0.9980E 01
229	0.7686E 01	242	0.7240E 01	275	0.4615E 01
281	0.7059E 01	283	0.8986E 01	292	0.1045E 02
302	0.5598E 01	308	0.7383E 01	311	0.3250E 01
313	0.3025E 01	321	0.3169E 01	329	0.8066E 01
345	0.1032E 02	445	0.5667E 01	446	0.2501E 01
447	0.2570E 01	448	0.2884E 01	449	0.1695E 02
450	0.5230E 01	451	0.5209E 01	453	0.5303E 01
454	0.1287E 02	456	0.5207E 01	459	0.4268E 01
460	0.4857E 01	463	0.7066E 01	464	0.1329E 02
465	0.1191E 02	466	0.9992E 01	469	0.6244E 01
470	0.3920E 01	473	0.4623E 01	474	0.7800E 01
475	0.7402E 01	476	0.1816E 02	477	0.1442E 01
478	0.3289E 01	479	0.1308E 02	484	0.6091E 01

OBSERVATIONS IN GROUP &WITHIN GROUP S.S.
48 0.3638E 03

GROUP 2

OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN
10	0.4676E 01	16	0.7741E 01	18	0.5326E 01
27	0.5853E 01	36	0.4272E 01	37	0.2770E 02
76	0.5291E 01	78	0.1191E 02	81	0.3862E 01
82	0.5344E 01	85	0.5564E 01	87	0.9820E 01
89	0.4022E 01	91	0.4145E 01	93	0.6427E 01
95	0.1093E 01	96	0.1153E 02	106	0.8356E 01
107	0.4776E 01	108	0.5032E 01	115	0.3870E 01
123	0.4976E 01	148	0.5325E 01	150	0.3708E 02
168	0.5760E 01	169	0.4283E 01	179	0.9453E 01
180	0.1188E 02	216	0.6380E 01	219	0.9598E 01
220	0.9366E 01	221	0.1497E 02	225	0.2333E 02
226	0.1727E 02	232	0.7961E 01	237	0.4921E 01
245	0.1413E 02	250	0.4945E 01	253	0.4832E 01
254	0.6188E 01	258	0.4554E 01	260	0.4798E 01
262	0.4045E 01	268	0.4690E 02	273	0.1790E 01
280	0.1279E 02	285	0.2971E 01	289	0.2224E 01
310	0.1032E 02	312	0.1876E 02	322	0.2314E 01
323	0.2669E 01	371	0.7231E 01	379	0.1778E 02
392	0.1542E 02	397	0.4234E 01	402	0.6037E 01
443	0.7817E 01	458	0.7095E 01	467	0.7058E 01
482	0.5876E 01	0	0.0000E 00	0	0.0000E 00

OBSERVATIONS IN GROUP &WITHIN GROUP S.S.
61 0.5419E 03

GROUP 3

OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN
12	0.8294E 01	34	0.1341E 02	72	0.3145E 02
172	0.1484E 02	218	0.2244E 02	227	0.1558E 02
246	0.1771E 02	293	0.8796E 01	295	0.2849E 02
303	0.1606E 02	309	0.2042E 02	326	0.6538E 01
335	0.2098E 02	341	0.1929E 02	361	0.2206E 02
363	0.1330E 02	366	0.8738E 01	373	0.1765E 02
414	0.3063E 02	415	0.2425E 02	419	0.2626E 02
435	0.1652E 02	439	0.1385E 02	462	0.1880E 02

OBSERVATIONS IN GROUP SWITHIN GROUP S.S.
24 0.4364E 03

GROUP 4

OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN
331	0.4383E 01	338	0.6816E 01	339	0.2273E 02
350	0.7650E 01	354	0.5193E 01	359	0.1468E 02
360	0.1622E 02	362	0.4673E 01	364	0.1669E 02
365	0.9677E 01	367	0.1417E 01	368	0.3636E 01
369	0.1189E 02	370	0.6578E 01	372	0.8872E 01
375	0.7524E 01	377	0.4653E 01	380	0.1310E 02
381	0.6766E 01	382	0.2180E 02	383	0.7847E 01
386	0.9504E 01	389	0.1297E 02	390	0.4230E 01
398	0.2971E 01	399	0.5583E 01	400	0.3077E 01
427	0.4369E 02	0	0.0000E 00	0	0.0000E 00

OBSERVATIONS IN GROUP &WITHIN GROUP S.S.
28 0.2848E 03

GROUP 5

OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN
8	0.4554E 01	75	0.1728E 02	102	0.8499E 02
240	0.1642E 02	241	0.8093E 01	247	0.1613E 02
272	0.1659E 02	286	0.9592E 01	314	0.1714E 02
435	0.4448E 02	0	0.0000E 00	0	0.0000E 00

OBSERVATIONS IN GROUP &WITHIN GROUP S.S.
10 0.2353E 03

6	0.5517E 01	31	0.9417E 01	41	0.2466E 01
47	0.7456E 01	50	0.1174E 02	68	0.1834E 02
70	0.1462E 02	92	0.1486E 02	104	0.7328E 01
141	0.8195E 01	186	0.8437E 01	196	0.4356E 01
198	0.6033E 01	210	0.7475E 01	212	0.5960E 01
238	0.9765E 01	248	0.2399E 01	261	0.2291E 02
267	0.1016E 02	269	0.1041E 02	294	0.5854E 01
301	0.2292E 02	305	0.1253E 02	307	0.7562E 01
352	0.1606E 02	394	0.1254E 02	410	0.1083E 02
433	0.9263E 01	434	0.7328E 01	480	0.5572E 01
483	0.2113E 02	486	0.5832E 01	487	0.3140E 02

OBSERVATIONS IN GROUP &WITHIN GROUP S.S.
33 0.3567E 03

GROUP 7

OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN
97	0.2320E 02	114	0.2237E 02	332	0.1007E 02
337	0.1705E 02	349	0.1612E 02	409	0.7537E 01
417	0.2363E 02	422	0.1653E 02	425	0.5891E 01
430	0.2541E 02	0	0.0000E 00	0	0.0000E 00

OBSERVATIONS IN GROUP &WITHIN GROUP S.S.
10 0.1680E 03

GROUP 8

OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN
19	0.7739E 01	20	0.5236E 01	22	0.1697E 01
23	0.7123E 01	25	0.4984E 01	30	0.3615E 01
43	0.1260E 01	44	0.3040E 01	51	0.3547E 00
56	0.3246E 01	59	0.3687E 01	60	0.4071E 01
77	0.5284E 01	80	0.5445E 01	86	0.4241E 01
88	0.5243E 01	90	0.6151E 01	110	0.5078E 01
121	0.4949E 01	127	0.2380E 01	129	0.1871E 01
130	0.1138E 02	132	0.4249E 01	134	0.2728E 01
135	0.2164E 01	138	0.3569E 01	160	0.1872E 01
162	0.3443E 01	163	0.3724E 01	164	0.2602E 01
167	0.3731E 01	171	0.1997E 01	174	0.1227E 02
190	0.7967E 01	191	0.1020E 02	194	0.7576E 01
201	0.5482E 01	205	0.5298E 01	206	0.1183E 02
208	0.4922E 01	214	0.1239E 02	223	0.9364E 01
230	0.3901E 01	235	0.3042E 01	251	0.3425E 01
255	0.3059E 01	259	0.7074E 01	266	0.7872E 01
270	0.4994E 01	282	0.1196E 02	290	0.4138E 01
296	0.7408E 01	304	0.2695E 01	306	0.4016E 01
316	0.4625E 01	317	0.3114E 01	318	0.4915E 01
334	0.6080E 01	336	0.7804E 01	342	0.5292E 01
343	0.9140E 01	346	0.6488E 01	348	0.1630E 02
353	0.4553E 01	403	0.8865E 01	458	0.8787E 01
441	0.1054E 02	452	0.1533E 01	457	0.3051E 01
468	0.3904E 01	471	0.6031E 01	481	0.1743E 01

OBSERVATIONS IN GROUP &WITHIN GROUP S.S.
72 0.3918E 03

GROUP 9

OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN
140	0.5866E 01	142	0.2053E 02	144	0.8951E 01
182	0.1289E 02	184	0.1449E 02	188	0.3405E 01
195	0.6009E 01	202	0.7547E 01	213	0.1671E 02
224	0.5817E 01	231	0.4747E 01	233	0.5875E 01
234	0.1171E 02	236	0.7869E 01	328	0.1326E 02
440	0.1212E 02	0	0.0000E 00	0	0.0000E 00

OBSERVATIONS IN GROUP &WITHIN GROUP S.S.
16 0.1578E 03

GROUP 10

OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN
4	0.2084E 02	173	0.3032E 01	175	0.2063E 01
176	0.2048E 01	181	0.6602E 01	187	0.4278E 02
203	0.6189E 01	204	0.6131E 01	228	0.2770E 02
256	0.2474E 01	278	0.2603E 02	287	0.1361E 02
344	0.1535E 02	0	0.0000E 00	0	0.0000E 00

OBSERVATIONS IN GROUP &WITHIN GROUP S.S.
13 0.1748E 03

GROUP 11

OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN
1	0.8919E 01	2	0.1021E 01	3	0.6949E 00
11	0.8071E 01	14	0.7018E 00	15	0.5490E 01
17	0.6504E 01	24	0.8756E 00	28	0.3098E 01
29	0.8427E 01	45	0.2713E 01	46	0.5350E 01
54	0.6884E 01	103	0.9010E 01	111	0.8729E 00
117	0.7568E 01	120	0.5459E 01	122	0.4886E 01
124	0.2940E 01	125	0.7222E 01	128	0.3794E 01
131	0.3244E 01	133	0.2967E 01	136	0.6897E 01
143	0.7565E 01	145	0.7166E 01	146	0.5579E 01
151	0.3903E 01	156	0.3300E 01	165	0.3340E 01
166	0.1761E 02	192	0.6226E 01	199	0.7067E 01
243	0.7118E 01	244	0.6988E 01	249	0.8701E 01
257	0.9187E 01	263	0.1925E 02	264	0.8542E 01
271	0.6055E 01	279	0.3309E 01	288	0.2755E 01
297	0.3383E 01	298	0.4238E 01	300	0.1520E 01
324	0.1201E 01	461	0.9891E 01	472	0.6139E 01

OBSERVATIONS IN GROUP &WITHIN GROUP S.S.
48 0.2732E 03

GROUP 12

OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN
5	0.4867E 01	13	0.6323E 01	21	0.3520E 01
32	0.2205E 01	40	0.9353E 01	48	0.1326E 02
52	0.5541E 01	79	0.1614E 02	84	0.7306E 01
94	0.3146E 01	98	0.1957E 02	100	0.1751E 02
105	0.5275E 01	109	0.3914E 01	112	0.3719E 01
126	0.4420E 01	137	0.1307E 02	139	0.3041E 01
147	0.7200E 01	152	0.1536E 01	183	0.1475E 02
185	0.3815E 01	193	0.8568E 01	207	0.3038E 01
239	0.1003E 02	276	0.5219E 01	277	0.1040E 02
284	0.8415E 01	299	0.3046E 01	315	0.1220E 02
320	0.6178E 01	325	0.3545E 01	327	0.2938E 01
347	0.1347E 02	357	0.4774E 01	385	0.1117E 02
393	0.1115E 02	396	0.1796E 02	408	0.8989E 01
423	0.6603E 01	424	0.4248E 01	0	0.0000E 00

OBSERVATIONS IN GROUP &WITHIN GROUP S.S.
41 0.3212E 03

GROUP 13

OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN
35	0.6687E 01	38	0.6129E 01	39	0.7277E 01
55	0.3502E 02	61	0.1033E 02	62	0.1748E 02
63	0.3139E 01	67	0.1309E 02	71	0.4630E 01
73	0.2948E 02	83	0.4541E 01	99	0.1525E 02
149	0.3765E 01	155	0.3989E 01	158	0.1121E 02
209	0.7615E 01	252	0.1973E 01	274	0.9094E 01
319	0.1426E 02	330	0.1230E 02	333	0.8889E 01
351	0.1081E 02	356	0.8499E 01	374	0.5315E 01
376	0.6446E 01	378	0.3432E 02	384	0.1004E 02
387	0.8149E 01	388	0.2002E 02	391	0.6013E 01
405	0.4987E 01	406	0.1242E 02	407	0.1305E 02
411	0.1191E 02	412	0.1346E 01	413	0.5965E 01
416	0.4055E 01	418	0.4457E 01	420	0.8965E 01
426	0.1374E 02	429	0.7923E 01	431	0.3519E 01
432	0.1410E 02	436	0.4270E 01	437	0.1083E 02
442	0.1241E 01	444	0.4672E 01	0	0.0000E 00

OBSERVATIONS IN GROUP &WITHIN GROUP S.S.
47 0.4632E 03

GROUP 14

OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN
33	0.4549E 01	42	0.8620E 01	53	0.6966E 01
57	0.7877E 01	64	0.5490E 01	74	0.1172E 02
101	0.2008E 02	113	0.1781E 02	116	0.1122E 02
118	0.3210E 02	119	0.1275E 02	153	0.4654E 01
154	0.5587E 01	159	0.2677E 02	170	0.1795E 02
197	0.6185E 01	200	0.5746E 01	211	0.7841E 01
215	0.1115E 02	291	0.1411E 02	340	0.9972E 01
355	0.1460E 02	358	0.2357E 02	395	0.1762E 02
401	0.6581E 01	404	0.3014E 02	421	0.6010E 01
428	0.4114E 01	455	0.2399E 01	0	0.0000E 00

OBSERVATIONS IN GROUP &WITHIN GROUP S.S.
29 0.3542E 03

GROUP 15

OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN	OBSERVATION	DISTANCE FROM GROUP MEAN
65	0.6491E 02	66	0.3584E 02	69	0.3474E 02
178	0.7840E 01	189	0.3137E 02	222	0.1471E 02
265	0.5153E 02	0	0.0000E 00	0	0.0000E 00

OBSERVATIONS IN GROUP &WITHIN GROUP S.S.
7 0.2409E 03

```
     ANALYSIS BY VARIABLE
   VARIABLE       GROUP MEANS

FINAL COL. SHOWS CONTRIBUTION TO  TOTAL SUM OF SQUARES EXPLAINED BY CLUSTERING
     COMPON 1    0.3413E 01  -0.8107E 00  -0.1937E 00  -0.6847E 00  -0.2695E 01  -0.2433E 01  -0.3686E 01   0.1514E 01
  0.8042E 00   0.4293E 01   0.2241E 01  -0.7522E 00  -0.2949E 01  -0.1893E 01  -0.1052E 01   0.2217E 04
     COMPON 2    0.6478E 00  -0.1461E 01   0.5207E 01   0.2738E 00  -0.4652E 00  -0.2902E 00   0.1997E 01  -0.4591E 00
 -0.9496E 00   0.1439E 01  -0.1115E 01  -0.1487E 01   0.4586E 00   0.1110E 01   0.5096E-01   0.1115E 04
     COMPON 3    0.4715E 00  -0.5535E 00  -0.5653E 00   0.9990E 00  -0.6169E 01  -0.9979E-01   0.4716E 00   0.4169E 00
  0.6562E 00  -0.2880E 01   0.1348E 00   0.2767E 00   0.5291E 00   0.5057E 00  -0.8641E 00   0.6079E 03
     COMPON 4   -0.4494E-01   0.5501E 00  -0.7977E 00   0.2199E 01   0.7141E 00   0.4623E 00   0.2183E 01   0.4833E 00
 -0.1393E 01   0.3720E 00  -0.5501E 00  -0.8272E 00  -0.5860E 00  -0.2116E 00  -0.6052E 01   0.5941E 03
     COMPON 5   -0.6635E 00  -0.4523E 00   0.6276E 00   0.1255E 01  -0.5325E 00  -0.1208E 01   0.1444E 01  -0.7752E 00
 -0.8623E 00   0.8308E 00   0.1235E 01   0.1959E 01   0.4705E 00  -0.1784E 01  -0.1601E 01   0.5742E 03
     COMPON 6    0.9410E 00  -0.8488E-01  -0.1334E 01   0.1010E 01   0.1389E 00   0.5649E 00  -0.3962E 00   0.3478E 00
 -0.1248E 01  -0.2499E 00  -0.5739E 00  -0.5244E 00   0.1136E 01  -0.2704E 01   0.2839E 01   0.5171E 03
     COMPON 7    0.8151E 00  -0.5251E 00  -0.3374E 00  -0.1792E 01   0.6184E 00   0.1724E 01   0.1458E 01  -0.2268E 00
  0.1597E 01   0.9998E 00  -0.4597E-01  -0.5060E-01   0.4142E 00  -0.1325E 01  -0.3649E 01   0.4744E 03
     COMPON 8   -0.7959E 00   0.6581E 00   0.6923E 00  -0.3673E-01   0.6543E 00  -0.1670E 01  -0.1022E 01   0.3657E 00
  0.2026E 01   0.7414E 00  -0.6131E 00  -0.3843E 00   0.1145E 01  -0.9854E 00  -0.8526E 00   0.3750E 03
     COMPON 9    0.4331E 00  -0.9257E 00  -0.4999E 00   0.1196E 01   0.3997E 01  -0.4625E 00   0.1049E 01  -0.1848E 00
  0.1670E 01  -0.1505E 01   0.1977E 00   0.5305E-01  -0.6470E 00  -0.9197E-01   0.9345E 00   0.3897E 03
     COMPON10    0.5269E 00  -0.9039E-01   0.2195E 00  -0.2318E 00   0.2205E 01  -0.2507E 00  -0.4108E 01   0.8794E-02
 -0.4815E 00  -0.1325E 01  -0.2089E-01   0.4537E 00   0.5114E 00   0.4078E 00  -0.2933E 01   0.3483E 03

       15  CLUSTERS
TOTAL SUM OF SQUARES EXPLAINED BY CLUSTERING     = 0.7212E 04

                         SUMMARY

                    SUM OF SQUARES      PERCENTAGE
   WITHIN GROUPS     0.4764E 04      0.3978E 02
   BETWEEN GROUPS    0.7212E 04      0.6022E 02
   TOTAL             0.1198E 05      0.1000E 03
       ND=    1
       ND=    2
```

APPENDIX E

Means of 10 and 20 Cluster Classes

- Experimental Analysis I

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS GROUP	S01	S02	S03	S04	S05	L01	L02	L03	L04	L05	SIZE
1	0.3912E 04	0.3501E 04	0.3178E 02	0.2758E 01	0.4570E 01	0.3699E 02	0.9110E 01	0.9078E 00	0.2897E-01	0.1026E 02	107
2	0.8493E 03	0.7962E 03	0.9269E 01	0.1629E 01	0.2260E 01	0.2561E 02	0.1045E 02	0.6944E 00	0.2049E 01	0.9334E 01	108
3	0.4820E 04	0.4175E 04	0.1351E 02	0.2513E 01	0.2148E 01	0.1747E 02	0.3693E 01	0.5026E 00	0.4000E-01	0.1074E 02	27
4	0.1597E 04	0.1150E 04	0.5792E 01	0.2375E 01	0.1811E 01	0.3652E 02	0.2651E 01	0.0000E 00	0.6635E 00	0.2915E 02	37
5	0.2472E 03	0.2192E 03	0.5000E-01	0.2717E 01	0.2000E 01	0.0000E 00	0.6472E 01	0.0000E 00	0.7365E 02	0.4027E 01	12
6	0.2651E 03	0.2380E 03	0.9838E 00	0.8753E 00	0.1029E 01	0.1864E 02	0.2206E 01	0.0000E 00	0.0000E 00	0.1140E 01	34
7	0.1138E 04	0.1079E 04	0.1310E 02	0.1450E 01	0.2645E 01	0.3082E 02	0.1131E 02	0.1042E 00	0.3700E 00	0.8555E 01	76
8	0.5859E 03	0.4674E 03	0.2928E 01	0.8894E 00	0.3844E 00	0.1322E 02	0.5793E 01	0.0000E 00	0.3077E-02	0.2082E 01	52
9	0.7472E 03	0.6587E 03	0.5973E 01	0.1290E 01	0.1481E 01	0.1807E 02	0.6684E 01	0.0000E 00	0.9259E-01	0.7093E 01	27
10	0.7687E 03	0.6747E 03	0.9310E 02	0.1246E 01	0.1000E 01	0.1841E 01	0.3850E 01	0.0000E 00	0.8929E 01	0.6303E 01	7
TOTAL	0.1754E 04	0.1551E 04	0.1475E 02	0.1826E 01	0.2435E 01	0.2610E 02	0.7848E 01	0.3976E 00	0.2520E 01	0.9352E 01	487

GROUP MEANS GROUP	L06	L07	L08	L09	L10	L11	L12	L13	L14	A01	SIZE
1	0.2824E 00	0.1991E 00	0.4182E 02	0.5720E-01	0.3448E 00	0.3353E 00	0.8737E 01	0.0000E 00	0.2056E 00	0.2524E 01	107
2	0.6686E 00	0.8321E 00	0.4788E 02	0.1274E 01	0.1213E 01	0.6103E 00	0.5579E 01	0.5556E-01	0.2778E 00	0.5166E 01	108
3	0.3075E 01	0.5548E 00	0.3552E 02	0.3748E 00	0.2803E 02	0.2401E 01	0.1689E 02	0.2222E 00	0.0000E 00	0.1270E 00	27
4	0.1599E 01	0.5878E 00	0.1860E 02	0.4688E 01	0.5541E 01	0.3051E 01	0.2102E 02	0.6757E 00	0.3514E 00	0.1556E 01	37
5	0.5175E 00	0.0000E 00	0.5176E 01	0.5208E 00	0.9633E 01	0.4972E 01	0.1809E 02	0.8333E-01	0.8333E-01	0.0000E 00	12
6	0.1687E 01	0.1685E 01	0.2627E 02	0.2658E 02	0.2178E 02	0.2645E 01	0.8667E 01	0.1471E 00	0.2941E-01	0.1193E 02	34
7	0.6830E 00	0.4661E 00	0.4544E 02	0.8792E 00	0.1388E 01	0.3909E 00	0.4464E 01	0.5263E-01	0.2763E 00	0.1569E 01	76
8	0.3105E 01	0.4749E 01	0.3127E 02	0.7668E 01	0.3211E 02	0.5770E 01	0.1514E 02	0.9615E-01	0.3846E-01	0.4621E 01	52
9	0.4674E 00	0.7281E 00	0.5635E 02	0.1459E 01	0.9051E 01	0.1885E 01	0.5581E 01	0.3704E-01	0.3333E 00	0.4576E 01	27
10	0.0000E 00	0.1812E 02	0.4679E 02	0.1416E 02	0.0000E 00	0.4977E 01	0.1645E 02	0.1429E 00	0.2857E 00	0.4657E 00	7
TOTAL	0.1097E 01	0.1302E 01	0.3938E 02	0.3781E 01	0.8225E 01	0.1734E 01	0.9600E 01	0.1109E 00	0.2074E 00	0.3657E 01	487

GROUP MEANS GROUP	A02	A03	A04	A05	A06	A07	W01	W02	W03	W04	SIZE
1	0.4150E 02	0.3516E 02	0.2718E 00	0.1444E 02	0.2175E 01	0.9942E 00	0.9476E 00	0.8420E 02	0.1373E 02	0.2228E 02	107
2	0.4075E 02	0.2825E 02	0.6706E 00	0.9756E 01	0.3371E 01	0.1225E 01	0.3158E 01	0.9727E 02	0.9901E 01	0.4846E 01	108
3	0.9404E 01	0.6600E 01	0.1035E 02	0.1381E 02	0.7859E 01	0.6322E 00	0.1386E 01	0.4785E 01	0.3395E 01	0.1321E 02	27
4	0.3092E 02	0.4297E 02	0.1921E 01	0.7256E 01	0.4561E 01	0.5181E 00	0.3231E 01	0.8884E 02	0.1203E 02	0.1031E 02	37
5	0.0000E 00	0.0000E 00	0.8333E 01	0.8333E 01	0.0000E 00	0.3167E-01	0.2581E 02	0.7785E 02	0.1431E 02	0.1542E 02	12
6	0.9679E 01	0.5107E 01	0.0000E 00	0.1583E 02	0.1573E 01	0.6744E 00	0.4175E 01	0.8301E 02	0.1961E 01	0.3561E 01	34
7	0.3621E 02	0.3567E 02	0.7549E 00	0.1833E 02	0.9029E 00	0.1456E 01	0.2762E 01	0.9803E 02	0.3509E 01	0.2752E 02	76
8	0.5325E 01	0.6561E 01	0.1424E 02	0.9456E 01	0.1000E 02	0.5702E 00	0.4135E 01	0.8460E 02	0.2884E 01	0.7852E 01	52
9	0.3605E 02	0.1745E 02	0.1243E 01	0.1305E 02	0.5406E 01	0.1415E 01	0.3887E 01	0.8713E 02	0.5556E 01	0.6173E 01	27
10	0.1744E 01	0.2939E 01	0.1557E 00	0.9157E 02	0.3129E 01	0.2239E 02	0.1230E 02	0.8482E 02	0.1667E 02	0.1429E 02	7
TOTAL	0.2994E 02	0.2523E 02	0.2840E 01	0.1392E 02	0.3671E 01	0.1301E 01	0.3423E 01	0.8518E 02	0.8207E 01	0.1378E 02	487

CENTROIDS OF 10 CLUSTER CLASSES - SAMPLE A

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS — VARIABLES

GROUP	W05	W06	W07	M01	M02	M03	M04	M05	M06	M07	SIZE
1	0.1924E 02	0.3553E 02	0.9221E 01	0.9626E 00	0.4673E-01	0.5514E 00	0.7850E 00	0.7290E 00	0.0000E 00	0.9346E-02	107
2	0.5124E 01	0.6500E 02	0.1513E 02	0.3426E 00	0.1019E 00	0.1852E-01	0.8611E 00	0.1574E 00	0.8694E-01	0.0000E 00	108
3	0.1896E 02	0.3561E 02	0.2901E 01	0.6296E 00	0.1481E 00	0.7407E-01	0.5185E 00	0.1111E 00	0.0000E 00	0.1852E 00	27
4	0.2856E 02	0.4377E 02	0.3333E 01	0.2703E 00	0.2973E 00	0.5405E-01	0.6757E 00	0.8108E-01	0.0000E 00	0.5405E-01	37
5	0.2083E 02	0.3347E 02	0.1597E 02	0.0000E 00	0.8333E 00	0.0000E 00	0.3333E 00	0.0000E 00	0.1997E 02	0.1667E 00	12
6	0.1292E 02	0.1443E 02	0.6733E 02	0.8824E-01	0.2059E 00	0.2941E-01	0.5588E 00	0.0000E 00	0.0000E 00	0.4706E 00	34
7	0.5855E 02	0.4715E 01	0.5702E 01	0.5921E 00	0.5263E-01	0.6579E-01	0.8421E 00	0.2763E 00	0.1008E 00	0.0000E 00	76
8	0.1667E 02	0.6651E 02	0.6090E 01	0.7692E-01	0.1154E 00	0.0000E 00	0.1923E 00	0.0000E 00	0.0000E 00	0.5769E-01	52
9	0.1296E 02	0.5247E 02	0.2284E 02	0.2222E 00	0.1111E 00	0.0000E 00	0.7037E 00	0.1111E 00	0.0000E 00	0.0000E 00	27
10	0.1429E 02	0.5476E 02	0.0000E 00	0.2857E 00	0.0000E 00	0.0000E 00	0.4286E 00	0.1429E 00	0.1786E 01	0.0000E 00	7
TOTAL	0.2184E 02	0.4104E 02	0.1370E 02	0.4661E 00	0.1263E 00	0.1458E 00	0.6879E 00	0.2587E 00	0.5529E 00	0.5955E-01	487

GROUP MEANS — VARIABLES

GROUP	M08	H01	H02	H03	H04	H05	H06	G01	G02	G03	SIZE
1	0.1607E 01	0.1000E 01	0.1598E 01	0.9720E 00	0.2804E-01	0.5115E 02	0.3738E-01	0.5822E 02	0.4116E 02	0.6295E 00	107
2	0.4998E 01	0.1000E 01	0.1167E 01	0.1000E 01	0.0000E 00	0.5868E 02	0.1759E 00	0.4937E 02	0.5032E 02	0.3106E 00	108
3	0.1266E 01	0.1481E 00	0.1481E 01	0.1111E 00	0.3704E-01	0.5111E 02	0.0000E 00	0.8908E 02	0.3510E 01	0.7407E 01	27
4	0.2340E 01	0.1000E 01	0.1000E 01	0.1000E 01	0.0000E 00	0.5211E 02	0.1622E 00	0.5720E 02	0.4964E 01	0.3734E 02	37
5	0.1146E 02	0.1000E 01	0.1667E 01	0.9167E 00	0.8333E-01	0.5542E 02	0.1667E 00	0.4843E 02	0.5157E 02	0.0000E 00	12
6	0.6258E 01	0.1000E 01	0.1235E 01	0.9118E 00	0.8824E-01	0.6626E 02	0.3235E 00	0.8485E 02	0.3382E 01	0.1176E 02	34
7	0.4166E 01	0.1000E 01	0.1257E 01	0.9868E 00	0.1316E-01	0.3808E 02	0.4474E 00	0.3535E 02	0.6452E 02	0.1355E 00	76
8	0.2514E 01	0.1000E 01	0.1135E 01	0.1000E 01	0.0000E 00	0.5304E 02	0.6923E 00	0.9151E 02	0.8487E 01	0.0000E 00	52
9	0.4808E 01	0.9630E 00	0.1000E 01	0.0000E 00	0.9630E 00	0.5793E 02	0.0000E 00	0.7804E 02	0.2196E 02	0.0000E 00	27
10	0.3325E 01	0.1000E 01	0.1000E 01	0.7143E 00	0.2857E 00	0.4771E 02	0.7143E 00	0.8571E 02	0.1429E 02	0.0000E 00	7
TOTAL	0.3662E 01	0.9507E 00	0.1279E 01	0.8747E 00	0.7508E-01	0.5254E 02	0.2402E 00	0.6099E 02	0.3468E 02	0.4335E 01	487

GROUP MEANS — VARIABLES

GROUP	G04	G05	G06	SIZE
1	0.3364E 00	0.2701E 01	0.1402E 00	107
2	0.2407E 00	0.1552E 01	0.5556E-01	108
3	0.1852E 00	0.1037E 01	0.1111E 00	27
4	0.8108E-01	0.4865E 00	0.5405E-01	37
5	0.6667E 00	0.1833E 01	0.0000E 00	12
6	0.1765E 00	0.1235E 01	0.0000E 00	34
7	0.1974E 00	0.1711E 01	0.5263E-01	76
8	0.5769E-01	0.2115E 00	0.3846E-01	52
9	0.7407E-01	0.1111E 01	0.7407E-01	27
10	0.5714E 00	0.1286E 01	0.2857E 00	7
TOTAL	0.2218E 00	0.1489E 01	0.7592E-01	487

UNIVARIATE F TESTS : SAMPLE A - 10 CLUSTER CLASSES

WILKS LAMBDA (U-STATISTIC) AND UNIVARIATE F-RATIØ

VARIABLE	WILKS LAMBDA	F
S01	,6680	26,3369
S02	,6879	24,0434
S03	,6182	32,7304
S04	,6982	22,9058
S05	,5054	51,8742
L01	,8299	10,8653
L02	,9341	3,7416
L03	,9746	1,3792
L04	,2669	145,5921
L05	,8361	10,3881
L06	,9672	1,7958
L07	,8722	7,7676
L08	,8964	6,1237
L09	,7942	13,7352
L10	,7705	15,7886
L11	,9396	3,4099
L12	,8665	8,1647
L13	,7030	22,3935
L14	,9245	4,3262
A01	,9553	2,4778
A02	,7537	17,3208
A03	,7560	17,1012
A04	,8934	6,3217
A05	,8238	11,3367
A06	,9613	2,1357
A07	,3850	84,6646
W01	,7052	22,1554
W02	,4861	56,0223
W03	,9287	4,0689
W04	,8812	7,1430
W05	,7452	18,1224
W06	,6899	23,8250
W07	,6884	23,9880
M01	,5994	35,4164
M02	,8391	10,1649
M03	,6235	32,0016
M04	,7880	14,2551
M05	,6382	30,0451
M06	,6668	26,4887
M07	,7304	19,5611
M08	,8574	8,8143
H01	,1915	223,7075
H02	,8676	8,0881
H03	,2183	189,7521
H04	,3191	113,0996
H05	,6147	33,2212
H06	,7305	19,5500
G01	,7944	13,7181
G02	,6919	23,5953
G03	,7435	18,2816
G04	,9102	5,2304
G05	,7401	18,6081
G06	,9654	1,9006

WITH 9 AND 477 DEGREES ØF FREEDØM

$F_{0.01} = 3.11$

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS

GROUP	S01	S02	S03	S04	S05	L01	L02	L03	L04	L05	SIZE
1	0.6235E 04	0.5387E 04	0.6246E 02	0.3203E 01	0.5292E 01	0.4260E 02	0.6917E 01	0.9735E 00	0.8125E-01	0.8145E 01	24
2	0.2519E 04	0.2181E 04	0.2288E 02	0.2627E 01	0.4103E 01	0.3725E 02	0.6294E 01	0.1744E 00	0.8333E-01	0.1223E 02	39
3	0.3160E 03	0.2949E 03	0.1933E 00	0.1561E 01	0.3600E 01	0.2865E 02	0.2861E 02	0.1581E 01	0.1366E 02	0.1268E 02	15
4	0.5390E 04	0.4672E 04	0.1745E 02	0.2748E 01	0.2375E 01	0.1709E 02	0.4065E 01	0.5654E 00	0.4500E-01	0.7895E 01	24
5	0.6350E 03	0.5653E 03	0.5758E 01	0.1374E 01	0.1182E 01	0.2572E 02	0.1060E 02	0.0000E 00	0.1352E 01	0.7475E 01	33
6	0.1960E 04	0.1471E 04	0.7989E 01	0.2356E 01	0.2429E 01	0.3798E 02	0.3788E 01	0.0000E 00	0.1625E 00	0.2673E 02	28
7	0.1217E 03	0.9610E 02	0.6000E-01	0.2484E 01	0.1500E 01	0.0000E 00	0.0000E 00	0.0000E 00	0.7812E 02	0.2867E 01	10
8	0.2366E 03	0.2056E 03	0.4971E 00	0.1027E 01	0.1000E 01	0.9774E 01	0.8629E 00	0.0000E 00	0.0000E 00	0.0000E 00	17
9	0.5480E 03	0.4904E 03	0.6071E 01	0.1133E 01	0.1520E 01	0.2537E 02	0.4387E 01	0.0000E 00	0.0000E 00	0.5724E 01	25
10	0.1252E 04	0.8888E 03	0.5518E 01	0.2454E 01	0.1462E 01	0.3893E 02	0.2550E 01	0.0000E 00	0.0000E 00	0.3544E 02	13
11	0.3033E 03	0.2441E 03	0.3429E 00	0.8957E 00	0.5714E 00	0.3149E 02	0.3887E 01	0.0000E 00	0.0000E 00	0.5693E 01	7
12	0.2210E 04	0.2115E 04	0.2506E 02	0.2340E 01	0.3521E 01	0.2982E 02	0.7548E 01	0.3648E 00	0.1558E 00	0.9001E 01	48
13	0.1988E 04	0.1855E 04	0.2417E 02	0.1487E 01	0.1600E 01	0.0000E 00	0.3133E-01	0.0000E 00	0.0000E 00	0.0000E 00	15
14	0.6757E 04	0.6211E 04	0.1184E 02	0.3590E 01	0.6400E 01	0.4808E 02	0.3534E 02	0.5396E 01	0.0000E 00	0.6450E 01	10
15	0.1802E 04	0.1737E 04	0.2250E 02	0.1852E 01	0.3711E 01	0.3445E 02	0.1160E 02	0.2433E 00	0.4318E 00	0.9194E 01	45
16	0.6594E 03	0.6211E 03	0.7599E 01	0.1541E 01	0.2139E 01	0.2687E 02	0.9209E 01	0.1216E 01	0.2598E 01	0.1067E 02	36
17	0.4475E 03	0.4186E 03	0.4939E 01	0.8801E 00	0.1182E 01	0.2288E 02	0.9508E 01	0.0000E 00	0.0000E 00	0.5222E 01	33
18	0.4519E 03	0.3262E 03	0.8787E 00	0.7520E 00	0.1667E 00	0.9019E 01	0.4973E 01	0.0000E 00	0.5333E-02	0.1265E 01	30
19	0.6877E 03	0.6051E 03	0.4527E 01	0.1144E 01	0.1345E 01	0.1729E 02	0.6489E 01	0.0000E 00	0.8621E-01	0.1003E 02	29
20	0.3445E 03	0.2700E 03	0.7209E 02	0.9750E 00	0.6667E 00	0.0000E 00	0.3687E 01	0.0000E 00	0.1042E 02	0.6010E 01	6
TOTAL	0.1754E 04	0.1551E 04	0.1475E 02	0.1826E 01	0.2435E 01	0.2610E 02	0.7848E 01	0.3976E 00	0.2520E 01	0.9352E 01	487

GROUP MEANS

GROUP	L06	L07	L08	L09	L10	L11	L12	L13	L14	A01	SIZE
1	0.0000E 00	0.1329E 00	0.4074E 02	0.0000E 00	0.4075E 00	0.2908E 00	0.1070E 02	0.0000E 00	0.2917E 00	0.1471E 00	24
2	0.5500E 00	0.3082E 00	0.4309E 02	0.0000E 00	0.1821E-01	0.6428E 00	0.1198E 02	0.0000E 00	0.2564E-01	0.1822E 01	39
3	0.4291E 01	0.1494E 01	0.3165E 01	0.4053E 01	0.1807E 01	0.1467E 01	0.9011E 01	0.0000E 00	0.2006E 00	0.0000E 00	15
4	0.2712E 01	0.5979E 00	0.3939E 02	0.3312E 00	0.2711E 02	0.1797E 01	0.1827E 02	0.1667E 00	0.0000E 00	0.1429E 00	24
5	0.7970E 00	0.2005E 01	0.3589E 02	0.5822E 01	0.1033E 02	0.2247E 01	0.8032E 01	0.6061E-01	0.3030E-01	0.3699E 01	33
6	0.1724E 01	0.3121E 00	0.2269E 02	0.1507E 01	0.5118E 01	0.3303E 01	0.1741E 02	0.5357E 00	0.2500E 00	0.1665E 01	28
7	0.6210E 00	0.0000E 00	0.6211E 01	0.6250E 00	0.1156E 02	0.5966E 01	0.2065E 02	0.1000E 00	0.0000E 00	0.0000E 00	10
8	0.1358E 01	0.1413E 01	0.1195E 02	0.4735E 02	0.2759E 02	0.1858E 01	0.1131E 02	0.1176E 00	0.0000E 00	0.0000E 00	17
9	0.1956E 00	0.1662E 01	0.6116E 02	0.1004E 01	0.4002E 00	0.6504E 00	0.6342E 01	0.4000E-01	0.2000E 00	0.1920E 01	25
10	0.8385E 00	0.5692E 00	0.6081E 01	0.8158E 01	0.6828E 01	0.3395E 01	0.2439E 02	0.7692E 00	0.3846E 00	0.1846E 01	13
11	0.7460E 01	0.9871E 00	0.5714E 01	0.5071E 01	0.3970E 02	0.3567E 01	0.4774E 01	0.5714E 00	0.0000E 00	0.5714E 02	7
12	0.0000E 00	0.2992E 00	0.5164E 02	0.7542E 00	0.4165E 00	0.8708E-01	0.3797E 01	0.2083E-01	0.3750E 00	0.1588E 01	48
13	0.0000E 00	0.1533E-01	0.9995E 02	0.0000E 00	0.0000E 00	0.0000E 00	0.6953E 01	0.0000E 00	0.0000E 00	0.3045E 01	15
14	0.1200E 00	0.1430E 00	0.4471E 01	0.0000E 00	0.0000E 00	0.0000E 00	0.8446E 01	0.0000E 00	0.4000E 00	0.1500E 02	10
15	0.6755E 00	0.4040E 00	0.4155E 02	0.8629E 00	0.5836E 00	0.5622E-01	0.3511E 01	0.4444E-01	0.3111E 00	0.1328E 01	45
16	0.0000E 00	0.4544E 00	0.4733E 02	0.5878E 00	0.1067E 01	0.7353E 00	0.4370E 01	0.8333E-01	0.4444E 00	0.9562E 01	36
17	0.8809E 00	0.1473E 01	0.4752E 02	0.7515E 00	0.1169E 02	0.3055E 00	0.4388E 01	0.6061E-01	0.2727E 00	0.3357E 01	33
18	0.4601E 01	0.6038E 01	0.3152E 02	0.9963E 01	0.3260E 02	0.8006E 01	0.2058E 02	0.1333E 00	0.3333E-01	0.4963E 01	30
19	0.4352E 00	0.6997E 00	0.4902E 02	0.1358E 01	0.1459E 02	0.1755E 01	0.5509E 01	0.6897E-01	0.3103E 00	0.4261E 01	29
20	0.0000E 00	0.2112E 02	0.4224E 02	0.1652E 02	0.0000E 00	0.5807E 01	0.1813E 02	0.1667E 00	0.1667E 00	0.4983E 00	6
TOTAL	0.1097E 01	0.1302E 01	0.3938E 02	0.3781E 01	0.8225E 01	0.1734E 01	0.9600E 01	0.1109E 00	0.2074E 00	0.3657E 01	487

CENTROIDS OF 20 CLUSTER CLASSES - SAMPLE A

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS — VARIABLES

GROUP	A02	A03	A04	A05	A06	A07	W01	W02	W03	W04	SIZE
1	0.3905E 02	0.3996E 02	0.3712E 00	0.1888E 02	0.1617E 01	0.1196E 01	0.5796E 00	0.7862E 02	0.1563E 02	0.3201E 02	24
2	0.3909E 02	0.3811E 02	0.1385E-01	0.1707E 02	0.2992E 01	0.9956E 00	0.1350E 01	0.9635E 02	0.5854E 01	0.2162E 02	39
3	0.0000E 00	0.5417E 01	0.1667E 01	0.1958E 02	0.0000E 00	0.9067E-01	0.5273E 01	0.9549E 02	0.1478E 02	0.9000E 01	15
4	0.1058E 02	0.7425E 01	0.1104E 02	0.1553E 02	0.8841E 01	0.7113E 00	0.9475E 00	0.5380E 01	0.3819E 01	0.1466E 02	24
5	0.2009E 02	0.2025E 02	0.1031E 02	0.1578E 02	0.8642E 01	0.1113E 01	0.4118E 01	0.8999E 02	0.5959E 01	0.2222E 01	33
6	0.3431E 02	0.4668E 02	0.2154E 01	0.5834E 01	0.2215E 01	0.5986E 00	0.2038E 01	0.8798E 02	0.1321E 02	0.1000E 02	28
7	0.0000E 00	0.0000E 00	0.1000E 02	0.1000E 02	0.0000E 00	0.3800E-01	0.3006E 02	0.7687E 02	0.9166E 01	0.1250E 02	10
8	0.0000E 00	0.0000E 00	0.0000E 00	0.2282E 02	0.7047E 00	0.7465E 00	0.5190E 01	0.7875E 02	0.0000E 00	0.6723E 01	17
9	0.3691E 02	0.3088E 02	0.1128E 00	0.6106E 01	0.3987E 01	0.1109E 01	0.2903E 01	0.9865E 02	0.0000E 00	0.5000E 01	25
10	0.3539E 02	0.3812E 02	0.8854E 00	0.6315E 01	0.2055E 01	0.5138E 00	0.4757E 01	0.9191E 02	0.1474E 02	0.1070E 02	13
11	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.1643E 00	0.4686E 01	0.4832E 02	0.9524E 01	0.0000E 00	7
12	0.5119E 02	0.3154E 02	0.3494E 00	0.1334E 02	0.1986E 01	0.1362E 01	0.1416E 01	0.9418E 02	0.2353E 02	0.9896E 01	48
13	0.7036E 02	0.1852E 02	0.6007E 00	0.6970E 01	0.4080E 00	0.2111E 01	0.1993E 01	0.8680E 02	0.6666E 01	0.1556E 02	15
14	0.1120E 02	0.2074E 02	0.0000E 00	0.1000E 02	0.3058E 01	0.1480E 00	0.6770E 00	0.3403E 02	0.3429E 01	0.2569E 02	10
15	0.4110E 02	0.3872E 02	0.5333E-02	0.1760E 02	0.1250E 01	0.1474E 01	0.1390E 01	0.9730E 02	0.7037E 01	0.2832E 02	45
16	0.4198E 02	0.2971E 02	0.1728E 00	0.8795E 01	0.1446E 01	0.1145E 01	0.3403E 01	0.9861E 02	0.1018E 02	0.6944E 00	36
17	0.2710E 02	0.3003E 02	0.3003E 01	0.1767E 02	0.6585E 00	0.1278E 01	0.4164E 01	0.9785E 02	0.0000E 00	0.3056E 02	33
18	0.0000E 00	0.2222E 01	0.1289E 02	0.6289E 01	0.1667E 02	0.4680E 00	0.4327E 01	0.8267E 02	0.1111E 01	0.6667E 01	30
19	0.3241E 02	0.1579E 02	0.1157E 01	0.1031E 02	0.5033E 01	0.1140E 01	0.3705E 01	0.8379E 02	0.4023E 01	0.5747E 01	29
20	0.1047E 01	0.2372E 01	0.1733E 00	0.9311E 02	0.2800E 01	0.2502E 02	0.1421E 02	0.8446E 02	0.1111E 02	0.1667E 02	6
TOTAL	0.2994E 02	0.2523E 02	0.2840E 01	0.1302E 02	0.3671E 01	0.1301E 01	0.3423E 01	0.8518E 02	0.8207E 01	0.1378E 02	487

GROUP MEANS — VARIABLES

GROUP	W05	W06	W07	M01	M02	M03	M04	M05	M06	M07	SIZE
1	0.1993E 02	0.2861E 02	0.3819E 01	0.1000E 01	0.8333E-01	0.7500E 00	0.6250E 00	0.9167E 00	0.0000E 00	0.0000E 00	24
2	0.1812E 02	0.3047E 02	0.2593E 02	0.1000E 01	0.7692E-01	0.6667E 00	0.6923E 00	0.8205E 00	0.8974E-02	0.0000E 00	39
3	0.3000E 02	0.4289E 02	0.3333E 01	0.4667E 00	0.6667E 00	0.6667E-01	0.1000E 01	0.0000E 00	0.5107E 00	0.0000E 00	15
4	0.2133E 02	0.4006E 02	0.3264E 01	0.7083E 00	0.1667E 00	0.8333E-01	0.5417E 00	0.1250E 00	0.0000E 00	0.1250E 00	24
5	0.4646E 01	0.8717E 02	0.0000E 00	0.2121E 00	0.1515E 00	0.0000E 00	0.6364E 00	0.0000E 00	0.0000E 00	0.0000E 00	33
6	0.2452E 02	0.5065E 02	0.1607E 01	0.5357E 00	0.2857E 00	0.3571E-01	0.7857E 00	0.7143E-01	0.0000E 00	0.0000E 00	28
7	0.2500E 02	0.5417E 02	0.1917E 02	0.0000E 00	0.8000E 00	0.0000E 00	0.2000E 00	0.0000E 00	0.2397E 02	0.2000E 00	10
8	0.1113E 02	0.1807E 02	0.6498E 02	0.1176E 00	0.4118E 00	0.0000E 00	0.4118E 00	0.0000E 00	0.0000E 00	0.5294E 00	17
9	0.4267E 01	0.7800E 01	0.8293E 02	0.8000E-01	0.4000E-01	0.0000E 00	0.8400E 00	0.8000E-01	0.0000E 00	0.4000E-01	25
10	0.3462E 02	0.3526E 02	0.4487E 01	0.2308E 00	0.3846E 00	0.7692E-01	0.5385E 00	0.7692E-01	0.0000E 00	0.7692E-01	13
11	0.1429E 02	0.1905E 02	0.2057E 02	0.0000E 00	0.0000E 00	0.0000E 00	0.4286E 00	0.0000E 00	0.0000E 00	0.1000E 01	7
12	0.6424E 01	0.5753E 02	0.2629E 01	0.7500E 00	0.2083E-01	0.1250E 00	0.8750E 00	0.6042E 00	0.1379E 00	0.0000E 00	48
13	0.2000E 02	0.4444E 02	0.1333E 02	0.2667E 00	0.0000E 00	0.0000E 00	0.6667E 00	0.5333E 00	0.0000E 00	0.0000E 00	15
14	0.3119E 02	0.3969E 02	0.0000E 00	0.1000E 01	0.0000E 00	0.7000E 00	0.1000E 01	0.1000E 00	0.0000E 00	0.1000E 00	10
15	0.5556E 02	0.1852E 01	0.7037E 01	0.8444E 00	0.2222E-01	0.1778E 00	0.9556E 00	0.4889E 00	0.0000E 00	0.0000E 00	45
16	0.2778E 01	0.8032E 02	0.6018E 01	0.1944E 00	0.2778E-01	0.2778E-01	0.8889E 00	0.5556E-01	0.6722E-01	0.0000E 00	36
17	0.6364E 02	0.2273E 01	0.3535E 01	0.2424E 00	0.3030E-01	0.0000E 00	0.6061E 00	0.0000E 00	0.0000E 00	0.0000E 00	33
18	0.1278E 02	0.7222E 02	0.7222E 01	0.3333E-01	0.3333E-01	0.0000E 00	0.1000E 00	0.0000E 00	0.0000E 00	0.1000E 00	30
19	0.1724E 02	0.4655E 02	0.2299E 02	0.2069E 00	0.1034E 00	0.0000E 00	0.6552E 00	0.6897E-01	0.0000E 00	0.6897E-01	29
20	0.8333E 01	0.6389E 02	0.0000E 00	0.1667E 00	0.0000E 00	0.0000E 00	0.5000E 00	0.0000E 00	0.2083E 01	0.0000E 00	6
TOTAL	0.2184E 02	0.4104E 02	0.1370E 02	0.4661E 00	0.1263E 00	0.1458E 00	0.6879E 00	0.2587E 00	0.5529E 00	0.5955E-01	487

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS — VARIABLES

GROUP	H08	H01	H02	H03	H04	H05	H06	G01	G02	G03	SIZE
1	0.9404E 00	0.1000E 01	0.1708E 01	0.1000E 01	0.0000E 00	0.4362E 02	0.4167E-01	0.5177E 02	0.4591E 02	0.2318E 01	24
2	0.2102E 01	0.1000E 01	0.1359E 01	0.9231E 00	0.7692E-01	0.5879E 02	0.7692E-01	0.8130E 02	0.1851E 02	0.1951E 00	39
3	0.1804E 02	0.1000E 01	0.1467E 01	0.1000E 01	0.0000E 00	0.5120E 02	0.3333E 00	0.4815E 02	0.5187E 02	0.0000E 00	15
4	0.1170E 01	0.1667E 00	0.1542E 01	0.1250E 00	0.4167E-01	0.5100E 02	0.0000E 00	0.9605E 02	0.3948E 01	0.0000E 00	24
5	0.5505E 01	0.1000E 01	0.1182E 01	0.1000E 01	0.0000E 00	0.5536E 02	0.4242E 00	0.8120E 02	0.1577E 02	0.3030E 01	33
6	0.2259E 01	0.1000E 01	0.1000E 01	0.1000E 01	0.0000E 00	0.5246E 02	0.1786E 00	0.8639E 02	0.1361E 02	0.0000E 00	28
7	0.1271E 02	0.1000E 01	0.1700E 01	0.9000E 00	0.1000E 00	0.5470E 02	0.2000E 00	0.4660E 02	0.5340E 02	0.0000E 00	10
8	0.7449E 01	0.1000E 01	0.1412E 01	0.1000E 01	0.0000E 00	0.6753E 02	0.4706E 00	0.8780E 02	0.4382E 00	0.1176E 02	17
9	0.5205E 01	0.1000E 01	0.1080E 01	0.1000E 01	0.0000E 00	0.7020E 02	0.8000E-01	0.7544E 02	0.2322E 02	0.1342E 01	25
10	0.2057E 01	0.1000E 01	0.1000E 01	0.1000E 01	0.0000E 00	0.5169E 02	0.1538E 00	0.6057E 01	0.1655E 01	0.9231E 02	13
11	0.1670E 01	0.7143E 00	0.1000E 01	0.5714E 00	0.1429E 00	0.5671E 02	0.1429E 00	0.2874E 02	0.1411E 02	0.5714E 02	7
12	0.2147E 01	0.1000E 01	0.1333E 01	0.1000E 01	0.0000E 00	0.5417E 02	0.6250E-01	0.4858E 02	0.5133E 02	0.8562E-01	48
13	0.1468E 01	0.1000E 01	0.1600E 01	0.9333E 00	0.6667E-01	0.5120E 02	0.6667E-01	0.1780E 02	0.8220E 02	0.0000E 00	15
14	0.1304E 01	0.1000E 01	0.2700E 01	0.1000E 01	0.0000E 00	0.4980E 02	0.1000E 00	0.3754E 02	0.6246E 02	0.0000E 00	10
15	0.2724E 01	0.1000E 01	0.1289E 01	0.9778E 00	0.2222E-01	0.3722E 02	0.2667E 00	0.2679E 02	0.7309E 02	0.1222E 00	45
16	0.4297E 01	0.1000E 01	0.1083E 01	0.1000E 01	0.0000E 00	0.5692E 02	0.1111E 00	0.3330E 02	0.6670E 02	0.0000E 00	36
17	0.5830E 01	0.1000E 01	0.1121E 01	0.1000E 01	0.0000E 00	0.3794E 02	0.7273E 00	0.5307E 02	0.4376E 02	0.3176E 01	33
18	0.5440E 00	0.1000E 01	0.1033E 01	0.1000E 01	0.0000E 00	0.5423E 02	0.8000E 00	0.9667E 02	0.3333E 01	0.0000E 00	30
19	0.4569E 01	0.9310E 00	0.1000E 01	0.0000E 00	0.9310E 00	0.5790E 02	0.3448E-01	0.8300E 02	0.1700E 02	0.0000E 00	29
20	0.3727E 01	0.1000E 01	0.1000E 01	0.6667E 00	0.3333E 00	0.4850E 02	0.6667E 00	0.1000E 03	0.0000E 00	0.0000E 00	6
TOTAL	0.3662E 01	0.9507E 00	0.1279E 01	0.8747E 00	0.7508E-01	0.5254E 02	0.2402E 00	0.6099E 02	0.3468E 02	0.4335E 01	487

GROUP MEANS — VARIABLES

GROUP	G04	G05	G06	SIZE
1	0.2500E 00	0.2833E 01	0.4167E-01	24
2	0.7692E-01	0.2846E 01	0.5128E-01	39
3	0.4667E 00	0.1867E 01	0.1333E 00	15
4	0.2083E 00	0.1083E 01	0.1250E 00	24
5	0.1515E 00	0.6364E 00	0.6061E-01	33
6	0.0000E 00	0.8571E 00	0.0000E 00	28
7	0.6000E 00	0.1400E 01	0.0000E 00	10
8	0.1176E 00	0.1118E 01	0.0000E 00	17
9	0.2400E 00	0.1440E 01	0.0000E 00	25
10	0.2308E 00	0.5385E 00	0.1538E 00	13
11	0.0000E 00	0.2857E 00	0.0000E 00	7
12	0.4375E 00	0.2229E 01	0.8333E-01	48
13	0.7333E 00	0.1400E 01	0.0000E 00	15
14	0.1000E 01	0.3200E 01	0.7000E 00	10
15	0.2000E 00	0.2111E 01	0.1333E 00	45
16	0.1389E 00	0.9722E 00	0.5556E-01	36
17	0.9091E-01	0.1091E 01	0.0000E 00	33
18	0.3333E-01	0.1333E 00	0.3333E-01	30
19	0.3448E-01	0.1103E 01	0.6897E-01	29
20	0.6667E 00	0.1167E 01	0.3333E 00	6
TOTAL	0.2218E 00	0.1489E 01	0.7592E-01	487

UNIVARIATE F TESTS : SAMPLE A - 20 CLUSTER CLASSES

WILKS LAMBDA (U-STATISTIC) AND UNIVARIATE F-RATIO

VARIABLE	WILKS LAMBDA	F
S01	.5463	20.3747
S02	.5770	18.0185
S03	.5455	20.4764
S04	.6359	14.0727
S05	.3871	38.9086
L01	.7526	8.0777
L02	.7289	9.1435
L03	.8764	3.4651
L04	.2826	62.3980
L05	.8030	6.0296
L06	.9218	2.0840
L07	.8511	4.2986
L08	.7020	10.4326
L09	.6507	13.1915
L10	.7896	6.5485
L11	.9090	2.4620
L12	.8178	5.4771
L13	.6978	10.6432
L14	.8540	4.2023
A01	.7135	9.8701
A02	.6285	14.5303
A03	.7229	9.4215
A04	.9060	2.5490
A05	.8151	5.5772
A06	.9120	2.3717
A07	.3297	49.9760
W01	.6408	13.7772
W02	.4316	32.3655
W03	.8420	4.6114
W04	.8428	4.5840
W05	.7086	10.1099
W06	.5391	21.0135
W07	.4570	29.2088
M01	.5214	22.5635
M02	.7222	9.4549
M03	.5395	20.9789
M04	.7550	7.9746
M05	.4918	25.4032
M06	.5978	16.5354
M07	.5795	17.8333
M08	.5987	16.4719
H01	.2903	60.0868
H02	.7435	8.4801
H03	.2109	91.9696
H04	.3098	54.7629
H05	.5116	23.4670
H06	.6761	11.7752
G01	.5960	16.6632
G02	.5907	17.0300
G03	.3461	46.4379
G04	.7434	8.4852
G05	.7135	9.8710
G06	.8433	4.5656

WITH 19 AND 467 DEGREES OF FREEDOM

$F_{0.01} = 2.38$

APPENDIX F

Results from Experiments A to F

CLUSTER ANALYSIS

EXPERIMENT A

EFFECT OF CHANGING NUMBER OF ITERATIONS

	Analysis I			Analysis II			Analysis III		
No. of Classes	tr W	Beale F-test	Explan. Power(%)	tr W	Beale F-test	Explan. Power(%)	tr W	Beale F-test	Explan. Power(%)
30	3663	-		3596	1.14		3595	1.14	
29	3635	1.79		3633	1.58		3633	1.58	
28	3695	1.51		3686	1.71		3686	1.69	
27	3748	1.39		3746	1.37		3746	1.37	
26	3799	1.57		3796	1.60		3796	1.62	
25	3859	1.92		3857	1.97		3857	1.95	
24	3936	1.44		3936	1.11		3936	0.12	
23	3997	0.74		3983	0.47		3940	2.10	
22	4030	2.03		4004	2.04		4032	1.42	
21	4124	1.36		4098	1.47		4098	1.47	
20	4181	1.40	35.5	4170	1.65	35.6	4170	1.60	35.6
19	4264	1.62	35.1	4256	1.73	35.0	4253	1.79	35.0
18	4354	1.95	34.3	4352	2.14	34.6	4352	2.14	34.6
17	4470	1.93	33.6	4479	2.08	33.5	4479	2.08	33.5
16	4594	2.44*	32.6	4613	1.89	33.1	4613	1.89	33.1
15	4764	2.29	31.5	4745	1.83	32.4	4745	1.83	32.4
14	4939	1.80	31.1	4844	2.81*	31.6	4884	2.81*	31.6
13	5091	1.92	30.3	5118	1.92	30.4	5118	1.92	30.3
12	5270	2.04	29.4	5298	2.17	29.2	5298	2.17	29.2
11	5482	2.40*	27.9	5524	2.02	27.8	5524	2.02	27.8
10	5763	2.25	26.5	5763	2.23	26.6	5763	2.23	26.6
9	6067	2.33*		6064	2.37*		6064	2.37*	
8	6434	2.25		6438	2.22		6438	2.22	
7	6856	1.77		6856	1.77		6856	1.77	
6	7261	1.62		7261	1.62		7261	1.62	
Total sum of squares	11980			11980			11980		

EXPERIMENTAL ANALYSIS II - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	1	4	3	5	6	7	8	9	2	10	11	12	13	14	15	Tot
1	46							1		1						48
2		45							14			1	1			61
3			24													24
4				28												28
5					10											10
6		2				29			2							33
7							10									10
8	17	22						26	2		5					72
9		3				1		11						1		16
10									1	12						13
11	2							3			43					45
12		2							2		1	36				41
13		1		1		1						3	41			47
14			1											28		29
15															7	7
Tot	65	75	25	29	10	31	10	41	21	13	49	40	42	29	7	487

EXPERIMENTAL ANALYSIS II - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	1	2	3	4	5	6	7	8	9	10	Tot
1	106	1									107
2		108									108
3			27								27
4				37							37
5					12						12
6						34					34
7							76				76
8								52			52
9									27		27
10										7	7
Tot	106	109	27	37	12	34	76	52	27	7	487

EXPERIMENT A.1

EXPERIMENTAL ANALYSIS III - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	1	4	3	5	6	7	8	9	2	10	11	12	13	14		Tot
1	46							1		1						48
2		45							14			1	1			61
3			24													24
4				28												28
5					10											10
6	2					29			2							33
7							10									10
8	18	22						26	2		4					72
9		3				1		11						1		16
10									1	12						13
11	2							3			43					45
12		2							2		5	32				41
13		1		1		1						4	40			47
14			1											28		29
15															7	7
Tot	66	75	25	29	10	31	10	41	21	13	52	37	41	29	7	487

EXPERIMENTAL ANALYSIS III - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	1	2	3	4	5	6	7	8	9	10	Tot
1	106	1									107
2		108									108
3			27								27
4				37							37
5					12						12
6						34					34
7							76				76
8								52			52
9									27		27
10										7	7
Tot	106	109	27	37	12	34	76	52	27	7	487

<u>EXPERIMENT A.2</u>

CLUSTER ANALYSIS

EXPERIMENT B

EFFECT OF CHANGING SEEDING NUMBER OF CLUSTERS

No. of Classes	Analysis I tr W	Analysis I Beale F-test	Analysis I Explan. Power(%)	Analysis IV tr W	Analysis IV Beale F-test	Analysis IV Explan. Power(%)	Analysis V tr W	Analysis V Beale F-test	Analysis V Explan. Power(%)
30	3663	-							
29	3635	1.79							
28	3695	1.51							
27	3748	1.39							
26	3799	1.57							
25	3859	1.92		3882	0.62				
24	3936	1.44		3915	1.40				
23	3997	0.74		3973	1.21				
22	4030	2.03		4027	1.17				
21	4124	1.36		4081	2.18				
20	4191	1.40	35.5	4187	1.71	35.4	4198	1.20	35.0
19	4264	1.62	35.1	4277	1.33	35.0	4261	2.07	34.7
18	4354	1.95	34.3	4351	1.60	34.2	4376	1.62	34.0
17	4470	1.93	33.6	4446	2.16	33.5	4473	1.88	33.4
16	4594	2.44*	32.6	4584	2.21	32.9	4593	2.16	32.5
15	4764	2.29	31.5	4738	2.28	32.1	4744	2.39*	31.5
14	4939	1.80	31.1	4911	2.61*	31.2	4925	1.66	30.5
13	5091	1.92	30.3	5130	2.01	30.0	5065	2.40*	30.0
12	5270	2.04	29.4	5318	2.24	29.4	5287	1.83	28.9
11	5482	2.40*	27.9	5552	1.75	27.8	5478	2.45*	28.0
10	5763	2.25	26.5	5760	2.56*	26.6	5764	2.24	26.5
9	6067	2.33*		6106	2.09		6067	2.36*	
8	6434	2.25		6438	2.22		6438	2.22	
7	6856	1.77		6856	1.77		6856	1.76	
6	7261	1.62		7261	1.63		7261	1.63	
Total sum of squares	11980	* = Sig at 1% level	25810	11980	* = Sig at 1% level	25810	11980	* = Sig at 1% level	25810

EXPERIMENTAL ANALYSIS IV - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	2	12	1	3	9	7	5	14	10	8	6	4	15	11	13	Tot
1	47															48
2		44				6						11				61
3			24													24
4				28												28
5					10											10
6						20	10					2	1			33
7							10									10
8		5				1		65				1				72
9								1	15							16
10										12		1				13
11	6							4			38					45
12		2		2					1		29	2	5			41
13		5		1		1	2						38			47
14							1							28		29
15															7	7
Tot	53	56	24	31	10	28	23	71	16	12	67	17	44	28	7	487

EXPERIMENTAL ANALYSIS IV - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	2	4	1	3	7	5	6	10	8	9	Tot
1	104	2				1					107
2		107						1			108
3			25			2					27
4				36		1					37
5					12						12
6		7				19		8			34
7	1			1			74	50			76
8									27		52
9										7	27
10											7
Tot	105	116	25	37	12	25	74	59	27	7	487

EXPERIMENT B.1

EXPERIMENTAL ANALYSIS V - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	1	12	2	3	6	15	7	8	5	11	10	13	14	9	4	Tot
1	43									4	1					48
2		47										1	1			61
3			24													24
4				28												28
5					10											10
6		5		1		25		2								33
7							10									10
8	36	25						2	1	2	6					72
9									16							16
10								1		12						13
11											48					45
12		1						2			1	37				41
13		1		1									45			47
14														29		29
15															7	7
Tot	79	79	24	30	10	25	10	19	17	18	56	38	46	29	7	487

EXPERIMENTAL ANALYSIS V - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	1	7	2	3	5	6	9	10	8	4	Tot
1	106					1					107
2		107					1				108
3			27								27
4				36		1					37
5					12						12
6						32			2		34
7	2						74				76
8								52			52
9									27		27
10										7	7
Tot	108	107	27	36	12	34	75	52	29	7	487

EXPERIMENT B.2

CLUSTER ANALYSIS

EXPERIMENT C

EFFECT OF CHANGING NUMBER OF COMPONENTS IN ANALYSIS

No. of Classes	Analysis I			Analysis VI			Analysis VII		
	tr W	Beale F-test	Explan. Power(%)	tr W	Beale F-test	Explan. Power(%)	tr W	Beale F-test	Explan. Power(%)
30	3633	-		5828	-		7474	0.48	
29	3635	1.79		5821	1.20		7494	1.54	
28	3695	1.51		5869	1.52		7560	2.00*	
27	3748	1.39		5932	1.54		7648	1.82	
26	3799	1.57		5998	1.59		7731	1.55	
25	3859	1.92		6069	1.58		7804	2.31*	
24	3936	1.44		6142	1.84		7917	2.67*	
23	3997	0.74		6231	2.08*		8053	2.70*	
22	4030	2.03		6336	1.96		8197	3.24*	
21	4124	1.36		6440	1.79		8378	3.13*	
20	4191	1.40	35.5	6540	2.98*	37.0	8563	2.95*	38.7
19	4264	1.62	35.1	6710	2.44*	36.0	8747	2.72*	37.7
18	4354	1.95	34.3	6870	2.32*	35.4	8927	2.32*	36.7
17	4470	1.93	33.6	7026	2.18*	34.6	9090	2.82*	35.5
16	4594	2.44*	32.6	7183	2.29*	33.4	9301	2.66*	34.3
15	4764	2.29	31.5	7360	1.99	32.5	9514	2.70*	33.3
14	4939	1.80	31.1	7527	2.42*	31.4	9747	2.48*	32.0
13	5091	1.92	30.3	7724	2.30*	30.2	9978	3.21*	31.6
12	5270	2.04	29.4	7976	2.83*	29.8	10304	3.14*	30.3
11	5482	2.40*	27.9	8287	2.60*	28.4	10655	2.84*	28.9
10	5763	2.25	26.5	8608	2.42*	26.8	11009	2.87*	27.2
9	6067	2.33*		8947	2.51*		11411	2.70*	
8	6434	2.25		9350	2.28*		11842	2.51*	
7	6856	1.77		9779	2.05*		12305	2.14*	
6	7261	1.62		10239	2.10*		12769	2.36*	
Total sum of squares	11980	* = Sig at 1% level	26810	15125	* = Sig at 1% level		17735	* = Sig at 1% level	

EXPERIMENTAL ANALYSIS VI - CLASS NUMBERS (columns); EXPERIMENTAL ANALYSIS I - CLASS NUMBERS (rows)

	1	9	2	4	8	7	3	6	10	11	12	15	5	14	13	Tot
1	44									4						48
2		38				9		13					1			61
3			21							1			1	1		24
4		1		27												28
5					10											10
6						17		2				13	1			33
7			2	1			4					3				10
8	26	35				5		2		2	2					72
9		1							14		1					16
10							1	1		11						13
11	7									4	37					45
12		1		1				2	2		27		8			41
13		2		1		1		1				3	39			47
14			2											27		29
15															7	7
Tot	77	78	25	30	10	32	5	21	16	22	67	19	50	28	7	487

EXPERIMENTAL ANALYSIS VI - CLASS NUMBERS (columns); EXPERIMENTAL ANALYSIS I - CLASS NUMBERS (rows)

	1	6	2	4	7	3	8	5	10	8	Tot
1	103					1	3				107
2	4	100					2	2			108
3			26	1							27
4	1			36							37
5					12						12
6		10				21		1	2		34
7		1					73	1	1		76
8						2		50			52
9			1						26		27
10										7	7
Tot	108	111	27	37	12	24	78	54	29	7	487

EXPERIMENT C.1

EXPERIMENTAL ANALYSIS VII - CLASS NUMBERS

(Rows: EXPERIMENTAL ANALYSIS I - CLASS NUMBERS)

	1	5	11	6	8	9	12	15	7	3	10	4	2	14	13	Tot
1	43									5						48
2		50				9					1		1			61
3			22							1			1			24
4		1		26							1					28
5					10											10
6						18		11				4				33
7			2	3			4	1								10
8	29	30				4				5	3		1			72
9		1							14		1					16
10							1			12						13
11	9									4	34			1		45
12		2		1					2		30	4	2			41
13		6		1		2		4				15	18		1	47
14			2									4		23		29
15	1							1							5	7
Tot	82	90	26	31	10	33	5	17	16	27	70	27	23	24	6	487

EXPERIMENTAL ANALYSIS VII - CLASS NUMBERS

(Rows: EXPERIMENTAL ANALYSIS I - CLASS NUMBERS)

	1	3	7	4	6	8	5	2	10	9	Tot
1	103					1	3				107
2		106					2				108
3			26				1				27
4	1	3		30			2	1			37
5		2			10						12
6		4		1		4		23	2		34
7		1					74		1		76
8		2					1	48		1	52
9			1						26		27
10	1								1	5	7
Tot	105	118	27	31	10	5	83	72	30	6	487

EXPERIMENT C.2

CLUSTER ANALYSIS

EXPERIMENT D

EFFECT OF STANDARDISATION OR UNSTANDARDISATION OF OPERATIONAL AND COMPONENT VARIABLES

No. of Classes	Analysis I			Analysis VIII			Analysis IX			Analysis X		
30	3663	-		1624	-		0.2121	28.35*		1434	1.11	
29	3635	1.79		1623	0.60		0.2661	29.34*		1448	2.20	
28	3695	1.51		1632	1.16		0.3383	-		1478	1.34	
27	3748	1.39		1650	1.18		0.2910	11.19*		1497	1.69	
26	3789	1.57		1669	1.37		0.3228	2.58*		1521	1.08	
25	3859	1.92		1691	1.82		0.3312	5.09*		1538	1.53	
24	3936	1.44		1723	1.57		0.3487	-		1562	2.12	
23	3997	0.74		1752	1.64		0.3378	2.15		1598*	2.43*	
22	4030	2.03		1784	1.70		0.3459	1.60		1641	1.31	
21	4124	1.36		1819	1.33		0.3523	-		1666	1.93	
20	4191	1.40	35.5	1848	1.39	35.4	0.3509	-	6.8	1704	1.80	27.0
19	4264	1.62	35.1	1880	1.47	34.7	0.3485	0.54	6.8	1742	1.72	26.9
18	4354	1.95	34.3	1916	1.64	34.3	0.3510	1.09	6.2	1781	1.68	26.3
17	4470	1.93	33.6	1959	1.96	33.6	0.3562	1.04	5.9	1822	1.97	25.9
16	4594	2.44	32.6	2014	1.61	32.5	0.3616	1.95	4.7	1873	1.82	25.0
15	4764	2.29*	31.5	2063	1.57	31.5	0.3722	0.81	4.7	1925	1.47	24.9
14	4939	1.80	31.1	2115	1.91	30.9	0.3770	0.16	4.2	1971	2.06	24.1
13	5091	1.92	30.3	2184	2.76*	29.6	0.3781	-	4.7	2040	1.92	22.5
12	5270	2.04*	29.4	2294	2.90*	27.9	0.3714	1.71	4.7	2112	2.01	21.6
11	5482	2.50*	27.9	2425	2.60*	26.8	0.3839	0.19	4.2	2195	2.55*	20.7
10	5763	2.25	26.5	2560	2.68*	25.6	0.3855	-	3.0	2314	2.39*	18.7
9	6067	2.33*		2721	2.56*		0.3843	0.96		2444	2.95*	
8	6434	2.25		2902	1.84		0.3939	0.76		2631	2.63*	
7	6856	1.77		3058	2.24		0.4026	1.21		2833	2.70*	
6	7261	1.62		3287	1.80		0.4190	-		3089	2.37*	
Total sum of squares	11980	*Sig at 1% level	25810	4870	*Sig at 1% level	25810	0.4291	*Sig at 1% level	4870	4510	*Sig at 1% level	25810

EXPERIMENTAL ANALYSIS VIII - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS

	2	4	8	6	10	12	11	7	14	1	3	5	9	13	15	Tot
1	45							2						1		48
2		32				4		8				13	4			61
3			21							3						24
4				23				5								28
5					10											10
6						30		1		1		1				33
7						1	9									10
8	3	37				2		30								72
9		1							14					1		16
10		1					1			10		1				13
11	2	3		1					3		38			1		45
12		1		1				4	3		29	2	1			41
13		1						7	1		1	2	35			47
14			1									1		27		29
15															7	7
Tot	50	76	22	25	10	37	10	57	21	14	68	20	40	30	7	487

EXPERIMENTAL ANALYSIS VIII - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS

	2	1	5	4	7	8	3	6	9		Tot
1	64	29	3			1	9		1		107
2	5	92		1		4	1	5			108
3			26						1		27
4	1	1		30		1		4			37
5		1			11						12
6	1					31			2		34
7		2		1			72		1		76
8	1	1					3	47			52
9									27		27
10										7	7
Tot	72	126	29	32	11	37	85	56	32	7	487

EXPERIMENT D.1

EXPERIMENTAL ANALYSIS IX - CLASS NUMBERS

(Rows: EXPERIMENTAL ANALYSIS I - CLASS NUMBERS)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Tot
1	4	1	2	1	4		3	1	6		2	6	13	2	3	48
2	3	2	1		2		8		1		5	5	29	1	4	61
3	3		3			1	3		1		1	1	9		2	24
4	8	2										2	16			28
5			1				1				2		5		1	10
6	3	1	1				3				2	3	14		6	33
7	2								2			2	4			10
8	9	5	3		3		7		2		10	11	16	2	4	72
9	1						6		1		2		6			16
10	1	1					4			1	2	1	2	1		13
11	4	2	1		2	1	3				10	10	11	3	1	45
12	3					1	3		1	1	4	6	22			41
13	5				1		2		6		4	2	23		4	47
14	2		2		1		1		1		4	4	13		1	29
15	1						1						2		3	7
Tot	49	14	14	1	13	3	45	1	21	2	48	53	185	9	29	487

EXPERIMENTAL ANALYSIS IX - CLASS NUMBERS

(Rows: EXPERIMENTAL ANALYSIS I - CLASS NUMBERS)

	1	2	3	4	5	6	7	8	9	10	Tot
1	19	19	1	1	14	17	1	8	26	1	107
2	17	36			13	7		6	28	1	108
3	3	7			5	1	2	2	6	1	27
4	2	16			5	5			9		37
5	2	5			1			1	2	1	12
6	3	12			4	3			12		34
7	13	28	1		8	8	1	3	11	3	76
8	5	23			6	4	1	1	12		52
9	5	10			3	2	1	1	5		27
10		4							3		7
Tot	69	160	2	1	59	47	6	22	114	7	487

<u>EXPERIMENT D.2</u>

EXPERIMENTAL ANALYSIS X - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Tot
1	19	1	5	18				1	3				1			48
2	2		16				9		1	3		2		19	9	61
3		3		1	9	6		1	1	2				1		24
4	1		2	1	1		7	2			11				3	28
5					1			1		1		1		6		10
6					1		1	2		4		22		2	1	33
7					1				1		7	1				10
8	6		37	5			5		3			1	2	1	12	72
9			9	1					3			1	2			16
10	1	1	1	1		7				1			1			13
11	6		2	1			2		20	1		1	14	1		45
12	2		1				4	10	11	2	1		9		1	41
13	1		1	1	25	1	1	6		1	1	2	1	2	4	47
14	1		3		7			3	3			4		1	7	29
15										7						7
Tot	39	5	77	29	45	14	29	26	46	22	20	35	30	33	37	487

EXPERIMENTAL ANALYSIS X - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	1	2	3	4	5	6	7	8	9	10	Tot
1	10	2	28	28	5	10	3		5	16	107
2	16		60	2	9	3	1		9	8	108
3	7	3	1	7		2	3	2		2	27
4	8		2	2	9	1		14		1	37
5	1		7			1	1		1	1	12
6	2		1			3	4	4	20		34
7			3		6	34	5		3	25	76
8	32		2	1	2	6	2		4	3	52
9	12		4			4			5	2	27
10							7				7
Tot	8	5	108	40	31	64	26	20	47	58	487

EXPERIMENT D.3

CLUSTER ANALYSIS

EXPERIMENT E

EFFECT OF *A PRIORI* SEEDING

	Analysis I			Analysis XI		
17	4470	1.93	33.6	4505	1.46	33.1
16	4594	2.44*	32.6	4599	1.91	32.4
15	4764	2.29	31.5	4732	1.97	31.7
14	4939	1.80	31.1	4881	2.37*	31.5
13	5091	1.92	30.3	5079	1.67	30.4
12	5270	2.04	29.4	5234	2.36*	29.3
11	5482	2.40*	27.9	5477	2.41*	28.0
10	5763	2.25	26.5	5759	2.26	26.6
9	6067	2.33*		6064	2.37*	25.4
8	6434	2.25		6438	2.22	23.6
7	6856	1.77		6856	1.76	21.2
6	7261	1.62		7261	1.62	
	11980	* Sig at 1% level	25810	11980	* Sig at 1% level	25810

EXPERIMENTAL ANALYSIS XI - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	10	1	6	3	4	5	12	13	7	14	2	8	15	11	9	Tot
1	41									7						48
2		42						17				1	1			61
3			24													24
4				28												28
5					10											10
6		2				29		2								33
7							10									10
8	23	32						2	2	2	11					72
9									16							16
10								1		12						13
11	2	1									45	1				45
12		1						2				38				41
13													46			47
14														29		29
15															7	7
Tot	66	78	24	28	10	29	10	24	18	21	56	40	47	29	7	487

EXPERIMENTAL ANALYSIS XI - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	2	1	6	3	4	5	7	10	9	8	Tot
1	105					1	1				107
2		105		1			2				108
3			27								27
4				37							37
5					12						12
6		6				27		1			34
7							76				76
8						2		50			52
9									27		27
10										7	7
Tot	105	111	27	38	12	30	79	51	27	7	487

EXPERIMENT E.1

CLUSTER ANALYSIS

EXPERIMENT F

EFFECT OF CHANGING

THE VARIABLE SET AND NUMBER OF COMPONENTS

	Analysis XII			Analysis XIV			Analysis XV			Analysis XVII		
of ses	tr W	Beale F-test	Explan. Power(%)	tr W	Beale F-test	Explan. Power(%)	tr W	Beale F-test	Explan. Power(%)	tr W	Beale F-test	Explan. Power(%)
	2519	-		1030	-		1975	-		802	-	
	2511	1.51		1004	0.55		1957	1.05		796	0.66	
	2546	1.28		1013	0.41		1976	1.12		804	0.90	
	2577	1.19		1020	0.84		1997	1.49		816	1.23	
	2607	1.22		1035	1.05		2026	1.96		834	0.79	
	2639	1.64		1055	1.07		2066	1.91		846	1.32	
	2684	2.01		1076	1.10		2107	1.46		866	1.57	
	2742	1.90		1099	1.27		2140	1.43		893	1.57	
	2800	1.58		1127	0.68		2174	1.92		921	1.26	
	2851	1.87		1143	0.68		2222	2.37*		945	1.63	
	2915	1.95	30.0	1160	1.24	26.5	2285	2.00	33.2	979	1.93	29.9
	2986	1.52	29.6	1193	1.39	26.0	2342	2.92*	32.6	1023	2.12	29.4
	3045	1.64	29.0	1233	1.28	25.6	2431	1.87	31.0	1075	1.58	28.9
	3113	1.50	28.7	1273	1.44	24.4	2493	2.49*	30.6	1118	1.46	28.6
	3180	1.60	28.1	1322	1.44	23.6	2582	2.20	29.8	1161	1.56	27.7
	3257	1.65	27.3	1376	1.28	23.2	2668	2.50*	29.0	1213	1.87	27.4
	3343	1.65	26.4	1429	1.24	22.6	2775	1.75	28.1	1281	1.27	26.7
	3437	1.89	25.5	1486	1.16	22.0	2858	2.47*	26.7	1333	1.29	26.1
	3556	2.44*	24.5	1546	1.27	21.6	2987	3.35*	25.5	1393	1.55	24.5
	3727	2.41*	22.9	1620	1.28	21.0	3184	2.22	25.3	1474	1.22	23.6
	3919	2.57*	20.9	1705	1.26	20.4	3335	2.99*	24.1	1548	1.13	22.6
	4155	2.03		1802	1.55		3569	3.37*		1627	1.56	
	4374	2.42*		1943	1.42		3881	3.21*		1755	2.09	
	4683	1.59		2100	1.28		4245	2.54*		1963	1.41	
	4932	1.83		2277	1.33		4606	2.40*		2146	1.58	
of res	7788	*Sig at 1% level	25810	4936	*Sig at 1% level	25810	8006	*Sig at 1% level	25810	5291	Sig at 1% level	25810

EXPERIMENTAL ANALYSIS XII - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Tot
1	5				23	2	8					7	2		1	48
2	15	1		1		5	2			10	10	13	4			61
3		3	5	2	6		1	3	1			1	1		1	24
4	22	1	1		1			1		1		1				28
5		1									1			8		10
6	2		3			22		2		2	2					33
7	1		4			3				1					1	10
8	14				8	1	16			1	3	21	8			72
9	1						1		14							16
10							1				1		11			13
11	3				3		3			4		27	7		1	45
12	7		3		1	1		2	2	19	2	4				41
13	7	7	12	7				12		1	1					47
14	1		3								1	1			23	29
15	1				1		1	2						1	1	7
Tot	79	13	31	10	43	34	33	22	17	39	21	75	33	9	28	487

EXPERIMENTAL ANALYSIS XII - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS

	1	2	3	4	5	6	7	8	9	10	Tot
1	22				44	12	3	1	25		107
2	50	1	1	1	6	22	7	10	10		108
3	1	3	8	2	5	2	3		3		27
4	8	1	4	1	7	14		2			37
5		1						3		8	12
6	1		11	1		19		2			34
7	53		3	1		3	5	4	7		76
8		8	27	8		4	4	1			52
9	5		1	1		18	1	1			27
10			2		2	1			1	1	7
Tot	140	14	57	15	64	95	23	24	46	9	487

EXPERIMENT F.1

EXPERIMENTAL ANALYSIS XIII - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Tot
1	11			14	2	16		3				1		1		48
2	8		2		14		1			8		5		17	6	61
3	1	5	2	11		1		1			1		2			24
4	3	2		8	11									3	1	28
5							4		6							10
6	1	2	10		7									13		33
7		5		1	1									2	1	10
8	44			6	9	5		2				3		3		72
9							1				13		2			16
10							1	12								13
11	19			2	3	3		3				15		1	2	45
12		3		2	11					2		5	6		12	41
13		24	4	3	8								6		2	47
14	1	3	1	4	3								1	15	1	29
15				1	1	2	1						2			7
Tot	88	44	19	52	70	27	8	21	6	10	14	29	19	55	25	487

EXPERIMENTAL ANALYSIS XIII - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	1	2	3	4	5	6	7	8	9	10	Tot
1	32			25	3	26	19		1	1	107
2	37	1	7	7	30	1	2		7	16	108
3	1	9		11	1	1	1		3		27
4	2	3	1	18	10					3	37
5			2					10			12
6		13	2	1	17					1	34
7	21		4	2	6		2		9	32	76
8		33	2	4	2				7	4	52
9	1	1	1	4	17				2	1	27
10		2		1		2		1		1	7
Tot	94	62	19	73	86	30	24	11	29	59	487

EXPERIMENT F.2

EXPERIMENTAL ANALYSIS XIV - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Tot
1	3	43								2						48
2	6							14			8	30	3			61
3				18					4	1			1			24
4					11		1	14						2		28
5	1										1	7		1		10
6	1					11		2			2	17				33
7			4	2	3									1		10
8	50	10						7			3		1	1		72
9	4	1								3	1	7				16
10	4	4	1						1				3			13
11	19	4						1		21	2		1			45
12	4				1			1		15	14	6				41
13					1	3		4		1	3	29		5	1	47
14	3			2				2			2	19		1		29
15		1				1									5	7
Tot	95	63	5	22	16	15	1	45	5	43	36	115	9	11	6	487

EXPERIMENTAL ANALYSIS XIV - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS	1	2	3	4	5	6	7	8	9	10	Tot
1	16	71	1				7	10	2		107
2	42	4					4	4	54		108
3				24			2	1			27
4	20				15			1	1		37
5	1				1			2	8		12
6			4		3	11			16		34
7	6	10						53	7		76
8	1					4		3	43	1	52
9	2			1				3	21		27
10		1				1				5	7
Tot	88	86	5	25	19	16	13	77	152	6	487

EXPERIMENT F.3

EXPERIMENTAL ANALYSIS XV - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Tot
1	1	38					8		1							48
2											8	35	7	11		61
3				7			3		1	13						24
4					11		2		1				13	1		28
5						2		2	1		1	2	1	1		10
6						10	1				3	15	1	2	1	33
7			7		1					2						10
8		12					1		10		6	1	1	41		72
9	2	1					1		2		2	5		3		16
10		2	1				9		1							13
11	15	6							26		1					45
12	10				1				6		12	5	6	1		41
13	1					6		8			2	25	4	1		47
14						2		21	2	2	1				1	29
15						1					1				5	7
Tot	29	59	8	7	13	21	25	31	51	17	37	88	33	61	7	487

EXPERIMENTAL ANALYSIS XV - CLASS NUMBERS

EXPERIMENTAL ANALYSIS I - CLASS NUMBERS

	1	2	3	4	5	6	7	8	9	10	Tot
1	11	69	1					4	22		107
2		1			2		54	8	43		108
3	1	2		24							27
4	1		1		26		4		5		37
5					1	2	5	1	3		12
6			6		1	13	10	3		1	34
7	51				5		3	13	4		76
8	2					6	37	6	1		52
9	1			1			18	3	3	1	27
10	1					1				5	7
Tot	68	72	8	25	35	22	131	38	81	7	487

EXPERIMENT F.4

APPENDIX G

Means of 20, 15 and 10 Cluster Classes

Experimental Analysis VIII

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS — VARIABLES

GROUP	S01	S02	S03	S04	S05	L01	L02	L03	L04	L05	SIZE
1	0,1355E 04	0.1278E 04	0.1415E 02	0.1858E 01	0.2810E 01	0.2597E 02	0.1170E 02	0.1021E 01	0.2154E 01	0,9641E 01	126
2	0,3606E 04	0.3090E 04	0.3023E 02	0,2715E 01	0.4202E 01	0.3823E 02	0.6262E 01	0.1893E 00	0.7222E-01	0,1069E 02	72
3	0,1351E 04	0.1274E 04	0.1063E 02	0,1479E 01	0,2753E 01	0.3157E 02	0.1117E 02	0.3372E 00	0.3308E 00	0,8347E 01	85
4	0,1312E 04	0,1009E 04	0.5753E 01	0,2282E 01	0,1875E 01	0.3747E 02	0.2968E 01	0.0000E 00	0.7672E 00	0,3172E 02	32
5	0,5738E 04	0,5005E 04	0.1752E 02	0,2862E 01	0.2690E 01	0.7183E 02	0.6954E 01	0.7810E 00	0.3724E-01	0,6930E 01	29
6	0,9609E 03	0,7876E 03	0.3255E 01	0.1059E 01	0,5000E 00	0.1470E 02	0.4734E 01	0.0000E 00	0.2857E-02	0,3220E 01	56
7	0,2197E 03	0.1928E 03	0.5455E-01	0,2723E 01	0.1909E 01	0.0000E 00	0.4506E 01	0.0000E 00	0.7560E 02	0,2606E 01	11
8	0,3633E 03	0,3297E 03	0.1269E 01	0,1097E 01	0.1216E 01	0.2099E 02	0.3198E 01	0.0000E 00	0.0000E 00	0,2529E 01	37
9	0,7975E 03	0,7208E 03	0,6839E 01	0,1228E 01	0.1562E 01	0.1709E 02	0.5953E 01	0.0000E 00	0.7813E-01	0,9293E 01	32
10	0,7687E 03	0,6747E 03	0.9310E 02	0.1246E 01	0.1000E 01	0.1841E 01	0.3850E 01	0.0000E 00	0.8929E 01	0,6303E 01	7
TOTAL	0,1754E 04	0,1551E 04	0.1475E 02	0,1826E 01	0,2435E 01	0,2610E 02	0,7848E 01	0,3976E 00	0.2520E 01	0,9352E 01	487

GROUP MEANS — VARIABLES

GROUP	L06	L07	L08	L09	L10	L11	L12	L13	L14	A01	SIZE
1	0,5343E 00	0,6034E 00	0.4013E 02	0,1127E 01	0.1114E 01	0.3813E 00	0.5012E 01	0,3968E-01	0.3492E 00	0,4593E 01	126
2	0,2979E 00	0,2682E 00	0.4277E 02	0,8444E 00	0.3768E 00	0.5092E 00	0.1156E 02	0.0000E 00	0.8333E-01	0,1302E 01	72
3	0,6995E 00	0,4496E 00	0.4139E 02	0,8319E 00	0.4871E 01	0.3495E 00	0.4754E 01	0,3529E-01	0.2706E 00	0,1411E 01	85
4	0,8350E 00	0,7175E 00	0.1544E 02	0,4201E 01	0,5876E 01	0.2198E 01	0.1982E 02	0.7813E 00	0.3750E 00	0,1638E 01	32
5	0,2863E 01	0,5186E 00	0.3364E 02	0.3490E 00	0.2609E 02	0.2236E 01	0.1721E 02	0.1724E 00	0.3448E-01	0,1183E 00	29
6	0,3461E 01	0.4526E 01	0.3087E 02	0,7478E 01	0.2481E 02	0.6492E 01	0.1575E 02	0.1071E 00	0.3571E-01	0,5048E 01	56
7	0,5645E 00	0,0000E 00	0.5646E 01	0,5682E 00	0.1051E 02	0.5424E 01	0.1907E 02	0,9091E-01	0.0000E 00	0,0000E 00	11
8	0,1715E 01	0,1669E 01	0.3176E 02	0.2324E 02	0.1490E 02	0.2327E 01	0.8229E 01	0.1622E 00	0.5405E-01	0,1405E 02	37
9	0,3944E 00	0,6406E 00	0,5210E 02	0,1231E 01	0.1323E 02	0,1591E 01	0.5096E 01	0,6250E-01	0.2813E 00	0,3964E 01	32
10	0,0000E 00	0,1812E 02	0.4679E 02	0.1416E 02	0.0000E 00	0.4977E 01	0.1645E 02	0.1429E 00	0.2857E 00	0,4657E 00	7
TOTAL	0,1097E 01	0,1302E 01	0,3938E 02	0,3781E 01	0,8225E 01	0,1734E 01	0,9600E 01	0,1109E 00	0.2074E 00	0,3657E 01	487

GROUP MEANS — VARIABLES

GROUP	A02	A03	A04	A05	A06	A07	W01	W02	W03	W04	SIZE
1	0,4026E 02	0,2708E 02	0.2519E 00	0.1050E 02	0.3847E 01	0.1226E 01	0.2718E 01	0,9232E 02	0.1481E 02	0,6825E 01	126
2	0,4233E 02	0.3804E 02	0.1697E 00	0.1600E 02	0.2163E 01	0.9625E 00	0.1169E 01	0.9167E 02	0.9629E 01	0,2514E 02	72
3	0,3502E 02	0,3373E 02	0.9513E 00	0.1967E 02	0.1008E 01	0.1377E 01	0.2616E 01	0,9644E 02	0.3333E 01	0,2637E 02	85
4	0,3033E 02	0,4643E 02	0.1824E 01	0.8249E 01	0.2154E 01	0.5878E 00	0.3474E 01	0,8798E 02	0.1234E 02	0,8802E 01	32
5	0,8917E 01	0,9383E 01	0.9637E 01	0.1630E 02	0.7366E 01	0.6134E 00	0.1336E 01	0,6772E 01	0.3653E 01	0,1530E 02	29
6	0,1198E 02	0,9269E 01	0.1410E 02	0.5662E 01	0.9299E 01	0.5571E 00	0.3816E 01	0,8557E 02	0.3274E 01	0,8631E 01	56
7	0,0000E 00	0.0000E 00	0.9091E 01	0,9091E 01	0.0000E 00	0.3455E-01	0.2771E 02	0,7677E 02	0.1015E 02	0,1682E 02	11
8	0,1388E 02	0.1116E 02	0.0000E 00	0.1262E 02	0.2346E 01	0.7395E 00	0.4074E 01	0,8325E 02	0.1802E 01	0,1738E 01	37
9	0,3315E 02	0,1753E 02	0.1049E 01	0,1151E 02	0,4673E 01	0.1264E 01	0.3520E 01	0,8531E 02	0.5469E 01	0,7552E 01	32
10	0,1744E 01	0,2939E 01	0.1557E 00	0.9157E 02	0.3129E 01	0.2239E 02	0.1230E 02	0,8482E 02	0.1667E 02	0,1429E 02	7
TOTAL	0,2994E 02	0,2523E 02	0,2840E 01	0,1392E 02	0,3671E 01	0.1301E 01	0,3423E 01	0,8518E 02	0.8207E 01	0,1378E 02	487

CENTROIDS OF 10 CLUSTER CLASSES : SAMPLE A - STANDARDISED COMPONENT SCORES

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS — VARIABLES

GROUP	W05	W06	W07	M01	M02	M03	M04	M05	M06	M07	SIZE
1	0,6310E 01	0,6391E 02	0,8144E 01	0,4444E 00	0,7143E-01	0,3175E-01	0,8968E 00	0,2540E 00	0,7175E-01	0,0000E 00	126
2	0,1396E 02	0,3329E 02	0,1799E 02	0,9722E 00	0,8333E-01	0,6944E 00	0,6667E 00	0,8056E 00	0,4861E-02	0,0000E 00	72
3	0,6098E 02	0,4216E 01	0,5098E 01	0,6118E 00	0,8235E-01	0,9412E-01	0,8353E 00	0,2941E 00	0,9012E-01	0,0000E 00	85
4	0,3177E 02	0,4448E 02	0,2004E 01	0,3125E 00	0,3125E 00	0,6250E-01	0,7188E 00	0,3125E-01	0,0000E 00	0,3125E-01	32
5	0,2266E 02	0,3500E 02	0,2701E 01	0,6897E 00	0,1379E 00	0,1724E 00	0,5517E 00	0,1034E 00	0,0000E 00	0,1724E 00	29
6	0,1220E 02	0,7113E 02	0,4762E 01	0,8929E-01	0,1071E 00	0,0000E 00	0,2321E 00	0,1786E-01	0,0000E 00	0,5357E-01	56
7	0,2273E 02	0,3268E 02	0,1742E 02	0,0000E 00	0,8182E 00	0,0000E 00	0,2727E 00	0,0000E 00	0,2179E 02	0,1818E 00	11
8	0,1070E 02	0,1470E 02	0,7106E 02	0,1081E 00	0,1892E 00	0,2703E-01	0,6486E 00	0,0000E 00	0,0000E 00	0,4324E 00	37
9	0,1719E 02	0,4583E 02	0,2083E 02	0,2500E 00	0,9375E-01	0,3125E-01	0,6563E 00	0,1563E 00	0,0000E 00	0,6250E-01	32
10	0,1429E 02	0,5476E 02	0,0000E 00	0,2857E 00	0,0000E 00	0,0000E 00	0,4286E 00	0,1429E 00	0,1786E 01	0,0000E 00	7
TOTAL	0,2184E 02	0,4104E 02	0,1570E 02	0,4661E 00	0,1243E 00	0,1458E 00	0,6879E 00	0,2587E 00	0,5529E 00	0,5955E-01	487

GROUP MEANS — VARIABLES

GROUP	M08	H01	H02	H03	H04	H05	H06	G01	G02	G03	SIZE
1	0,4336E 01	0,1000E 01	0,1349E 01	0,1000E 01	0,0000E 00	0,5631E 02	0,1508E 00	0,4192E 02	0,5726E 02	0,8263E 00	126
2	0,1965E 01	0,1000E 01	0,1403E 01	0,9722E 00	0,2778E-01	0,5435E 02	0,4167E-01	0,7510E 02	0,2413E 02	0,7728E 00	72
3	0,4046E 01	0,1000E 01	0,1271E 01	0,1000E 01	0,0000E 00	0,3828E 02	0,4235E 00	0,3948E 02	0,6040E 02	0,1212E 00	85
4	0,2682E 01	0,1000E 01	0,1000E 01	0,1000E 01	0,0000E 00	0,5153E 02	0,1875E 00	0,4774E 02	0,1164E 02	0,4062E 02	32
5	0,1060E 01	0,2414E 00	0,1552E 01	0,2069E 00	0,3448E-01	0,5007E 02	0,3448E-01	0,8626E 02	0,6848E 01	0,6897E 01	29
6	0,2167E 01	0,1000E 01	0,1107E 01	0,1000E 01	0,0000E 00	0,5311E 02	0,6071E 00	0,9169E 02	0,8310E 01	0,0000E 00	56
7	0,1201E 02	0,1000E 01	0,1727E 01	0,9091E 00	0,9091E-01	0,5509E 02	0,1818E 00	0,4707E 02	0,5293E 02	0,0000E 00	11
8	0,5910E 01	0,1000E 01	0,1270E 01	0,9730E 00	0,2703E-01	0,6743E 02	0,2703E 00	0,7884E 02	0,9442E 01	0,1172E 02	37
9	0,4364E 01	0,9375E 00	0,1000E 01	0,0000E 00	0,9375E 00	0,5669E 02	0,3125E-01	0,7681E 02	0,2296E 02	0,2378E 00	32
10	0,3323E 01	0,1000E 01	0,1000E 01	0,7143E 00	0,2857E 00	0,4771E 02	0,7143E 00	0,8571E 02	0,1429E 02	0,0000E 00	7
TOTAL	0,3662E 01	0,9507E 00	0,1279E 01	0,8747E 00	0,7508E-01	0,5254E 02	0,2402E 00	0,6099E 02	0,3468E 02	0,4335E 01	487

GROUP MEANS — VARIABLES

GROUP	G04	G05	G06	SIZE
1	0,3730E 00	0,1611E 01	0,1111E 00	126
2	0,1250E 00	0,2611E 01	0,2778E-01	72
3	0,2000E 00	0,1824E 01	0,5882E-01	85
4	0,9375E-01	0,5625E 00	0,6250E-01	32
5	0,2759E 00	0,1207E 01	0,2414E 00	29
6	0,5357E-01	0,2500E 00	0,3571E-01	56
7	0,6364E 00	0,1636E 01	0,0000E 00	11
8	0,1892E 00	0,1351E 01	0,0000E 00	37
9	0,9375E-01	0,1094E 01	0,6250E-01	32
10	0,5714E 00	0,1286E 01	0,2857E 00	7
TOTAL	0,2218E 00	0,1489E 01	0,7392E-01	487

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS — VARIABLES

GROUP	S01	S02	S03	S04	S05	L01	L02	L03	L04	L05	SIZE
1	0,6727E 04	0.6340E 04	0.1440E 02	0.4099E 01	0.5000E 01	0.3683E 02	0.2519E 02	0.4395E 01	0.0000E 00	0,6188E 01	14
2	0,4249E 04	0.3649E 04	0.3552E 02	0.2817E 01	0.4600E 01	0.3957E 02	0.5548E 01	0.2726E 00	0.6200E-01	0,9428E 01	50
3	0,1334E 04	0,1268E 04	0.1516E 02	0.1481E 01	0.2745E 01	0.3409E 02	0.1221E 02	0.3546E 00	0.2857E 00	0,7669E 01	68
4	0,1388E 04	0.1307E 04	0.1746E 02	0.1935E 01	0.2684E 01	0.2648E 02	0.8290E 01	0.8086E 00	0.1329E 01	0,7744E 01	76
5	0,2422E 03	0.2251E 03	0.2090E 00	0.1331E 01	0.3050E 01	0.2326E 02	0.1966E 02	0.1185E 01	0.1248E 02	0,1701E 02	20
6	0,1437E 04	0.1078E 04	0.6215E 01	0.2352E 01	0.1800E 01	0.3817E 02	0.3070E 01	0.0000E 00	0.0000E 00	0,3493E 02	25
7	0,1682E 04	0.1421E 04	0.1264E 02	0.2149E 01	0.2789E 01	0.3532E 02	0.6003E 01	0.5596E-01	0.7982E-01	0,1557E 02	57
8	0,4803E 04	0,4018E 04	0.1856E 02	0,2321E 01	0,2364E 01	0.1691E 02	0.4407E 01	0.2727E 00	0.4909E-01	0,1210E 02	22
9	0,5741E 03	0.4807E 03	0.2791E 01	0,8847E 00	0,3500E 00	0.1210E 02	0.8829E 01	0.0000E 00	0.4000E-02	0,2125E 01	40
10	0,1217E 03	0.9610E 02	0.6000E-01	0.2484E 01	0.1500E 01	0.0000E 00	0.0000E 00	0.0000E 00	0.7812E 02	0,2867E 01	10
11	0,6155E 03	0.5025E 03	0.6000E 00	0.1434E 01	0.1200E 01	0.3375E 02	0.6304E 01	0.0000E 00	0.0000E 00	0,4081E 01	10
12	0,3634E 03	0.3426E 03	0.3256E 01	0,9343E 00	0.1378E 01	0.1882E 02	0.5086E 01	0.0000E 00	0.5676E-01	0,3164E 01	37
13	0,8434E 03	0.7619E 03	0.7295E 01	0.1291E 01	0.1567E 01	0.1823E 02	0.6350E 01	0.0000E 00	0.8333E-01	0,6600E 01	30
14	0,1649E 04	0.1541E 04	0.2128E 02	0,1314E 01	0.1476E 01	0.2505E 00	0.2238E-01	0.0000E 00	0.0000E 00	0,2505E 00	21
15	0,7687E 03	0.6747E 03	0.9510E 02	0,1246E 01	0.1000E 01	0.1841E 01	0.3850E 01	0.0000E 00	0.8929E 01	0,6303E 01	7
TOTAL	0,1754E 04	0,1551E 04	0,1475E 02	0,1826E 01	0,2435E 01	0,2610E 02	0,7848E 01	0,3976E 00	0,2520E 01	0,9352E 01	487

GROUP MEANS — VARIABLES

GROUP	L06	L07	L08	L09	L10	L11	L12	L13	L14	A01	SIZE
1	0,1514E 01	0,3343E 00	0.5366E 01	0,6383E 01	0.1380E 02	0.0000E 00	0.6321E 01	0.7143E-01	0.2857E 00	0,3746E 01	14
2	0,4290E 00	0,2228E 00	0.4426E 02	0.0000E 00	0.2098E 00	0.2682E 00	0.1194E 02	0.0000E 00	0.1000E 00	0,1104E 01	50
3	0,8744E 00	0,5841E 00	0.3040E 02	0,8365E 00	0,6691E 01	0.8475E 00	0.4240E 01	0,4412E-01	0.3088E 00	0,1572E 01	68
4	0,0000E 00	0,4454E 00	0,5281E 02	0,1368E 01	0,7286E 00	0.3633E 00	0.4589E 01	0,5263E-01	0.4868E 00	0,5688E 01	76
5	0,3218E 01	0,1802E 01	0,6573E 01	0,3460E 01	0,1135E 02	0.1101E 01	0.9622E 01	0,0000E 00	0.1500E 00	0,0000E 00	20
6	0,1069E 01	0,8280E 00	0.1050E 02	0,3098E 01	0,2336E-01	0.2548E 01	0.2086E 02	0,8400E 00	0.4400E 00	0,1619E 01	25
7	0,6211E 00	0,5360E 00	0,3000E 02	0,2660E 01	0,3154E 01	0.2715E 01	0.9846E 01	0,1053E 00	0.5263E-01	0,2283E 01	57
8	0,1995E 01	0,6650E 00	0,4208E 02	0,3614E 00	0,2115E 02	0.1961E 01	0.1991E 02	0,1818E 00	0.0000E 00	0,1559E 00	22
9	0,4034E 01	0,5653E 01	0,3065E 02	0,8227E 01	0,2838E 02	0.5228E 01	0.1515E 02	0,1000E 00	0.5000E-01	0,6208E 01	40
10	0,6210E 00	0,0000E 00	0,6211E 01	0,6250E 00	0,1156E 02	0.5966E 01	0.2065E 02	0,1000E 00	0.0000E 00	0,0000E 00	10
11	0,5342E 01	0,6910E 00	0,5538E 01	0,1201E 02	0,3228E 02	0.5997E 01	0.1123E 02	0,5000E 00	0.0000E 00	0,5000E 02	10
12	0,7559E 00	0,1692E 01	0,3721E 02	0,1868E 02	0,1254E 02	0.1293E 01	0.7120E 01	0,8108E-01	0.8108E-01	0,9697E 00	37
13	0,4207E 00	0,6623E 00	0,5557E 02	0,1313E 01	0,1077E 02	0.1697E 01	0.5226E 01	0,3333E-01	0.3000E 00	0,4229E 01	30
14	0,0000E 00	0,2000E-01	0,9946E 02	0,0000E 00	0,0000E 00	0.0000E 00	0.8540E 01	0,0000E 00	0.4762E-01	0,2175E 01	21
15	0,0000E 00	0,1812E 02	0,4079E 02	0,1416E 02	0,0000E 00	0.4977E 01	0.1645E 02	0,1429E 00	0.2857E 00	0,4657E 00	7
TOTAL	0,1097E 01	0,1302E 01	0,3938E 02	0,3781E 01	0,8225E 01	0.1734E 01	0.9600E 01	0.1109E 00	0.2074E 00	0,3657E 01	487

CENTROIDS OF 15 CLUSTER CLASSES : SAMPLE A - STANDARDISED COMPONENT SCORES

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS

GROUP	A02	A03	A04	A05	A06	A07	W01	W02	W03	W04	SIZE
1	0.8001E 01	0.1645E 02	0.7143E 01	0.1207E 02	0.2504E 01	0.2157E 00	0.2238E 01	0.3725E 02	0.4830E 01	0.2890E 02	14
2	0.4228E 02	0.3907E 02	0.1772E 00	0.1511E 02	0.2262E 01	0.9610E 00	0.9470E 00	0.9132E 02	0.9067E 01	0.2773E 02	50
3	0.3412E 02	0.3470E 02	0.5054E 00	0.1937E 02	0.9165E 00	0.1285E 01	0.2752E 01	0.9655E 02	0.2941E 01	0.2561E 02	68
4	0.4465E 02	0.2858E 02	0.2401E 00	0.1137E 02	0.4250E 01	0.1432E 01	0.2539E 01	0.9547E 02	0.1701E 02	0.6009E 01	76
5	0.0000E 00	0.6253E 01	0.6250E 01	0.1697E 02	0.5255E 00	0.1315E 00	0.5620E 01	0.9224E 02	0.1108E 02	0.6750E 01	20
6	0.3273E 02	0.4205E 02	0.2335E 01	0.6990E 01	0.2277E 01	0.5904E 00	0.3613E 01	0.9242E 02	0.1580E 02	0.9266E 01	25
7	0.3994E 02	0.3923E 02	0.1438E 01	0.1003E 02	0.1815E 01	0.8593E 00	0.1847E 01	0.9164E 02	0.1020E 02	0.1284E 02	57
8	0.1154E 02	0.8100E 01	0.8158E 01	0.1695E 02	0.9645E 01	0.7723E 00	0.9286E 00	0.6627E 00	0.2651E 01	0.1318E 02	22
9	0.3538E 01	0.6831E 01	0.1536E 02	0.1145E 02	0.1411E 02	0.6935E 00	0.4604E 01	0.8407E 02	0.4416E 01	0.5000E 01	40
10	0.0000E 00	0.0000E 00	0.1900E 02	0.1000E 02	0.0000E 00	0.3800E-01	0.3006E 02	0.7687E 02	0.9166E 01	0.1250E 02	10
11	0.6667E 01	0.3333E 01	0.0000E 00	0.0000E 00	0.0000E 00	0.1470E 00	0.4045E 01	0.5457E 02	0.6667E 01	0.0000E 00	10
12	0.1915E 02	0.1904E 02	0.5022E-01	0.1442E 02	0.3118E 01	0.9632E 00	0.3535E 01	0.9131E 02	0.0000E 00	0.3604E 01	37
13	0.3536E 02	0.1870E 02	0.1119E 01	0.1228E 02	0.4984E 01	0.1348E 01	0.3419E 01	0.8767E 02	0.5833E 01	0.8056E 01	30
14	0.6213E 02	0.1861E 02	0.1204E 01	0.5366E 01	0.9933E 00	0.1927E 01	0.1668E 01	0.9053E 02	0.4761E 01	0.2540E 02	21
15	0.1744E 01	0.2939E 01	0.1557E 00	0.9157E 02	0.3129E 01	0.2239E 02	0.1230E 02	0.8482E 02	0.1667E 02	0.1429E 02	7
TOTAL	0.2994E 02	0.2523E 02	0.2840E 01	0.1392E 02	0.3671E 01	0.1301E 01	0.3423E 01	0.8518E 02	0.8207E 01	0.1378E 02	487

GROUP MEANS

GROUP	W05	W06	W07	M01	M02	M03	M04	M05	M06	M07	SIZE
1	0.2806E 02	0.3719E 02	0.1021E 01	0.1000E 01	0.0000E 00	0.5000E 00	0.8571E 00	0.7143E-01	0.0000E 00	0.7143E-01	14
2	0.1870E 02	0.2617E 02	0.1833E 02	0.1000E 01	0.4000E-01	0.7800E 00	0.6200E 00	0.9200E 00	0.0000E 00	0.0000E 00	50
3	0.6324E 02	0.1838E 01	0.6373E 01	0.6029E 00	0.2941E-01	0.1029E 00	0.8676E 00	0.2647E 00	0.0000E 00	0.0000E 00	68
4	0.5088E 01	0.6541E 02	0.6485E 01	0.4079E 00	0.2632E-01	0.0000E 00	0.8816E 00	0.2895E 00	0.1189E 00	0.0000E 00	76
5	0.2000E 02	0.6217E 02	0.0000E 00	0.2500E 00	0.7500E 00	0.5000E-01	0.9000E 00	0.0000E 00	0.3830E 00	0.0000E 00	20
6	0.3600E 02	0.3560E 02	0.3333E 01	0.2400E 00	0.2800E 00	0.4000E-01	0.7200E 00	0.4000E-01	0.0000E 00	0.0000E 00	25
7	0.8977E 01	0.6456E 02	0.3421E 01	0.6842E 00	0.1404E 00	0.2105E 00	0.7895E 00	0.2982E 00	0.0000E 00	0.0000E 00	57
8	0.1872E 02	0.3916E 02	0.3260E 01	0.6364E 00	0.1818E 00	0.9091E-01	0.5455E 00	0.1364E 00	0.0000E 00	0.9091E-01	22
9	0.9167E 01	0.7600E 02	0.5417E 01	0.1000E 00	0.5000E-01	0.0000E 00	0.1500E 00	0.0000E 00	0.0000E 00	0.7500E-01	40
10	0.2500E 02	0.3417E 02	0.1917E 02	0.0000E 00	0.8000E 00	0.0000E 00	0.2000E 00	0.0000E 00	0.2397E 02	0.2000E 00	10
11	0.1667E 02	0.2667E 02	0.3000E 02	0.1000E 00	0.0000E 00	0.1000E 00	0.6000E 00	0.0000E 00	0.0000E 00	0.1000E 01	10
12	0.8964E 01	0.9549E 01	0.7788E 02	0.1351E 00	0.2432E 00	0.0000E 00	0.6757E 00	0.5405E-01	0.9459E-02	0.2432E 00	37
13	0.1833E 02	0.4556E 02	0.2222E 02	0.2667E 00	0.6667E-01	0.3333E-01	0.6667E 00	0.1667E 00	0.0000E 00	0.6667E-01	30
14	0.3016E 02	0.3016E 02	0.9324E 01	0.3333E 00	0.0000E 00	0.0000E 00	0.5238E 00	0.4762E 00	0.0000E 00	0.0000E 00	21
15	0.1429E 02	0.5476E 02	0.0000E 00	0.2857E 00	0.0000E 00	0.0000E 00	0.4286E 00	0.1429E 00	0.1786E 01	0.0000E 00	7
TOTAL	0.2184E 02	0.4104E 02	0.1370E 02	0.4661E 00	0.1243E 00	0.1458E 00	0.6879E 00	0.2587E 00	0.5529E 00	0.5955E-01	487

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS

GROUP	H08	H01	H02	H03	H04	H05	H06	G01	G02	G03	SIZE
1	0,1229E 01	0.1000E 01	0.2500E 01	0.1000E 01	0.0000E 00	0.4871E 02	0.7143E-01	0.5208E 02	0.4792E 02	0.0000E 00	14
2	0,1513E 01	0.1000E 01	0.1520E 01	0.9600E 00	0.4000E-01	0.5206E 02	0.4000E-01	0.7316E 02	0.2572E 02	0.1113E 01	50
3	0,3345E 01	0.1000E 01	0.1221E 01	0.1000E 01	0.0000E 00	0.3778E 02	0.4118E 00	0.4099E 02	0.5886E 02	0.1515E 00	68
4	0,3042E 01	0.1000E 01	0.1289E 01	0.1000E 01	0.0000E 00	0.5543E 02	0.7895E-01	0.3943E 02	0.5920E 02	0.1370E 01	76
5	0,1894E 02	0.1000E 01	0.1250E 01	0.9500E 00	0.5000E-01	0.5180E 02	0.3500E 00	0.6008E 02	0.3992E 02	0.0000E 00	20
6	0,2374E 01	0.1000E 01	0.1000E 01	0.1000E 01	0.0000E 00	0.5020E 02	0.2000E 00	0.4110E 02	0.1090E 02	0.4800E 02	25
7	0,2638E 01	0.1000E 01	0.1018E 01	0.1000E 01	0.0000E 00	0.5598E 02	0.1579E 00	0.8035E 02	0.1965E 02	0.0000E 00	57
8	0,1462E 01	0.4545E-01	0.1500E 01	0.0000E 00	0.4545E-01	0.5232E 02	0.0000E 00	0.9569E 02	0.4307E 01	0.0000E 00	22
9	0,1789E 01	0.1000E 01	0.1175E 01	0.1000E 01	0.0000E 00	0.5433E 02	0.8000E 00	0.8647E 02	0.1353E 02	0.0000E 00	40
10	0,1271E 02	0.1000E 01	0.1700E 01	0.9000E 00	0.1000E 00	0.5470E 02	0.2000E 00	0.4660E 02	0.5340E 02	0.0000E 00	10
11	0,1821E 01	0.8000E 00	0.1200E 01	0.7000E 00	0.1000E 00	0.5680E 02	0.2000E 00	0.2401E 02	0.1599E 02	0.6000E 02	10
12	0,6714E 01	0.1000E 01	0.1243E 01	0.1000E 01	0.0000E 00	0.6946E 02	0.2432E 00	0.8176E 02	0.1463E 02	0.3609E 01	37
13	0,3169E 01	0.9667E 00	0.1000E 01	0.0000E 00	0.9667E 00	0.5723E 02	0.3333E-01	0.7526E 02	0.2449E 02	0.2537E 00	30
14	0,1308E 01	0.1000E 01	0.1476E 01	0.1000E 01	0.0000E 00	0.4686E 02	0.3810E 00	0.2700E 02	0.7300E 02	0.0000E 00	21
15	0,3323E 01	0.1000E 01	0.1000E 01	0.7143E 00	0.2857E 00	0.4771E 02	0.7143E 00	0.8571E 02	0.1429E 02	0.0000E 00	7
TOTAL	0,3662E 01	0,9507E 00	0,1279E 01	0,8747E 00	0,7508E-01	0.5254E 02	0.2402E 00	0.6099E 02	0.3468E 02	0.4335E 01	487

GROUP MEANS

GROUP	G04	G05	G06	SIZE
1	0,7857E 00	0.2643E 01	0.5714E 00	14
2	0,1800E 00	0.3020E 01	0.2000E-01	50
3	0,1324E 00	0.1779E 01	0.7553E-01	68
4	0,3816E 00	0.1592E 01	0.1316E 00	76
5	0,3000E 00	0.1500E 01	0.5000E-01	20
6	0,8000E-01	0.4800E 00	0.8000E-01	25
7	0,0000E 00	0.1386E 01	0.1754E-01	57
8	0,1818E 00	0.1136E 01	0.9091E-01	22
9	0,7500E-01	0.1000E 00	0.5000E-01	40
10	0,6000E 00	0.1400E 01	0.0000E 00	10
11	0,2000E 00	0.8000E 00	0.0000E 00	10
12	0,1892E 00	0.1405E 01	0.0000E 00	37
13	0,1000E 00	0.1100E 01	0.6067E-01	30
14	0,6190E 00	0.1381E 01	0.0000E 00	21
15	0,5714E 00	0.1286E 01	0.2857E 00	7
TOTAL	0,2218E 00	0,1489E 01	0.7392E-01	487

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS GROUP	S01	S02	S03	S04	S05	L01	L02	L03	L04	L05	SIZE
1	0.6507E 04	0.6025E 04	0.1738E 02	0.3447E 01	0.6000E 01	0.4412E 02	0.3206E 02	0.4905E 01	0.0000E 00	0.6361E 01	11
2	0.4133E 04	0.3546E 04	0.3700E 02	0.2833E 01	0.4622E 01	0.4075E 02	0.5427E 01	0.1511E 00	0.4333E-01	0.9734E 01	45
3	0.5016E 03	0.4071E 03	0.2584E 01	0.8565E 00	0.6522E 00	0.1016E 02	0.3543E 00	0.0000E 00	0.0000E 00	0.3434E 01	23
4	0.3988E 03	0.3834E 03	0.4064E 01	0.1097E 01	0.1500E 01	0.2898E 02	0.1256E 02	0.7983E 00	0.1239E 01	0.1145E 02	36
5	0.1878E 03	0.1701E 03	0.4317E 00	0.1237E 01	0.3417E 01	0.2591E 02	0.1718E 02	0.1976E 01	0.2391E 01	0.1838E 02	12
6	0.1437E 04	0.1078E 04	0.6215E 01	0.2352E 01	0.1800E 01	0.3817E 02	0.3070E 01	0.0000E 00	0.0000E 00	0.3493E 02	25
7	0.2207E 04	0.1911E 04	0.1433E 02	0.2410E 01	0.3239E 01	0.3788E 02	0.6222E 01	0.1485E 00	0.1696E 00	0.1600E 02	46
8	0.4803E 04	0.4018E 04	0.1656E 02	0.2321E 01	0.2344E 01	0.1691E 02	0.4407E 01	0.2727E 00	0.4909E-01	0.1210E 02	22
9	0.1302E 04	0.1157E 04	0.2308E 00	0.2132E 01	0.3077E 00	0.5692E 01	0.1076E 01	0.0000E 00	0.0000E 00	0.0000E 00	13
10	0.1111E 03	0.8400E 02	0.7500E-01	0.2497E 01	0.1500E 01	0.0000E 00	0.0000E 00	0.0000E 00	0.7459E 02	0.3584E 01	8
11	0.1520E 04	0.1451E 04	0.1778E 02	0.1611E 01	0.3161E 01	0.3744E 02	0.1463E 02	0.4305E 00	0.3470E 00	0.8437E 01	56
12	0.6155E 03	0.5025E 03	0.6000E 00	0.1434E 01	0.1200E 01	0.3375E 02	0.6304E 01	0.0000E 00	0.0000E 00	0.4081E 01	10
13	0.4034E 03	0.3814E 03	0.1321E 01	0.2171E 01	0.2375E 01	0.7198E 01	0.2227E 02	0.0000E 00	0.5159E 02	0.2456E 01	8
14	0.4835E 03	0.4635E 03	0.6033E 01	0.1132E 01	0.1786E 01	0.2617E 02	0.6138E 01	0.0000E 00	0.0000E 00	0.4615E 01	28
15	0.8680E 03	0.7837E 03	0.7547E 01	0.1330E 01	0.1621E 01	0.1886E 02	0.6569E 01	0.0000E 00	0.8621E-01	0.6828E 01	29
16	0.1874E 04	0.1739E 04	0.2430E 02	0.1469E 01	0.1667E 01	0.2922E 00	0.2611E-01	0.0000E 00	0.0000E 00	0.2922E 00	18
17	0.1315E 04	0.1101E 04	0.2406E 01	0.8453E 00	0.3684E 00	0.1349E 02	0.7718E 01	0.3984E 00	0.8421E-02	0.2666E 01	19
18	0.1785E 04	0.1673E 04	0.2204E 02	0.2203E 01	0.3017E 01	0.2509E 02	0.8018E 01	0.6085E 00	0.8293E 00	0.7969E 01	59
19	0.7687E 03	0.6747E 03	0.9510E 02	0.1246E 01	0.1000E 01	0.1841E 01	0.3850E 01	0.0000E 00	0.8929E 01	0.6303E 01	7
20	0.2295E 03	0.2213E 03	0.7042E 00	0.6542E 00	0.1083E 01	0.1128E 02	0.1222E 01	0.0000E 00	0.0000E 00	0.0000E 00	12
TOTAL	0.1754E 04	0.1531E 04	0.1475E 02	0.1826E 01	0.2435E 01	0.2610E 02	0.7848E 01	0.3976E 00	0.2520E 01	0.9352E 01	487

GROUP MEANS GROUP	L06	L07	L08	L09	L10	L11	L12	L13	L14	A01	SIZE
1	0.0000E 00	0.1627E 00	0.4027E 01	0.0000E 00	0.7761E 01	0.0000E 00	0.7140E 01	0.9091E-01	0.3636E 00	0.4768E 01	11
2	0.4767E 00	0.2138E 00	0.4297E 02	0.0000E 00	0.2381E 00	0.2933E 00	0.1231E 02	0.0000E 00	0.8889E-01	0.3933E 00	45
3	0.0000E 00	0.2132E 01	0.4522E 02	0.0000E 00	0.3870E 02	0.1957E 01	0.9568E 01	0.1304E 00	0.4348E-01	0.2929E 01	23
4	0.7306E 00	0.1532E 01	0.3039E 02	0.3539E 01	0.8761E 01	0.7844E 00	0.3178E 01	0.1111E 00	0.1389E 00	0.9864E 01	36
5	0.5363E 01	0.1027E 01	0.3778E 01	0.5067E 01	0.1893E 02	0.3192E 00	0.1104E 02	0.0000E 00	0.1667E 00	0.0000E 00	12
6	0.1069E 01	0.8240E 00	0.1050E 02	0.3098E 01	0.2336E 01	0.2548E 01	0.2086E 02	0.8400E 00	0.4400E 00	0.1619E 01	25
7	0.7052E 00	0.2974E 00	0.3436E 02	0.1114E 01	0.3110E 01	0.2792E 01	0.1078E 02	0.8696E-01	0.6522E-01	0.2149E 01	46
8	0.1995E 01	0.6630E 00	0.4208E 02	0.3614E 00	0.2115E 02	0.1961E 01	0.1991E 02	0.1818E 00	0.0000E 00	0.1559E 00	22
9	0.0000E 00	0.1003E 02	0.1036E 02	0.3420E 02	0.3314E 02	0.1298E 02	0.2179E 02	0.1538E 00	0.7692E-01	0.1709E 01	13
10	0.7763E 00	0.0000E 00	0.7764E 01	0.7813E 00	0.1250E 02	0.7458E 01	0.2136E 02	0.1250E 00	0.0000E 00	0.0000E 00	8
11	0.1062E 01	0.4927E 00	0.3538E 02	0.7482E 00	0.5289E 00	0.2252E 00	0.4013E 01	0.1786E-01	0.3571E 00	0.1599E 01	56
12	0.5342E 01	0.6910E 00	0.5558E 01	0.1201E 02	0.3228E 02	0.5997E 01	0.1123E 02	0.5000E 00	0.0000E 00	0.5000E 02	10
13	0.0000E 00	0.9252E 00	0.1338E 02	0.0000E 00	0.2184E 01	0.2272E 01	0.1070E 02	0.0000E 00	0.1250E 00	0.0000E 00	8
14	0.1746E 00	0.1575E 01	0.5722E 02	0.9764E 00	0.3104E 01	0.5807E 00	0.5336E 01	0.3571E-01	0.2500E 00	0.1846E 01	28
15	0.4352E 00	0.6852E 00	0.5748E 02	0.1358E 01	0.7608E 01	0.1755E 01	0.5406E 01	0.3448E-01	0.3103E 00	0.4374E 01	29
16	0.0000E 00	0.2333E-01	0.9937E 02	0.0000E 00	0.0000E 00	0.0000E 00	0.6151E 01	0.0000E 00	0.5556E-01	0.2538E 01	18
17	0.8381E 01	0.2789E 01	0.4087E 02	0.1553E 01	0.1612E 02	0.3696E 01	0.1685E 02	0.0000E 00	0.0000E 00	0.7031E 01	19
18	0.0000E 00	0.3080E 00	0.5604E 02	0.6615E 00	0.4751E 00	0.4686E 00	0.5168E 01	0.5085E-01	0.5085E 00	0.2926E 01	59
19	0.0000E 00	0.1812E 02	0.4679E 02	0.1416E 02	0.0000E 00	0.4977E 01	0.1645E 02	0.1429E 00	0.2857E 00	0.4657E 00	7
20	0.1923E 01	0.1765E 01	0.1136E 02	0.5578E 02	0.1667E 02	0.0000E 00	0.7237E 01	0.1667E 00	0.0000E 00	0.0000E 00	12
TOTAL	0.1097E 01	0.1302E 01	0.3938E 02	0.3781E 01	0.8225E 01	0.1734E 01	0.9600E 01	0.1109E 00	0.2074E 00	0.3657E 01	487

CENTROIDS OF 20 CLUSTER CLASSES : SAMPLE A - STANDARDISED COMPONENT SCORES

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS — VARIABLES

GROUP	A02	A03	A04	A05	A06	A07	W01	W02	W03	W04	SIZE
1	0,1018E 02	0,2094E 02	0.0000E 00	0.1536E 02	0.3301E 01	0.2673E 00	0.6791E 00	0.3717E 02	0.6147E 01	0,3548E 02	11
2	0,4294E 02	0,3875E 02	0.1969E 00	0.1520E 02	0.2514E 01	0.9904E 00	0.9556E 00	0.9042E 02	0.8592E 01	0,2915E 02	45
3	0,1576E 02	0.1464E 02	0.8802E 01	0.5054E 01	0.4989E 01	0.6813E 00	0.2881E 01	0.8908E 02	0.0000E 00	0.2754E 02	23
4	0,2028E 02	0.2376E 02	0.1768E 01	0.1862E 02	0.3484E 01	0.1027E 01	0.4119E 01	0.9530E 02	0.3750E 01	0.6944E 00	36
5	0.0000E 00	0.1042E 02	0.2083E 01	0.2829E 02	0.8758E 00	0.2050E 00	0.6241E 01	0.8998E 02	0.6250E 01	0.6250E 01	12
6	0,3273E 02	0.4205E 02	0.2535E 01	0.6990E 01	0.2277E 01	0.5904E 00	0.3613E 01	0.9242E 02	0.1580E 02	0.9266E 01	25
7	0,3905E 02	0.4335E 02	0.1470E 00	0.1126E 02	0.1865E 01	0.8372E 00	0.1621E 01	0.9040E 02	0.1083E 02	0.1862E 02	46
8	0.1154E 02	0.8100E 01	0.8158E 01	0.1695E 02	0.9645E 01	0.7723E 00	0.9286E 00	0.6627E 00	0.2651E 01	0.1318E 02	22
9	0.0000E 00	0.5128E 01	0.8546E 00	0.0000E 00	0.7692E 01	0.8462E-01	0.5855E 01	0.6203E 02	0.2564E 01	0.1099E 01	13
10	0.0000E 00	0.0000E 00	0.1250E 02	0.1250E 02	0.0000E 00	0.4750E-01	0.3306E 02	0.7338E 02	0.7291E 01	0.1563E 02	8
11	0,3693E 02	0.3674E 02	0.1673E 00	0.2167E 02	0.1113E 01	0.1419E 01	0.2794E 01	0.9765E 02	0.3571E 01	0.2396E 02	56
12	0,6667E 01	0.3333E 01	0.0000E 00	0.0000E 00	0.0000E 00	0.1470E 00	0.4045E 01	0.5457E 02	0.6667E 01	0.0000E 00	10
13	0,9461E 01	0,2129E 01	0.0000E 00	0,9100E 00	0,0000E 00	0,1863E 00	0,8081E 01	0,9340E 02	0,3083E 02	0,7500E 01	8
14	0,3448E 02	0,2823E 02	0,7429E-01	0,6351E 01	0,4014E 01	0,1114E 01	0,2977E 01	0,9699E 02	0.0000E 00	0,5357E 01	28
15	0,3658E 02	0,1934E 02	0,1157E 01	0,1270E 02	0,5156E 01	0,1394E 01	0,3494E 01	0,8802E 02	0,6034E 01	0,8333E 01	29
16	0,7248E 02	0,1832E 02	0,5856E 00	0,5734E 01	0,3400E 00	0,2099E 01	0,1734E 01	0,8895E 02	0,5555E 01	0,2407E 02	18
17	0,0000E 00	0,0000E 00	0,3433E 02	0,6880E 01	0,2018E 02	0,5984E 00	0,3393E 01	0,8968E 02	0,3508E 01	0,2632E 01	19
18	0,5124E 02	0,3216E 02	0,3093E 00	0,1022E 02	0,3138E 01	0,1466E 01	0,2038E 01	0,9552E 02	0,2233E 02	0,5622E 01	59
19	0,1744E 01	0,2939E 01	0,1557E 00	0,9157E 02	0,3129E 01	0,2239E 02	0,1230E 02	0,8482E 02	0,1667E 02	0,1429E 02	7
20	0,0000E 00	0,0000E 00	0,0000E 00	0,3233E 02	0,9983E 00	0,1058E 01	0,4406E 01	0,8373E 02	0,0000E 00	0,4167E 01	12
TOTAL	0,2994E 02	0,2523E 02	0,2840E 01	0,1392E 02	0,3671E 01	0,1301E 01	0,3423E 01	0,8518E 02	0,8207E 01	0,1378E 02	487

GROUP MEANS — VARIABLES

GROUP	W05	W06	W07	M01	M02	M03	M04	M05	M06	M07	SIZE
1	0,2532E 02	0.3305E 02	0.0000E 00	0.1000E 01	0.0000E 00	0.6364E 00	0.1000E 01	0.9091E-01	0.0000E 00	0.0000E 00	11
2	0,1818E 02	0.2461E 02	0.1926E 02	0.1000E 01	0.4444E-01	0.8222E 00	0.5778E 00	0.9333E 00	0.0000E 00	0.0000E 00	45
3	0,6377E 02	0.6522E 01	0.2174E 01	0.2174E 00	0.1304E 00	0.0000E 00	0.2609E 00	0.0000E 00	0.0000E 00	0.4348E-01	23
4	0,2315E 01	0.9185E 02	0.1389E 01	0.1944E 00	0.2778E-01	0.0000E 00	0.7500E 00	0.0000E 00	0.6167E-01	0.0000E 00	36
5	0.3333E 02	0.5417E 02	0.0000E 00	0.4167E 00	0.9167E 00	0.8333E-01	0.9167E 00	0.0000E 00	0.6383E 00	0.0000E 00	12
6	0.3600E 02	0.3560E 02	0.3333E 01	0.2400E 00	0.2800E 00	0.4000E-01	0.7200E 00	0.4000E-01	0.0000E 00	0.0000E 00	25
7	0.1221E 02	0.5337E 02	0.4964E 01	0.8696E 00	0.1739E 00	0.2826E 00	0.8043E 00	0.3913E 00	0.7609E-02	0.0000E 00	46
8	0.1872E 02	0.3916E 02	0.3560E 01	0.6364E 00	0.1818E 00	0.9091E-01	0.5455E 00	0.1364E 00	0.0000E 00	0.9091E-01	22
9	0.1099E 01	0.7875E 02	0.1648E 02	0.2308E 00	0.0000E 00	0.0000E 00	0.7692E-01	0.0000E 00	0.0000E 00	0.3077E 00	13
10	0.3125E 02	0.3229E 02	0.1354E 02	0.0000E 00	0.7500E 00	0.0000E 00	0.1250E 00	0.0000E 00	0.2934E 02	0.0000E 00	8
11	0,6250E 02	0.2232E 01	0.7738E 01	0.6786E 00	0.1786E-01	0.1250E 00	0.9464E 00	0.3214E 00	0.0000E 00	0.0000E 00	56
12	0.1667E 02	0.2667E 02	0.3000E 02	0.1000E 00	0.0000E 00	0.1000E 00	0.6000E 00	0.0000E 00	0.0000E 00	0.1000E 01	10
13	0,0000E 00	0.5125E 02	0.1042E 02	0.0000E 00	0.7500E 00	0.0000E 00	0.6250E 00	0.1250E 00	0.1452E 01	0.2500E 00	8
14	0,7976E 01	0.6071E 01	0.8059E 02	0.1071E 00	0.7143E-01	0.0000E 00	0.8571E 00	0.1429E 00	0.0000E 00	0.3571E-01	28
15	0,1552E 02	0.4713E 02	0.2299E 02	0.2759E 00	0.6897E-01	0.3448E-01	0.6897E 00	0.1724E 00	0.0000E 00	0.3448E-01	29
16	0,2407E 02	0.3519E 02	0.1111E 02	0.3333E 00	0.0000E 00	0.0000E 00	0.6111E 00	0.5556E 00	0.0000E 00	0.0000E 00	18
17	0,7017E 01	0,8070E 02	0,6141E 01	0.5263E-01	0.1053E 00	0.0000E 00	0.2105E 00	0.0000E 00	0.0000E 00	0.0000E 00	19
18	0,4576E 01	0,6392E 02	0.3551E 01	0.5254E 00	0.1695E-01	0.1695E-01	0.8983E 00	0.3729E 00	0.3390E-02	0.0000E 00	59
19	0,1429E 02	0,5476E 02	0.0000E 00	0.2857E 00	0.0000E 00	0.0000E 00	0.4286E 00	0.1429E 00	0.1786E 01	0.0000E 00	7
20	0,1458E 02	0,2083E 02	0.6042E 02	0.8333E-01	0.4167E 00	0.0000E 00	0.5000E 00	0.0000E 00	0.0000E 00	0.6667E 00	12
TOTAL	0,2184E 02	0,4104E 02	0.1370E 02	0.4661E 00	0.1253E 00	0.1458E 00	0.6879E 00	0.2587E 00	0.5529E 00	0.5955E-01	487

CENTROIDS OF 20 CLUSTER CLASSES : SAMPLE A - STANDARDISED COMPONENT SCORES

CLUSTER CLASSIFICATION - SAMPLE A

GROUP MEANS — VARIABLES

GROUP	H08	H01	H02	H03	H04	H05	H06	G01	G02	G03	SIZE
1	0,1246E 01	0.1000E 01	0.2636E 01	0.1000E 01	0,0000E 00	0.4718E 02	0.9091E-01	0.3969E 02	0.6031E 02	0.0000E 00	11
2	0,1527E 01	0.1000E 01	0,1511E 01	0.9556E 00	0,4444E-01	0.5189E 02	0.4444E-01	0.7179E 02	0.2697E 02	0.1236E 01	45
3	0.2626E 01	0.1000E 01	0.1217E 01	0.9565E 00	0.4348E-01	0.4061E 02	0.7826E 00	0.7950E 02	0.2050E 02	0.0000E 00	23
4	0,5241E 01	0.1000E 01	0.1167E 01	0.1000E 01	0.0000E 00	0.5494E 02	0.4167E 00	0.5963E 02	0.4037E 02	0.0000E 00	36
5	0,2266E 02	0.1000E 01	0.1250E 01	0.9167E 00	0.8333E-01	0.4942E 02	0.2500E 00	0.6988E 02	0.3012E 02	0.0000E 00	12
6	0,2374E 01	0.1000E 01	0.1000E 01	0.1000E 01	0,0000E 00	0.5020E 02	0.2000E 00	0.4110E 02	0.1090E 02	0.4800E 02	25
7	0,2363E 01	0.1000E 01	0.1087E 01	0.1000E 01	0.0000E 00	0.5528E 02	0.1522E 00	0.7970E 02	0.2030E 02	0.0000E 00	46
8	0.1462E 01	0.4545E-01	0.1500E 01	0.0000E 00	0.4545E-01	0.5232E 02	0.0000E 00	0.9569E 02	0.4307E 01	0.0000E 00	22
9	0,4192E 00	0.1000E 01	0.1154E 01	0.1000E 01	0.0000E 00	0.5938E 02	0.5385E 00	0.8404E 02	0.5731E 00	0.1538E 02	13
10	0.1334E 02	0.1000E 01	0.1625E 01	0.8750E 00	0.1250E 00	0.5262E 02	0.1250E 00	0.5825E 02	0.4175E 02	0.0000E 00	8
11	0.3268E 01	0.1000E 01	0.1250E 01	0.1000E 01	0.0000E 00	0.3771E 02	0.3571E 00	0.3498E 02	0.6484E 02	0.1839E 00	56
12	0,1821E 01	0.8000E 00	0.1200E 01	0.7000E 00	0.1000E 00	0.5680E 02	0.2000E 00	0.2401E 02	0.1599E 02	0.6000E 02	10
13	0,9624E 01	0.1000E 01	0.1625E 01	0.1000E 01	0,0000E 00	0.5750E 02	0.3750E 00	0,3376E 02	0.6624E 02	0.0000E 00	8
14	0,5745E 01	0.1000E 01	0,1143E 01	0,1000E 01	0,0000E 00	0,7000E 02	0,7143E-01	0,7144E 02	0.2736E 02	0,1198E 01	28
15	0,3279E 01	0,9655E 00	0.1000E 01	0.0000E 00	0,9655E 00	0,5776E 02	0,0000E 00	0.7441E 02	0.2533E 02	0,2624E 00	29
16	0,1369E 01	0.1000E 01	0.1556E 01	0,1000E 01	0,0000E 00	0.4844E 02	0.2778E 00	0,1484E 02	0.8516E 02	0,0000E 00	18
17	0,2214E 01	0.1000E 01	0.1053E 01	0.1000E 01	0,0000E 00	0.5605E 02	0.7895E 00	0.9515E 02	0.4847E 01	0,0000E 00	19
18	0,2475E 01	0,1000E 01	0.1505E 01	0,1000E 01	0,0000E 00	0,5466E 02	0,1695E-01	0,4000E 02	0,5993E 02	0,6966E-01	59
19	0,3323E 01	0.1000E 01	0.1000E 01	0,7143E 00	0,2857E 00	0.4771E 02	0.7143E 00	0.8571E 02	0.1429E 02	0,0000E 00	7
20	0,8113E 01	0,1000E 01	0,1417E 01	0,1000E 01	0,0000E 00	0,6783E 02	0,4167E 00	0,1000E 03	0.0000E 00	0,0000E 00	12
TOTAL	0,3662E 01	0,9507E 00	0,1279E 01	0,8747E 00	0,7508E-01	0.5254E 02	0,2402E 00	0,6099E 02	0.3468E 02	0,4335E 01	487

GROUP MEANS — VARIABLES

GROUP	G04	G05	G06	SIZE
1	0,9091E 00	0.3182E 01	0,7273E 00	11
2	0,1778E 00	0.3089E 01	0,0000E 00	45
3	0,8696E-01	0.7391E 00	0.4348E-01	23
4	0.1389E 00	0.6667E 00	0.1111E 00	36
5	0,1667E 00	0,1333E 01	0,8333E-01	12
6	0,8000E-01	0.4800E 00	0,8000E-01	25
7	0,0000E 00	0.1650E 01	0,4348E-01	46
8	0,1818E 00	0,1136E 01	0,9091E-01	22
9	0,7692E-01	0,5385E 00	0,0000E 00	13
10	0,6250E 00	0,1750E 01	0,0000E 00	8
11	0,1429E 00	0,1893E 01	0,8929E-01	56
12	0,2000E 00	0,8000E 00	0,0000E 00	10
13	0,7500E 00	0,2000E 01	0,0000E 00	8
14	0,2857E 00	0,1393E 01	0,3571E-01	28
15	0,1034E 00	0,1138E 01	0,6897E-01	29
16	0,6667E 00	0,1444E 01	0,0000E 00	18
17	0,5263E-01	0,1053E 00	0,5263E-01	19
18	0,4068E 00	0,1780E 01	0,8475E-01	59
19	0,5714E 00	0,1286E 01	0,2857E 00	7
20	0,8333E-01	0,1417E 01	0,0000E 00	12
TOTAL	0,2218E 00	0,1489E 01	0,7592E-01	487

CENTROIDS OF 20 CLUSTER CLASSES : SAMPLE A - STANDARDISED COMPONENT SCORES

APPENDIX H

Results of Experiment G

DISCRIMINANT ANALYSIS HITS AND MISSES

Experimental Analysis XVI

PREDICTED GROUP

ACTUAL GROUP

	1	2	3	4	5	6	7	8	9	10	Total	% HITS
1	87	11					6		3		107	81
2	6	99			1	1		1			108	92
3			23					3	1		27	85
4	2	4		29			2				37	78
5					12						12	100
6		3				25	1	2	3		34	74
7	5	3		1			65	1	1		76	86
8		7		1			1	43			52	83
9						1			26		27	96
10										7	7	100
											487	85.4

Variables	25
% Trace	100
Functions	9
Priors	Si

43 out of 73 misses correctly predicted by the second highest probability

Experimental Analysis XVII

PREDICTED GROUP

ACTUAL GROUP

	1	2	3	4	5	6	7	8	9	10	Total	% HITS
1	88	9					7		3		107	82
2	8	93		2	1	1	1	2			108	86
3		1	23			1		1	1		27	85
4	1	7		29							37	78
5					12						12	100
6		4				26		1	3		34	76
7	8	6		2			57	2	1		76	75
8		6		1		2		43			52	83
9			1						26		27	96
10							1		1	5	7	71
											487	82.5

Variables	25
% Trace	90
Functions	7
Priors	Si

39 our of 85 misses correctly predicted by the second highest probability.

DISCRIMINANT ANALYSIS HITS AND MISSES

Experimental Analysis XVIII

PREDICTED GROUP

ACTUAL GROUP (row labels)

	1	2	3	4	5	6	7	8	9	10	Total	% HITS
1	93	6					5		3		107	87
2	5	89			1		11	2			108	82
3			23	1				2	1		27	85
4	9	17		4			4	3			37	11
5					12						12	100
6		6				16		9	3		34	47
7	23	20					31	1	1		76	41
8		9						39			52	75
9			1						26		27	96
10							1		1	5	7	71
											487	69.4

Variables	25
% Trace	80
Functions	5
Priors	Si

80 out of 149 misses correctly predicted by the second highest probability

Experimental Analysis XIX

PREDICTED GROUP

ACTUAL GROUP (row labels)

	1	2	3	4	5	6	7	8	9	10	Total	% HITS
1	96	6					4		1		107	90
2	4	101			1	2		1			108	94
3		1	23					2	1		27	85
4		2		34			1				37	92
5					12						12	100
6		2				27		1	4		34	79
7	3	2					70		1		76	92
8		5						47			52	90
9						1			26		27	96
10											7	100
											487	91.0%

Variables	50
% Trace	100
Functions	9
Priors	Si

20 out of 44 misses correctly predicted by the second highest probability.

DISCRIMINANT ANALYSIS HITS AND MISSES

Experimental Analysis XX

PREDICTED GROUP

TUAL

OUP

	1	2	3	4	5	6	7	8	9	10	Total	% HITS
1	95	4					5		3		107	89
2	5	99				3		1			108	92
3		1	23					2	1		27	85
4		3		33			1				37	89
5					12						12	100
6		2				28		1	3		34	82
7	4	2					69		1		76	91
8		6						46			52	88
9			1						26		27	96
10	1									6	7	86
											487	89.7

Variables	50
% Trace	95
Functions	8
Priors	Si

31 out of 50 misses correctly predicted by the second highest probability

Experimental Analysis XXI

PREDICTED GROUP

TUAL

OUP

	1	2	3	4	5	6	7	8	9	10	Total	% HITS
1	95	3					6		3		107	89
2	5	100					2	1			108	93
3		1	23					2	1		27	85
4		5		32							37	86
5					12						12	100
6		5				26			3		34	76
7	3	4					67	1	1		76	88
8		5		1		3		43			52	83
9			1						26		27	96
10	1									6	7	86
											487	88.3

Variables	50
% Trace	90
Functions	7
Priors	Si

33 out of 57 misses correctly predicted by the second highest probability

DISCRIMINANT ANALYSIS HITS AND MISSES

Experimental Analysis XXII

PREDICTED GROUP

ACTUAL GROUP	1	2	3	4	5	6	7	8	9	10	Total	% HITS
1	95	3					6		3		107	89
2	1	89					17	1			108	82
3			23	1				2	1		27	85
4		11		24			1	1			37	65
5					12						12	100
6		8				9		14	3		34	26
7	23	32					19	1	1		76	25
8		6		1				45			52	86
9			1						26		27	96
10	1									6	7	86
											487	71.5

Variables	50
% Trace	80
Functions	5
Priors	Si

95 out of 139 misses correctly predicted by the second highest probability

Experimental Analaysis XXIII

PREDICTED GROUP

ACTUAL GROUP	1	2	3	4	5	6	7	8	9	10	Total	% HITS
1	85	8					11		3		107	79
2	8	85		4	1	5	1	4			108	79
3		1	23					2	1		27	85
4	1	4		30		1	1				37	81
5					12						12	100
6						28	1	2	3		34	82
7	5	2		1			66	1	1		76	87
8		6		1			1	44			52	85
9			1						26		27	96
10							1		1	5	7	71
											487	83

Variables	25
% Trace	95
Functions	8
Priors	Eq

50 out of 83 misses correctly predicted by the second highest probability

DISCRIMINANT ANALYSIS HITS AND MISSES

Experimental Analysis XXIV

PREDICTED GROUP

ACTUAL GROUP

	1	2	3	4	5	6	7	8	9	10	Total	% HITS
1	95	3					6		3		107	89
2	5	95		1	1	4	1	1			108	88
3		1	23					2	1		27	85
4		3		33			1				37	89
5					12						12	100
6						30		1	3		34	88
7	3	2					70		1		76	92
8		4		1				47			52	90
9			1						26		27	96
10	1									6	7	86
											487	89.7

Variables	50
% Trace	95
Functions	8
Priors	Eq

30 out of 50 misses correctly predicted by the second highest probability.

Step-Wise MANOVA - 15 Groups

SUMMARY TABLE

STEP NUMBER	VARIABLE ENTERED	VARIABLE REMØVED	F TØ ENTER ØR REMØVE
1	H03		118.96433
2	L04		78.10467
3	H04		55.23024
4	A07		53.78203
5	S05		47.38327
6	M06		34.19105
7	H05		25.46650
8	G03		24.09248
9	W06		20.17978
10	M05		17.39752
11	M03		16.14444
12	M07		15.68379
13	L13		13.42342
14	W07		10.83100
15	G02		10.25933
16	W02		9.56666
17	L09		8.29538
18	L02		7.01597
19	A01		6.36077
20	S04		6.32333
21	H02		5.10562
22	A02		4.52715
23	A03		5.13323
24	M08		4.52947
25	W03		4.03136
26	H06		3.98697
27	M01		3.90062
28	W01		3.49717
29	L07		3.76990
30	L05		3.26168
31	S01		2.99767
32	G05		2.83773
33	L01		2.52905
34	S03		2.48324
35	L03		2.45254
36	G06		2.57062
37	A04		2.35872
38	L08		2.70527
39	M04		2.19785
40	L14		1.97151
41	W05		1.93536
42	W04		3.47139
43	L12		2.23769
44	L11		1.87899
45	G04		1.48735
46	A06		1.46347
47	M02		1.22747
48	S02		1.08207
49	A05		.87419
50	L06		.44914

Discriminant Analysis - 15 Groups

NUMBER REMØVED	EIGENVALUE	CANØNICAL CØRRELATIØN	PERCENT ØF TRACE	WILKS LAMBDA	CHI-SQUARE	D.F.	SIGNIFICANCE
0	6,35752	,92956	26,0	,00001	5442,86658	350	0,000
1	4,61488	,90659	18,9	,00006	4510,86408	312	0,000
2	3,10341	,86966	12,7	,00036	3705,09274	276	0,000
3	2,37416	,83883	9,7	,00147	3045,77352	242	0,000
4	1,72109	,79530	7,0	,00496	2477,83310	210	0,000
5	1,58700	,78323	6,5	,01350	2010,35082	180	0,000
6	1,51452	,77609	6,2	,03493	1566,46827	152	0,000
7	1,08015	,72060	4,4	,08784	1135,85655	126	0,000
8	,79523	,66556	3,3	,18272	793,80679	102	0,000
9	,55586	,59773	2,3	,32802	520,54890	80	0,000
10	,39312	,53121	1,6	,51037	314,11546	60	0,000
11	,20535	,41276	,8	,71100	159,28436	42	,000
12	,12033	,32772	,5	,85701	72,06157	26	,000
13	,04153	,19967	,2	,96013	19,00068	12	,089

10 FUNCTIØNS WILL BE USED IN REMAINING ANALYSES

STANDARDIZED DISCRIMINANT FUNCTIØN CØEFFICIENTS

	1	2	3	4	5	6	7	8	9	10
S04	,00890	-,09090	,39792	-,20853	,07484	,02258	-,08819	-,22195	,15018	-,09119
S05	,05209	,26632	,59971	-,02150	,14685	-,07727	,17105	,18530	-,49090	,35890
L02	-,21781	,11743	-,06419	-,03351	-,12511	,16945	-,02646	-,07962	-,48524	,02253
L04	1,81462	-,56228	,29793	,28774	-,04061	,09207	,24514	-,11272	,12702	-,04558
L09	,07414	,07240	-,11331	,10530	,26160	-,36210	-,12890	,39958	,08093	-,02948
L13	-,02373	,00734	-,14116	-,29976	,21807	,22579	,51633	-,33129	,18517	-,19923
A01	,03583	-,05376	-,06746	-,29592	,04811	,02066	,27981	-,01523	-,27513	,32357
A02	,06238	,18511	,15737	,05525	-,17460	-,11700	,30018	,18107	,15080	,41057
A03	,08769	,23167	,08027	-,06410	-,10550	,04254	,29356	-,00090	,28751	,17638
A07	-,12855	-,09698	-,11973	,65026	1,42287	,28973	-,00446	,05714	-,13971	,18716
W02	,06914	,28469	-,04810	,13565	-,24365	-,18357	,03357	,02484	,51142	,25933
W03	-,14205	,02919	-,07410	-,06144	,22801	-,18245	-,08090	-,18053	,08477	,31702
W06	,02458	-,24402	-,28413	-,15212	,02071	-,35778	-,49247	-,73002	-,07307	,30677
W07	,06680	-,34776	-,11536	-,16658	,20284	-,86135	,05140	,41436	,02460	,11343
H03	,08138	,23268	,56588	-,01066	,19581	-,38980	,16160	-,17786	-,10853	-,65053
H05	-,01677	,30442	,28371	-,00628	,25969	-,31655	,06442	-,30020	,62892	,22022
H06	1,19991	-,18596	,10368	-,09352	,08008	-,02126	-,02190	-,01023	,03751	,11901
H07	,09546	-,23925	-,01245	-,37011	,17835	-,28716	,35312	,39833	-,15310	,32045
H08	-,01001	-,06592	-,25673	-,03690	-,13322	-,18678	,03454	,08547	,17638	,14414
H02	,04216	-,01252	,22824	,01217	-,05396	-,14829	-,07320	,01498	-,39430	-,06267
H03	,82016	1,93196	-1,27102	,69732	,09502	-,12585	,50009	-,34270	-,98460	-,84851
H04	-,21125	,49539	-,64486	1,61159	-,38997	-,27823	1,12635	-,51812	-,91002	-,68002
H05	-,01557	,01922	-,11474	-,06014	,07462	-,44635	-,25785	-,54465	-,19781	,21189
G02	,20623	,11489	,08961	,17393	-,17334	,21815	-,06143	,18219	-,31069	,52380
G03	,04054	,03368	-,28352	-,52379	,16195	,17150	,72681	-,27861	-,16823	,22233

DISCRIMINANT ANALYSIS HITS AND MISSES

Experimental Analaysis XXV

PREDICTED GROUP

ACTUAL GROUP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total	% HITS
1	38							3			4			3		48	79
2		45		1		2		5				2	6			61	73
3			20	1								1	1	1		24	83
4				25				2				1				28	89
5					10											10	100
6		2				30							1			33	91
7			1				9									10	90
8	5	9				1		56			1					72	78
9		5				1		5			4			1		16	0
10								1		11	1					13	85
11	5							2			34	6		1		48	71
12		2		1							1	37				41	90
13		4				1						4	37			47	79
14			2											27		29	93
15								1						1	5	7	71
																487	78.9

Variables	25
% Trace	95
Functions	10
Priors	Si

64 out of 103 misses correctly predicted by the second highest probability.

Step-Wise MANOVA - 20 Groups

SUMMARY TABLE

STEP NUMBER	VARIABLE ENTERED	VARIABLE REMOVED	F TO ENTER OR REMOVE
1	H03		91.96962
2	L04		62.55499
3	A07		50.12281
4	G03		47.53707
5	H04		41.03111
6	S05		36.24601
7	W07		27.94450
8	M06		26.50679
9	W06		19.59978
10	M07		15.56138
11	S03		13.80652
12	L09		12.66621
13	M08		11.17146
14	G02		10.88335
15	W02		9.24988
16	A01		9.02166
17	M03		8.92514
18	M05		7.02835
19	H06		6.68669
20	L13		6.42997
21	W03		5.35028
22	L02		5.04480
23	G04		4.98308
24	H05		4.57412
25	S01		4.53790
26	A02		4.33985
27	A03		4.90637
28	L07		3.39761
29	M01		3.39725
30	M02		3.33082
31	W01		3.26675
32	H02		2.92608
33	L03		2.34208
34	L08		2.53970
35	L10		3.00475
36	L12		2.42899
37	S04		2.34859
38	A04		1.91027
39	A06		2.02987
40	G06		1.83196
41	L14		1.77414
42	M04		1.76026
43	G05		1.85719
44	L06		1.34842
45	L11		1.32294
46	S02		1.50711
47	W05		.97643
48	W04		3.35390
49	A05		.84798
50	L01		.77937

Discriminant Analysis - 20 Groups

NUMBER REMØVED	EIGENVALUE	CANØNICAL CØRRELATIØN	PERCENT ØF TRACE	WILKS LAMBDA	CHI-SQUARE	D.F.	SIGNIFICANCE
0	7,53760	,93961	24,8	,00000	6419,26778	475	0,000
1	5,53046	,92026	18,2	,00001	5423,15677	432	0,000
2	3,74838	,88848	12,3	,00006	4551,53315	391	0,000
3	2,93587	,86367	9,7	,00026	3827,93316	352	0,000
4	2,32651	,83629	7,7	,00104	3191,50740	315	0,000
5	1,84267	,80512	6,1	,00345	2633,21317	280	0,000
6	1,72618	,79573	5,7	,00981	2147,92971	247	0,000
7	1,25447	,74595	4,1	,02675	1682,08241	216	0,000
8	,87776	,68370	2,9	,06030	1304,48432	187	0,000
9	,68395	,63731	2,3	,11324	1011,81247	160	0,000
10	,54226	,59296	1,8	,19068	769,74207	135	0,000
11	,40784	,53823	1,3	,29408	568,49861	112	0,000
12	,35163	,51005	1,2	,41402	409,61428	91	0,000
13	,27103	,46178	,9	,55960	269,65476	72	,000
14	,16430	,37565	,5	,71127	158,25387	55	,000
15	,10958	,31426	,4	,82814	87,59470	40	,000
16	,06107	,23991	,2	,91888	39,29444	27	,060
17	,01687	,12879	,1	,97500	11,75901	16	,760
18	,00863	,09249	,0	,99145	3,99039	7	,781

11 FUNCTIØNS WILL BE USED IN REMAINING ANALYSES

STANDARDIZED DISCRIMINANT FUNCTIØN CØEFFICIENTS

	1	2	3	4	5	6	7	8	9	10	11
S01	,17347	,04208	-,32464	-,12877	,39736	-,14412	,04231	-,03204	-,10607	-,26277	-,05267
S03	-,47279	-,44169	-,43909	-,16996	-,26245	,13351	,26360	-,12089	,18140	-,05343	,05399
S05	-,15205	-,22047	-,36020	,07434	,17682	,17494	,16079	,27897	-,32899	-,07960	-,45155
L02	,13986	-,20225	-,03902	-,04884	-,00825	,05906	-,14320	,14885	-,46587	-,40746	-,05706
L04	-1,67486	1,05153	-,35277	,07229	,13864	,32855	-,01831	-,03351	,34275	-,16342	-,05705
L09	-,06492	,16166	,38460	,09608	,22898	-,41430	,34152	,28613	-,11634	-,14113	-,11179
L13	,05945	-,03125	,09420	-,25671	,23298	,21969	-,09739	-,08257	,13661	-,09984	-,22542
A01	,05504	,02855	,00677	-,48096	,10049	,15442	,00359	-,00517	-,15500	,08188	,52533
A07	,69243	,75363	,73683	,69853	1,57326	-,02040	,16645	-,03561	-,21867	,19024	-,11603
W02	-,27627	-,27540	,23205	-,02153	-,32246	,34461	,09955	-,02195	,24388	,36623	-,50597
W03	,11063	-,10087	,06345	-,07552	,06446	-,09790	,06998	-,39838	-,19259	,20885	-,07787
W05	,03521	,11710	,06500	,09799	-,14404	-,31133	-,19318	-1,00420	-,16476	-,07787	,23312
W07	,00612	,33287	,11788	-,02000	-,32247	-,45276	,85642	,00571	-,04155	,31354	,00924
M03	-,12367	-,26620	-,31757	,03095	,22049	,08299	,35835	-,04654	,18385	-,52721	,21608
M05	,00530	-,30588	-,17990	-,00311	,19039	,04099	,38548	-,28592	,32600	,25307	,14368
M06	-1,13568	,42089	-,15795	-,10675	,16289	-,09388	,02004	-,11958	,07526	,05699	,12641
M07	-,01909	,25463	-,04703	-,49443	,11653	-,18081	,36080	,25205	-,18180	,04050	,41247
M08	-,14321	,11947	,06466	-,14654	-,22267	-,01553	,12614	,07243	-,61973	-,12598	-,44104
H03	-1,24613	-1,45077	1,36129	,95772	,09929	,28391	,21625	,03041	-,22125	-,90437	,65849
H04	,13394	-,21054	,78299	1,20863	-,39181	1,36448	,41094	,14009	-,22521	-,90402	,79890
H05	,03602	,00390	,18545	-,05846	-,18665	-,12256	,31532	-,55763	-,14425	-,16738	-,08582
H06	,00790	,09221	,20739	,11564	,04651	-,20199	-,25342	,38546	,29424	-,31244	,14881
G02	-,25226	-,15292	-,10745	,07188	-,03192	,14096	-,11582	,08779	-,42099	,68965	,37216
G03	-,19841	-,31929	,68424	-1,14045	,31213	,77051	,05409	-,16868	-,08746	,02880	-,18968
G04	-,01382	-,07820	-,00616	-,02716	,08060	-,03720	,01450	-,05185	-,44998	,14470	,15204

PREDICTED GROUP

ACTUAL GROUP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	% HITS
1	21														3						24	88
2	2	24			1	3			1			4			1				3		39	62
3			12		1										1	1					15	80
4				20		2												1	1		24	83
5					21					1			1			5		5			33	64
6					1	19						2			1	2	2	1			28	68
7							10														10	100
8								13	3	1											17	76
9						1			24												25	96
10						1				12											13	92
11											7										7	100
12		2			1	2						38			2	3					48	79
13					1				1			3	1		4	3		1	1		15	7
14												1		9							10	90
15	2	1										2			35		4	1			45	78
16					3	1						3				29					36	88
17										1					2		30				33	91
18					4	1			1								4	20			30	67
19				2															27		29	93
20																			1	5	6	83
																					487	77.4

Variables	25
% Trace	95
Functions	11
Priors	Si

56 out of 110 misses correctly predicted by the second highest probability.

APPENDIX I

Means of 15 and 10 Cluster Classes

Samples B and C

CENTROIDS OF 10 CLUSTER CLASSES - SAMPLE B

LUSTER CLASSIFICATION - SAMPLE B

OUP MEANS — VARIABLES

OUP	S01	S02	S03	S04	S05	L01	L02	L03	L04	L05	SIZE
1	0.9374E 04	0.8946E 04	0.4965E 02	0.5729E 01	0.6900E 01	0.4639E 02	0.1289E 02	0.6110E 01	0.0000E 00	0.1327E 02	20
2	0.9774E 03	0.7844E 03	0.4759E 01	0.1956E 01	0.1852E 01	0.2318E 02	0.2553E 01	0.1432E 00	0.1550E 01	0.2019E 02	81
3	0.9945E 03	0.7212E 03	0.5176E 00	0.1104E 01	0.8824E 00	0.2593E 02	0.1246E 01	0.2624E 00	0.3255E 01	0.6598E 01	17
4	0.3242E 04	0.2903E 04	0.3051E 02	0.2563E 01	0.4545E 01	0.3253E 02	0.8800E 01	0.4038E 00	0.1178E-01	0.7515E 01	101
5	0.3418E 03	0.3067E 03	0.5569E 01	0.9858E 00	0.1476E 01	0.2491E 02	0.1507E 02	0.7031E 00	0.1638E 01	0.9272E 01	84
6	0.7022E 02	0.5667E 02	0.0000E 00	0.2344E 01	0.1111E 01	0.0000E 00	0.4908E 01	0.0000E 00	0.8782E 02	0.1010E 01	9
7	0.1885E 04	0.1717E 04	0.9316E 01	0.1713E 01	0.2000E 01	0.2593E 02	0.6699E 01	0.4920E 00	0.2514E 01	0.2030E 02	30
8	0.8500E 02	0.7075E 02	0.2085E 02	0.7525E 00	0.5000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	4
9	0.1560E 04	0.1358E 04	0.1417E 02	0.1574E 01	0.1646E 01	0.1371E 02	0.2739E 01	0.3854E-01	0.3805E-01	0.5566E 01	82
0	0.1293E 04	0.1246E 04	0.1958E 02	0.1626E 01	0.2481E 01	0.2690E 02	0.6781E 01	0.2033E 00	0.3616E 00	0.5951E 01	58
TAL	0.1852E 04	0.1666E 04	0.1689E 02	0.1918E 01	0.2539E 01	0.2487E 02	0.7209E 01	0.5510E 00	0.2489E 01	0.1032E 02	486

OUP MEANS — VARIABLES

OUP	L06	L07	L08	L09	L10	L11	L12	L13	L14	A01	SIZE
1	0.1740E 00	0.6450E-01	0.1484E 02	0.2732E 01	0.1534E 01	0.3600E 00	0.4350E 01	0.5000E-01	0.2500E 00	0.9820E 00	20
2	0.3246E 01	0.6416E 00	0.1087E 02	0.1479E 02	0.1684E 02	0.3603E 01	0.1418E 02	0.4568E 00	0.2346E 00	0.2333E 01	81
3	0.1016E 02	0.4429E 00	0.1019E 02	0.2054E 02	0.1536E 02	0.2929E 01	0.1115E 02	0.0000E 00	0.5862E-01	0.6471E 02	17
4	0.7045E 00	0.2657E 00	0.4947E 02	0.8030E-01	0.2148E 00	0.4186E 00	0.8218E 01	0.4950E-01	0.4257E 00	0.9723E 00	101
5	0.5258E 00	0.3293E 01	0.3571E 02	0.3926E 01	0.4948E 01	0.3026E 01	0.9677E 01	0.1190E-01	0.2500E 00	0.5876E 01	84
6	0.1852E 01	0.0000E 00	0.1683E 01	0.0000E 00	0.1981E 01	0.0000E 00	0.2006E 02	0.0000E 00	0.0000E 00	0.0000E 00	9
7	0.5553E 00	0.5023E 00	0.2693E 02	0.5502E 01	0.8574E 01	0.1372E 01	0.1068E 02	0.1333E 00	0.2000E 00	0.2651E 01	30
8	0.2500E 02	0.5104E 02	0.0000E 00	0.0000E 00	0.2306E 02	0.0000E 00	0.4920E 02	0.0000E 00	0.0000E 00	0.0000E 00	4
9	0.6135E 00	0.4344E 00	0.7552E 02	0.3573E 00	0.9860E 00	0.3031E 01	0.7890E 01	0.4876E-01	0.4878E-01	0.2131E 01	82
0	0.2052E 00	0.6236E 00	0.5674E 02	0.8026E 00	0.1436E 01	0.7155E-01	0.3331E 01	0.1034E 00	0.3276E 00	0.1924E 01	58
TAL	0.1543E 01	0.1348E 01	0.4178E 02	0.4488E 01	0.5407E 01	0.1932E 01	0.9479E 01	0.1193E 00	0.2428E 00	0.4726E 01	486

OUP MEANS — VARIABLES

OUP	A02	A03	A04	A05	A06	A07	W01	W02	W03	W04	SIZE
1	0.3195E 02	0.3227E 02	0.9070E 01	0.9222E 01	0.6511E 01	0.5485E 00	0.7060E 00	0.3665E 02	0.1574E 02	0.2443E 02	20
2	0.1624E 02	0.3075E 02	0.5935E 01	0.8414E 01	0.5209E 01	0.6698E 00	0.4424E 01	0.8284E 02	0.6913E 01	0.6132E 01	81
3	0.0000E 00	0.5862E 01	0.0000E 00	0.0000E 00	0.0000E 00	0.1424E 00	0.2606E 01	0.7273E 02	0.5862E 01	0.4902E 01	17
4	0.3965E 02	0.3652E 02	0.1951E 00	0.1725E 02	0.3437E 01	0.1372E 01	0.1037E 01	0.8986E 02	0.1756E 02	0.1745E 02	101
5	0.2546E 02	0.1098E 02	0.1097E 01	0.2871E 02	0.6445E 01	0.1647E 01	0.5024E 01	0.9747E 02	0.4762E 01	0.5040E 01	84
6	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.3831E 02	0.8255E 02	0.2667E 02	0.1089E 02	9
7	0.2037E 02	0.2614E 02	0.2527E 00	0.1560E 02	0.1444E 01	0.6917E 00	0.2159E 01	0.7407E 00	0.8869E 01	0.1561E 02	30
8	0.0000E 00	0.0000E 00	0.5625E 00	0.2500E 02	0.7444E 02	0.2419E 02	0.1043E 02	0.1000E 03	0.0000E 00	0.2500E 02	4
9	0.5116E 02	0.2667E 02	0.5507E 01	0.7524E 01	0.3566E 00	0.1281E 01	0.1428E 01	0.9791E 02	0.5122E 01	0.7500E 01	82
0	0.4395E 02	0.3573E 02	0.7350E 00	0.1162E 02	0.4351E 01	0.1623E 01	0.1711E 01	0.9630E 02	0.2586E 01	0.3147E 02	58
TAL	0.3180E 02	0.2652E 02	0.2630E 01	0.1415E 02	0.4326E 01	0.1395E 01	0.3419E 01	0.8379E 02	0.8693E 01	0.1515E 02	486

OUP MEANS — VARIABLES

OUP	W05	W06	W07	M01	M02	M03	M04	M05	M06	M07	SIZE
1	0.1712E 02	0.3542E 02	0.7298E 01	0.1000E 01	0.3000E 00	0.8500E 00	0.7500E 00	0.3500E 00	0.0000E 00	0.0000E 00	20
2	0.3239E 02	0.4241E 02	0.1216E 02	0.3210E 00	0.3951E 00	0.4938E-01	0.6173E 00	0.1235E-01	0.3342E 00	0.3704E-01	81
3	0.2255E 02	0.4706E 02	0.1961E 02	0.0000E 00	0.1765E 00	0.0000E 00	0.5294E 00	0.0000E 00	0.2747E 00	0.1000E 01	17
4	0.1725E 02	0.3882E 02	0.8722E 01	0.9307E 00	0.5941E-01	0.5347E 00	0.7228E 00	0.7921E 00	0.1178E-01	0.0000E 00	101
5	0.6944E 01	0.5438E 02	0.2687E 02	0.1905E 00	0.3571E-01	0.3571E-01	0.7024E 00	0.2381E-01	0.2132E 00	0.0000E 00	84
6	0.0000E 00	0.4611E 02	0.8333E 01	0.0000E 00	0.5556E 00	0.0000E 00	0.3333E 00	0.0000E 00	0.4404E 02	0.0000E 00	9
7	0.1000E 02	0.3611E 02	0.1906E 02	0.4333E 00	0.1667E 00	0.1667E 00	0.5667E 00	0.1667E 00	0.4767E-01	0.6667E-01	30
8	0.2500E 02	0.5000E 02	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.2500E 00	0.0000E 00	0.0000E 00	0.0000E 00	4
9	0.8252E 01	0.6699E 02	0.1213E 02	0.4756E 00	0.7317E-01	0.1220E-01	0.5854E 00	0.3293E 00	0.0000E 00	0.1220E-01	82
0	0.5316E 02	0.3879E 01	0.8908E 01	0.6207E 00	0.5172E-01	0.6897E-01	0.8103E 00	0.3448E 00	0.0000E 00	0.0000E 00	58
TAL	0.2024E 02	0.4290E 02	0.1419E 02	0.5021E 00	0.1450E 00	0.1811E 00	0.6626E 00	0.2922E 00	0.9231E 00	0.4733E-01	486

OUP MEANS — VARIABLES

OUP	M08	H01	H02	H03	H04	H05	H06	G01	G02	G03	SIZE
	0.9435E 00	0.9000E 00	0.2050E 01	0.8500E 00	0.5000E-01	0.5485E 02	0.5000E-01	0.3864E 02	0.6136E 02	0.0000E 00	20
	0.4849E 01	0.1000E 01	0.1074E 01	0.9753E 00	0.2469E-01	0.5416E 02	0.2593E 00	0.7516E 02	0.9486E 01	0.1535E 02	81
	0.1385E 01	0.9412E 00	0.1176E 01	0.6235E 00	0.1176E 00	0.5400E 02	0.1765E 00	0.8158E 02	0.1842E 02	0.0000E 00	17
	0.1892E 01	0.1000E 01	0.1673E 01	0.9901E 00	0.9901E-02	0.4836E 02	0.1980E-01	0.6501E 02	0.3419E 02	0.8009E 00	101
	0.6931E 01	0.1000E 01	0.1071E 01	0.8690E 00	0.1310E 00	0.5939E 02	0.3571E 00	0.7544E 02	0.2446E 02	0.1000E 00	84
	0.1764E 02	0.1000E 01	0.1444E 01	0.8889E 00	0.1111E 00	0.5367E 02	0.2222E 00	0.6667E 02	0.3333E 02	0.0000E 00	9
	0.2205E 01	0.6667E-01	0.1533E 01	0.0000E 00	0.6667E-01	0.5323E 02	0.3333E-01	0.7046E 02	0.1953E 02	0.1000E 02	30
	0.3703E 01	0.1000E 01	0.1750E 01	0.7500E 00	0.2500E 00	0.4500E 02	0.7500E 00	0.7500E 02	0.2500E 02	0.0000E 00	4
	0.1835E 01	0.1000E 01	0.1073E 01	0.9512E 00	0.4878E-01	0.5718E 02	0.3049E 00	0.6972E 02	0.2992E 02	0.3022E 00	82
	0.2625E 01	0.1000E 01	0.1362E 01	0.9828E 00	0.1724E-01	0.3650E 02	0.2586E 00	0.2161E 02	0.7799E 02	0.3986E 00	58
TAL	0.3605E 01	0.9362E 00	0.1317E 01	0.8827E 00	0.5350E-01	0.5214E 02	0.2119E 00	0.6407E 02	0.3247E 02	0.3468E 01	486

OUP MEANS — VARIABLES

OUP	G04	G05	G06	SIZE
	0.5000E 00	0.2150E 01	0.7000E 00	20
	0.8642E-01	0.8889E 00	0.1358E 00	81
	0.0000E 00	0.4706E 00	0.0000E 00	17
	0.3762E 00	0.2723E 01	0.6931E-01	101
	0.1071E 00	0.1345E 01	0.7143E-01	84
	0.3333E 00	0.1222E 01	0.0000E 00	9
	0.3333E 00	0.1000E 01	0.1000E 00	30
	0.2500E 00	0.0000E 00	0.2500E 00	4
	0.1707E 00	0.1061E 01	0.2439E-01	82
	0.2931E 00	0.1552E 01	0.6897E-01	58
TAL	0.2243E 00	0.1500E 01	0.9877E-01	486

CENTROIDS OF 15 CLUSTER CLASSES - SAMPLE B

STER CLASSIFICATION - SAMPLE B

P MEANS — VARIABLES

P	S01	S02	S03	S04	S05	L01	L02	L03	L04	L05	SIZE
	0,9054E 04	0,8640E 04	0.4910E 02	0.5572E 01	0.6840E 01	0.4663E 02	0.1231E 02	0.6386E 01	0.0000E 00	0.1568E 02	21
	0,1315E 04	0,1097E 04	0.7014E 01	0.2675E 01	0.2444E 01	0.3512E 02	0.3855E 01	0.0000E 00	0.1528E 01	0.3447E 02	36
	0,8675E 03	0,8401E 03	0.6000E 00	0.1032E 01	0.1000E 01	0.3391E 02	0.1020E 01	0.0000E 00	0.4256E 01	0.8285E 01	13
	0,4185E 04	0,3653E 04	0.4051E 02	0.2812E 01	0.4880E 01	0.3778E 02	0.5775E 01	0.2702E 00	0.0000E 00	0.8563E 01	50
	0,5870E 03	0,3889E 03	0.1459E 01	0.1314E 01	0.1200E 01	0.4437E 01	0.8090E 00	0.2650E 00	0.3725E 01	0.2592E 01	30
	0,4563E 03	0,3421E 03	0.6062E 01	0.9745E 00	0.1000E 01	0.1615E 02	0.8201E 01	0.1875E 01	0.7555E 01	0.3450E 01	20
	0,6912E 02	0,5637E 02	0.0000E 00	0.2544E 01	0.1250E 01	0.0000E 00	0.3402E 01	0.0000E 00	0.9053E 02	0.1811E 01	8
	0,1931E 04	0,1787E 04	0.9796E 01	0.1755E 01	0.2107E 01	0.2706E 02	0.6078E 01	0.5271E 00	0.2694E 01	0.2175E 02	28
	0,2107E 04	0,1993E 04	0.3585E 02	0.1954E 01	0.4041E 01	0.2008E 02	0.1004E 02	0.1359E 00	0.0000E 00	0.2985E 01	49
	0,2059E 03	0,1895E 03	0.5950E 01	0.7217E 00	0.1583E 01	0.2316E 02	0.2003E 02	0.0000E 00	0.2925E 00	0.7528E 01	24
	0,8500E 02	0,7075E 02	0.2085E 02	0.7525E 00	0.5000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	4
	0,2055E 04	0,1893E 04	0.1023E 02	0.2195E 01	0.2766E 01	0.3222E 02	0.7561E 01	0.6491E 00	0.4675E-01	0.1180E 02	64
	0,1051E 04	0,8404E 03	0.1212E 02	0.1258E 01	0.1070E 01	0.5832E 01	0.2768E 01	0.0000E 00	0.0000E 00	0.1307E 01	43
	0,1157E 04	0,1123E 04	0.1596E 02	0.1600E 01	0.2209E 01	0.3070E 02	0.7258E 01	0.2742E 00	0.4377E 00	0.5013E 01	43
	0,4871E 03	0,3599E 03	0.3507E 01	0.1079E 01	0.1226E 01	0.2125E 02	0.9551E 01	0.0000E 00	0.0000E 00	0.1417E 02	53
L	0,1852E 04	0,1666E 04	0.1689E 02	0.1918E 01	0.2539E 01	0.2487E 02	0.7209E 01	0.5510E 00	0.2489E 01	0.1032E 02	486

P MEANS — VARIABLES

P	L06	L07	L08	L09	L10	L11	L12	L13	L14	A01	SIZE
	0,1657E 00	0.6524E-01	0.1470E 02	0.2602E 01	0.1461E 01	0.3429E 00	0.4359E 01	0.4762E-01	0.2381E 00	0.9352E 00	21
	0,4061E 00	0.5753E 00	0.1468E 02	0.5286E 01	0.4081E 01	0.8981E 00	0.1104E 02	0.5278E 00	0.4167E 00	0.2387E 01	36
	0,1329E 02	0.4508E 00	0.1032E 02	0.6899E 01	0.1205E 02	0.6408E 00	0.4578E 01	0.0000E 00	0.7692E-01	0.8462E 02	13
	0,1343E 01	0.2502E 00	0.4368E 02	0.8660E-01	0.2478E 00	0.4516E 00	0.1107E 02	0.1000E 00	0.3000E 00	0.6616E 00	50
	0,6117E 01	0.2750E 01	0.7923E 01	0.3181E 02	0.3957E 02	0.8065E 01	0.1372E 02	0.3333E 00	0.0000E 00	0.5920E 00	30
	0,0000E 00	0.2113E 01	0.4365E 02	0.9804E 01	0.6917E 01	0.1039E 02	0.1218E 02	0.0000E 00	0.5000E-01	0.3334E 01	20
	0,2084E 01	0.0000E 00	0.0000E 00	0.0000E 00	0.2172E 01	0.0000E 00	0.1940E 02	0.0000E 00	0.0000E 00	0.0000E 00	8
	0,5950E 00	0.5362E 00	0.2721E 02	0.5181E 01	0.7758E 01	0.3961E 00	0.9472E 01	0.1429E 00	0.2143E 00	0.3055E 01	28
	0,0000E 00	0.2624E 00	0.6019E 02	0.0000E 00	0.3067E 00	0.2247E 00	0.4762E 01	0.0000E 00	0.4593E 00	0.1376E 01	49
	0,1190E 01	0.2014E 01	0.3499E 02	0.0000E 00	0.1079E 02	0.1630E 01	0.9543E 01	0.0000E 00	0.2500E 00	0.1093E 01	24
	0,2500E 02	0.5104E 02	0.0000E 00	0.0000E 00	0.2306E 02	0.0000E 00	0.4920E 02	0.0000E 00	0.0000E 00	0.0000E 00	4
	0,1228E 01	0.3739E 00	0.4406E 02	0.1393E 01	0.6750E 00	0.2209E 01	0.6275E 01	0.1563E-01	0.2813E 00	0.2713E 01	64
	0,0000E 00	0.6391E 00	0.3775E 02	0.3019E 00	0.1406E 01	0.3197E 01	0.9079E 01	0.9302E-01	0.4651E-01	0.2995E 01	43
	0,2553E 00	0.7484E 00	0.5182E 02	0.8891E 00	0.1756E 01	0.0000E 00	0.3016E 01	0.1395E 00	0.3023E 00	0.1400E 01	43
	0,1076E 01	0.2378E 01	0.4088E 02	0.7664E 01	0.3028E 01	0.1490E 01	0.1601E 02	0.1509E 00	0.2264E 00	0.7751E 01	53
L	0,1543E 01	0.1348E 01	0.4178E 02	0.4488E 01	0.5407E 01	0.1932E 01	0.9479E 01	0.1193E 00	0.2428E 00	0.4726E 01	486

P MEANS — VARIABLES

P	A02	A03	A04	A05	A06	A07	W01	W02	W03	W04	SIZE
	0,3043E 02	0.3334E 02	0.8039E 01	0.8783E 01	0.8356E 01	0.5910E 00	0.7162E 00	0.3932E 02	0.1618E 02	0.2526E 02	21
	0,2653E 02	0.5121E 02	0.1724E 01	0.7049E 01	0.5544E 01	0.7894E 00	0.3737E 01	0.8613E 02	0.1509E 02	0.8472E 01	36
	0,0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.1731E 00	0.2768E 01	0.7980E 02	0.0000E 00	0.3846E 01	13
	0,3794E 02	0.4550E 02	0.1240E-01	0.1456E 02	0.1335E 01	0.9866E 00	0.8342E 00	0.9061E 02	0.1997E 02	0.1982E 02	50
	0,1900E 00	0.5026E 01	0.9037E 01	0.5344E 01	0.2745E 01	0.5157E 00	0.6073E 01	0.7079E 02	0.4444E 01	0.3611E 01	30
	0,2229E 02	0.1285E 02	0.0000E 00	0.8327E 01	0.3206E 01	0.1418E 01	0.8997E 01	0.8394E 02	0.1500E 02	0.9500E 01	20
	0,0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.4192E 02	0.8036E 02	0.2375E 02	0.2125E 02	8
	0,2023E 02	0.2603E 02	0.2707E 00	0.1672E 02	0.1547E 01	0.7139E 00	0.2245E 01	0.0000E 00	0.9524E 01	0.1458E 02	28
	0,4843E 02	0.1999E 02	0.5341E 00	0.1868E 02	0.6702E 01	0.2034E 01	0.1143E 01	0.8919E 02	0.1207E 02	0.1497E 02	49
	0,1260E 02	0.5272E 01	0.9671E 00	0.5696E 02	0.6434E 01	0.3125E 01	0.4712E 01	0.9844E 02	0.3472E 01	0.0000E 00	24
	0,0000E 00	0.0000E 00	0.5025E 00	0.2500E 02	0.7444E 02	0.2419E 02	0.1043E 02	0.1000E 03	0.0000E 00	0.2500E 02	4
	0,4532E 02	0.3178E 02	0.4932E 01	0.1158E 02	0.2111E 01	0.9711E 00	0.1572E 01	0.9560E 02	0.6953E 01	0.7916E 01	64
	0,5270E 02	0.2246E 02	0.5012E 01	0.9266E 01	0.5926E 00	0.1590E 01	0.1381E 01	0.9880E 02	0.3488E 01	0.7170E 01	43
	0,4050E 02	0.3940E 02	0.8002E 00	0.1163E 02	0.3545E 01	0.1568E 01	0.1913E 01	0.9638E 02	0.3488E 01	0.3895E 02	43
	0,2569E 02	0.2141E 02	0.2265E 01	0.1690E 02	0.7121E 01	0.9875E 00	0.4003E 01	0.9694E 02	0.6289E 00	0.6761E 01	53
L	0,3180E 02	0.2652E 02	0.2030E 01	0.1415E 02	0.4326E 01	0.1395E 01	0.3419E 01	0.8379E 02	0.8693E 01	0.1315E 02	486

CENTROIDS OF 15 CLUSTER CLASSES - SAMPLE B

CLUSTER CLASSIFICATION - SAMPLE B

GROUP MEANS — VARIABLES

GROUP	W05	W06	W07	M01	M02	M03	M04	M05	M06	M07	SIZE
1	0.1749E 02	0.3612E 02	0.6950E 01	0.1000E 01	0.2857E 00	0.8571E 00	0.7619E 00	0.3333E 00	0.0000E 00	0.0000E 00	21
2	0.3681E 02	0.3079E 02	0.8042E 01	0.5833E 00	0.5278E 00	0.1111E 00	0.6111E 00	0.2778E-01	0.3306E-01	0.0000E 00	36
3	0.2692E 02	0.5385E 02	0.1538E 02	0.0000E 00	0.1538E 00	0.0000E 00	0.6154E 00	0.0000E 00	0.3592E 00	0.1000E 01	13
4	0.1168E 02	0.3759E 02	0.1095E 02	0.1000E 01	0.6000E-01	0.8600E 00	0.5600E 00	0.9000E 00	0.0000E 00	0.0000E 00	50
5	0.3806E 02	0.5111E 02	0.2778E 01	0.1000E 00	0.3667E 00	0.0000E 00	0.4667E 00	0.0000E 00	0.1236E 01	0.1667E 00	30
6	0.1250E 02	0.4550E 02	0.1750E 02	0.5000E-01	0.1000E 00	0.0000E 00	0.5000E 00	0.5000E-01	0.8070E 00	0.1000E 00	20
7	0.0000E 00	0.4562E 02	0.9375E 01	0.0000E 00	0.6250E 00	0.0000E 00	0.3750E 00	0.0000E 00	0.4764E 02	0.0000E 00	8
8	0.8928E 01	0.3690E 02	0.1577E 02	0.4643E 00	0.1786E 00	0.1786E 00	0.5714E 00	0.1786E 00	0.5107E-01	0.7143E-01	28
9	0.3605E 02	0.3299E 02	0.3911E 01	0.7347E 00	0.0000E 00	0.1429E 00	0.8980E 00	0.8367E 00	0.0000E 00	0.0000E 00	49
10	0.4167E 01	0.9028E 02	0.2083E 01	0.1667E 00	0.4167E-01	0.8333E-01	0.8333E 00	0.0000E 00	0.2925E 00	0.0000E 00	24
11	0.2500E 02	0.5000E 02	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00	0.2500E 00	0.0000E 00	0.0000E 00	0.0000E 00	4
12	0.1445E 02	0.5656E 02	0.1411E 02	0.7813E 00	0.1094E 00	0.9375E-01	0.7969E 00	0.3438E 00	0.0000E 00	0.0000E 00	64
13	0.6783E 01	0.7926E 02	0.3295E 01	0.3023E 00	0.4651E-01	0.0000E 00	0.4419E 00	0.1860E 00	0.0000E 00	0.0000E 00	43
14	0.4535E 02	0.3294E 01	0.8915E 01	0.5581E 00	0.4651E-01	0.6977E-01	0.8140E 00	0.2326E 00	0.0000E 00	0.0000E 00	43
15	0.8176E 01	0.2657E 02	0.5786E 02	0.1509E 00	0.7547E-01	0.0000E 00	0.6604E 00	0.3774E-01	0.0000E 00	0.1887E-01	53
TOTAL	0.2024E 02	0.4290E 02	0.1419E 02	0.5021E 00	0.1450E 00	0.1811E 00	0.6626E 00	0.2922E 00	0.9231E 00	0.4733E-01	486

GROUP MEANS — VARIABLES

GROUP	M08	H01	H02	H03	H04	H05	H06	G01	G02	G03	SIZE
1	0.9886E 00	0.9048E 00	0.2048E 01	0.8571E 00	0.4762E-01	0.5443E 02	0.4762E-01	0.4097E 02	0.5903E 02	0.0000E 00	21
2	0.3076E 01	0.1000E 01	0.1056E 01	0.1000E 01	0.0000E 00	0.5417E 02	0.5556E-01	0.5909E 02	0.1408E 02	0.2682E 02	36
3	0.1654E 01	0.9231E 00	0.1000E 01	0.8462E 00	0.7692E-01	0.5508E 02	0.2308E 00	0.7591E 02	0.2409E 02	0.0000E 00	13
4	0.1427E 01	0.1000E 01	0.1380E 01	0.9800E 00	0.2000E-01	0.4856E 02	0.2000E-01	0.7339E 02	0.2499E 02	0.1618E 01	50
5	0.7921E 01	0.1000E 01	0.1267E 01	0.9667E 00	0.3333E-01	0.4777E 02	0.6000E 00	0.8345E 02	0.6553E 01	0.1000E 02	30
6	0.6358E 01	0.1000E 01	0.1000E 01	0.0000E 00	0.1000E 01	0.5875E 02	0.1500E 00	0.8922E 02	0.1078E 02	0.0000E 00	20
7	0.1984E 02	0.1000E 01	0.1500E 01	0.1000E 01	0.0000E 00	0.5362E 02	0.2500E 00	0.6250E 02	0.3750E 02	0.0000E 00	8
8	0.2339E 01	0.0000E 00	0.1571E 01	0.0000E 00	0.0000E 00	0.5200E 02	0.0000E 00	0.7028E 02	0.1901E 02	0.1071E 02	28
9	0.2462E 01	0.1000E 01	0.2000E 01	0.1000E 01	0.0000E 00	0.4439E 02	0.4082E-01	0.4416E 02	0.5562E 02	0.2102E-01	49
10	0.1120E 02	0.1000E 01	0.1167E 01	0.1000E 01	0.0000E 00	0.5533E 02	0.7500E 00	0.7117E 02	0.2883E 02	0.0000E 00	24
11	0.3703E 01	0.1000E 01	0.1750E 01	0.7500E 00	0.2500E 00	0.4500E 02	0.7500E 00	0.7500E 02	0.2500E 02	0.0000E 00	4
12	0.1866E 01	0.1000E 01	0.1031E 01	0.1000E 01	0.0000E 00	0.5730E 02	0.9375E-01	0.7202E 02	0.2772E 02	0.2650E 00	64
13	0.1955E 01	0.1000E 01	0.1047E 01	0.1000E 01	0.0000E 00	0.5537E 02	0.5116E 00	0.5886E 02	0.4084E 02	0.2965E 00	43
14	0.2808E 01	0.1000E 01	0.1233E 01	0.9767E 00	0.2326E-01	0.3560E 02	0.3256E 00	0.1974E 02	0.8026E 02	0.0000E 00	43
15	0.3943E 01	0.1000E 01	0.1057E 01	0.1000E 01	0.0000E 00	0.6319E 02	0.1509E 00	0.8632E 02	0.1352E 02	0.1585E 00	53
TOTAL	0.3603E 01	0.9362E 00	0.1317E 01	0.8827E 00	0.5350E-01	0.5214E 02	0.2119E 00	0.6407E 02	0.3247E 02	0.3468E 01	486

GROUP MEANS — VARIABLES

GROUP	G04	G05	G06	SIZE
1	0.4762E 00	0.2190E 01	0.6067E 00	21
2	0.1111E 00	0.7778E 00	0.1944E 00	36
3	0.0000E 00	0.6154E 00	0.0000E 00	13
4	0.1400E 00	0.2860E 01	0.2000E-01	50
5	0.1000E 00	0.1000E 01	0.3333E-01	30
6	0.0000E 00	0.1200E 01	0.1000E 00	20
7	0.3750E 00	0.1375E 01	0.0000E 00	8
8	0.3571E 00	0.9286E 00	0.1071E 00	28
9	0.9184E 00	0.2673E 01	0.1020E 00	49
10	0.2500E 00	0.2042E 01	0.1067E 00	24
11	0.2500E 00	0.0000E 00	0.2500E 00	4
12	0.3125E-01	0.1687E 01	0.6250E-01	64
13	0.2326E 00	0.7907E 00	0.2326E-01	43
14	0.1395E 00	0.1186E 01	0.6977E-01	43
15	0.3774E-01	0.7547E 00	0.3774E-01	53
TOTAL	0.2243E 00	0.1500E 01	0.9677E-01	486

CENTROIDS OF 10 CLUSTER CLASSES - SAMPLE C

ER CLASSIFICATION - RANDOM SAMPLE C

MEANS S01	S02	S03	S04	S05	L01	L02	L03	L04	L05	SIZE
0.3114E 04	0.1775E 04	0.8727E 01	0.2244E 01	0.2111E 01	0.2340E 02	0.4680E 01	0.3367E 00	0.5945E 01	0.1293E 02	27
0.1162E 04	0.6593E 03	0.3302E 01	0.2043E 01	0.1776E 01	0.4248E 02	0.3884E 01	0.6757E 00	0.5333E 00	0.2619E 02	49
0.1815E 04	0.1700E 04	0.2550E 02	0.1808E 01	0.3013E 01	0.2586E 02	0.4523E 01	0.1084E 01	0.6958E 00	0.8742E 01	77
0.1215E 04	0.9009E 03	0.4330E 01	0.1272E 01	0.1057E 01	0.8124E 01	0.2416E 01	0.0000E 00	0.2381E 01	0.1028E 01	70
0.3450E 04	0.3145E 04	0.3049E 02	0.2765E 01	0.4729E 01	0.3936E 02	0.9429E 01	0.7764E 00	0.4924E 00	0.1136E 02	107
0.1420E 05	0.1270E 05	0.9094E 02	0.7830E 01	0.5602E 01	0.3093E 02	0.3264E 01	0.1541E 01	0.0000E 00	0.2539E 02	13
0.6987E 03	0.5858E 03	0.4071E 01	0.9503E 00	0.1180E 01	0.1321E 02	0.7742E 01	0.5787E-01	0.1093E 00	0.9511E 01	61
0.7007E 03	0.6632E 03	0.8317E 01	0.1125E 01	0.2273E 01	0.3957E 02	0.1660E 02	0.1066E 01	0.7833E 00	0.9047E 01	55
0.1171E 03	0.1015E 03	0.5448E 00	0.2243E 01	0.1870E 01	0.0000E 00	0.4065E 01	0.0000E 00	0.6533E 02	0.4909E 01	23
0.7425E 02	0.2887E 02	0.8091E 01	0.5238E 00	0.2500E 00	0.7500E 01	0.5000E 01	0.0000E 00	0.0000E 00	0.0000E 00	8
0.2051E 04	0.1756E 04	0.1590E 02	0.1964E 01	0.2506E 01	0.2607E 02	0.6948E 01	0.6137E 00	0.4021E 01	0.1048E 02	490

MEANS L06	L07	L08	L09	L10	L11	L12	L13	L14	A01	SIZE
0.7975E 01	0.8744E 00	0.2599E 02	0.4006E 01	0.1587E 02	0.1614E 01	0.2166E 02	0.2222E 00	0.1481E 00	0.8710E 01	27
0.3250E 01	0.4694E 00	0.5154E 01	0.1129E 02	0.5869E 01	0.5989E 01	0.9951E 01	0.5306E 00	0.1837E 00	0.2490E 02	49
0.2299E-01	0.4591E 00	0.6003E 02	0.2025E 00	0.3945E 00	0.1790E 01	0.4400E 01	0.5195E-01	0.3117E 00	0.1645E 01	77
0.1512E 01	0.1980E 01	0.4002E 02	0.1504E 02	0.1870E 02	0.3996E 01	0.1559E 02	0.5714E-01	0.2857E-01	0.5261E 01	70
0.2357E 00	0.2276E 00	0.3072E 02	0.7619E 00	0.4372E 00	0.3247E 00	0.7269E 01	0.3738E-01	0.3364E 00	0.1212E 01	107
0.3800E 01	0.7385E-01	0.3171E 02	0.9954E 00	0.2202E 01	0.1503E 01	0.6772E 01	0.3077E 00	0.3846E 00	0.1944E 01	13
0.2032E 01	0.1333E 01	0.5507E 02	0.4228E 01	0.8709E 01	0.2480E 01	0.1062E 02	0.6557E-01	0.1639E 00	0.1434E 01	61
0.1278E 00	0.1650E 01	0.2594E 02	0.2221E 01	0.2908E 01	0.2818E-01	0.5871E 01	0.5455E-01	0.2545E 00	0.3146E 01	55
0.0000E 00	0.5174E 00	0.4935E 01	0.3790E 01	0.1826E 02	0.0000E 00	0.1610E 02	0.8696E-01	0.8696E-01	0.4348E 01	23
0.0000E 00	0.3823E 02	0.3732E 02	0.0000E 00	0.1104E 02	0.0000E 00	0.2650E 02	0.0000E 00	0.0000E 00	0.0000E 0	8
0.1404E 01	0.1498E 01	0.3746E 02	0.4676E 01	0.6824E 01	0.1963E 01	0.1004E 02	0.1163E 00	0.2163E 00	0.5552E 01	490

MEANS A02	A03	A04	A05	A06	A07	W01	W02	W03	W04	SIZE
0.1498E 02	0.2288E 02	0.1590E 01	0.1086E 02	0.4393E 00	0.2681E 00	0.2211E 01	0.1969E 01	0.1852E 01	0.7115E 01	27
0.7424E 01	0.2662E 02	0.2412E 01	0.1200E 02	0.3280E 01	0.4986E 00	0.3138E 01	0.9020E 02	0.1211E 02	0.7952E 01	40
0.5280E 02	0.3550E 02	0.1229E 01	0.7933E 01	0.8326E 00	0.1484E 01	0.1336E 01	0.9523E 02	0.8788E 01	0.2946E 02	77
0.2050E 02	0.1013E 02	0.4077E 01	0.1816E 02	0.5078E 01	0.6847E 00	0.3727E 01	0.8641E 02	0.8299E 01	0.1303E 02	70
0.4167E 02	0.3478E 02	0.5079E 00	0.1230E 02	0.4864E 01	0.1121E 01	0.1205E 01	0.6366E 02	0.1139E 02	0.1372E 02	107
0.2999E 02	0.3607E 02	0.7679E 01	0.8408E 01	0.8215E 01	0.8546E 00	0.7192E 00	0.4690E 02	0.5060E 01	0.2271E 02	13
0.2360E 02	0.2243E 02	0.1200E 02	0.6974E 01	0.1751E 01	0.8593E 00	0.2769E 01	0.9193E 02	0.5464E 00	0.5054E 01	61
0.2640E 02	0.1317E 02	0.8738E 00	0.2321E 02	0.1404E 02	0.1672E 01	0.3536E 01	0.9454E 02	0.2424E 01	0.6363E 01	55
0.2484E 01	0.1242E 01	0.9220E 01	0.6213E 00	0.1261E 02	0.6604E 00	0.3159E 02	0.7256E 02	0.7753E 01	0.2601E 02	23
0.0000E 00	0.0000E 00	0.2555E 01	0.7426E 02	0.2318E 02	0.2436E 02	0.3341E 02	0.9870E 02	0.4166E 01	0.0000E 00	8
0.2875E 02	0.2469E 02	0.3005E 01	0.1326E 02	0.5347E 01	0.1587E 01	0.4221E 01	0.8305E 02	0.7272E 01	0.1564E 02	490

MEANS W05	W06	W07	M01	M02	M03	M04	M05	M06	M07	SIZE
0.1824E 02	0.3977E 02	0.1000E 02	0.3704E 00	0.2963E 00	0.7407E-01	0.4444E 00	0.1852E 00	0.6885E 00	0.3333E 00	27
0.2092E 02	0.5223E 02	0.6005E 01	0.1429E 00	0.1224E 00	0.4082E-01	0.8571E 00	0.2041E-01	0.0000E 00	0.4286E 00	49
0.4481E 02	0.1223E 02	0.4719E 01	0.7143E 00	0.2597E-01	0.2597E-01	0.8831E 00	0.4935E 00	0.0000E 00	0.0000E 00	77
0.2012E 02	0.5520E 02	0.5357E 01	0.2714E 00	0.2000E 00	0.4286E-01	0.3429E 00	0.4286E-01	0.1004E 00	0.2857E-01	70
0.1696E 02	0.4426E 02	0.1107E 02	0.9720E 00	0.1308E 00	0.6262E 00	0.8224E 00	0.6822E 00	0.5056E-01	0.0000E 00	107
0.1664E 02	0.3174E 02	0.3046E 01	0.7692E 00	0.3846E 00	0.6154E 00	0.5385E 00	0.4615E 00	0.0000E 00	0.0000E 00	13
0.6557E 01	0.1872E 02	0.6913E 02	0.8197E-01	0.6557E-01	0.0000E 00	0.6885E 00	0.6557E-01	0.0000E 00	0.3279E-01	61
0.8333E 01	0.7530E 02	0.7576E 01	0.3273E 00	0.3636E-01	0.1818E-01	0.9455E 00	0.5455E-01	0.0000E 00	0.0000E 00	55
0.2820E 02	0.2971E 02	0.8601E 01	0.4348E-01	0.6087E 00	0.0000E 00	0.5217E 00	0.0000E 00	0.2444E 02	0.4348E-01	23
0.1250E 02	0.5417E 02	0.2917E 02	0.1250E 00	0.0000E 00	0.0000E 00	0.1250E 00	0.0000E 00	0.0000E 00	0.0000E 00	8
0.2086E 02	0.4103E 02	0.1575E 02	0.4694E 00	0.1408E 00	0.1735E 00	0.7102E 00	0.2714E 00	0.1222E 01	0.7143E-01	490

MEANS M08	H01	H02	H03	H04	H05	H06	G01	G02	G03	SIZE
0.3030E 01	0.7407E-01	0.1259E 01	0.0000E 00	0.7407E-01	0.5304E 02	0.0000E 00	0.7960E 02	0.9286E 01	0.1111E 02	27
0.3090E 01	0.1000E 01	0.1000E 01	0.9706E 00	0.2041E-01	0.5412E 02	0.1020E 01	0.6130E 02	0.8091E 01	0.3061E 02	49
0.2285E 01	0.1000E 01	0.1286E 01	0.9610E 00	0.3896E-01	0.4169E 02	0.1429E 00	0.2197E 02	0.7603E 02	0.0000E 00	77
0.4000E 01	0.1000E 01	0.1014E 01	0.9857E 00	0.1429E-01	0.4909E 02	0.5857E 00	0.9119E 02	0.6418E 01	0.3939E 00	70
0.2134E 01	0.9907E 00	0.1551E 01	0.9720E 00	0.1869E-01	0.5181E 02	0.6542E-01	0.5685E 02	0.4054E 02	0.2615E 01	107
0.6538E 00	0.9231E 00	0.1462E 01	0.6923E 00	0.2308E 00	0.5023E 02	0.0000E 00	0.3816E 02	0.4645E 02	0.1538E 02	13
0.3511E 01	0.1000E 01	0.1115E 01	0.6721E 00	0.3279E 00	0.6805E 02	0.2295E 00	0.3169E 02	0.1475E 02	0.3361E 01	61
0.7880E 01	0.1000E 01	0.1200E 01	0.1000E 01	0.0000E 00	0.5698E 02	0.3818E 00	0.4957E 02	0.5043E 02	0.0000E 00	55
0.2305E 02	0.1000E 01	0.1609E 01	0.9130E 00	0.8696E-01	0.4413E 02	0.1304E 00	0.6686E 02	0.3314E 02	0.0000E 00	23
0.2525E 01	0.1000E 01	0.1125E 01	0.7500E 00	0.2500E 00	0.5400E 02	0.5000E 00	0.1000E 03	0.0000E 00	0.0000E 00	8
0.4330E 01	0.9449E 00	0.1201E 01	0.8714E 00	0.7347E-01	0.5237E 02	0.2163E 00	0.6092E 02	0.3392E 02	0.5152E 01	490

MEANS G04	G05	G06	SIZE
0.1852E 00	0.4815E 00	0.3704E-01	27
0.1224E 00	0.4082E 00	0.8163E-01	49
0.3117E 00	0.1571E 01	0.7792E-01	77
0.5714E-01	0.7000E 00	0.1429E-01	70
0.2710E 00	0.2822E 01	0.7477E-01	107
0.3840E 00	0.1462E 01	0.6154E 00	13
0.1148E 00	0.1066E 01	0.3279E-01	61
0.2000E 00	0.1291E 01	0.1273E 00	55
0.5217E 00	0.1565E 01	0.4348E-01	23
0.2500E 00	0.0000E 00	0.1250E 00	8
0.2143E 00	0.1420E 01	0.7959E-01	490

CENTROIDS OF 15 CLUSTER CLASSES - SAMPLE C

CLUSTER CLASSIFICATION - RANDOM SAMPLE C

GROUP MEANS — VARIABLES

GROUP	S01	S02	S03	S04	S05	L01	L02	L03	L04	L05
1	0.3290E 04	0.1800E 04	0.8728E 01	0.2245E 01	0.1917E 01	0.1809E 02	0.5130E 01	0.3787E 00	0.6688E 01	0.1051E 02
2	0.9560E 03	0.7572E 03	0.1333E 01	0.1286E 01	0.1576E 01	0.4400E 02	0.3548E 01	0.8570E 00	0.0000E 00	0.2049E 02
3	0.2477E 04	0.2194E 04	0.2110E 02	0.2435E 01	0.2618E 01	0.1968E 02	0.3175E 01	0.2091E-01	0.9873E-01	0.1073E 02
4	0.3754E 03	0.3298E 03	0.2031E 01	0.1243E 01	0.1561E 01	0.1928E 02	0.6710E 01	0.0000E 00	0.2858E 01	0.2561E 00
5	0.3000E 04	0.2632E 04	0.3105E 02	0.2722E 01	0.4840E 01	0.4087E 02	0.1030E 02	0.0000E 00	0.1954E 00	0.1067E 02
6	0.1742E 05	0.1505E 05	0.1003E 03	0.9709E 01	0.5780E 01	0.2551E 02	0.2712E 01	0.8500E 00	0.0000E 00	0.2354E 02
7	0.8010E 03	0.6508E 03	0.4001E 01	0.1081E 01	0.1349E 01	0.1593E 02	0.7015E 01	0.8209E-01	0.1551E 00	0.1378E 02
8	0.2282E 04	0.1935E 04	0.1230E 02	0.3625E 01	0.2957E 01	0.4187E 02	0.3315E 01	0.6361E 00	0.5796E 00	0.3770E 02
9	0.5350E 03	0.4121E 03	0.5255E 01	0.8633E 00	0.9167E 00	0.1267E 02	0.5172E 01	0.0000E 00	0.0000E 00	0.2625E 01
10	0.6087E 03	0.6471E 03	0.1023E 02	0.1057E 01	0.2400E 01	0.4316E 02	0.2144E 02	0.1332E 01	0.1780E 00	0.9777E 01
11	0.5210E 04	0.5038E 04	0.3374E 02	0.2719E 01	0.5559E 01	0.4691E 02	0.1159E 02	0.4955E 01	0.1188E 01	0.1029E 02
12	0.1143E 03	0.9637E 02	0.6103E 00	0.2208E 01	0.1842E 01	0.0000E 00	0.4921E 01	0.0000E 00	0.7540E 02	0.5942E 01
13	0.1590E 04	0.1509E 04	0.2243E 02	0.1551E 01	0.3000E 01	0.2571E 02	0.4660E 01	0.5778E 00	0.9630E 00	0.7784E 01
14	0.7423E 02	0.2867E 02	0.8091E 01	0.5238E 00	0.2500E 00	0.7500E 01	0.5000E 01	0.0000E 00	0.0000E 00	0.0000E 00
15	0.9720E 03	0.6277E 03	0.3010E 01	0.9034E 00	0.6000E 00	0.3699E 01	0.1329E 01	0.0000E 00	0.3676E 01	0.7656E 00
TOTAL	0.2051E 04	0.1756E 04	0.1390E 02	0.1964E 01	0.2506E 01	0.2607E 02	0.6948E 01	0.6137E 00	0.4021E 01	0.1048E 02

GROUP MEANS — VARIABLES

GROUP	L06	L07	L08	L09	L10	L11	L12	L13	L14	A01
1	0.8974E 01	0.9800E 00	0.2594E 02	0.4469E 01	0.1784E 02	0.1816E 01	0.2390E 02	0.2083E 00	0.8333E-01	0.9799E 01
2	0.4187E 01	0.3491E 00	0.4426E 01	0.1489E 02	0.7602E 01	0.4716E 01	0.7595E 01	0.3030E 00	0.6061E-01	0.4535E 02
3	0.4878E 00	0.4244E 00	0.6425E 02	0.8529E 00	0.2781E 00	0.2162E 01	0.7875E 01	0.1818E-01	0.2364E 00	0.2415E 01
4	0.1630E 01	0.2021E 01	0.1091E 02	0.2503E 02	0.2241E 02	0.1740E 01	0.6927E 01	0.9756E-01	0.7317E-01	0.1379E 01
5	0.1817E 00	0.2592E 00	0.3038E 02	0.6629E 00	0.3910E 00	0.1705E 00	0.9829E 01	0.6349E-01	0.3810E 00	0.9373E 00
6	0.6175E 01	0.4000E-01	0.3706E 02	0.2962E 00	0.3515E 01	0.1909E 01	0.9957E 01	0.3750E 00	0.3750E 00	0.9937E 00
7	0.2750E 01	0.1641E 01	0.4204E 02	0.3038E 01	0.8372E 01	0.3087E 01	0.9087E 01	0.6977E-01	0.1628E 00	0.1310E 01
8	0.1002E 01	0.4065E 00	0.9130E 01	0.3085E 01	0.2267E 01	0.4040E 01	0.1217E 02	0.6522E 00	0.5652E 00	0.2598E 01
9	0.2371E 00	0.8021E 00	0.6035E 02	0.1029E 02	0.7787E 01	0.4590E 01	0.1204E 02	0.8333E-01	0.1250E 00	0.9421E 00
10	0.0000E 00	0.1822E 01	0.1009E 02	0.2284E 01	0.1920E 01	0.0000E 00	0.4794E 01	0.1000E 00	0.3333E 0[illegible]	0.9745E 00
11	0.4853E-01	0.1262E 00	0.2598E 02	0.0000E 00	0.2985E 00	0.8009E 00	0.2891E 01	0.0000E 00	0.2647E 00	0.1322E 01
12	0.0000E 00	0.6263E 00	0.2230E 01	0.0000E 00	0.1063E 02	0.0000E 00	0.1805E 02	0.1055E 00	0.5263E-01	0.5263E 01
13	0.3540E-01	0.4464E 00	0.6109E 02	0.1912E 00	0.5424E 00	0.1726E 01	0.4330E 01	0.6000E-01	0.2800E 00	0.1741E 01
14	0.0000E 00	0.3823E 02	0.3732E 02	0.0000E 00	0.1104E 02	0.0000E 00	0.2630E 02	0.0000E 00	0.0000E 00	0.0000E 00
15	0.8469E 00	0.2139E 01	0.6671E 02	0.1390E 01	0.1944E 02	0.2768E 01	0.2020E 02	0.5714E-01	0.5714E-01	0.9513E 01
TOTAL	0.1404E 01	0.1498E 01	0.3746E 02	0.4676E 01	0.6824E 01	0.1963E 01	0.1004E 02	0.1163E 00	0.2163E 00	0.5532E 01

GROUP MEANS — VARIABLES

GROUP	A02	A03	A04	A05	A06	A07	W01	W02	W03	W04
1	0.1430E 02	0.2091E 02	0.1301E 01	0.1155E 02	0.4133E 00	0.2575E 00	0.2178E 01	0.9400E 00	0.0000E 00	0.3003E 01
2	0.3341E 01	0.1180E 02	0.2791E 01	0.2550E 01	0.1136E 01	0.3033E 00	0.2864E 01	0.8240E 02	0.7575E 0[illegible]	0.3333E 01
3	0.5591E 02	0.2894E 02	0.2453E 01	0.5072E 01	0.3303E 01	0.1180E 01	0.1578E 01	0.9139E 02	0.1771E 02	0.6752E 01
4	0.1044E 02	0.7438E 01	0.1401E 01	0.3875E 02	0.6445E 01	0.8529E 00	0.6635E 01	0.8667E 02	0.6301E 01	0.2073E 02
5	0.4123E 02	0.3352E 02	0.1033E 00	0.1838E 02	0.4174E 01	0.1276E 01	0.1404E 01	0.8713E 02	0.1098E 02	0.1530E 02
6	0.3094E 02	0.3729E 02	0.1140E 02	0.6328E 01	0.4650E 00	0.7637E 00	0.6600E 00	0.2934E 02	0.3311E 0[illegible]	0.1319E 02
7	0.2231E 02	0.2638E 02	0.1602E 02	0.3614E 01	0.1850E 01	0.6379E 00	0.5025E 01	0.9306E 02	0.7751E 0[illegible]	0.2132E 01
8	0.2077E 02	0.3224E 02	0.1093E 01	0.1540E 02	0.7299E 01	0.9541E 00	0.5032E 01	0.7726E 02	0.1918E 02	0.1674E 02
9	0.2703E 02	0.1711E 02	0.6403E 01	0.1347E 02	0.1687E 01	0.1167E 01	0.2983E 01	0.9192E 02	0.0000E 00	0.1458E 02
10	0.2154E 02	0.8455E 01	0.3333E 00	0.2303E 02	0.2003E 02	0.1949E 01	0.3697E 01	0.9528E 02	0.1667E 0[illegible]	0.3338E 01
11	0.3394E 02	0.4317E 02	0.4794E-01	0.2917E 01	0.9670E 01	0.7265E 00	0.7097E 00	0.7436E 02	0.9363E 0[illegible]	0.2524E 02
12	0.3007E 01	0.1504E 01	0.1033E 02	0.7521E 00	0.1063E 02	0.7684E 00	0.3264E 02	0.7109E 02	0.8070E 0[illegible]	0.2754E 02
13	0.5270E 02	0.3263E 02	0.1132E 01	0.1073E 02	0.1058E 01	0.1578E 01	0.1264E 01	0.9658E 02	0.3000E 01	0.3367E 02
14	0.0000E 00	0.0000E 00	0.2222E 01	0.7426E 02	0.2318E 02	0.2436E 02	0.3341E 02	0.9870E 02	0.4166E 01	0.0000E 00
15	0.1990E 02	0.2200E 02	0.4028E 01	0.7619E 01	0.4912E 01	0.7960E 00	0.3487E 01	0.9388E 02	0.5238E 01	0.2523E 00
TOTAL	0.2873E 02	0.2469E 02	0.3663E 01	0.1326E 02	0.5347E 01	0.1387E 01	0.4221E 01	0.8303E 02	0.7272E 01	0.1334E 02

CENTROIDS OF 15 CLUSTER CLASSES - SAMPLE C

CLUSTER CLASSIFICATION - RANDOM SAMPLE - C

GROUP MEANS — VARIABLES

GROUP	W05	W06	W07	M01	M02	M03	M04	M05	M06	M07	SIZE
1	0.1633E 02	0.3849E 02	0.1215E 02	0.3750E 00	0.2500E 00	0.8333E-01	0.3750E 00	0.1667E 00	0.7746E 00	0.3333E 00	24
2	0.1636E 02	0.6708E 02	0.4345E 01	0.6061E-01	0.6061E-01	0.0000E 00	0.8788E 00	0.0000E 00	0.0000E 00	0.6667E-01	33
3	0.1030E 02	0.6104E 02	0.4182E 01	0.7636E 00	0.9091E-01	0.1818E-01	0.7818E 00	0.3818E 00	0.0000E 00	0.0000E 00	55
4	0.3610E 02	0.2581E 02	0.1077E 02	0.3171E 00	0.3659E 00	0.7317E-01	0.4390E 00	0.2439E-01	0.3427E 00	0.4878E-01	41
5	0.2167E 02	0.3614E 02	0.1622E 02	0.9683E 00	0.1587E 00	0.7937E 00	0.7302E 00	0.7778E 00	0.8587E-01	0.0000E 00	63
6	0.1549E 02	0.6661E 02	0.1599E 01	0.6250E 00	0.5000E 00	0.5000E 00	0.6250E 00	0.5000E 00	0.0000E 00	0.0000E 00	8
7	0.8914E 01	0.7170E 01	0.8191E 02	0.1395E 00	0.1163E 00	0.0000E 00	0.6977E 00	0.6977E-01	0.0000E 00	0.4651E-01	43
8	0.2627E 02	0.5467E 02	0.3140E 01	0.3913E 00	0.3478E 00	0.1304E 00	0.9565E 00	0.1304E 00	0.0000E 00	0.0000E 00	23
9	0.1528E 02	0.3819E 02	0.3194E 02	0.4167E-01	0.4167E-01	0.0000E 00	0.6250E 00	0.0000E 00	0.0000E 00	0.0000E 00	24
10	0.1111E 01	0.7972E 02	0.8011E 01	0.3333E 00	0.0000E 00	0.0000E 00	0.9667E 00	0.0000E 00	0.0000E 00	0.0000E 00	30
11	0.1922E 02	0.3826E 02	0.7917E 01	0.1000E 01	0.2941E-01	0.5588E 00	0.9118E 00	0.5882E 00	0.0000E 00	0.0000E 00	34
12	0.3150E 02	0.2544E 02	0.7368E 01	0.5263E-01	0.5789E 00	0.0000E 00	0.5789E 00	0.0000E 00	0.2951E 02	0.5263E-01	19
13	0.5733E 02	0.2333E 01	0.3007E 01	0.6800E 00	0.0000E 00	0.6000E-01	0.8800E 00	0.5600E 00	0.0000E 00	0.0000E 00	50
14	0.1250E 02	0.5417E 02	0.2917E 02	0.1250E 00	0.0000E 00	0.0000E 00	0.1250E 00	0.0000E 00	0.0000E 00	0.0000E 00	8
15	0.4286E 01	0.8476E 02	0.4762E 01	0.5714E-01	0.2857E-01	0.0000E 00	0.4286E 00	0.0000E 00	0.0000E 00	0.0000E 00	35
TOTAL	0.2088E 02	0.4103E 02	0.1575E 02	0.4694E 00	0.1408E 00	0.1735E 00	0.7102E 00	0.2714E 00	0.1222E 01	0.7143E-01	490

GROUP MEANS — VARIABLES

GROUP	M08	H01	H02	H03	H04	H05	H06	G01	G02	G03	SIZE
1	0.2271E 01	0.4167E-01	0.1292E 01	0.0000E 00	0.4167E-01	0.5267E 02	0.0000E 00	0.8538E 02	0.6282E 01	0.8333E 01	24
2	0.3874E 01	0.1000E 01	0.1000E 01	0.9697E 00	0.3030E-01	0.5545E 02	0.1818E 00	0.7650E 02	0.1441E 02	0.9091E 01	33
3	0.1789E 01	0.1000E 01	0.1073E 01	0.1000E 01	0.0000E 00	0.5427E 02	0.1273E 00	0.5252E 02	0.4667E 02	0.8136E 00	55
4	0.4589E 01	0.1000E 01	0.1146E 01	0.1000E 01	0.0000E 00	0.4498E 02	0.6098E 00	0.6311E 02	0.1413E 02	0.2759E 01	41
5	0.2607E 01	0.9841E 00	0.1571E 01	0.9524E 00	0.3175E-01	0.5086E 02	0.7937E-01	0.7282E 02	0.2322E 02	0.3954E 01	63
6	0.4250E 00	0.8750E 00	0.1250E 01	0.8750E 00	0.0000E 00	0.5375E 02	0.0000E 00	0.5081E 02	0.3669E 02	0.1250E 02	8
7	0.4107E 01	0.1000E 01	0.1163E 01	0.1000E 01	0.0000E 00	0.7109E 02	0.2558E 00	0.6386E 02	0.1341E 02	0.2726E 01	43
8	0.2559E 01	0.9130E 00	0.1000E 01	0.7826E 00	0.1304E 00	0.4961E 02	0.4348E-01	0.2968E 02	0.1380E 02	0.5652E 02	23
9	0.2363E 01	0.1000E 01	0.1000E 01	0.0000E 00	0.1000E 01	0.5792E 02	0.1250E 00	0.7079E 02	0.2504E 02	0.4167E 01	24
10	0.8561E 01	0.1000E 01	0.1300E 01	0.1000E 01	0.0000E 00	0.5933E 02	0.3000E 00	0.4670E 02	0.5330E 02	0.0000E 00	30
11	0.1394E 01	0.1000E 01	0.1882E 01	0.9706E 00	0.2941E-01	0.4701E 02	0.5882E-01	0.9071E 01	0.9093E 02	0.0000E 00	34
12	0.2210E 02	0.1000E 01	0.1526E 01	0.8947E 00	0.1053E 00	0.4305E 02	0.5263E-01	0.6364E 02	0.3636E 02	0.0000E 00	19
13	0.2510E 01	0.1000E 01	0.1320E 01	0.1000E 01	0.0000E 00	0.3838E 02	0.1600E 00	0.2726E 02	0.7274E 02	0.0000E 00	50
14	0.2525E 01	0.1000E 01	0.1125E 01	0.7500E 00	0.2500E 00	0.5400E 02	0.5000E 00	0.1000E 03	0.0000E 00	0.0000E 00	8
15	0.3464E 01	0.1000E 01	0.1000E 01	0.1000E 01	0.0000E 00	0.5531E 02	0.6857E 00	0.8344E 02	0.1656E 02	0.0000E 00	35
TOTAL	0.4330E 01	0.9449E 00	0.1201E 01	0.8714E 00	0.7347E-01	0.5237E 02	0.2163E 00	0.6092E 02	0.3392E 02	0.5152E 01	490

GROUP MEANS — VARIABLES

GROUP	G04	G05	G06	SIZE
1	0.2083E 00	0.5417E 00	0.0000E 00	24
2	0.3030E-01	0.3030E 00	0.3030E-01	33
3	0.1636E 00	0.1745E 01	0.5455E-01	55
4	0.4878E-01	0.1244E 01	0.0000E 00	41
5	0.1746E 00	0.3111E 01	0.0000E 00	63
6	0.3750E 00	0.7500E 00	0.5000E 00	8
7	0.6977E-01	0.1047E 01	0.4651E-01	43
8	0.2174E 00	0.5217E 00	0.3043E 00	23
9	0.1250E 00	0.1125E 01	0.4167E-01	24
10	0.2333E 00	0.1400E 01	0.1667E 00	30
11	0.5294E 00	0.1971E 01	0.3235E 00	34
12	0.5789E 00	0.1737E 01	0.5263E-01	19
13	0.3800E 00	0.1720E 01	0.4000E-01	50
14	0.2500E 00	0.0000E 00	0.1250E 00	8
15	0.1714E 00	0.3429E 00	0.2857E-01	35
TOTAL	0.2143E 00	0.1420E 01	0.7959E-01	490

APPENDIX J

Class Means for Classifications I and II

- Sample D

CLUSTER CLASSIFICATION - SAMPLE D

GROUP MEANS

GROUP	S01	S02	S03	S04	S05	L01	L02	L03	L04	L05	SIZE
1	0,4048E 04	0.3537E 04	0.4000E 02	0.3244E 01	0.4861E 01	0.3791E 02	0.6282E 01	0.3755E 00	0.0000E 00	0.1466E 02	194
2	0,1373E 05	0.1170E 05	0.5900E 02	0.6519E 01	0,5807E 01	0.4117E 02	0.7348E 01	0.3232E 01	0.6552E-02	0.1234E 02	29
3	0,6524E 03	0.5124E 03	0.3919E 01	0.9507E 00	0.1110E 01	0.1878E 02	0.7948E 01	0.3920E 00	0.1033E 01	0.7667E 01	163
4	0,1501E 04	0.1237E 04	0.7599E 01	0.2730E 01	0.2104E 01	0.3670E 02	0.2645E 01	0.7489E 00	0.3647E 00	0.3506E 02	135
5	0,5044E 03	0.4529E 03	0.6576E 01	0.1163E 01	0.1444E 01	0.1686E 02	0.6728E 01	0.4013E 00	0.1363E 01	0.7587E 01	133
6	0,9085E 03	0.7486E 03	0.9418E 00	0.1487E 01	0.1258E 01	0.2101E 02	0.1875E 01	0.2559E 01	0.9598E 00	0.4745E 01	163
7	0,1094E 03	0.9113E 02	0.1085E 00	0.2137E 01	0.1433E 01	0.4125E 00	0.3354E 01	0.0000E 00	0.7970E 02	0.3952E 01	60
8	0,1774E 04	0.1431E 04	0.5420E 01	0.1961E 01	0.1584E 01	0.2131E 02	0.3862E 01	0.6811E 00	0.1449E 01	0.1237E 02	101
9	0,7324E 03	0.6464E 03	0.7482E 01	0.1150E 01	0.1115E 01	0.1352E 02	0.6214E 01	0.3962E-01	0.5109E 00	0.6297E 01	208
10	0,1675E 04	0.1593E 04	0.1968E 02	0.2179E 01	0.3603E 01	0.4168E 02	0.1357E 02	0.1186E 01	0.5069E 00	0.1067E 02	234
11	0,2948E 03	0.2529E 03	0.3812E 01	0.9081E 00	0.2129E 01	0.3106E 02	0.1538E 02	0.1487E 01	0.3757E 01	0.1168E 02	116
12	0,1503E 04	0.1325E 04	0.2034E 02	0.2002E 01	0.3184E 01	0.2657E 02	0.7178E 01	0.1040E 00	0.1663E 00	0.1050E 02	228
13	0,4641E 04	0.4411E 04	0.1497E 02	0.3114E 01	0,6354E 01	0.4860E 02	0.2711E 02	0.4380E 01	0.7961E 00	0.1015E 02	90
14	0,3160E 04	0.2982E 04	0.4464E 02	0.2165E 01	0.3576E 01	0.1037E 02	0.2515E 01	0.4485E-01	0.1357E 00	0.2693E 01	132
15	0,9610E 03	0.7731E 03	0.1024E 02	0.1016E 01	0.1178E 01	0.1294E 02	0.3940E 01	0.1195E 00	0.5527E 00	0.4298E 01	146
16	0,2191E 03	0.1558E 03	0.5282E 02	0.8752E 00	0,4828E 00	0.2993E 01	0.6499E 01	0.0000E 00	0.3448E 01	0.3701E 01	29
TOTAL	0,1757E 04	0.1552E 04	0.1582E 02	0.1905E 01	0,2545E 01	0.2515E .02	0.7543E 01	0.8193E 00	0.2986E 01	0.1012E 02	2161

GROUP MEANS

GROUP	L06	L07	L08	L09	L10	L11	L12	L13	L14	A01	SIZE
1	0,8424E 00	0.2102E 00	0.3670E 02	0.6272E 00	0.3939E 00	0.6024E 00	0.9981E 01	0.7732E-01	0.2113E 00	0.5551E 00	194
2	0,1852E 01	0.1193E 00	0.2852E 02	0.1728E 00	0.5240E 01	0.1892E 01	0.1024E 02	0.1579E 00	0.2059E 00	0.9245E 00	29
3	0,2459E 01	0.1220E 01	0.4885E 02	0.2996E 01	0.8657E 01	0.2614E 01	0.1243E 02	0.7975E-01	0.1238E 00	0.5283E 01	163
4	0,1338E 01	0.6143E 00	0.9067E 01	0.7540E 01	0.7317E 01	0.2519E 01	0.1156E 02	0.6000E 00	0.3926E 00	0.2623E 01	135
5	0,1357E 01	0.1405E 01	0.4929E 02	0.4624E 01	0.8384E 01	0.2117E 01	0.3335E 01	0.7519E-01	0.1729E 00	0.2357E 01	133
6	0,4887E 01	0.1073E 01	0.7631E 01	0.1770E 02	0.3756E 02	0.6349E 01	0.8630E 01	0.2331E 00	0.1840E-01	0.2231E 02	163
7	0,1876E 01	0.1032E 01	0.2427E 01	0.0000E 00	0.7246E 01	0.1512E 01	0.1605E 02	0.1667E-01	0.0000E 00	0.2500E 01	60
8	0,3839E 01	0.4257E 00	0.2445E 02	0.1064E 02	0.2008E 02	0.3814E 01	0.1185E 02	0.2079E 00	0.8911E-01	0.4768E 01	101
9	0,2735E 00	0.1056E 01	0.6907E 02	0.1115E 01	0.1808E 01	0.1458E 01	0.7920E 01	0.3365E-01	0.2019E 00	0.5040E 01	208
10	0,2853E 00	0.2903E 00	0.3086E 02	0.6340E 00	0,2974E 00	0.2378E 00	0.3841E 01	0.3346E-01	0.5365E 00	0.2373E 01	234
11	0,9657E 00	0.2596E 01	0.1118E 02	0.1456E 02	0,7341E 01	0.2744E 01	0.1000E 02	0.1293E 00	0.1293E 00	0,6547E 00	116
12	0,3659E 00	0.4376E 00	0.5516E 02	0.7839E 00	0,7389E 00	0.1179E 01	0.7895E 01	0.5263E-01	0.3333E 00	0.1410E 01	228
13	0,1598E 00	0.1482E 00	0.8331E 01	0.1346E 00	0.1882E 00	0.1370E 00	0.4753E 01	0.3333E-01	0.5333E 00	0.6570E 01	90
14	0,3258E 00	0.1285E 00	0.8329E 02	0.0000E 00	0,5063E 00	0.1561E 00	0.5144E 01	0.3788E-01	0.1439E 00	0.8747E 00	132
15	0,8417E 00	0,8240E 00	0.7148E 02	0,6141E 00	0.4300E 01	0.1794E 01	0.8757E 01	0.8904E-01	0.1027E 00	0.3427E 01	146
16	0,0000E 00	0,3634E 02	0.3413E 02	0,4271E 01	0,8671E 01	0.5616E 01	0.2981E 02	0.0000E 00	0.0000E 00	0.4897E-01	29
TOTAL	0,1284E 01	0.1243E 01	0.3988E 02	0.4017E 01	0.6884E 01	0.1913E 01	0.8910E 01	0.1143E 00	0.2300E 00	0.4236E 01	2161

CLASS MEANS : CLASSIFICATION I - SAMPLE D

CLUSTER CLASSIFICATION - SAMPLE D

GROUP MEANS — VARIABLES

GROUP	A02	A03	A04	A05	A06	A07	W01	W02	W03	W04	SIZE
1	0,4089E 02	0,3921E 02	0.5573E 00	0.1468E 02	0.3587E 01	0.1139E 01	0.1021E 01	0.8757E 02	0.1441E 02	0.2434E 02	194
2	0,2297E 02	0,2815E 02	0.1004E 02	0.1457E 02	0.6104E 01	0.4924E 00	0.5424E 00	0.1765E 02	0.1036E 02	0.2442E 02	29
3	0,2563E 02	0,2083E 02	0.7074E 01	0.9264E 01	0.7379E 01	0.9675E 00	0.2978E 01	0.9479E 02	0.6134E 00	0.5266E 01	163
4	0,2260E 02	0,4519E 02	0.4685E 01	0.1253E 02	0.4022E 01	0.7307E 00	0.3152E 01	0.8790E 02	0.1738E 02	0.1233E 02	135
5	0,3516E 02	0,1809E 02	0.1448E 01	0.1241E 02	0.5725E 01	0.1382E 01	0.4530E 01	0.9057E 02	0.7331E 01	0.9198E 01	133
6	0,4061E 01	0.3907E 01	0.2141E 01	0.5195E 01	0.4258E 00	0.1314E 00	0.3225E 01	0.7239E 02	0.5692E 01	0.7471E 01	163
7	0,0000E 00	0,1667E 01	0.0000E 00	0.2500E 01	0.3333E 01	0.2897E 00	0.2760E 02	0.8360E 02	0.1596E 02	0.2575E 02	60
8	0,1299E 02	0.1304E 02	0.3273E 01	0.8149E 01	0.1342E 01	0.3889E 00	0.2273E 01	0.6154E 01	0.3395E 00	0.1025E 02	101
9	0,3953E 02	0,2490E 02	0.6356E 01	0.8383E 01	0.2328E 01	0.1376E 01	0.2960E 01	0.9643E 02	0.1883E 01	0.2404E 01	208
10	0,4061E 02	0.3028E 02	0.1066E 01	0.1734E 02	0.2777E 01	0.1423E 01	0.1781E 01	0.9447E 02	0.9364E 01	0.1747E 02	234
11	0,4588E 01	0.7022E 01	0.1147E 01	0.5083E 02	0.90x0E 01	0.1918E 01	0.5238E 01	0.9597E 02	0.5244E 01	0.1027E 02	116
12	0,4753E 02	0.3029E 02	0.4538E 00	0.1511E 02	0.4326E 01	0.1580E 01	0.1817E 01	0.9635E 02	0.1464E 02	0.7229E 01	228
13	0,1883E 02	0.3054E 02	0.7596E 01	0.3051E 01	0.8053E 01	0.3482E 00	0.7524E 00	0.5931E 02	0.1252E 02	0.2043E 02	90
14	0,5926E 02	0,2901E 02	0.8437E 00	0.8081E 01	0.1912E 01	0.1765E 01	0.8968E 00	0.8873E 02	0.1174E 02	0.2460E 02	132
15	0,3664E 02	0,2371E 02	0.5577E 01	0.1201E 02	0.3768E 01	0.1794E 01	0.2513E 01	0.9620E 02	0.2055E 01	0.2584E 02	146
16	0,4580E 01	0,1015E 01	0.4070E 01	0.6432E 02	0.2192E 02	0.2705E 02	0.1568E 02	0.9426E 02	0.1724E 01	0.1264E 02	29
TOTAL	0,3081E 02	0,2426E 02	0.3045E 01	0.1390E 02	0.4218E 01	0.1511E 01	0.3332E 01	0.8487E 02	0.8326E 01	0.1371E 02	2161

GROUP MEANS — VARIABLES

GROUP	W05	W06	W07	M01	M02	M03	M04	M05	M06	M07	SIZE
1	0,1965E 02	0.2993E 02	0.1166E 02	0.9897E 00	0.1443E 00	0.7577E 00	0.6031E 00	0.8608E 00	0.0000E 00	0.0000E 00	194
2	0,1958E 02	0,4158E 02	0.4056E 01	0.9310E 00	0.1724E 00	0.6552E 00	0.5172E 00	0.4483E 00	0.0000E 00	0.0000E 00	29
3	0,4151E 01	0,6493E 01	0.8548E 02	0.1411E 00	0.7362E-01	0.2454E-01	0.5706E 00	0.1840E-01	0.1362E-01	0.6135E-02	163
4	0,1427E 02	0,4866E 02	0.7160E 01	0.4074E 00	0,3778E 00	0.1111E 00	0.7630E 00	0.3704E-01	0.2467E-01	0.2963E-01	135
5	0,2074E 02	0,4256E 02	0.2018E 02	0,1880E 00	0,6767E-01	0.3008E-01	0.6316E 00	0.9774E-01	0.7835E-01	0.0000E 00	133
6	0,2483E 02	0,4806E 02	0.1395E 02	0.2209E 00	0.1943E 00	0.6135E-02	0.4969E 00	0.0000E 00	0.3693E-01	0.4540E 00	163
7	0,1192E 02	0,4049E 02	0.5089E 01	0.1000E 00	0,6000E 00	0.0000E 00	0.3500E 00	0.0000E 00	0.3041E 02	0.3333E-01	60
8	0,1756E 02	0,3405E 02	0.1305E 02	0,2475E 00	0.1287E 00	0.7921E-01	0.5644E 00	0.1188E 00	0.1293E 00	0.1683E 00	101
9	0,3886E 01	0,9055E 02	0.1282E 01	0.1298E 00	0,4808E-01	0.9615E-02	0.6298E 00	0.4808E-01	0.1688E-01	0.4808E-02	208
10	0,3900E 02	0,2489E 02	0.9286E 01	0.7564E 00	0.7265E-01	0.2179E 00	0.9402E 00	0.3974E 00	0.8376E-02	0.4274E-02	234
11	0,2651E 02	0,5187E 02	0.6106E 01	0.3534E 00	0.2414E 00	0.6034E-01	0.8534E 00	0.1724E-01	0.3046E 00	0.6034E-01	116
12	0,1043E 02	0,6165E 02	0.6045E 01	0,7544E 00	0.9649E-01	0.1491E 00	0.8728E 00	0.5570E 00	0.1110E-01	0.0000E 00	228
13	0,2034E 02	0,4293E 02	0.3771E 01	0.1000E 01	0,5556E-01	0.7778E 00	0.8778E 00	0.2222E 00	0.0000E 00	0.1111E-01	90
14	0,3455E 02	0,2494E 02	0.4179E 01	0.9015E 00	0,30x0E-01	0.8333E-01	0.7879E 00	0.9318E 00	0.0000E 00	0.0000E 00	132
15	0,6438E 02	0,3196E 01	0.4520E 01	0.2192E 00	0.1301E 00	0.2740E-01	0.5068E 00	0.7534E-01	0.6740E-01	0.1370E-01	146
16	0,1351E 02	0,6006E 02	0.1207E 02	0.1034E 00	0,6867E-01	0.0000E 00	0.2414E 00	0.0000E 00	0.9497E 00	0.3448E-01	29
TOTAL	0,2214E 02	0,4078E 02	0.1589E 02	0.4859E 00	0.1356E 00	0.1745E 00	0.6867E 00	0.2772E 00	0.8980E 00	0.5137E-01	2161

CLASS MEANS : CLASSIFICATION I - SAMPLE D

CLUSTER CLASSIFICATION - SAMPLE D

GROUP MEANS

GROUP	H08	H01	H02	H03	H04	H05	H06	G01	G02	G03	SIZE
1	0,1591E 01	0.1000E 01	0.1490E 01	0.9691E 00	0.3003E-01	0.5160E 02	0.1546E-01	0.7190E 02	0.2378E 02	0.4319E 01	194
2	0,5317E 00	0.6552E 00	0.1793E 01	0.5172E 00	0.1379E 00	0.5276E 02	0.6897E-01	0.6749E 02	0.3125E 02	0.1256E 01	29
3	0,3470E 01	0.1000E 01	0.1067E 01	0.9693E 00	0.3067E-01	0.7057E 02	0.1288E 00	0.7995E 02	0.2005E 02	0.0000E 00	163
4	0,2491E 01	0.1000E 01	0.1000E 01	0.9926E 00	0.7407E-02	0.5400E 02	0.4444E-01	0.5235E 02	0.1257E 02	0.3504E 02	135
5	0,5693E 01	0.9925E 00	0.1023E 01	0,0000E 00	0.9925E 00	0.5584E 02	0.1579E 00	0.6985E 02	0.2839E 02	0.1762E 01	133
6	0,3078E 01	0.1000E 01	0.1104E 01	0,9816E 00	0.1840E-01	0.5350E 02	0.4601E 00	0.9324E 02	0.6021E 01	0.7432E 00	163
7	0,1451E 02	0.9833E 00	0.1700E 01	0,9167E 00	0.6667E-01	0.4822E 02	0.1333E 00	0.5839E 02	0.4016E 02	0.1454E 01	60
8	0,2265E 01	0.1782E 00	0.1198E 01	0,0000E 00	0.1782E 00	0.5241E 02	0.9901E-02	0.7356E 02	0.1021E 02	0,1623E 02	101
9	0,3092E 01	0,1000E 01	0.1106E 01	0.1000E 01	0,0000E 00	0.5590E 02	0.4231E 00	0.6262E 02	0.3560E 02	0.1785E 01	208
10	0,3124E 01	0,1000E 01	0.1171E 01	0,9957E 00	0.4274E-02	0.4492E 02	0.1282E 00	0.1943E 02	0.8022E 02	0.3543E 00	234
11	0,1492E 02	0.1000E 01	0.1241E 01	0.9914E 00	0.8621E-02	0.4937E 02	0.7069E 00	0.7997E 02	0.1868E 02	0.1349E 01	116
12	0,2936E 01	0.1000E 01	0.1333E 01	0,9868E 00	0.1316E-01	0.5493E 02	0.1579E 00	0.8121E 02	0.1809E 02	0.7037E 00	228
13	0,1570E 01	0,9667E 00	0.2256E 01	0,9556E 00	0,1111E-01	0.4922E 02	0.8880E-01	0,2374E 02	0.7626E 02	0.0000E 00	90
14	0,1625E 01	0.1000E 01	0.1712E 01	0.1000E 01	0,0000E 00	0.4380E 02	0.6818E-01	0,2585E 02	0.7283E 02	0.1313E 01	132
15	0,3004E 01	0,1000E 01	0.1164E 01	0,9932E 00	0,5849E-02	0.3864E 02	0.6370E 00	0,4999E 02	0.4961E 02	0.3995E 00	146
16	0,3483E 01	0,1000E 01	0,1172E 01	0.8621E 00	0,1379E 00	0.5493E 02	0.6207E 00	0,8696E 02	0.1304E 02	0,0000E 00	29
TOTAL	0,3819E 01	0,9547E 00	0.1284E 01	0,8695E 00	0,8515E-01	0.5206E 02	0.2318E 00	0.6116E 02	0.3482E 02	0.4021E 01	2161

GROUP MEANS

GROUP	G04	G05	G06	SIZE
1	0,1289E 00	0,2959E 01	0,9278E-01	194
2	0,4483E 00	0.1483E 01	0.3103E 00	29
3	0,1350E 00	0.1018E 01	0.3681E-01	163
4	0,5185E-01	0.5057E 00	0.1030E 00	135
5	0,8271E-01	0.1255E 01	0.7519E-01	133
6	0,7362E-01	0,6074E 00	0.3081E-01	163
7	0,6167E 00	0,1700E 01	0.3333E-01	60
8	0,1782E 00	0.7129E 00	0.7921E-01	101
9	0,1635E 00	0.1014E 01	0.3565E-01	208
10	0,1154E 00	0,1513E 01	0.1026E 00	234
11	0,1466E 00	0.1664E 01	0.3448E-01	116
12	0,3026E 00	0,2618E 01	0.4025E-01	228
13	0,7667E 00	0,2422E 01	0.3778E 00	90
14	0,6439E 00	0,2227E 01	0.4545E-01	132
15	0,1507E 00	0,1000E 01	0.3425E-01	146
16	0,3448E 00	0,7931E 00	0.1724E 00	29
TOTAL	0,2212E 00	0.1539E 01	0.8191E-01	2161

CLASS MEANS : CLASSIFICATION I - SAMPLE D

CLASSIFICATION II - UNIVARIATE F TESTS

WILKS LAMBDA (U-STATISTIC) AND UNIVARIATE F-RATIO

VARIABLE	WILKS LAMBDA	F
S01	.3943	219.6489
S02	.3694	244.1438
S03	.6045	93.5527
S04	.6145	89.7263
S05	.4015	213.1817
L01	.7174	56.3301
L02	.7472	48.3704
L03	.9584	6.2099
L04	.2673	391.9108
L05	.8394	27.3611
L06	.9598	5.9857
L07	.6369	81.5391
L08	.5323	125.6675
L09	.8645	22.4075
L10	.7828	39.6723
L11	.9656	5.0874
L12	.9258	11.4614
L13	.8093	33.6870
L14	.8499	25.2467
A01	.8760	20.2428
A02	.7007	61.0888
A03	.7965	36.5390
A04	.9666	4.9448
A05	.7617	44.7477
A06	.9570	6.4183
A07	.5606	112.0998
W01	.5699	107.9253
W02	.4366	184.5590
W03	.8966	16.4841
W04	.9009	15.7286
W05	.7877	38.5475
W06	.6419	79.7673
W07	.4879	150.0955
M01	.5622	111.3375
M02	.8851	18.5615
M03	.5737	106.2736
M04	.8673	21.8826
M05	.5044	140.5242
M06	.4721	159.9219
M07	.7013	60.9018
M08	.7136	57.3821
H01	.2803	367.2467
H02	.7574	45.7921
H03	.1616	741.6766
H04	.2848	359.0935
H05	.6538	75.7201
H06	.7340	51.8237
G01	.6863	65.3586
G02	.6294	84.1949
G03	.7781	40.7697
G04	.7826	39.7127
G05	.7334	51.9798
G06	.9327	10.3232

WITH 15 AND 2145 DEGREES OF FREEDOM

CLUSTER CLASSIFICATION - SAMPLE D

GROUP MEANS — VARIABLES

GROUP	S01	S02	S03	S04	S05	L01	L02	L03	L04	L05	SIZE
1	0,3169E 04	0.2731E 04	0.3335E 02	0.2736E 01	0.4283E 01	0.3408E 02	0.6789E 01	0.2771E 00	0.4916E-01	0.1167E 02	332
2	0,7402E 03	0.5849E 03	0.4295E 01	0.1056E 01	0.1158E 01	0.1762E 02	0.7085E 01	0.3363E 00	0.8861E 00	0.7893E 01	190
3	0,7773E 03	0.6466E 03	0.1497E 01	0.1292E 01	0.1502E 01	0.2559E 02	0.3747E 01	0.1612E 01	0.1520E 01	0.6980E 01	223
4	0,3463E 04	0.2846E 04	0.1174E 02	0.2602E 01	0.2216E 01	0.2320E 02	0.4878E 01	0.1245E 01	0.1465E 01	0.1246E 02	111
5	0,3751E 04	0.3573E 04	0.1154E 02	0.2534E 01	0.5291E 01	0.4624E 02	0.2805E 02	0.6299E 01	0.1433E 01	0.8550E 01	127
6	0,1942E 04	0.1694E 04	0.1474E 02	0.3296E 01	0.2840E 01	0.3909E 02	0.3625E 01	0.6582E 00	0.2708E 00	0.3332E 02	165
7	0,1336E 04	0.1208E 04	0.1517E 02	0.1601E 01	0.2051E 01	0.1888E 02	0.7430E 01	0.2345E 00	0.4806E 00	0.7442E 01	433
8	0,1212E 03	0.1026E 03	0.1031E 00	0.2156E 01	0.1468E 01	0.3992E 00	0.3245E 01	0.0000E 00	0.7903E 02	0.4432E 01	62
9	0,1660E 04	0.1547E 04	0.2137E 02	0.1548E 01	0.2614E 01	0.2330E 02	0.7331E 01	0.1595E 00	0.4151E 00	0.6012E 01	334
10	0,6780E 03	0.6216E 03	0.8946E 01	0.1268E 01	0.1744E 01	0.1957E 02	0.6922E 01	0.3606E 00	0.1225E 01	0.1020E 02	148
11	0,2087E 03	0.1542E 03	0.4791E 02	0.9100E 00	0.6944E 00	0.5623E 01	0.7524E 01	0.0000E 00	0.3049E 01	0.3549E 01	36
TOTAL	0,1757E 04	0.1552E 04	0.1582E 02	0.1905E 01	0.2545E 01	0.2515E 02	0.7543E 01	0.8193E 00	0.2966E 01	0.1019E 02	2161

GROUP MEANS — VARIABLES

GROUP	L06	L07	L08	L09	L10	L11	L12	L13	L14	A01	SIZE
1	0,5071E 00	0.3200E 00	0.4464E 02	0.1133E 01	0.5274E 00	0.9200E 00	0.1002E 02	0.5422E-01	0.2360E 00	0.6245E 00	332
2	0,2748E 01	0.1106E 01	0.4648E 02	0.3591E 01	0.1225E 02	0.3115E 01	0.1245E 02	0.9474E-01	0.1263E 00	0.7137E 01	190
3	0,3605E 01	0.1401E 01	0.7781E 01	0.1884E 02	0.2803E 02	0.5637E 01	0.8611E 01	0.2287E 00	0.4933E-01	0.1447E 02	223
4	0,3786E 01	0.3918E 00	0.2573E 02	0.9534E 01	0.1729E 02	0.3918E 01	0.1227E 02	0.2072E 00	0.9009E-01	0.3586E 01	111
5	0,6352E 00	0.3880E 00	0.8086E 01	0.6551E-01	0.4450E 00	0.1023E 00	0.5966E 01	0.1575E-01	0.4409E 00	0.4930E 01	127
6	0,7973E 00	0.5086E 00	0.1043E 02	0.6550E 01	0.4749E 01	0.2058E 01	0.1016E 02	0.4970E 00	0.4768E 00	0.2166E 01	165
7	0,4254E 00	0.7573E 00	0.6174E 02	0.9070E 00	0.1701E 01	0.1024E 01	0.7040E 01	0.4619E-01	0.2818E 00	0.3723E 01	433
8	0,2532E 01	0.9984E 00	0.2349E 01	0.0000E 00	0.7012E 01	0.1463E 01	0.1572E 02	0.1613E-01	0.0000E 00	0.2419E 01	62
9	0,4119E 00	0.4872E 00	0.5940E 02	0.3121E 00	0.2144E 01	0.7262E 00	0.5260E 01	0.5689E-01	0.2635E 00	0.2654E 01	334
10	0,1152E 01	0.1290E 01	0.4813E 02	0.4263E 01	0.6887E 01	0.1564E 01	0.7607E 01	0.8784E-01	0.1824E 00	0.2235E 01	148
11	0,0000E 00	0.3158E 02	0.3763E 02	0.4082E 01	0.6945E 01	0.5113E 01	0.2617E 02	0.0000E 00	0.2778E-01	0.8250E-01	36
TOTAL	0,1284E 01	0,1243E 01	0.3988E 02	0,4017E 01	0.6884E 01	0.1913E 01	0.8910E 01	0,1143E 00	0.2300E 00	0,4236E 01	2161

GROUP MEANS — VARIABLES

GROUP	A02	A03	A04	A05	A06	A07	W01	W02	W03	W04	SIZE
1	0,4312E 02	0.3451E 02	0.5517E 00	0.1658E 02	0.4316E 01	0.1327E 01	0.1408E 01	0.9076E 02	0.1394E 02	0.2011E 02	332
2	0,2440E 02	0.2070E 02	0.7223E 01	0.9286E 01	0.5904E 01	0.9651E 00	0.3007E 01	0.9309E 02	0.5263E 00	0.6000E 01	190
3	0,4260E 01	0.4523E 01	0.1487E 01	0.1888E 02	0.3016E 01	0.4604E 00	0.3612E 01	0.7976E 02	0.5394E 01	0.9609E 01	223
4	0,1432E 02	0.1552E 02	0.4072E 01	0.1076E 02	0.2685E 01	0.4127E 00	0.1821E 01	0.3990E 01	0.2180E 01	0.1281E 02	111
5	0,1507E 02	0,2401E 02	0.6947E 01	0.7321E 01	0.8648E 01	0.4206E 00	0.1177E 01	0.6950E 02	0.1068E 02	0.1724E 02	127
6	0,2832E 02	0.4265E 02	0.3045E 01	0.1320E 02	0.4544E 01	0.7988E 00	0.3169E 01	0.8623E 02	0.1891E 02	0.1389E 02	165
7	0,4378E 02	0.2751E 02	0.3739E 01	0.1056E 02	0.2833E 01	0.1470E 01	0.2452E 01	0.9468E 02	0.8574E 01	0.4073E 01	433
8	0,0000E 00	0.1613E 01	0.0000E 00	0.2419E 01	0.3226E 01	0.2803E 00	0.2695E 02	0.8287E 02	0.1585E 02	0.2532E 02	62
9	0,4255E 02	0.2806E 02	0.2514E 01	0.1575E 02	0.1882E 01	0.1661E 01	0.1805E 01	0.9474E 02	0.4201E 01	0.2454E 02	334
10	0,3499E 02	0.1904E 02	0.6474E 00	0.1329E 02	0.5475E 01	0.1379E 01	0.4300E 01	0.8838E 02	0.7905E 01	0.1113E 02	148
11	0,3973E 01	0.1282E 01	0.3789E 01	0.6431E 02	0.2379E 02	0.2486E 02	0.1415E 02	0.9538E 02	0.2083E 01	0.1643E 02	36
TOTAL	0,3081E 02	0.2426E 02	0.3045E 01	0.1390E 02	0.4218E 01	0.1511E 01	0.3332E 01	0.8487E 02	0.8326E 01	0.1371E 02	2161

CLASS MEANS : CLASSIFICATION II - SAMPLE D

CLUSTER CLASSIFICATION - SAMPLE D

GROUP MEANS — VARIABLES

GROUP	W05	W06	W07	M01	M02	M03	M04	M05	M06	M07	SIZE
1	0,2120E 02	0.3310E 02	0.1165E 02	0.9548E 00	0.1265E 00	0.5602E 00	0.7078E 00	0.7771E 00	0.2410E-03	0.0000E 00	332
2	0,5552E 01	0.6552E 01	0.8137E 02	0.1684E 00	0.6842E-01	0.2105E-01	0.5895E 00	0.2632E-01	0.1168E-01	0.4211E-01	190
3	0,3022E 02	0.4701E 02	0.7765E 01	0.2735E 00	0.2332E 00	0.2691E-01	0.5830E 00	0.0000E 00	0.1244E 00	0.3408E 00	223
4	0,1569E 02	0.3666E 02	0.1014E 02	0.3694E 00	0.1532E 00	0.1712E 00	0.5676E 00	0.1622E 00	0.1177E 00	0.1171E 00	111
5	0,2167E 02	0.4322E 02	0.7186E 01	0.8661E 00	0.5512E-01	0.6063E 00	0.8898E 00	0.1654E 00	0.6630E-01	0.7874E-02	127
6	0,1545E 02	0.4680E 02	0.4949E 01	0.5212E 00	0.4000E 00	0.1697E 00	0.7455E 00	0.1273E 00	0.2018E-01	0.2424E-01	165
7	0,3659E 01	0.8195E 02	0.1742E 01	0.3926E 00	0.5312E-01	0.3002E-01	0.7506E 00	0.2794E 00	0.1600E-01	0.4619E-02	433
8	0,1194E 02	0.4079E 02	0.6102E 01	0.9677E-01	0.6129E 00	0.0000E 00	0.3710E 00	0.0000E 00	0.2943E 02	0.3226E-01	62
9	0,5921E 02	0.6028E 01	0.6023E 01	0.5689E 00	0.5988E-01	0.9880E-01	0.7605E 00	0.3982E 00	0.2991E-01	0.5988E-02	334
10	0,2131E 02	0.4209E 02	0.1757E 02	0.2297E 00	0.7432E-01	0.7432E-01	0.6284E 00	0.1486E 00	0.7041E-01	0.1351E-01	148
11	0,1991E 02	0.5185E 02	0.9722E 01	0.8333E-01	0.1111E 00	0.0000E 00	0.3611E 00	0.0000E 00	0.9322E 00	0.2778E-01	36
TOTAL	0,2214E 02	0.4078E 02	0.1389E 02	0.4859E 00	0.1356E 00	0.1745E 00	0.6867E 00	0.2772E 00	0.8980E 00	0.5137E-01	2161

GROUP MEANS — VARIABLES

GROUP	M08	H01	H02	H03	H04	H05	H06	G01	G02	G03	SIZE
1	0,2245E 01	0.1000E 01	0.1482E 01	0.9970E 00	0.3012E-02	0.5166E 02	0.6627E-01	0.7849E 02	0.1887E 02	0.2641E 01	332
2	0,3352E 01	0.1000E 01	0.1055E 01	0.9474E 00	0.5263E-01	0.7012E 02	0.1158E 00	0.7889E 02	0.2059E 02	0.5263E 00	190
3	0,6412E 01	0.1000E 01	0.1130E 01	0.9821E 00	0.1704E-01	0.5009E 02	0.5605E 00	0.9378E 02	0.4996E 01	0.1223E 01	223
4	0,2043E 01	0.1441E 00	0.1378E 01	0.9009E-02	0.1351E 00	0.5234E 02	0.1802E-01	0.7350E 02	0.1230E 02	0.1420E 02	111
5	0,3712E 01	0.1000E 01	0.2000E 01	0.1000E 01	0.0000E 00	0.5066E 02	0.2047E 00	0.2449E 02	0.7551E 02	0.0000E 00	127
6	0,2779E 01	0.1000E 01	0.1012E 01	0.1000E 01	0.0000E 00	0.5299E 02	0.4242E-01	0.4361E 02	0.2806E 02	0.2833E 02	165
7	0,3112E 01	0.1000E 01	0.1219E 01	0.1000E 01	0.0000E 00	0.5509E 02	0.3002E 00	0.5738E 02	0.4158E 02	0.1039E 01	433
8	0,1445E 02	0.9839E 00	0.1094E 01	0.9194E 00	0.6452E-01	0.4860E 02	0.1452E 00	0.5973E 02	0.3886E 02	0.1408E 01	62
9	0,3058E 01	0.1000E 01	0.1269E 01	0.1000E 01	0.0000E 00	0.3872E 02	0.3413E 00	0.3005E 02	0.6932E 02	0.6275E 00	334
10	0,5563E 01	0.9865E 00	0.1034E 01	0.0000E 00	0.9865E 00	0.5551E 02	0.1486E 00	0.6856E 02	0.2845E 02	0.2986E 01	148
11	0,5460E 01	0.1000E 01	0.1278E 01	0.8889E 00	0.1111E 00	0.5172E 02	0.6111E 00	0.8336E 02	0.1664E 02	0.0000E 00	36
TOTAL	0,3819E 01	0,9547E 00	0.1284E 01	0.8695E 00	0.8515E-01	0.5206E 02	0.2318E 00	0,6116E 02	0.3482E 02	0,4021E 01	2161

GROUP MEANS — VARIABLES

GROUP	G04	G05	G06	SIZE
1	0,2048E 00	0.2982E 01	0.4518E-01	332
2	0,1158E 00	0.9947E 00	0.3684E-01	190
3	0,7175E-01	0.9462E 00	0.1794E-01	223
4	0,2523E 00	0.8829E 00	0.1351E 00	111
5	0,6614E 00	0.2031E 01	0.2677E 00	127
6	0,4242E-01	0.6364E 00	0.2242E 00	165
7	0,2633E 00	0.1471E 01	0.5312E-01	433
8	0,6290E 00	0.1758E 01	0.3226E-01	62
9	0,2156E 00	0.1515E 01	0.5988E-01	334
10	0,1014E 00	0.1291E 01	0.8108E-01	148
11	0,3611E 00	0.8889E 00	0.2222E 00	36
TOTAL	0,2212E 00	0.1539E 01	0.8191E-01	2161

CLASS MEANS : CLASSIFICATION II - SAMPLE D

CLASSIFICATION II - UNIVARIATE F TESTS - SAMPLE D

WILKS LAMBDA (U-STATISTIC) AND UNIVARIATE F-RATIØ

VARIABLE	WILKS LAMBDA	F
S01	.8060	51.7572
S02	.7946	55.5656
S03	.7906	56.9416
S04	.7801	60.5975
S05	.6402	120.8068
L01	.8253	45.5114
L02	.7685	64.7534
L03	.9229	17.9660
L04	.2573	620.6626
L05	.8306	43.8369
L06	.9668	7.3732
L07	.6662	107.7089
L08	.6357	123.1860
L09	.8591	35.2614
L10	.8354	42.3471
L11	.9672	7.2932
L12	.9375	14.3442
L13	.8408	40.7040
L14	.9112	20.9641
A01	.9371	14.4266
A02	.7455	73.3932
A03	.8250	45.5931
A04	.9781	4.8183
A05	.8959	24.9777
A06	.9570	9.6656
A07	.5467	178.2923
W01	.5912	148.6594
W02	.5022	213.1286
W03	.9125	20.6162
W04	.9144	20.1140
W05	.7198	83.7047
W06	.5730	160.1983
W07	.4399	273.7749
M01	.7160	85.2614
M02	.8620	34.4326
M03	.6856	98.5747
M04	.9445	12.6382
M05	.6912	96.0528
M06	.4897	224.0786
M07	.7882	57.7811
M08	.8760	30.4366
H01	.1780	993.0384
H02	.8287	44.4325
H03	.0960	2024.2971
H04	.2177	772.6993
H05	.6060	139.7775
H06	.8453	39.3500
G01	.7307	79.2337
G02	.7053	89.8271
G03	.8303	43.9312
G04	.8628	34.2026
G05	.7852	58.8020
G06	.9420	13.2450

WITH 10 AND 2150 DEGREES ØF FREEDØM

APPENDIX K

Three Population Classifications

STANDARD CLASSIFICATION - POPULATION

TOTAL
NO. OF OBSERVATIONS =21743

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.2015E 04	0.7427E 04	0.2000E 01	0.7513E 06
S02	0.1695E 04	0.4397E 04	0.1000E 01	0.4131E 06
S03	0.1856E 02	0.9563E 02	0.0000E 00	0.1096E 05
S04	0.1971E 01	0.2164E 01	0.7273E-02	0.1346E 03
S05	0.2586E 01	0.2274E 01	0.0000E 00	0.5400E 02
L01	0.2571E 02	0.2354E 02	0.0000E 00	0.1000E 03
L02	0.7336E 01	0.1121E 02	0.0000E 00	0.1000E 03
L03	0.6112E 00	0.3499E 01	0.0000E 00	0.1000E 03
L04	0.3274E 01	0.1366E 02	0.0000E 00	0.1000E 03
L05	0.9627E 01	0.1619E 02	0.0000E 00	0.1000E 03
L06	0.1185E 01	0.6126E 01	0.0000E 00	0.1000E 03
L07	0.1538E 01	0.8156E 01	0.0000E 00	0.1000E 03
L08	0.4008E 02	0.3479E 02	0.0000E 00	0.1000E 03
L09	0.4524E 01	0.1595E 02	0.0000E 00	0.1000E 03
L10	0.6219E 01	0.1977E 02	0.0000E 00	0.1000E 03
L11	0.2007E 01	0.8962E 01	0.0000E 00	0.9962E 02
L12	0.9473E 01	0.1461E 02	0.0000E 00	0.9972E 02
L13	0.1110E 00	0.3141E 00	0.0000E 00	0.1000E 01
L14	0.2277E 00	0.4193E 00	0.0000E 00	0.1000E 01
A01	0.4378E 01	0.1377E 02	0.0000E 00	0.1000E 03
A02	0.3049E 02	0.2765E 02	0.0000E 00	0.1000E 03
A03	0.2458E 02	0.2932E 02	0.0000E 00	0.1000E 03
A04	0.3187E 01	0.1454E 02	0.0000E 00	0.1000E 03
A05	0.1414E 02	0.2369E 02	0.0000E 00	0.1000E 03
A06	0.4011E 01	0.1583E 02	0.0000E 00	0.1000E 03
A07	0.1956E 01	0.1351E 02	0.0000E 00	0.9643E 03
W01	0.3756E 01	0.1056E 02	0.1452E-03	0.6042E 03
W02	0.8425E 02	0.2422E 02	0.0000E 00	0.1000E 03
W03	0.8525E 01	0.1768E 02	0.0000E 00	0.1000E 03
W04	0.1413E 02	0.2305E 02	0.0000E 00	0.1000E 03
W05	0.2154E 02	0.3336E 02	0.0000E 00	0.1000E 03
W06	0.4109E 02	0.3891E 02	0.0000E 00	0.1000E 03
W07	0.1322E 02	0.2786E 02	0.0000E 00	0.1000E 03
M01	0.4844E 00	0.4998E 00	0.0000E 00	0.1000E 01
M02	0.1387E 00	0.3456E 00	0.0000E 00	0.1000E 01
M03	0.1778E 00	0.3323E 00	0.0000E 00	0.1000E 01
M04	0.6866E 00	0.4639E 00	0.0000E 00	0.1000E 01
M05	0.2856E 00	0.4498E 00	0.0000E 00	0.1000E 01
M06	0.1046E 01	0.8110E 01	0.0000E 00	0.1000E 03
M07	0.4747E-01	0.2137E 00	0.0000E 00	0.1000E 01
M08	0.3977E 01	0.9162E 01	0.0000E 00	0.5000E 03
H01	0.9479E 00	0.2222E 00	0.0000E 00	0.1000E 01
H02	0.1291E 01	0.5943E 00	0.1000E 01	0.4000E 01
H03	0.8722E 00	0.3338E 00	0.0000E 00	0.1000E 01
H04	0.7566E-01	0.2644E 00	0.0000E 00	0.1000E 01
H05	0.5191E 02	0.1248E 02	0.1500E 02	0.9400E 02
H06	0.2160E 00	0.4115E 00	0.0000E 00	0.1000E 01
G01	0.6167E 02	0.4162E 02	0.0000E 00	0.1000E 03
G02	0.3423E 02	0.4927E 02	0.0000E 00	0.1000E 03
G03	0.4701E 01	0.2023E 02	0.0000E 00	0.1000E 03
G04	0.2260E 00	0.4142E 00	0.0000E 00	0.1000E 01
G05	0.1518E 01	0.1306E 01	0.0000E 00	0.4000E 01
G06	0.8858E-01	0.3179E 00	0.0000E 00	0.5000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
3346	4240	4411	2671	5093	1982

CLASS 1
NO. OF OBSERVATIONS = 1130

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.2267E 04	0.3053E 04	0.2700E 02	0.5740E 05
S02	0.2100E 04	0.3554E 04	0.2000E 02	0.5190E 05
S03	0.9559E 01	0.2706E 02	0.0000E 00	0.4318E 03
S04	0.1812E 01	0.2034E 01	0.1091E-01	0.2519E 02
S05	0.2657E 01	0.2091E 01	0.0000E 00	0.1900E 02
L01	0.8078E 02	0.1134E 02	0.6602E 02	0.1000E 03
L02	0.5103E 01	0.7816E 01	0.0000E 00	0.3333E 02
L03	0.9165E 00	0.3639E 01	0.0000E 00	0.3290E 02
L04	0.9957E-01	0.1367E 01	0.0000E 00	0.3333E 02
L05	0.4988E 01	0.7876E 01	0.0000E 00	0.3333E 02
L06	0.9093E 00	0.3606E 01	0.0000E 00	0.3000E 02
L07	0.7339E 00	0.2439E 01	0.0000E 00	0.3269E 02
L08	0.4037E 01	0.6930E 01	0.0000E 00	0.3333E 02
L09	0.1344E 01	0.4023E 01	0.0000E 00	0.3333E 02
L10	0.1090E 01	0.4120E 01	0.0000E 00	0.3333E 02
L11	0.1921E 01	0.8515E 01	0.0000E 00	0.8096E 02
L12	0.6183E 01	0.1097E 02	0.0000E 00	0.9500E 02
L13	0.1159E 00	0.3201E 00	0.0000E 00	0.1000E 01
L14	0.1451E 00	0.3522E 00	0.0000E 00	0.1000E 01
A01	0.1252E 02	0.2898E 02	0.0000E 00	0.1000E 03
A02	0.1270E 02	0.2471E 02	0.0000E 00	0.1000E 03
A03	0.1668E 02	0.2795E 02	0.0000E 00	0.1000E 03
A04	0.3988E 01	0.1607E 02	0.0000E 00	0.1000E 03
A05	0.1538E 02	0.2957E 02	0.0000E 00	0.1000E 03
A06	0.8208E 01	0.2389E 02	0.0000E 00	0.1000E 03
A07	0.7386E 00	0.2152E 01	0.0000E 00	0.3250E 02
W01	0.2141E 01	0.3327E 01	0.3121E-01	0.4706E 02
W02	0.7753E 02	0.3360E 02	0.0000E 00	0.1000E 03
W03	0.7322E 01	0.1729E 02	0.0000E 00	0.1000E 03
W04	0.1357E 02	0.2506E 02	0.0000E 00	0.1000E 03
W05	0.2230E 02	0.3423E 02	0.0000E 00	0.1000E 03
W06	0.4093E 02	0.4014E 02	0.0000E 00	0.1000E 03
W07	0.1331E 02	0.2975E 02	0.0000E 00	0.1000E 03
M01	0.4566E 00	0.4981E 00	0.0000E 00	0.1000E 01
M02	0.8230E-01	0.2748E 00	0.0000E 00	0.1000E 01
M03	0.1903E 00	0.3925E 00	0.0000E 00	0.1000E 01
M04	0.7867E 00	0.4096E 00	0.0000E 00	0.1000E 01
M05	0.7168E-01	0.2580E 00	0.0000E 00	0.1000E 01
M06	0.5922E-01	0.7688E 00	0.0000E 00	0.2248E 02
M07	0.1301E 00	0.3364E 00	0.0000E 00	0.1000E 01
M08	0.4154E 01	0.6574E 01	0.0000E 00	0.6667E 02
H01	0.9257E 00	0.2623E 00	0.0000E 00	0.1000E 01
H02	0.1276E 01	0.6281E 00	0.1000E 01	0.4000E 01
H03	0.8487E 00	0.3584E 00	0.0000E 00	0.1000E 01
H04	0.7659E-01	0.2066E 00	0.0000E 00	0.1000E 01
H05	0.5186E 02	0.1244E 02	0.1700E 02	0.9100E 02
H06	0.2451E 00	0.4302E 00	0.0000E 00	0.1000E 01
G01	0.6056E 02	0.4358E 02	0.0000E 00	0.1000E 03
G02	0.5187E 02	0.4103E 02	0.0000E 00	0.1000E 03
G03	0.7579E 01	0.2526E 02	0.0000E 00	0.1000E 03
G04	0.1655E 00	0.3716E 00	0.0000E 00	0.1000E 01
G05	0.9496E 00	0.1398E 01	0.0000E 00	0.4000E 01
G06	0.1071E 00	0.3259E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
165	125	151	141	535	15

CLASS 2
NO. OF OBSERVATIONS = 399

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.5408E 04	0.5857E 04	0.1000E 02	0.7855E 05
S02	0.2996E 04	0.3499E 04	0.8000E 01	0.4630E 05
S03	0.7985E 01	0.2139E 02	0.0000E 00	0.3242E 03
S04	0.2535E 01	0.4318E 01	0.1250E 00	0.7163E 02
S05	0.3090E 01	0.3184E 01	0.0000E 00	0.3600E 02
L01	0.4636E 02	0.8527E 01	0.3333E 02	0.6651E 02
L02	0.4181E 02	0.6997E 01	0.3333E 02	0.6563E 02
L03	0.1339E 01	0.3469E 01	0.0000E 00	0.1774E 02
L04	0.2660E 00	0.1699E 01	0.0000E 00	0.2000E 02
L05	0.5167E 01	0.6399E 01	0.0000E 00	0.3333E 02
L06	0.5531E-01	0.4746E 00	0.0000E 00	0.7173E 01
L07	0.7939E 00	0.2287E 01	0.0000E 00	0.2174E 02
L08	0.5593E 01	0.6339E 01	0.0000E 00	0.3100E 02
L09	0.5880E 00	0.2088E 01	0.0000E 00	0.3030E 02
L10	0.4893E 00	0.3017E 01	0.0000E 00	0.3333E 02
L11	0.9178E 00	0.7155E 01	0.0000E 00	0.8025E 02
L12	0.7774E 01	0.1181E 02	0.0000E 00	0.9446E 02
L13	0.3759E-01	0.1902E 00	0.0000E 00	0.1000E 01
L14	0.4060E 00	0.4911E 00	0.0000E 00	0.1000E 01
A01	0.4470E 01	0.1741E 02	0.0000E 00	0.1000E 03
A02	0.1665E 02	0.2776E 02	0.0000E 00	0.1000E 03
A03	0.2174E 02	0.3253E 02	0.0000E 00	0.1000E 03
A04	0.4886E 01	0.1778E 02	0.0000E 00	0.1000E 03
A05	0.1550E 02	0.3252E 02	0.0000E 00	0.1000E 03
A06	0.7432E 01	0.2267E 02	0.0000E 00	0.1000E 03
A07	0.7123E 00	0.2345E 01	0.0000E 00	0.2870E 02
W01	0.1989E 01	0.3598E 01	0.6614E-01	0.5000E 02
W02	0.6686E 02	0.3378E 02	0.0000E 00	0.1000E 03
W03	0.9953E 01	0.1837E 02	0.0000E 00	0.1000E 03
W04	0.1584E 02	0.2538E 02	0.0000E 00	0.1000E 03
W05	0.2264E 02	0.3140E 02	0.0000E 00	0.1000E 03
W06	0.4094E 02	0.3875E 02	0.0000E 00	0.1000E 03
W07	0.9621E 01	0.2490E 02	0.0000E 00	0.1000E 03
M01	0.7093E 00	0.4541E 00	0.0000E 00	0.1000E 01
M02	0.7018E-01	0.2554E 00	0.0000E 00	0.1000E 01
M03	0.4712E 00	0.4992E 00	0.0000E 00	0.1000E 01
M04	0.9023E 00	0.2970E 00	0.0000E 00	0.1000E 01
M05	0.1078E 00	0.3101E 00	0.0000E 00	0.1000E 01
M06	0.2595E-01	0.4011E 00	0.0000E 00	0.7656E 01
M07	0.5509E-01	0.1840E 00	0.0000E 00	0.1000E 01
M08	0.5240E 01	0.8488E 01	0.0000E 00	0.7143E 02
H01	0.9323E 00	0.2512E 00	0.0000E 00	0.1000E 01
H02	0.1910E 01	0.8624E 00	0.1000E 01	0.4000E 01
H03	0.8847E 00	0.3194E 00	0.0000E 00	0.1000E 01
H04	0.4762E-01	0.2130E 00	0.0000E 00	0.1000E 01
H05	0.5070E 02	0.1184E 02	0.2200E 02	0.8700E 02
H06	0.1654E 00	0.3716E 00	0.0000E 00	0.1000E 01
G01	0.4310E 02	0.4345E 02	0.0000E 00	0.1000E 03
G02	0.5590E 02	0.4359E 02	0.0000E 00	0.1000E 03
G03	0.1003E 01	0.9962E 01	0.0000E 00	0.1000E 03
G04	0.0566E 00	0.4748E 00	0.0000E 00	0.1000E 01
G05	0.1962E 01	0.1474E 01	0.0000E 00	0.4000E 01
G06	0.1604E 00	0.4359E 00	0.0000E 00	0.3000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
11	54	261	52	41	0

STANDARD CLASSIFICATION - POPULATION

CLASS 3
NO. OF OBSERVATIONS = 4735

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.2362E 04	0.3522E 04	0.8000E 01	0.7314E 05
S02	0.2097E 04	0.2910E 04	0.8000E 01	0.4780E 05
S03	0.1771E 02	0.3551E 02	0.0000E 00	0.7310E 03
S04	0.2519E 01	0.3134E 01	0.7275E-01	0.1346E 03
S05	0.3536E 01	0.2324E 01	0.0000E 00	0.5400E 02
L01	0.4136E 02	0.1964E 02	0.0000E 00	0.6659E 02
L02	0.1293E 02	0.1467E 02	0.0000E 00	0.1000E 03
L03	0.1934E 01	0.6569E 01	0.0000E 00	0.1000E 03
L04	0.2767E 00	0.2762E 01	0.0000E 00	0.3333E 02
L05	0.2653E 02	0.2296E 02	0.0000E 00	0.1000E 03
L06	0.5224E 00	0.2778E 01	0.0000E 00	0.3333E 02
L07	0.6771E 00	0.2064E 01	0.0000E 00	0.3333E 02
L08	0.1282E 02	0.1156E 02	0.0000E 00	0.3335E 02
L09	0.1582E 01	0.4453E 01	0.0000E 00	0.3333E 02
L10	0.9765E 00	0.3596E 01	0.0000E 00	0.3333E 02
L11	0.1367E 01	0.6389E 01	0.0000E 00	0.9202E 02
L12	0.8627E 01	0.1356E 02	0.0000E 00	0.9909E 02
L13	0.1571E 00	0.3630E 00	0.0000E 00	0.1000E 01
L14	0.3376E 00	0.4729E 00	0.0000E 00	0.1000E 01
A01	0.4129E 01	0.1448E 02	0.0000E 00	0.1000E 03
A02	0.3113E 02	0.2774E 02	0.0000E 00	0.1000E 03
A03	0.3217E 02	0.2612E 02	0.0000E 00	0.1000E 03
A04	0.2229E 01	0.1074E 02	0.0000E 00	0.1000E 03
A05	0.1519E 02	0.2199E 02	0.0000E 00	0.1000E 03
A06	0.4666E 01	0.1475E 02	0.0000E 00	0.1000E 03
A07	0.1347E 01	0.1490E 02	0.0000E 00	0.9645E 03
W01	0.2629E 01	0.4642E 01	0.4700E-01	0.1172E 03
W02	0.8244E 02	0.3007E 02	0.0000E 00	0.1000E 03
W03	0.1021E 02	0.1833E 02	0.0000E 00	0.1000E 03
W04	0.1598E 02	0.2590E 02	0.0000E 00	0.1000E 03
W05	0.2292E 02	0.3187E 02	0.0000E 00	0.1000E 03
W06	0.3999E 02	0.3603E 02	0.0000E 00	0.1000E 03
W07	0.1032E 02	0.2291E 02	0.0000E 00	0.1000E 03
M01	0.6322E 00	0.4822E 00	0.0000E 00	0.1000E 01
M02	0.1627E 00	0.3691E 00	0.0000E 00	0.1000E 01
M03	0.2952E 00	0.4561E 00	0.0000E 00	0.1000E 01
M04	0.8217E 00	0.3828E 00	0.0000E 00	0.1000E 01
M05	0.3069E 00	0.4586E 00	0.0000E 00	0.1000E 01
M06	0.6448E-01	0.8369E 00	0.0000E 00	0.2647E 02
M07	0.2805E-01	0.1677E 00	0.0000E 00	0.1000E 01
M08	0.3724E 01	0.5865E 01	0.0000E 00	0.1111E 03
H01	0.9465E 00	0.2249E 00	0.0000E 00	0.1000E 01
H02	0.1311E 01	0.6490E 00	0.1000E 01	0.4000E 01
H03	0.8929E 00	0.3093E 00	0.0000E 00	0.1000E 01
H04	0.5367E-01	0.2254E 00	0.0000E 00	0.1000E 01
H05	0.5124E 02	0.1213E 02	0.1600E 02	0.9300E 02
H06	0.1496E 00	0.3560E 00	0.0000E 00	0.1000E 01
G01	0.5300E 02	0.4258E 02	0.0000E 00	0.1000E 03
G02	0.3901E 02	0.4134E 02	0.0000E 00	0.1000E 03
G03	0.7992E 01	0.2009E 02	0.0000E 00	0.1000E 03
G04	0.1798E 00	0.3840E 00	0.0000E 00	0.1000E 01
G05	0.1598E 01	0.1543E 01	0.0000E 00	0.4000E 01
G06	0.1606E 00	0.4317E 00	0.0000E 00	0.4000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
775	810	626	646	1535	343

CLASS 4
NO. OF OBSERVATIONS = 556

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1331E 03	0.2283E 03	0.2000E 01	0.4400E 04
S02	0.1112E 03	0.1861E 03	0.2000E 01	0.3429E 04
S03	0.6008E 00	0.6067E 01	0.0000E 00	0.9750E 02
S04	0.2117E 01	0.1913E 01	0.1250E 00	0.2625E 02
S05	0.1464E 01	0.1174E 01	0.0000E 00	0.8000E 01
L01	0.1712E 00	0.1735E 01	0.0000E 00	0.2475E 02
L02	0.1920E 01	0.5925E 01	0.0000E 00	0.3268E 02
L03	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
L04	0.9348E 02	0.1118E 02	0.6667E 02	0.1000E 03
L05	0.6521E 00	0.3539E 01	0.0000E 00	0.3333E 02
L06	0.1064E 01	0.4988E 01	0.0000E 00	0.3307E 02
L07	0.1091E 01	0.4350E 01	0.0000E 00	0.3333E 02
L08	0.4847E 00	0.3205E 01	0.0000E 00	0.3049E 02
L09	0.1157E 00	0.1365E 01	0.0000E 00	0.3243E 02
L10	0.1018E 01	0.3380E 01	0.0000E 00	0.3333E 02
L11	0.1179E 01	0.8341E 01	0.0000E 00	0.9202E 02
L12	0.1470E 02	0.1390E 02	0.0000E 00	0.9972E 02
L13	0.1619E-01	0.1262E 00	0.0000E 00	0.1000E 01
L14	0.3058E-01	0.1722E 00	0.0000E 00	0.1000E 01
A01	0.1256E 01	0.1132E 02	0.0000E 00	0.1000E 03
A02	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
A03	0.7307E 00	0.8381E 01	0.0000E 00	0.1000E 03
A04	0.5648E 00	0.7536E 01	0.0000E 00	0.1000E 03
A05	0.4033E 01	0.1885E 02	0.0000E 00	0.1000E 03
A06	0.2409E 01	0.1477E 02	0.0000E 00	0.1000E 03
A07	0.5754E 00	0.8151E 01	0.0000E 00	0.1875E 03
W01	0.2990E 02	0.4392E 02	0.1289E 01	0.6042E 03
W02	0.7814E 02	0.2975E 02	0.0000E 00	0.1000E 03
W03	0.1241E 02	0.2165E 02	0.0000E 00	0.1000E 03
W04	0.2118E 02	0.3545E 02	0.0000E 00	0.1000E 03
W05	0.2198E 02	0.3477E 02	0.0000E 00	0.1000E 03
W06	0.5503E 02	0.3511E 02	0.0000E 00	0.1000E 03
W07	0.8870E 01	0.2312E 02	0.0000E 00	0.1000E 03
M01	0.1075E 00	0.3133E 00	0.0000E 00	0.1000E 01
M02	0.5324E 00	0.4990E 00	0.0000E 00	0.1000E 01
M03	0.1799E-02	0.4237E-01	0.0000E 00	0.1000E 01
M04	0.4406E 00	0.4965E 00	0.0000E 00	0.1000E 01
M05	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
M06	0.2566E 02	0.3176E 02	0.0000E 00	0.1000E 03
M07	0.5306E-01	0.2259E 00	0.0000E 00	0.1000E 01
M08	0.2015E 02	0.3303E 02	0.0000E 00	0.5000E 03
H01	0.9586E 00	0.1991E 00	0.0000E 00	0.1000E 01
H02	0.1674E 01	0.6707E 00	0.1000E 01	0.4000E 01
H03	0.9263E 00	0.2613E 00	0.0000E 00	0.1000E 01
H04	0.3237E-01	0.1770E 00	0.0000E 00	0.1000E 01
H05	0.4905E 02	0.1515E 02	0.2300E 02	0.8700E 02
H06	0.1924E 00	0.3942E 00	0.0000E 00	0.1000E 01
G01	0.6337E 02	0.4488E 02	0.0000E 00	0.1000E 03
G02	0.5576E 02	0.4459E 02	0.0000E 00	0.1000E 03
G03	0.8764E 00	0.9215E 01	0.0000E 00	0.1000E 03
G04	0.6745E 00	0.4986E 00	0.0000E 00	0.1000E 01
G05	0.1743E 01	0.1514E 01	0.0000E 00	0.4000E 01
G06	0.2518E-01	0.1567E 00	0.0000E 00	0.1000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
39	59	340	72	21	25

CLASS 5
NO. OF OBSERVATIONS = 523

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.5402E 03	0.1269E 04	0.1200E 02	0.2100E 05
S02	0.3708E 03	0.8742E 03	0.9000E 01	0.1260E 05
S03	0.1428E 02	0.7416E 02	0.0000E 00	0.8787E 03
S04	0.1216E 01	0.1467E 01	0.9091E-01	0.1232E 02
S05	0.1126E 01	0.9730E 00	0.0000E 00	0.7000E 01
L01	0.1275E 01	0.4327E 01	0.0000E 00	0.3333E 02
L02	0.6934E 00	0.2751E 01	0.0000E 00	0.2500E 02
L03	0.4439E-01	0.8416E 00	0.0000E 00	0.1575E 02
L04	0.6593E-01	0.1264E 01	0.0000E 00	0.2500E 02
L05	0.6639E 00	0.3111E 01	0.0000E 00	0.2812E 02
L06	0.6139E 00	0.2342E 01	0.0000E 00	0.2237E 02
L07	0.1932E 01	0.4901E 01	0.0000E 00	0.3548E 02
L08	0.1519E 01	0.5205E 01	0.0000E 00	0.3396E 02
L09	0.9008E 02	0.1066E 02	0.6667E 02	0.1000E 03
L10	0.3090E 01	0.7436E 01	0.0000E 00	0.3333E 02
L11	0.8787E 01	0.1975E 02	0.0000E 00	0.9804E 02
L12	0.1027E 02	0.1792E 02	0.0000E 00	0.9600E 02
L13	0.1663E 00	0.3724E 00	0.0000E 00	0.1000E 01
L14	0.5736E-02	0.7552E-01	0.0000E 00	0.1000E 01
A01	0.5926E 01	0.2169E 02	0.0000E 00	0.1000E 03
A02	0.2346E 01	0.1562E 02	0.0000E 00	0.1000E 03
A03	0.1904E 01	0.1238E 02	0.0000E 00	0.1000E 03
A04	0.1279E 00	0.2271E 01	0.0000E 00	0.5000E 02
A05	0.2144E 02	0.3362E 02	0.0000E 00	0.1000E 03
A06	0.4592E 01	0.1530E 02	0.0000E 00	0.1000E 03
A07	0.2852E 01	0.1050E 02	0.0000E 00	0.8[illegible]E 02
W01	0.5763E 01	0.6371E 01	0.7008E-01	0.5769E 02
W02	0.7191E 02	0.3280E 02	0.0000E 00	0.1000E 03
W03	0.4551E 01	0.1415E 02	0.0000E 00	0.1000E 03
W04	0.1005E 02	0.2400E 02	0.0000E 00	0.1000E 03
W05	0.1909E 02	0.3343E 02	0.0000E 00	0.1000E 03
W06	0.4146E 02	0.4236E 02	0.0000E 00	0.1000E 03
W07	0.2236E 02	0.3741E 02	0.0000E 00	0.1000E 03
M01	0.2447E 00	0.4299E 00	0.0000E 00	0.1000E 01
M02	0.2830E 00	0.4504E 00	0.0000E 00	0.1000E 01
M03	0.5736E-02	0.7552E-01	0.0000E 00	0.1000E 01
M04	0.4226E 00	0.4940E 00	0.0000E 00	0.1000E 01
M05	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
M06	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
M07	0.3117E 00	0.4632E 00	0.0000E 00	0.1000E 01
M08	0.8957E 01	0.1568E 02	0.0000E 00	0.1000E 03
H01	0.9254E 00	0.2627E 00	0.0000E 00	0.1000E 01
H02	0.1094E 01	0.3970E 00	0.1000E 01	0.4000E 01
H03	0.7916E 00	0.4062E 00	0.0000E 00	0.1000E 01
H04	0.1338E 00	0.3405E 00	0.0000E 00	0.1000E 01
H05	0.5483E 02	0.1298E 02	0.2000E 02	0.8300E 02
H06	0.3480E 00	0.4763E 00	0.0000E 00	0.1000E 01
G01	0.8552E 02	0.3217E 02	0.0000E 00	0.1000E 03
G02	0.3694E 01	0.1477E 02	0.0000E 00	0.1000E 03
G03	0.1079E 02	0.2978E 02	0.0000E 00	0.1000E 03
G04	0.4207E-01	0.2007E 00	0.0000E 00	0.1000E 01
G05	0.1375E 01	0.1277E 01	0.0000E 00	0.4000E 01
G06	0.9560E-02	0.1153E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
225	0	0	67	167	64

STANDARD CLASSIFICATION - POPULATION

CLASS 6
NO. OF OBSERVATIONS = 1368

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.8571E 03	0.3212E 04	0.4000E 01	0.8426E 05
S02	0.5944E 03	0.1514E 04	0.3000E 01	0.2160E 05
S03	0.2744E 01	0.2142E 02	0.0000E 00	0.3242E 03
S04	0.1766E 01	0.2780E 01	0.1250E 00	0.6124E 02
S05	0.1081E 01	0.1255E 01	0.0000E 00	0.1500E 02
L01	0.1866E 01	0.5772E 01	0.0000E 00	0.3333E 02
L02	0.5505E 00	0.2463E 01	0.0000E 00	0.3151E 02
L03	0.6843E-01	0.1432E 01	0.0000E 00	0.3333E 02
L04	0.6427E 00	0.3541E 01	0.0000E 00	0.3333E 02
L05	0.1022E 01	0.3799E 01	0.0000E 00	0.3333E 02
L06	0.3243E 00	0.2425E 01	0.0000E 00	0.3333E 02
L07	0.1595E 01	0.4351E 01	0.0000E 00	0.3333E 02
L08	0.1685E 01	0.5153E 01	0.0000E 00	0.3333E 02
L09	0.9660E 01	0.1133E 02	0.0000E 00	0.6612E 02
L10	0.8254E 02	0.2239E 02	0.2041E 01	0.1000E 03
L11	0.3981E 01	0.1427E 02	0.0000E 00	0.9381E 02
L12	0.1165E 02	0.1351E 02	0.0000E 00	0.9941E 02
L13	0.2966E 00	0.4541E 00	0.0000E 00	0.1000E 01
L14	0.1494E-01	0.1215E 00	0.0000E 00	0.1000E 01
A01	0.6714E 01	0.2344E 02	0.0000E 00	0.1000E 03
A02	0.4152E 01	0.1729E 02	0.0000E 00	0.1000E 03
A03	0.4176E 01	0.1557E 02	0.0000E 00	0.1000E 03
A04	0.2654E 01	0.1451E 02	0.0000E 00	0.1000E 03
A05	0.7684E 01	0.2378E 02	0.0000E 00	0.1000E 03
A06	0.4114E 01	0.1318E 02	0.0000E 00	0.1000E 03
A07	0.8769E 00	0.5351E 01	0.0000E 00	0.1083E 03
W01	0.6853E 01	0.1233E 02	0.6474E-01	0.1798E 03
W02	0.6389E 02	0.3367E 02	0.0000E 00	0.1000E 03
W03	0.5506E 01	0.1528E 02	0.0000E 00	0.1000E 03
W04	0.9090E 01	0.2340E 02	0.0000E 00	0.1000E 03
W05	0.1865E 02	0.3388E 02	0.0000E 00	0.1000E 03
W06	0.4364E 02	0.4358E 02	0.0000E 00	0.1000E 03
W07	0.1797E 02	0.3527E 02	0.0000E 00	0.1000E 03
M01	0.1873E 00	0.3901E 00	0.0000E 00	0.1000E 01
M02	0.2416E 00	0.4280E 00	0.0000E 00	0.1000E 01
M03	0.7491E-02	0.8622E-01	0.0000E 00	0.1000E 01
M04	0.3811E 00	0.4857E 00	0.0000E 00	0.1000E 01
M05	0.9363E-03	0.3059E-01	0.0000E 00	0.1000E 01
M06	0.3766E 01	0.1308E 02	0.0000E 00	0.1000E 03
M07	0.1676E 00	0.3735E 00	0.0000E 00	0.1000E 01
M08	0.5015E 01	0.9707E 01	0.0000E 00	0.1055E 03
H01	0.8801E 00	0.3248E 00	0.0000E 00	0.1000E 01
H02	0.1211E 01	0.5770E 00	0.1000E 01	0.4000E 01
H03	0.7509E 00	0.4325E 00	0.0000E 00	0.1000E 01
H04	0.1292E 00	0.3354E 00	0.0000E 00	0.1000E 01
H05	0.3415E 02	0.1225E 02	0.2100E 02	0.8900E 02
H06	0.3361E 00	0.4724E 00	0.0000E 00	0.1000E 01
G01	0.8059E 02	0.3763E 02	0.0000E 00	0.1000E 03
G02	0.1042E 02	0.2824E 02	0.0000E 00	0.1000E 03
G03	0.6986E 01	0.2834E 02	0.0000E 00	0.1000E 03
G04	0.1648E 00	0.3710E 00	0.0000E 00	0.1000E 01
G05	0.3712E 00	0.1114E 01	0.0000E 00	0.4000E 01
G06	0.4963E-01	0.2256E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
85	130	153	67	618	15

CLASS 7
NO. OF OBSERVATIONS = 1466

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1420E 04	0.1516E 04	0.1400E 02	0.1372E 05
S02	0.1255E 04	0.1320E 04	0.6000E 01	0.1105E 05
S03	0.1744E 02	0.1371E 02	0.1000E 01	0.1055E 03
S04	0.1532E 01	0.9090E 00	0.1250E 00	0.1140E 02
S05	0.1883E 01	0.1332E 01	0.0000E 00	0.8000E 01
L01	0.3850E 01	0.6760E 01	0.0000E 00	0.3198E 02
L02	0.2398E 01	0.4720E 01	0.0000E 00	0.3333E 02
L03	0.2174E-01	0.3278E 00	0.0000E 00	0.7166E 01
L04	0.9913E-01	0.9991E 00	0.0000E 00	0.1720E 02
L05	0.1084E 01	0.3541E 01	0.0000E 00	0.3169E 02
L06	0.1049E 00	0.1119E 01	0.0000E 00	0.2632E 02
L07	0.7369E 00	0.1832E 01	0.0000E 00	0.3000E 02
L08	0.9117E 02	0.1356E 02	0.6601E 02	0.1000E 03
L09	0.2200E 00	0.1459E 01	0.0000E 00	0.2096E 02
L10	0.3189E 00	0.2011E 01	0.0000E 00	0.2657E 02
L11	0.1429E 01	0.7247E 01	0.0000E 00	0.8935E 02
L12	0.6972E 01	0.1300E 02	0.0000E 00	0.8692E 02
L13	0.6753E-01	0.2509E 00	0.0000E 00	0.1000E 01
L14	0.1132E 00	0.3169E 00	0.0000E 00	0.1000E 01
A01	0.1398E 01	0.3482E 01	0.0000E 00	0.3243E 02
A02	0.7888E 02	0.1353E 02	0.6607E 02	0.1000E 03
A03	0.1631E 02	0.1076E 02	0.0000E 00	0.3333E 02
A04	0.6928E 00	0.2238E 01	0.0000E 00	0.3103E 02
A05	0.2116E 01	0.5198E 01	0.0000E 00	0.3333E 02
A06	0.6023E 00	0.2583E 01	0.0000E 00	0.3182E 02
A07	0.1427E 01	0.9496E 00	0.3458E-01	0.1200E 02
W01	0.2196E 01	0.2239E 01	0.5515E-01	0.2679E 02
W02	0.9191E 02	0.2125E 02	0.0000E 00	0.1000E 03
W03	0.7632E 01	0.1737E 02	0.0000E 00	0.1000E 03
W04	0.1409E 02	0.2756E 02	0.0000E 00	0.1000E 03
W05	0.2293E 02	0.3551E 02	0.0000E 00	0.1000E 03
W06	0.4210E 02	0.3998E 02	0.0000E 00	0.1000E 03
W07	0.1325E 02	0.2814E 02	0.0000E 00	0.1000E 03
M01	0.4468E 00	0.4972E 00	0.0000E 00	0.1000E 01
M02	0.9072E-01	0.2872E 00	0.0000E 00	0.1000E 01
M03	0.3001E-01	0.1706E 00	0.0000E 00	0.1000E 01
M04	0.6508E 00	0.4767E 00	0.0000E 00	0.1000E 01
M05	0.3820E 00	0.4359E 00	0.0000E 00	0.1000E 01
M06	0.9587E-02	0.2025E 00	0.0000E 00	0.6619E 01
M07	0.2046E-02	0.4519E-01	0.0000E 00	0.1000E 01
M08	0.2521E 01	0.3198E 01	0.0000E 00	0.3226E 02
H01	0.9748E 00	0.1568E 00	0.0000E 00	0.1000E 01
H02	0.1308E 01	0.5590E 00	0.1000E 01	0.4000E 01
H03	0.8608E 00	0.3461E 00	0.0000E 00	0.1000E 01
H04	0.1139E 00	0.3177E 00	0.0000E 00	0.1000E 01
H05	0.5188E 02	0.1276E 02	0.1800E 02	0.9100E 02
H06	0.2531E 00	0.4348E 00	0.0000E 00	0.1000E 01
G01	0.5344E 02	0.4355E 02	0.0000E 00	0.1000E 03
G02	0.4595E 02	0.4353E 02	0.0000E 00	0.1000E 03
G03	0.6125E 00	0.7010E 01	0.0000E 00	0.1000E 03
G04	0.3636E 00	0.4810E 00	0.0000E 00	0.1000E 01
G05	0.1668E 01	0.1355E 01	0.0000E 00	0.4000E 01
G06	0.3956E-01	0.2018E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
269	323	571	141	153	9

CLASS 8
NO. OF OBSERVATIONS = 2070

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.2495E 04	0.7306E 04	0.9000E 01	0.2896E 06
S02	0.2027E 04	0.2010E 04	0.6000E 01	0.4205E 05
S03	0.2349E 02	0.4063E 02	0.1000E 00	0.2337E 04
S04	0.1738E 01	0.1142E 01	0.2907E-01	0.1441E 02
S05	0.2117E 01	0.1027E 01	0.0000E 00	0.1000E 02
L01	0.7450E 01	0.9312E 01	0.0000E 00	0.3333E 02
L02	0.2215E 01	0.3769E 01	0.0000E 00	0.3333E 02
L03	0.2333E-01	0.4395E 00	0.0000E 00	0.1795E 02
L04	0.8930E-01	0.1135E 01	0.0000E 00	0.2443E 02
L05	0.1758E 01	0.4363E 01	0.0000E 00	0.3125E 02
L06	0.2107E 01	0.1334E 01	0.0000E 00	0.2030E 02
L07	0.5765E 00	0.1548E 01	0.0000E 00	0.2500E 02
L08	0.8687E 02	0.1172E 02	0.6601E 02	0.1000E 03
L09	0.2591E 00	0.1345E 01	0.0000E 00	0.2771E 02
L10	0.5469E 00	0.2769E 01	0.0000E 00	0.3334E 02
L11	0.1493E 01	0.7259E 01	0.0000E 00	0.8395E 02
L12	0.8542E 01	0.1383E 02	0.0000E 00	0.9554E 02
L13	0.7004E-01	0.2552E 00	0.0000E 00	0.1000E 01
L14	0.1588E 00	0.3655E 00	0.0000E 00	0.1000E 01
A01	0.4342E 01	0.1389E 02	0.0000E 00	0.1000E 03
A02	0.3748E 02	0.2375E 02	0.0000E 00	0.6645E 02
A03	0.4029E 02	0.2719E 02	0.0000E 00	0.1000E 03
A04	0.9643E 01	0.2010E 02	0.0000E 00	0.1000E 03
A05	0.6543E 01	0.8777E 01	0.0000E 00	0.3333E 02
A06	0.1658E 01	0.4497E 01	0.0000E 00	0.3337E 02
A07	0.1562E 01	0.3192E 01	0.7271E-03	0.1635E 03
W01	0.1683E 01	0.2098E 01	0.1337E-01	0.9375E 02
W02	0.8981E 02	0.2363E 02	0.0000E 00	0.1000E 03
W03	0.8460E 01	0.1786E 02	0.0000E 00	0.1000E 03
W04	0.1341E 02	0.2921E 02	0.0000E 00	0.1000E 03
W05	0.2225E 02	0.3375E 02	0.0000E 00	0.1000E 03
W06	0.4171E 02	0.3955E 02	0.0000E 00	0.1000E 03
W07	0.1401E 02	0.2475E 02	0.0000E 00	0.1000E 03
M01	0.4588E 00	0.4983E 00	0.0000E 00	0.1000E 01
M02	0.8801E-01	0.2833E 00	0.0000E 00	0.1000E 01
M03	0.8240E-01	0.2750E 00	0.0000E 00	0.1000E 01
M04	0.6431E 00	0.4791E 00	0.0000E 00	0.1000E 01
M05	0.3968E 00	0.4381E 00	0.0000E 00	0.1000E 01
M06	0.1147E-01	0.2452E 00	0.0000E 00	0.1031E 02
M07	0.1798E-01	0.1329E 00	0.0000E 00	0.1000E 01
M08	0.1918E 01	0.2559E 01	0.0000E 00	0.5000E 02
H01	0.9682E 00	0.1756E 00	0.0000E 00	0.1000E 01
H02	0.1287E 01	0.5528E 00	0.1000E 01	0.4000E 01
H03	0.9041E 00	0.2944E 00	0.0000E 00	0.1000E 01
H04	0.6404E-01	0.2448E 00	0.0000E 00	0.1000E 01
H05	0.5207E 02	0.1254E 02	0.1800E 02	0.8700E 02
H06	0.2240E 00	0.4169E 00	0.0000E 00	0.1000E 01
G01	0.5926E 02	0.4378E 02	0.0000E 00	0.1000E 03
G02	0.3891E 02	0.4051E 02	0.0000E 00	0.1000E 03
G03	0.1828E 01	0.1191E 02	0.0000E 00	0.1000E 03
G04	0.2757E 00	0.4468E 00	0.0000E 00	0.1000E 01
G05	0.1557E 01	0.1424E 01	0.0000E 00	0.4000E 01
G06	0.5561E-01	0.2528E 00	0.0000E 00	0.3000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
499	634	751	214	340	224

STANDARD CLASSIFICATION - POPULATION

CLASS 9
NO. OF OBSERVATIONS = 1079

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.8897E 03	0.4155E 04	0.2000E 01	0.1249E 06
S02	0.7200E 03	0.3935E 04	0.1000E 01	0.1246E 06
S03	0.6553E 02	0.4080E 03	0.2700E-01	0.1096E 05
S04	0.1318E 01	0.1486E 01	0.1250E 00	0.3197E 02
S05	0.1634E 01	0.1354E 01	0.0000E 00	0.1300E 02
L01	0.1445E 02	0.1734E 02	0.0000E 00	0.6557E 02
L02	0.6077E 01	0.9345E 01	0.0000E 00	0.6364E 02
L03	0.2015E 00	0.2532E 01	0.0000E 00	0.5120E 02
L04	0.2111E 01	0.9445E 01	0.0000E 00	0.6604E 02
L05	0.4411E 01	0.9946E 01	0.0000E 00	0.6306E 02
L06	0.1971E 01	0.8809E 01	0.0000E 00	0.1000E 03
L07	0.9964E 01	0.2505E 02	0.0000E 00	0.1000E 03
L08	0.5070E 02	0.3594E 02	0.0000E 00	0.1000E 03
L09	0.5174E 01	0.1315E 02	0.0000E 00	0.6607E 02
L10	0.4905E 01	0.1250E 02	0.0000E 00	0.6606E 02
L11	0.3046E 01	0.1117E 02	0.0000E 00	0.9565E 02
L12	0.1499E 02	0.1995E 02	0.0000E 00	0.9770E 02
L13	0.6434E-01	0.2779E 00	0.0000E 00	0.1000E 01
L14	0.1359E 00	0.3469E 00	0.0000E 00	0.1000E 01
A01	0.4772E 00	0.2262E 01	0.0000E 00	0.3125E 02
A02	0.3972E 01	0.7310E 01	0.0000E 00	0.3300E 02
A03	0.2583E 01	0.5597E 01	0.0000E 00	0.3289E 02
A04	0.7271E 00	0.3515E 01	0.0000E 00	0.3077E 02
A05	0.6245E 02	0.3929E 02	0.0000E 00	0.1000E 03
A06	0.2984E 02	0.3751E 02	0.0000E 00	0.1000E 03
A07	0.1465E 02	0.4770E 02	0.2716E-03	0.9024E 03
W01	0.7316E 01	0.1513E 02	0.1350E-01	0.2187E 03
W02	0.8974E 02	0.2450E 02	0.0000E 00	0.1000E 03
W03	0.5756E 01	0.1550E 02	0.0000E 00	0.1000E 03
W04	0.1236E 02	0.2656E 02	0.0000E 00	0.1000E 03
W05	0.2246E 02	0.3557E 02	0.0000E 00	0.1000E 03
W06	0.4463E 02	0.4202E 02	0.0000E 00	0.1000E 03
W07	0.1452E 02	0.3100E 02	0.0000E 00	0.1000E 03
M01	0.2892E 00	0.4534E 00	0.0000E 00	0.1000E 01
M02	0.1529E 00	0.3599E 00	0.0000E 00	0.1000E 01
M03	0.4356E-01	0.2041E 00	0.0000E 00	0.1000E 01
M04	0.5876E 00	0.4923E 00	0.0000E 00	0.1000E 01
M05	0.8341E-01	0.2765E 00	0.0000E 00	0.1000E 01
M06	0.3255E 00	0.3410E 01	0.0000E 00	0.7000E 02
M07	0.7414E-02	0.8579E-01	0.0000E 00	0.1000E 01
M08	0.4911E 01	0.7538E 01	0.0000E 00	0.9091E 02
H01	0.9611E 00	0.1934E 00	0.0000E 00	0.1000E 01
H02	0.1226E 01	0.5028E 00	0.1000E 01	0.4000E 01
H03	0.8661E 00	0.3469E 00	0.0000E 00	0.1000E 01
H04	0.1010E 00	0.3014E 00	0.0000E 00	0.1000E 01
H05	0.5213E 02	0.1283E 02	0.1500E 02	0.9100E 02
H06	0.3846E 00	0.4865E 00	0.0000E 00	0.1000E 01
G01	0.7627E 02	0.3656E 02	0.0000E 00	0.1000E 03
G02	0.2230E 02	0.3562E 02	0.0000E 00	0.1000E 03
G03	0.1423E 01	0.1111E 02	0.0000E 00	0.1000E 03
G04	0.2549E 00	0.4358E 00	0.0000E 00	0.1000E 01
G05	0.1351E 01	0.1422E 01	0.0000E 00	0.4000E 01
G06	0.1640E 00	0.3969E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
239	169	309	159	126	77

CLASS 10
NO. OF OBSERVATIONS = 4058

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.2301E 04	0.2572E 04	0.1400E 02	0.5813E 05
S02	0.2034E 04	0.1973E 04	0.1200E 02	0.2260E 05
S03	0.2367E 02	0.2097E 02	0.1000E 00	0.3838E 03
S04	0.2170E 01	0.1085E 01	0.1250E 00	0.1498E 02
S05	0.3523E 01	0.1743E 01	0.0000E 00	0.1500E 02
L01	0.3186E 02	0.1142E 02	0.0000E 00	0.6534E 02
L02	0.8458E 01	0.8046E 01	0.0000E 00	0.6364E 02
L03	0.2880E 00	0.1820E 01	0.0000E 00	0.4308E 02
L04	0.9815E-01	0.1025E 01	0.0000E 00	0.2813E 02
L05	0.8960E 01	0.1032E 02	0.0000E 00	0.6194E 02
L06	0.4072E 00	0.2097E 01	0.0000E 00	0.3333E 02
L07	0.4561E 00	0.9730E 00	0.0000E 00	0.1852E 02
L08	0.4878E 02	0.9122E 01	0.3330E 02	0.6659E 02
L09	0.3763E 00	0.1869E 01	0.0000E 00	0.2529E 02
L10	0.3150E 00	0.1681E 01	0.0000E 00	0.3252E 02
L11	0.9633E 00	0.4928E 01	0.0000E 00	0.6667E 02
L12	0.7686E 01	0.1197E 02	0.0000E 00	0.9305E 02
L13	0.5594E-01	0.2298E 00	0.0000E 00	0.1000E 01
L14	0.3317E 00	0.4708E 00	0.0000E 00	0.1000E 01
A01	0.2774E 01	0.8111E 01	0.0000E 00	0.1000E 03
A02	0.4665E 02	0.2095E 02	0.0000E 00	0.1000E 03
A03	0.3730E 02	0.2043E 02	0.0000E 00	0.1000E 03
A04	0.1758E 01	0.1028E 02	0.0000E 00	0.1000E 03
A05	0.1001E 02	0.7029E 01	0.0000E 00	0.3322E 02
A06	0.1556E 01	0.3575E 01	0.0000E 00	0.3182E 02
A07	0.1204E 01	0.6580E 00	0.1095E-01	0.9783E 01
W01	0.1844E 01	0.1942E 01	0.4976E-01	0.2272E 02
W02	0.9164E 02	0.2047E 02	0.0000E 00	0.1000E 03
W03	0.1004E 02	0.1809E 02	0.0000E 00	0.1000E 03
W04	0.1535E 02	0.2558E 02	0.0000E 00	0.1000E 03
W05	0.2345E 02	0.3304E 02	0.0000E 00	0.1000E 03
W06	0.3952E 02	0.3637E 02	0.0000E 00	0.1000E 03
W07	0.1159E 02	0.2327E 02	0.0000E 00	0.1000E 03
M01	0.6966E 00	0.4597E 00	0.0000E 00	0.1000E 01
M02	0.7122E-01	0.2572E 00	0.0000E 00	0.1000E 01
M03	0.3411E 00	0.4741E 00	0.0000E 00	0.1000E 01
M04	0.7523E 00	0.4317E 00	0.0000E 00	0.1000E 01
M05	0.5118E 00	0.4999E 00	0.0000E 00	0.1000E 01
M06	0.8701E-02	0.2361E 00	0.0000E 00	0.1263E 02
M07	0.9364E-02	0.9031E-01	0.0000E 00	0.1000E 01
M08	0.2746E 01	0.3364E 01	0.0000E 00	0.7143E 02
H01	0.9761E 00	0.1527E 00	0.0000E 00	0.1000E 01
H02	0.1260E 01	0.5558E 00	0.1000E 01	0.4000E 01
H03	0.9224E 00	0.2676E 00	0.0000E 00	0.1000E 01
H04	0.5372E-01	0.2255E 00	0.0000E 00	0.1000E 01
H05	0.5088E 02	0.1217E 02	0.2000E 02	0.9400E 02
H06	0.1516E 00	0.3586E 00	0.0000E 00	0.1000E 01
G01	0.5421E 02	0.3829E 02	0.0000E 00	0.1000E 03
G02	0.4296E 02	0.3832E 02	0.0000E 00	0.1000E 03
G03	0.2834E 01	0.1332E 02	0.0000E 00	0.1000E 03
G04	0.1129E 00	0.3164E 00	0.0000E 00	0.1000E 01
G05	0.1981E 01	0.1554E 01	0.0000E 00	0.4000E 01
G06	0.4731E-01	0.2247E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
568	1308	342	651	244	945

CLASS 11
NO. OF OBSERVATIONS = 563

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1023E 04	0.1376E 04	0.8000E 01	0.1045E 05
S02	0.9281E 03	0.1143E 04	0.7000E 01	0.1400E 05
S03	0.2711E 02	0.2540E 02	0.5000E 00	[illegible]
S04	0.1486E 01	0.9949E 00	0.1250E 00	[illegible]
S05	0.2176E 01	0.1445E 01	0.0000E 00	[illegible]
L01	0.8961E 01	0.9490E 01	0.0000E 00	[illegible]
L02	0.3502E 01	0.4957E 01	0.0000E 00	[illegible]
L03	0.7970E-02	0.1389E 00	0.0000E 00	[illegible]
L04	0.1237E 00	0.1936E 01	0.0000E 00	0.4415E 02
L05	0.1605E 01	0.4607E 01	0.0000E 00	0.3247E 02
L06	0.4564E 00	0.3073E 01	0.0000E 00	0.3937E 02
L07	0.9961E 00	0.2095E 01	0.0000E 00	0.2353E 02
L08	0.8266E 02	0.1424E 02	0.3347E 02	0.1000E 03
L09	0.7016E 00	0.4471E 01	0.0000E 00	[illegible]
L10	0.1048E 01	0.4780E 01	0.0000E 00	[illegible]
L11	0.4923E 00	0.3971E 01	0.0000E 00	[illegible]
L12	0.6716E 01	0.8097E 01	0.0000E 00	[illegible]
L13	0.5197E-01	0.1759E 00	0.0000E 00	0.1000E 01
L14	0.3375E 00	0.4728E 00	0.0000E 00	0.1000E 01
A01	0.2080E 01	0.6449E 01	0.0000E 00	0.6667E 02
A02	0.3140E 02	0.1927E 02	0.0000E 00	0.6557E 02
A03	0.1692E 02	0.1445E 02	0.0000E 00	0.6372E 02
A04	0.2153E 01	0.5069E 01	0.0000E 00	[illegible]
A05	0.3660E 02	0.1715E 02	0.0000E 00	[illegible]
A06	0.1085E 02	0.1411E 02	0.0000E 00	0.6533E 02
A07	0.3464E 01	0.4558E 01	0.3300E-01	[illegible]
W01	0.2643E 01	0.2656E 01	0.1154E 00	0.3125E 02
W02	0.9563E 02	0.1949E 02	0.0000E 00	0.1000E 03
W03	0.6584E 01	0.1936E 02	0.0000E 00	0.1000E 03
W04	0.1538E 02	0.2926E 02	0.0000E 00	0.1000E 03
W05	0.2333E 02	0.3548E 02	0.0000E 00	0.1000E 03
W06	0.4119E 02	0.4101E 02	0.0000E 00	0.1000E 03
W07	0.1351E 02	0.2923E 02	0.0000E 00	0.1000E 03
M01	0.3604E 00	0.4827E 00	0.0000E 00	0.1000E 01
M02	0.5329E-01	0.2246E 00	0.0000E 00	0.1000E 01
M03	0.4263E-01	0.2020E 00	0.0000E 00	0.1000E 01
M04	0.7691E 00	0.4214E 00	0.0000E 00	0.1000E 01
M05	0.3961E 00	0.4891E 00	0.0000E 00	0.1000E 01
M06	0.1491E-01	0.3290E 00	0.0000E 00	0.7000E 01
M07	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
M08	0.3370E 01	0.3274E 01	0.0000E 00	0.2174E 02
H01	0.9822E 00	0.1321E 00	0.0000E 00	0.1000E 01
H02	0.1407E 01	0.5521E 00	0.1000E 01	0.3000E 01
H03	0.9130E 00	0.2819E 00	0.0000E 00	0.1000E 01
H04	0.6927E-01	0.2539E 00	0.0000E 00	0.1000E 01
H05	0.5243E 02	0.1298E 02	0.2100E 02	0.8600E 02
H06	0.2220E 00	0.4156E 00	0.0000E 00	0.1000E 01
G01	0.6548E 02	0.3935E 02	0.0000E 00	0.1000E 03
G02	0.3415E 02	0.3933E 02	0.0000E 00	0.1000E 03
G03	0.3743E 00	0.4567E 01	0.0000E 00	0.8065E 02
G04	0.5275E 00	0.4992E 00	0.0000E 00	0.1000E 01
G05	0.1908E 01	0.1409E 01	0.0000E 00	0.4000E 01
G06	0.9591E-01	0.3120E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
37	93	324	34	10	57

STANDARD CLASSIFICATION - POPULATION

CLASS 12
NO. OF OBSERVATIONS = 434

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1672E 04	0.2294E 04	0.2500E 02	0.3023E 05
S02	0.1476E 04	0.1768E 04	0.2300E 02	0.2864E 05
S03	0.2746E 02	0.3598E 02	0.4100E 00	0.3835E 03
S04	0.2016E 01	0.1747E 01	0.1250E 00	0.3137E 02
S05	0.3306E 01	0.1332E 01	0.0000E 00	0.1500E 02
L01	0.3365E 02	0.1145E 02	0.0000E 00	0.6645E 02
L02	0.1099E 02	0.8366E 01	0.0000E 00	0.6087E 02
L03	0.2786E 00	0.1564E 01	0.0000E 00	0.2299E 02
L04	0.2051E 00	0.1776E 01	0.0000E 00	0.2654E 02
L05	0.5943E 01	0.9274E 01	0.0000E 00	0.5074E 02
L06	0.1143E 01	0.5442E 01	0.0000E 00	0.5185E 02
L07	0.7127E 00	0.1519E 01	0.0000E 00	0.2041E 02
L08	0.4576E 02	0.1214E 02	0.0000E 00	0.6667E 02
L09	0.4972E 00	0.2310E 01	0.0000E 00	0.2894E 02
L10	0.6821E 00	0.3501E 01	0.0000E 00	0.3257E 02
L11	0.6478E 00	0.4196E 01	0.0000E 00	0.6856E 02
L12	0.7852E 01	0.1370E 02	0.0000E 00	0.8972E 02
L13	0.5755E-01	0.2327E 00	0.0000E 00	0.1000E 01
L14	0.4925E 00	0.4799E 00	0.0000E 00	0.1000E 01
A01	0.3272E 01	0.1334E 02	0.0000E 00	0.6667E 02
A02	0.2996E 02	0.1570E 02	0.0000E 00	0.6667E 02
A03	0.1998E 02	0.1449E 02	0.0000E 00	0.6667E 02
A04	0.1326E 01	0.7168E 01	0.0000E 00	0.6667E 02
A05	0.3864E 02	0.1334E 02	0.0000E 00	0.6620E 02
A06	0.6825E 01	0.1412E 02	0.0000E 00	0.6636E 02
A07	0.2063E 01	0.1367E 01	0.3750E-01	0.3000E 02
W01	0.2312E 01	0.2355E 01	0.1272E 00	0.2857E 02
W02	0.9155E 02	0.2797E 02	0.0000E 00	0.1000E 03
W03	0.9465E 01	0.1309E 02	0.0000E 00	0.1000E 03
W04	0.1680E 02	0.2704E 02	0.0000E 00	0.1000E 03
W05	0.2431E 02	0.3462E 02	0.0000E 00	0.1000E 03
W06	0.3937E 02	0.3724E 02	0.0000E 00	0.1000E 03
W07	0.1006E 02	0.2163E 02	0.0000E 00	0.1000E 03
M01	0.5875E 00	0.4923E 00	0.0000E 00	0.1000E 01
M02	0.5396E-01	0.2259E 00	0.0000E 00	0.1000E 01
M03	0.2530E 00	0.4347E 00	0.0000E 00	0.1000E 01
M04	0.8064E 00	0.3728E 00	0.0000E 00	0.1000E 01
M05	0.5000E 00	0.5000E 00	0.0000E 00	0.1000E 01
M06	0.1365E-01	0.1986E 00	0.0000E 00	0.3074E 01
M07	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
M08	0.3852E 01	0.4388E 01	0.0000E 00	0.3125E 02
H01	0.9652E 00	0.1332E 00	0.0000E 00	0.1000E 01
H02	0.1418E 01	0.6375E 00	0.1000E 01	0.4000E 01
H03	0.8945E 00	0.3072E 00	0.0000E 00	0.1000E 01
H04	0.7074E-01	0.2564E 00	0.0000E 00	0.1000E 01
H05	0.4956E 02	0.1273E 02	0.1700E 02	0.8700E 02
H06	0.1847E 00	0.3880E 00	0.0000E 00	0.1000E 01
G01	0.6073E 02	0.3540E 02	0.0000E 00	0.1000E 03
G02	0.3702E 02	0.3503E 02	0.0000E 00	0.1000E 03
G03	0.2252E 01	0.1235E 02	0.0000E 00	0.1000E 03
G04	0.2482E 00	0.4320E 00	0.0000E 00	0.1000E 01
G05	0.2102E 01	0.1452E 01	0.0000E 00	0.4000E 01
G06	0.1211E 00	0.3337E 00	0.0000E 00	0.3000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
52	208	173	244	42	115

CLASS 13
NO. OF OBSERVATIONS = 447

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1229E 04	0.2428E 04	0.2300E 02	0.3071E 05
S02	0.1071E 04	0.2116E 04	0.2200E 02	0.3000E 05
S03	0.4995E 01	0.2602E 02	0.0000E 00	0.3796E 03
S04	0.2237E 01	0.3258E 01	0.1250E 00	0.4110E 02
S05	0.1971E 01	0.1310E 01	0.0000E 00	0.2400E 02
L01	0.3091E 02	0.1732E 02	0.0000E 00	0.6596E 02
L02	0.4718E 01	0.9771E 01	0.0000E 00	0.6349E 02
L03	0.3665E 00	0.2568E 01	0.0000E 00	0.3333E 02
L04	0.1391E 00	0.9757E 00	0.0000E 00	0.1029E 02
L05	0.1252E 02	0.1552E 02	0.0000E 00	0.6644E 02
L06	0.6718E 00	0.2398E 01	0.0000E 00	0.2410E 02
L07	0.7677E 00	0.2321E 01	0.0000E 00	0.1923E 02
L08	0.3361E 01	0.6695E 01	0.0000E 00	0.3333E 02
L09	0.2151E 02	0.2107E 02	0.0000E 00	0.6481E 02
L10	0.2503E 02	0.2067E 02	0.0000E 00	0.6471E 02
L11	0.3177E 01	0.1068E 02	0.0000E 00	0.8657E 02
L12	0.8273E 01	0.1365E 02	0.0000E 00	0.8753E 02
L13	0.3110E 00	0.4629E 00	0.0000E 00	0.1000E 01
L14	0.1633E 00	0.3696E 00	0.0000E 00	0.1000E 01
A01	0.1571E 02	0.3269E 02	0.0000E 00	0.1000E 03
A02	0.1310E 02	0.2671E 02	0.0000E 00	0.1000E 03
A03	0.1541E 02	0.2924E 02	0.0000E 00	0.1000E 03
A04	0.3298E 01	0.1446E 02	0.0000E 00	0.1000E 03
A05	0.5250E 01	0.1148E 02	0.0000E 00	0.5714E 02
A06	0.9209E 00	0.4288E 01	0.0000E 00	0.5365E 02
A07	0.3306E 00	0.5570E 00	0.0000E 00	0.4800E 01
W01	0.3500E 01	0.3423E 01	0.2500E 00	0.2717E 02
W02	0.6660E 02	0.3911E 02	0.0000E 00	0.1000E 03
W03	0.7120E 01	0.1383E 02	0.0000E 00	0.1000E 03
W04	0.1016E 02	0.2242E 02	0.0000E 00	0.1000E 03
W05	0.1859E 02	0.3145E 02	0.0000E 00	0.1000E 03
W06	0.4672E 02	0.4100E 02	0.0000E 00	0.1000E 03
W07	0.1450E 02	0.3369E 02	0.0000E 00	0.1000E 03
M01	0.2685E 00	0.4437E 00	0.0000E 00	0.1000E 01
M02	0.2304E 00	0.4267E 00	0.0000E 00	0.1000E 01
M03	0.4251E-01	0.2017E 00	0.0000E 00	0.1000E 01
M04	0.6980E 00	0.4591E 00	0.0000E 00	0.1000E 01
M05	0.2685E-01	0.1616E 00	0.0000E 00	0.1000E 01
M06	0.2327E 00	0.3321E 01	0.0000E 00	0.5128E 02
M07	0.2058E 00	0.4043E 00	0.0000E 00	0.1000E 01
M08	0.4607E 01	0.7110E 01	0.0000E 00	0.5714E 02
H01	0.8770E 00	0.3285E 00	0.0000E 00	0.1000E 01
H02	0.1112E 01	0.4497E 00	0.1000E 01	0.4000E 01
H03	0.7875E 00	0.4091E 00	0.0000E 00	0.1000E 01
H04	0.8949E-01	0.2854E 00	0.0000E 00	0.1000E 01
H05	0.5414E 02	0.1164E 02	0.2300E 02	0.8600E 02
H06	0.2327E 00	0.4225E 00	0.0000E 00	0.1000E 01
G01	0.7295E 02	0.4143E 02	0.0000E 00	0.1000E 03
G02	0.8850E 01	0.2362E 02	0.0000E 00	0.1000E 03
G03	0.1820E 02	0.3823E 02	0.0000E 00	0.1000E 03
G04	0.9620E-01	0.2949E 00	0.0000E 00	0.1000E 01
G05	0.7181E 00	0.1193E 01	0.0000E 00	0.4000E 01
G06	0.9843E-01	0.3126E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
46	16	19	30	331	5

CLASS 14
NO. OF OBSERVATIONS = 69

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.3477E 03	0.5682E 03	0.1400E 02	0.3500E 04
S02	0.3197E 03	0.5401E 03	0.1100E 02	0.3300E 04
S03	0.3729E 00	0.1925E 01	0.0000E 00	0.1563E 02
S04	0.1767E 01	0.1240E 01	0.1250E 00	0.6210E 01
S05	0.2217E 01	0.1502E 01	0.0000E 00	0.7[illegible]E 01
L01	0.7092E 01	0.1465E 02	0.0000E 00	0.65[illegible]E 02
L02	0.2366E 02	0.1912E 02	0.0000E 00	0.6494E 02
L03	0.3294E 00	0.2716E 01	0.0000E 00	0.2273E 02
L04	0.4758E 02	0.9959E 01	0.3344E 02	0.6590E 02
L05	0.1655E 02	0.2152E 02	0.0000E 00	0.6494E 02
L06	0.1911E 01	0.5308E 01	0.0000E 00	0.2770E 02
L07	0.7322E 00	0.2167E 01	0.0000E 00	0.1429E 02
L08	0.1499E 01	0.5371E 01	0.0000E 00	0.2770E 02
L09	0.3565E 00	0.2228E 01	0.0000E 00	0.1[illegible]E 02
L10	0.2817E 00	0.1912E 01	0.0000E 00	0.1103E 02
L11	0.4011E 00	0.2436E 01	0.0000E 00	0.1810E 02
L12	0.9937E 01	0.1244E 02	0.0000E 00	0.6765E 02
L13	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
L14	0.1594E 00	0.3361E 00	0.0000E 00	0.1000E 01
A01	0.4682E 01	0.2151E 02	0.0000E 00	0.1000E 03
A02	0.2101E 01	0.1121E 02	0.0000E 00	0.6250E 02
A03	0.2788E 01	0.1535E 02	0.0000E 00	0.7692E 02
A04	0.4348E 01	0.2139E 02	0.0000E 00	0.1000E 03
A05	0.5736E 00	0.4485E 01	0.0000E 00	0.3750E 02
A06	0.0000E 00	0.0000E 00	0.0000E 00	[illegible]
A07	0.7235E-01	0.2246E 00	0.0000E 00	0.1[illegible]E 01
W01	0.1575E 02	0.2493E 02	0.3571E-01	0.1250E 03
W02	0.8555E 02	0.2700E 02	0.0000E 00	0.1000E 03
W03	0.1029E 02	0.2177E 02	0.0000E 00	0.8000E 02
W04	0.1557E 02	0.3309E 02	0.0000E 00	0.1000E 03
W05	0.2053E 02	0.3534E 02	0.0000E 00	0.1000E 03
W06	0.4198E 02	0.3382E 02	0.0000E 00	0.1000E 03
W07	0.1123E 02	0.2623E 02	0.0000E 00	0.1000E 03
M01	0.1739E 00	0.3790E 00	0.0000E 00	0.1000E 01
M02	0.6377E 00	0.4307E 00	0.0000E 00	0.1000E 01
M03	0.2899E-01	0.1578E 00	0.0000E 00	0.1000E 01
M04	0.5942E 00	0.4910E 00	0.0000E 00	0.1000E 01
M05	0.0000E 00	0.0000E 00	0.0000E 00	[illegible]
M06	0.6005E 01	0.1152E 02	0.0000E 00	0.5612E 02
M07	0.4348E-01	0.2039E 00	0.0000E 00	0.1000E 01
M08	0.1422E 02	0.1358E 02	0.0000E 00	0.1429E 03
H01	0.9420E 00	0.2337E 00	0.0000E 00	0.1000E 01
H02	0.1507E 01	0.6349E 00	0.1000E 01	0.3000E 01
H03	0.9275E 00	0.2593E 00	0.0000E 00	0.1000E 01
H04	0.1449E-01	0.1195E 00	0.0000E 00	0.1000E 01
H05	0.5128E 02	0.1096E 02	0.2700E 02	0.7200E 02
H06	0.2174E 00	0.4125E 00	0.0000E 00	0.1000E 01
G01	0.5291E 02	0.4102E 02	0.0000E 00	0.1000E 03
G02	0.4431E 02	0.4368E 02	0.0000E 00	0.1000E 03
G03	0.2786E 01	0.1445E 02	0.0000E 00	0.1000E 03
G04	0.5652E 00	0.4957E 00	0.0000E 00	0.1000E 01
G05	0.1870E 01	0.1032E 01	0.0000E 00	0.4000E 01
G06	0.5797E-01	0.2337E 00	0.0000E 00	0.1000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
5	15	39	6	2	2

STANDARD CLASSIFICATION - POPULATION

CLASS 15
NO. OF OBSERVATIONS = 866

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1700E 04	0.2337E 04	0.8000E 01	0.2330E 05
S02	0.1402E 04	0.1942E 04	0.7000E 01	0.2326E 05
S03	0.6600E 01	0.1005E 02	0.0000E 00	0.8328E 02
S04	0.1850E 01	0.1597E 01	0.2102E-01	0.2031E 02
S05	0.2146E 01	0.1576E 01	0.0000E 00	0.9000E 01
L01	0.3369E 02	0.1540E 02	0.0000E 00	0.6628E 02
L02	0.7059E 01	0.1119E 02	0.0000E 00	0.6486E 02
L03	0.6383E 00	0.4163E 01	0.0000E 00	0.6181E 02
L04	0.1059E 01	0.4597E 01	0.0000E 00	0.3145E 02
L05	0.1372E 02	0.1505E 02	0.0000E 00	0.6653E 02
L06	0.9066E 01	0.1473E 02	0.0000E 00	0.6667E 02
L07	0.1604E 01	0.4350E 01	0.0000E 00	0.5000E 02
L08	0.2377E 02	0.1387E 02	0.0000E 00	0.6591E 02
L09	0.5255E 01	0.8799E 01	0.0000E 00	0.3318E 02
L10	0.4203E 01	0.7373E 01	0.0000E 00	0.3257E 02
L11	0.5131E 01	0.1377E 02	0.0000E 00	0.8856E 02
L12	0.1016E 02	0.1552E 02	0.0000E 00	0.9741E 02
L13	0.1622E 00	0.3686E 00	0.0000E 00	0.1000E 01
L14	0.1727E 00	0.3780E 00	0.0000E 00	0.1000E 01
A01	0.7532E 01	0.2171E 02	0.0000E 00	0.1000E 03
A02	0.2374E 02	0.3353E 02	0.0000E 00	0.1000E 03
A03	0.2146E 02	0.2310E 02	0.0000E 00	0.1000E 03
A04	0.4947E 01	0.1399E 02	0.0000E 00	0.1000E 03
A05	0.4623E 01	0.7364E 01	0.0000E 00	0.3230E 02
A06	0.1363E 01	0.3521E 01	0.0000E 00	0.3256E 02
A07	0.4834E 00	0.7356E 00	0.0000E 00	0.1000E 02
W01	0.2772E 01	0.6197E 01	0.1823E-01	0.1323E 03
W02	0.8025E 02	0.3307E 02	0.0000E 00	0.1000E 03
W03	0.7715E 01	0.1724E 02	0.0000E 00	0.1000E 03
W04	0.1145E 02	0.2382E 02	0.0000E 00	0.1000E 03
W05	0.1933E 02	0.3217E 02	0.0000E 00	0.1000E 03
W06	0.4211E 02	0.3970E 02	0.0000E 00	0.1000E 03
W07	0.1679E 02	0.3180E 02	0.0000E 00	0.1000E 03
M01	0.3874E 00	0.4372E 00	0.0000E 00	0.1000E 01
M02	0.1652E 00	0.3713E 00	0.0000E 00	0.1000E 01
M03	0.9610E-01	0.2947E 00	0.0000E 00	0.1000E 01
M04	0.7372E 00	0.4401E 00	0.0000E 00	0.1000E 01
M05	0.1186E 00	0.3235E 00	0.0000E 00	0.1000E 01
M06	0.3061E 00	0.2482E 01	0.0000E 00	0.3125E 02
M07	0.1126E 00	0.3161E 00	0.0000E 00	0.1000E 01
M08	0.3715E 01	0.7355E 01	0.0000E 00	0.1250E 03
H01	0.9219E 00	0.2683E 00	0.0000E 00	0.1000E 01
H02	0.1165E 01	0.4960E 00	0.1000E 01	0.4000E 01
H03	0.8166E 00	0.3868E 00	0.0000E 00	0.1000E 01
H04	0.1051E 00	0.3167E 00	0.0000E 00	0.1000E 01
H05	0.5346E 02	0.1236E 02	0.2300E 02	0.8400E 02
H06	0.2142E 00	0.4137E 00	0.0000E 00	0.1000E 01
G01	0.6826E 02	0.4155E 02	0.0000E 00	0.1000E 03
G02	0.2411E 02	0.3526E 02	0.0000E 00	0.1000E 03
G03	0.7637E 01	0.2389E 02	0.0000E 00	0.1000E 03
G04	0.8108E-01	0.2730E 00	0.0000E 00	0.1000E 01
G05	0.1063E 01	0.1436E 01	0.0000E 00	0.4000E 01
G06	0.8859E-01	0.3328E 00	0.0000E 00	0.3000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
131	106	37	57	509	20

CLASS 16
NO. OF OBSERVATIONS = 15

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1082E 04	0.2171E 04	0.2000E 01	0.9100E 04
S02	0.5038E 03	0.3455E 03	0.1000E 01	0.1067E 04
S03	0.3616E 01	0.2302E 01	0.6000E 00	0.1236E 02
S04	0.1722E 01	0.1278E 01	0.1250E 00	0.4000E 01
S05	0.1467E 01	0.1408E 01	0.0000E 00	0.4000E 01
L01	0.1093E 02	0.1014E 02	0.0000E 00	0.3306E 02
L02	0.3479E 01	0.4088E 01	0.0000E 00	0.1579E 02
L03	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
L04	0.2273E 00	0.8504E 00	0.0000E 00	0.3409E 01
L05	0.4543E 01	0.6182E 01	0.0000E 00	0.1705E 02
L06	0.4583E 01	0.1200E 02	0.0000E 00	0.4545E 02
L07	0.2069E 02	0.3968E 02	0.0000E 00	0.1000E 03
L08	0.1417E 02	0.1292E 02	0.0000E 00	0.3168E 02
L09	0.2207E 02	0.2245E 02	0.0000E 00	0.6333E 02
L10	0.1930E 02	0.2339E 02	0.0000E 00	0.6588E 02
L11	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
L12	0.2231E 02	0.3080E 02	0.4702E 00	0.9171E 02
L13	0.2667E 00	0.4422E 00	0.0000E 00	0.1000E 01
L14	0.1333E 00	0.3399E 00	0.0000E 00	0.1000E 01
A01	0.4923E 01	0.1233E 02	0.0000E 00	0.4545E 02
A02	0.2262E 02	0.2313E 02	0.0000E 00	0.6522E 02
A03	0.1354E 02	0.2016E 02	0.0000E 00	0.5841E 02
A04	0.9868E 01	0.1929E 02	0.0000E 00	0.5714E 02
A05	0.3630E 02	0.1869E 02	0.0000E 00	0.6522E 02
A06	0.1275E 02	0.1719E 02	0.0000E 00	0.5833E 02
A07	0.1062E 02	0.2345E 02	0.1538E-01	0.8950E 02
W01	0.2112E 02	0.6132E 02	0.1236E 00	0.2500E 03
W02	0.9622E 02	0.6249E 01	0.7857E 02	0.1000E 03
W03	0.8889E 01	0.1565E 02	0.0000E 00	0.5000E 02
W04	0.7222E 01	0.1517E 02	0.0000E 00	0.5000E 02
W05	0.1778E 02	0.2995E 02	0.0000E 00	0.1000E 03
W06	0.4556E 02	0.4001E 02	0.0000E 00	0.1000E 03
W07	0.2056E 02	0.3454E 02	0.0000E 00	0.1000E 03
M01	0.3333E 00	0.4714E 00	0.0000E 00	0.1000E 01
M02	0.1333E 00	0.3399E 00	0.0000E 00	0.1000E 01
M03	0.1333E 00	0.3399E 00	0.0000E 00	0.1000E 01
M04	0.5333E 00	0.4989E 00	0.0000E 00	0.1000E 01
M05	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
M06	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
M07	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
M08	0.1973E 01	0.2155E 01	0.0000E 00	0.6270E 01
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1067E 01	0.2494E 00	0.1000E 01	0.2000E 01
H03	0.9333E 00	0.2494E 00	0.0000E 00	0.1000E 01
H04	0.6667E-01	0.2494E 00	0.0000E 00	0.1000E 01
H05	0.5553E 02	0.9528E 01	0.3800E 02	0.6900E 02
H06	0.2000E 00	0.4000E 00	0.0000E 00	0.1000E 01
G01	0.7928E 02	0.3383E 02	0.0000E 00	0.1000E 03
G02	0.2072E 02	0.3383E 02	0.0000E 00	0.1000E 03
G03	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
G04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
G05	0.1200E 01	0.1514E 01	0.0000E 00	0.4000E 01
G06	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
2	2	2	1	0	2

CLASS 17
NO. OF OBSERVATIONS = 1467

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.3213E 04	0.2455E 05	0.2000E 01	0.7513E 06
S02	0.2037E 04	0.1394E 05	0.1000E 01	0.4131E 06
S03	0.5335E 01	0.8427E 01	0.0000E 00	0.8685E 02
S04	0.1314E 01	0.1827E 01	0.7273E-02	0.2700E 02
S05	0.1120E 01	0.1797E 01	0.0000E 00	0.4600E 02
L01	0.5510E 01	0.9055E 01	0.0000E 00	0.3307E 02
L02	0.2673E 01	0.5789E 01	0.0000E 00	0.3261E 02
L03	0.7975E-01	0.1014E 01	0.0000E 00	0.2629E 02
L04	0.6568E 01	0.1631E 02	0.0000E 00	0.6610E 02
L05	0.2154E 01	0.5454E 01	0.0000E 00	0.3323E 02
L06	0.5990E 01	0.1572E 02	0.0000E 00	0.1000E 03
L07	0.5179E 01	0.1784E 02	0.0000E 00	0.1000E 03
L08	0.5548E 02	0.3433E 02	0.0000E 00	0.1000E 03
L09	0.6337E 01	0.1419E 02	0.0000E 00	0.6635E 02
L10	0.1003E 02	0.1743E 02	0.0000E 00	0.6679E 02
L11	0.5122E 01	0.1512E 02	0.0000E 00	0.9962E 02
L12	0.1678E 02	0.2123E 02	0.0000E 00	0.9705E 02
L13	0.1302E 00	0.3365E 00	0.0000E 00	0.1000E 01
L14	0.6885E-01	0.2532E 00	0.0000E 00	0.1000E 01
A01	0.4908E 01	0.1862E 02	0.0000E 00	0.1000E 03
A02	0.1305E 02	0.2707E 02	0.0000E 00	0.1000E 03
A03	0.1054E 02	0.2310E 02	0.0000E 00	0.1000E 03
A04	0.4591E 01	0.1851E 02	0.0000E 00	0.1000E 03
A05	0.1922E 01	0.5497E 01	0.0000E 00	0.3333E 02
A06	0.4377E 00	0.2249E 01	0.0000E 00	0.2680E 02
A07	0.6859E 00	0.7063E 01	0.0000E 00	0.2463E 03
W01	0.5297E 01	0.1422E 02	0.1452E-03	0.2292E 03
W02	0.7779E 02	0.3601E 02	0.0000E 00	0.1000E 03
W03	0.5530E 01	0.1531E 02	0.0000E 00	0.1000E 03
W04	0.8554E 01	0.2286E 02	0.0000E 00	0.1000E 03
W05	0.1600E 02	0.3162E 02	0.0000E 00	0.1000E 03
W06	0.4343E 02	0.4319E 02	0.0000E 00	0.1000E 03
W07	0.2015E 02	0.3622E 02	0.0000E 00	0.1000E 03
M01	0.1663E 00	0.3724E 00	0.0000E 00	0.1000E 01
M02	0.1793E 00	0.3636E 00	0.0000E 00	0.1000E 01
M03	0.2522E-01	0.1568E 00	0.0000E 00	0.1000E 01
M04	0.4090E 00	0.4916E 00	0.0000E 00	0.1000E 01
M05	0.4703E-01	0.2117E 00	0.0000E 00	0.1000E 01
M06	0.2005E 01	0.8985E 01	0.0000E 00	0.1000E 03
M07	0.7226E-01	0.2589E 00	0.0000E 00	0.1000E 01
M08	0.3320E 01	0.1012E 02	0.0000E 00	0.2857E 03
H01	0.8855E 00	0.3184E 00	0.0000E 00	0.1000E 01
H02	0.1162E 01	0.4467E 00	0.1000E 01	0.4000E 01
H03	0.7601E 00	0.4270E 00	0.0000E 00	0.1000E 01
H04	0.1254E 00	0.3312E 00	0.0000E 00	0.1000E 01
H05	0.5508E 02	0.1258E 02	0.1900E 02	0.9100E 02
H06	0.3095E 00	0.4623E 00	0.0000E 00	0.1000E 01
G01	0.7910E 02	0.3701E 02	0.0000E 00	0.1000E 03
G02	0.1724E 02	0.3401E 02	0.0000E 00	0.1000E 03
G03	0.3662E 01	0.1832E 02	0.0000E 00	0.1000E 03
G04	0.1827E 00	0.3864E 00	0.0000E 00	0.1000E 01
G05	0.8098E 00	0.1270E 01	0.0000E 00	0.4000E 01
G06	0.4840E-01	0.2525E 00	0.0000E 00	0.5000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
198	210	313	69	599	58

POPULATION ASSIGNMENT BY CLASSIFICATION I

TOTAL
NO. OF OBSERVATIONS =21743

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0,2015E 04	0.7427E 04	0,2000E 01	0.7513E 06
S02	0,1695E 04	0.4397E 04	0,1000E 01	0.4131E 06
S03	0,1890E 02	0.9663E 02	0,0000E 00	0.1096E 05
S04	0,1961E 01	0.2164E 01	0,7273E-02	0.1346E 03
S05	0,2580E 01	0.2074E 01	0,0000E 00	0.5400E 02
L01	0,2561E 02	0.2358E 02	0,0000E 00	0.1000E 03
L02	0,7338E 01	0.1121E 02	0,0000E 00	0.1000E 03
L03	0,6112E 00	0.3499E 01	0,0000E 00	0.1000E 03
L04	0,3274E 01	0.1586E 02	0,0000E 00	0.1000E 03
L05	0,9627E 01	0.1619E 02	0,0000E 00	0.1000E 03
L06	0,1185E 01	0.6126E 01	0,0000E 00	0.1000E 03
L07	0,1538E 01	0.8156E 01	0,0000E 00	0.1000E 03
L08	0,4608E 02	0.3479E 02	0,0000E 00	0.1000E 03
L09	0,4524E 01	0.1595E 02	0,0000E 00	0.1000E 03
L10	0,6219E 01	0.1977E 02	0,0000E 00	0.1000E 03
L11	0,2007E 01	0.8962E 01	0,0000E 00	0.9962E 02
L12	0,9473E 01	0.1461E 02	0,0000E 00	0.9972E 02
L13	0,1110E 00	0.3141E 00	0,0000E 00	0.1000E 01
L14	0,2277E 00	0.4193E 00	0,0000E 00	0.1000E 01
A01	0,4378E 01	0.1577E 02	0,0000E 00	0.1000E 03
A02	0,3169E 02	0.2965E 02	0,0000E 00	0.1000E 03
A03	0,2458E 02	0.2632E 02	0,0000E 00	0.1000E 03
A04	0,3167E 01	0.1454E 02	0,0000E 00	0.1000E 03
A05	0,1414E 02	0.2369E 02	0,0000E 00	0.1000E 03
A06	0,4611E 01	0.1583E 02	0,0000E 00	0.1000E 03
A07	0,1956E 01	0.1351E 02	0,0000E 00	0.9643E 03
W01	0,3758E 01	0.1056E 02	0,1452E-03	0.6042E 03
W02	0,8425E 02	0.2922E 02	0,0000E 00	0.1000E 03
W03	0,8525E 01	0.1763E 02	0,0000E 00	0.1000E 03
W04	0,1403E 02	0.2605E 02	0,0000E 00	0.1000E 03
W05	0,2194E 02	0.3336E 02	0,0000E 00	0.1000E 03
W06	0,4109E 02	0.3891E 02	0,0000E 00	0.1000E 03
W07	0,1322E 02	0.2786E 02	0,0000E 00	0.1000E 03
M01	0,4844E 00	0.4998E 00	0,0000E 00	0.1000E 01
M02	0,1387E 00	0.3456E 00	0,0000E 00	0.1000E 01
M03	0,1778E 00	0.3823E 00	0,0000E 00	0.1000E 01
M04	0,6866E 00	0.4639E 00	0,0000E 00	0.1000E 01
M05	0,2816E 00	0.4498E 00	0,0000E 00	0.1000E 01
M06	0,1148E 01	0.8110E 01	0,0000E 00	0.1000E 03
M07	0,4797E-01	0.2137E 00	0,0000E 00	0.1000E 01
M08	0,3977E 01	0.9162E 01	0,0000E 00	0.5000E 03
H01	0,9479E 00	0.2222E 00	0,0000E 00	0.1000E 01
H02	0,1291E 01	0.5943E 00	0,1000E 01	0.4000E 01
H03	0,8722E 00	0.3338E 00	0,0000E 00	0.1000E 01
H04	0,7566E-01	0.2644E 00	0,0000E 00	0.1000E 01
H05	0,5191E 02	0.1248E 02	0,1500E 02	0.9400E 02
H06	0,2160E 00	0.4115E 00	0,0000E 00	0.1000E 01
G01	0,6107E 02	0.4162E 02	0,0000E 00	0.1000E 03
G02	0,3423E 02	0.4027E 02	0,0000E 00	0.1000E 03
G03	0,4701E 01	0.2023E 02	0,0000E 00	0.1000E 03
G04	0,2200E 00	0.4142E 00	0,0000E 00	0.1000E 01
G05	0,1518E 01	0.1506E 01	0,0000E 00	0.4000E 01
G06	0,6858E-01	0.3179E 00	0,0000E 00	0.5000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
3346	4240	4411	2671	5093	1982

CLASS 1
NO. OF OBSERVATIONS = 2260

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0,3689E 04	0.2301E 04	0,3090E 03	0.2988E 05
S02	0,3282E 04	0.1938E 04	0,1770E 03	0.1115E 05
S03	0,3744E 02	0.2644E 02	0,0000E 00	0.3619E 03
S04	0,2987E 01	0.1256E 01	0,5000E 00	0.1498E 02
S05	0,4822E 01	0.1345E 01	0,1000E 01	0.1500E 02
L01	0,3939E 02	0.1377E 02	0,0000E 00	0.1000E 03
L02	0,6787E 01	0.6913E 01	0,0000E 00	0.4301E 02
L03	0,4693E 00	0.2418E 01	0,0000E 00	0.3692E 02
L04	0,4286E-01	0.7622E 00	0,0000E 00	0.2154E 02
L05	0,1132E 02	0.1201E 02	0,0000E 00	0.8400E 02
L06	0,5262E 00	0.2618E 01	0,0000E 00	0.5587E 02
L07	0,2591E 00	0.4747E 00	0,0000E 00	0.8324E 01
L08	0,4039E 02	0.2019E 02	0,0000E 00	0.1000E 03
L09	0,3880E 00	0.2910E 01	0,0000E 00	0.6175E 02
L10	0,4195E 00	0.2492E 01	0,0000E 00	0.4444E 02
L11	0,5093E 00	0.3121E 01	0,0000E 00	0.5303E 02
L12	0,8534E 01	0.1230E 02	0,0000E 00	0.8703E 02
L13	0,5575E-01	0.2294E 00	0,0000E 00	0.1000E 01
L14	0,1845E 00	0.3879E 00	0,0000E 00	0.1000E 01
A01	0,7928E 00	0.3203E 01	0,0000E 00	0.1000E 03
A02	0,4048E 02	0.1655E 02	0,0000E 00	0.1000E 03
A03	0,3899E 02	0.1671E 02	0,0000E 00	0.1000E 03
A04	0,5457E 00	0.4324E 01	0,0000E 00	0.6723E 02
A05	0,1568E 02	0.1467E 02	0,0000E 00	0.1000E 03
A06	0,3286E 01	0.9043E 01	0,0000E 00	0.1000E 03
A07	0,1117E 01	0.6240E 00	0,0000E 00	0.9913E 01
W01	0,1100E 01	0.7638E 00	0,7302E-01	0.8108E 01
W02	0,8968E 02	0.1817E 02	0,5085E 01	0.1000E 03
W03	0,1356E 02	0.1954E 02	0,0000E 00	0.1000E 03
W04	0,1842E 02	0.2448E 02	0,0000E 00	0.1000E 03
W05	0,2466E 02	0.3110E 02	0,0000E 00	0.1000E 03
W06	0,3406E 02	0.2898E 02	0,0000E 00	0.1000E 03
W07	0,9292E 01	0.1621E 02	0,0000E 00	0.1000E 03
M01	0,9881E 00	0.1086E 00	0,0000E 00	0.1000E 01
M02	0,8496E-01	0.2788E 00	0,0000E 00	0.1000E 01
M03	0,9438E 00	0.2303E 00	0,0000E 00	0.1000E 01
M04	0,5898E 00	0.4919E 00	0,0000E 00	0.1000E 01
M05	0,9031E 00	0.2958E 00	0,0000E 00	0.1000E 01
M06	0,1688E-02	0.4449E-01	0,0000E 00	0.1618E 01
M07	0,0000E 00	0.0000E 00	0,0000E 00	0.0000E 00
M08	0,1885E 01	0.1466E 01	0,9775E-01	0.2417E 02
H01	0,1000E 01	0.0000E 00	0,1000E 01	0.1000E 01
H02	0,1517E 01	0.7208E 00	0,1000E 01	0.4000E 01
H03	0,1000E 01	0.0000E 00	0,1000E 01	0.1000E 01
H04	0,0000E 00	0.0000E 00	0,0000E 00	0.0000E 00
H05	0,4975E 02	0.1222E 02	0,1600E 02	0.9100E 02
H06	0,5973E-01	0.2370E 00	0,0000E 00	0.1000E 01
G01	0,6449E 02	0.3331E 02	0,0000E 00	0.1000E 03
G02	0,3195E 02	0.3270E 02	0,0000E 00	0.1000E 03
G03	0,3557E 01	0.1264E 02	0,0000E 00	0.1000E 03
G04	0,1075E 00	0.3098E 00	0,0000E 00	0.1000E 01
G05	0,2854E 01	0.1246E 01	0,0000E 00	0.4000E 01
G06	0,8673E-01	0.3252E 00	0,0000E 00	0.3000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
225	223	82	601	97	1032

CLASS 2
NO. OF OBSERVATIONS = 290

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0,2724E 05	0.5467E 05	0,3116E 04	0.7513E 06
S02	0,2000E 05	0.3009E 05	0,2698E 04	0.4131E 06
S03	0,6871E 02	0.9513E 02	0,0000E 00	0.7316E 03
S04	0,9013E 01	0.1257E 02	0,2182E-01	0.1346E 03
S05	0,5962E 01	0.4841E 01	0,0000E 00	0.3600E 02
L01	0,3492E 02	0.2626E 02	0,0000E 00	0.9613E 02
L02	0,6334E 01	0.1069E 02	0,0000E 00	0.4545E 02
L03	0,2418E 01	0.5209E 01	0,0000E 00	0.2960E 02
L04	0,4940E 00	0.5858E 01	0,0000E 00	0.7959E 02
L05	0,1079E 02	0.1512E 02	0,0000E 00	0.7778E 02
L06	0,1356E 01	0.4495E 01	0,0000E 00	0.3271E 02
L07	0,1235E 00	0.3040E 00	0,0000E 00	0.2500E 01
L08	0,3649E 02	0.3670E 02	0,0000E 00	0.1000E 03
L09	0,2493E 01	0.1047E 02	0,0000E 00	0.9683E 02
L10	0,4589E 01	0.1470E 02	0,0000E 00	0.1000E 03
L11	0,1253E 01	0.5302E 01	0,0000E 00	0.5000E 02
L12	0,1068E 02	0.1768E 02	0,0000E 00	0.9652E 02
L13	0,1000E 00	0.3000E 00	0,0000E 00	0.1000E 01
L14	0,1897E 00	0.3920E 00	0,0000E 00	0.1000E 01
A01	0,3049E 01	0.1289E 02	0,0000E 00	0.1000E 03
A02	0,2093E 02	0.2466E 02	0,0000E 00	0.1000E 03
A03	0,3076E 02	0.3164E 02	0,0000E 00	0.1000E 03
A04	0,1365E 02	0.2791E 02	0,0000E 00	0.1000E 03
A05	0,7719E 01	0.1834E 02	0,0000E 00	0.1000E 03
A06	0,4238E 01	0.1526E 02	0,0000E 00	0.1000E 03
A07	0,4052E 00	0.5029E 00	0,0000E 00	0.3288E 01
W01	0,6051E 00	0.1339E 01	0,1452E-03	0.1965E 02
W02	0,2330E 02	0.2862E 02	0,0000E 00	0.1000E 03
W03	0,8323E 01	0.1458E 02	0,0000E 00	0.1000E 03
W04	0,1751E 02	0.2167E 02	0,0000E 00	0.1000E 03
W05	0,2655E 02	0.2644E 02	0,0000E 00	0.1000E 03
W06	0,3808E 02	0.2907E 02	0,0000E 00	0.1000E 03
W07	0,4356E 01	0.1033E 02	0,0000E 00	0.5000E 02
M01	0,7310E 00	0.4434E 00	0,0000E 00	0.1000E 01
M02	0,2138E 00	0.4100E 00	0,0000E 00	0.1000E 01
M03	0,5310E 00	0.4990E 00	0,0000E 00	0.1000E 01
M04	0,5517E 00	0.4973E 00	0,0000E 00	0.1000E 01
M05	0,3103E 00	0.4626E 00	0,0000E 00	0.1000E 01
M06	0,6979E-02	0.9435E-01	0,0000E 00	0.1557E 01
M07	0,1724E-01	0.1302E 00	0,0000E 00	0.1000E 01
M08	0,3848E 00	0.3777E 00	0,0000E 00	0.4334E 01
H01	0,6517E 00	0.4764E 00	0,0000E 00	0.1000E 01
H02	0,1793E 01	0.1040E 01	0,1000E 01	0.4000E 01
H03	0,6034E 00	0.4892E 00	0,0000E 00	0.1000E 01
H04	0,4828E-01	0.2143E 00	0,0000E 00	0.1000E 01
H05	0,5160E 02	0.1037E 02	0,2400E 02	0.8500E 02
H06	0,5517E-01	0.2283E 00	0,0000E 00	0.1000E 01
G01	0,6147E 02	0.4300E 02	0,0000E 00	0.1000E 03
G02	0,3577E 02	0.4216E 02	0,0000E 00	0.1000E 03
G03	0,2759E 01	0.1638E 02	0,0000E 00	0.1000E 03
G04	0,4586E 00	0.4983E 00	0,0000E 00	0.1000E 01
G05	0,1462E 01	0.1516E 01	0,0000E 00	0.4000E 01
G06	0,3759E 00	0.6592E 00	0,0000E 00	0.3000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
63	24	28	32	136	7

POPULATION ASSIGNMENT BY CLASSIFICATION I

CLASS 3
NO. OF OBSERVATIONS = 1653

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.7299E 03	0.3542E 04	0.5000E 01	0.1402E 06
S02	0.5213E 03	0.7204E 03	0.4000E 01	0.7400E 04
S03	0.4297E 01	0.8977E 01	0.0000E 00	0.1923E 03
S04	0.1010E 01	0.7856E 00	0.1250E 00	0.1106E 02
S05	0.1268E 01	0.1043E 01	0.0000E 00	0.6000E 01
L01	0.1958E 02	0.2416E 02	0.0000E 00	0.1000E 03
L02	0.7212E 01	0.1203E 02	0.0000E 00	0.1000E 03
L03	0.1873E 00	0.2078E 01	0.0000E 00	0.4068E 02
L04	0.6809E 00	0.4927E 01	0.0000E 00	0.5488E 02
L05	0.8088E 01	0.1701E 02	0.0000E 00	0.1000E 03
L06	0.1060E 01	0.6236E 01	0.0000E 00	0.8584E 02
L07	0.1766E 01	0.4008E 01	0.0000E 00	0.4000E 02
L08	0.4816E 02	0.3696E 02	0.0000E 00	0.1000E 03
L09	0.5869E 01	0.1783E 02	0.0000E 00	0.1000E 03
L10	0.7394E 01	0.2071E 02	0.0000E 00	0.1000E 03
L11	0.3456E 01	0.1221E 02	0.0000E 00	0.9404E 02
L12	0.1123E 02	0.1637E 02	0.0000E 00	0.9854E 02
L13	0.9074E-01	0.2864E 00	0.0000E 00	0.1000E 01
L14	0.1349E 00	0.3416E 00	0.0000E 00	0.1000E 01
A01	0.6525E 01	0.1845E 02	0.0000E 00	0.1000E 03
A02	0.2595E 02	0.3317E 02	0.0000E 00	0.1000E 03
A03	0.1972E 02	0.2859E 02	0.0000E 00	0.1000E 03
A04	0.5274E 01	0.1943E 02	0.0000E 00	0.1000E 03
A05	0.1032E 02	0.2116E 02	0.0000E 00	0.1000E 03
A06	0.5410E 01	0.1772E 02	0.0000E 00	0.1000E 03
A07	0.1032E 01	0.1980E 01	0.0000E 00	0.2870E 02
W01	0.3648E 01	0.5350E 01	0.1337E-01	0.8333E 02
W02	0.9321E 02	0.1829E 02	0.3719E 01	0.1000E 03
W03	0.8409E 00	0.6006E 01	0.0000E 00	0.6667E 02
W04	0.3113E 01	0.1146E 02	0.0000E 00	0.7500E 02
W05	0.4572E 01	0.1371E 02	0.0000E 00	0.6667E 02
W06	0.8044E 01	0.1861E 02	0.0000E 00	0.6667E 02
W07	0.8253E 02	0.2424E 02	0.2500E 02	0.1000E 03
M01	0.1125E 00	0.3160E 00	0.0000E 00	0.1000E 01
M02	0.9095E-01	0.2890E 00	0.0000E 00	0.1000E 01
M03	0.2601E-01	0.1592E 00	0.0000E 00	0.1000E 01
M04	0.6207E 00	0.4852E 00	0.0000E 00	0.1000E 01
M05	0.2733E-01	0.1645E 00	0.0000E 00	0.1000E 01
M06	0.2239E-01	0.3382E 00	0.0000E 00	0.9091E 01
M07	0.3085E-01	0.1729E 00	0.0000E 00	0.1000E 01
M08	0.4233E 01	0.6069E 01	0.0000E 00	0.4545E 02
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1067E 01	0.2734E 00	0.1000E 01	0.3000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.7052E 02	0.5843E 01	0.2800E 02	0.9400E 02
H06	0.1210E 00	0.3261E 00	0.0000E 00	0.1000E 01
G01	0.7942E 02	0.3462E 02	0.0000E 00	0.1000E 03
G02	0.1969E 02	0.3394E 02	0.0000E 00	0.1000E 03
G03	0.8916E 00	0.8762E 01	0.0000E 00	0.1000E 03
G04	0.1205E 00	0.3357E 00	0.0000E 00	0.1000E 01
G05	0.9349E 00	0.1307E 01	0.0000E 00	0.4000E 01
G06	0.3185E-01	0.1764E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
303	347	326	153	408	116

CLASS 4
NO. OF OBSERVATIONS = 1248

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1482E 04	0.1492E 04	0.3700E 02	0.1960E 05
S02	0.1191E 04	0.1136E 04	0.3600E 02	0.9400E 04
S03	0.7988E 01	0.9085E 01	0.0000E 00	0.1138E 03
S04	0.2783E 01	0.1849E 01	0.1250E 00	0.3200E 02
S05	0.2065E 01	0.1312E 01	0.0000E 00	0.1000E 02
L01	0.3701E 02	0.2174E 02	0.0000E 00	0.1000E 03
L02	0.3234E 01	0.6106E 01	0.0000E 00	0.4795E 02
L03	0.6546E 00	0.3719E 01	0.0000E 00	0.5882E 02
L04	0.3098E 00	0.2502E 01	0.0000E 00	0.4815E 02
L05	0.3256E 02	0.2266E 02	0.0000E 00	0.1000E 03
L06	0.1151E 01	0.4980E 01	0.0000E 00	0.4745E 02
L07	0.6353E 00	0.1400E 01	0.0000E 00	0.1681E 02
L08	0.1022E 02	0.1755E 02	0.0000E 00	0.9957E 02
L09	0.7027E 01	0.1472E 02	0.0000E 00	0.1000E 03
L10	0.7203E 01	0.1793E 02	0.0000E 00	0.1000E 03
L11	0.2087E 01	0.8225E 01	0.0000E 00	0.8096E 02
L12	0.1317E 02	0.1672E 02	0.0000E 00	0.8831E 02
L13	0.6274E 00	0.4835E 00	0.0000E 00	0.1000E 01
L14	0.3838E 00	0.4863E 00	0.0000E 00	0.1000E 01
A01	0.3774E 01	0.1212E 02	0.0000E 00	0.1000E 03
A02	0.2185E 02	0.2965E 02	0.0000E 00	0.1000E 03
A03	0.4510E 02	0.3282E 02	0.0000E 00	0.1000E 03
A04	0.3522E 01	0.1202E 02	0.0000E 00	0.1000E 03
A05	0.1172E 02	0.1657E 02	0.0000E 00	0.1000E 03
A06	0.4501E 01	0.1358E 02	0.0000E 00	0.1000E 03
A07	0.6891E 00	0.6742E 00	0.0000E 00	0.7778E 01
W01	0.3416E 01	0.4774E 01	0.1497E 00	0.1172E 03
W02	0.8839E 02	0.2413E 02	0.1356E 01	0.1000E 03
W03	0.1195E 02	0.1857E 02	0.0000E 00	0.1000E 03
W04	0.1501E 02	0.2319E 02	0.0000E 00	0.1000E 03
W05	0.2251E 02	0.3072E 02	0.0000E 00	0.1000E 03
W06	0.4291E 02	0.3517E 02	0.0000E 00	0.1000E 03
W07	0.7615E 01	0.1684E 02	0.0000E 00	0.1000E 03
M01	0.3510E 00	0.4773E 00	0.0000E 00	0.1000E 01
M02	0.3165E 00	0.4651E 00	0.0000E 00	0.1000E 01
M03	0.5929E-01	0.2362E 00	0.0000E 00	0.1000E 01
M04	0.7708E 00	0.4203E 00	0.0000E 00	0.1000E 01
M05	0.2965E-01	0.1696E 00	0.0000E 00	0.1000E 01
M06	0.6142E-01	0.7391E 00	0.0000E 00	0.1465E 02
M07	0.2083E-01	0.1428E 00	0.0000E 00	0.1000E 01
M08	0.2644E 01	0.2983E 01	0.0000E 00	0.2222E 02
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1032E 01	0.2347E 00	0.1000E 01	0.4000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.5365E 02	0.1179E 02	0.2200E 02	0.9000E 02
H06	0.8814E-01	0.2835E 00	0.0000E 00	0.1000E 01
G01	0.4404E 02	0.4792E 02	0.0000E 00	0.1000E 03
G02	0.6611E 01	0.2140E 02	0.0000E 00	0.1000E 03
G03	0.4935E 02	0.4972E 02	0.0000E 00	0.1000E 03
G04	0.9936E-01	0.2991E 00	0.0000E 00	0.1000E 01
G05	0.5353E 00	0.1039E 01	0.0000E 00	0.4000E 01
G06	0.1715E 00	0.4469E 00	0.0000E 00	0.4000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
71	17	11	10	1127	12

CLASS 5.
NO. OF OBSERVATIONS = 1569

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.8854E 03	0.1387E 04	0.6000E 01	0.1640E 05
S02	0.7328E 03	0.1104E 04	0.6000E 01	0.9605E 04
S03	0.7352E 01	0.1477E 02	0.0000E 00	0.2042E 03
S04	0.1253E 01	0.1073E 01	0.1250E 00	0.1003E 02
S05	0.1594E 01	0.1495E 01	0.0000E 00	0.1200E 02
L01	0.2106E 02	0.2423E 02	0.0000E 00	0.1000E 03
L02	0.6490E 01	0.1099E 02	0.0000E 00	0.1000E 03
L03	0.2747E 00	0.2933E 01	0.0000E 00	0.8667E 02
L04	0.6937E 00	0.5441E 01	0.0000E 00	0.7500E 02
L05	0.8404E 01	0.1711E 02	0.0000E 00	0.1000E 03
L06	0.1541E 01	0.7776E 01	0.0000E 00	0.9600E 02
L07	0.1508E 01	0.4126E 01	0.0000E 00	0.5000E 02
L08	0.4362E 02	0.3704E 02	0.0000E 00	0.1000E 03
L09	0.6963E 01	0.2056E 02	0.0000E 00	0.1000E 03
L10	0.9438E 01	0.2471E 02	0.0000E 00	0.1000E 03
L11	0.3361E 01	0.1206E 02	0.0000E 00	0.9557E 02
L12	0.1024E 02	0.1577E 02	0.0000E 00	0.9249E 02
L13	0.1096E 00	0.3124E 00	0.0000E 00	0.1000E 01
L14	0.1485E 00	0.3556E 00	0.0000E 00	0.1000E 01
A01	0.3453E 01	0.1361E 02	0.0000E 00	0.1000E 03
A02	0.2865E 02	0.3328E 02	0.0000E 00	0.1000E 03
A03	0.1690E 02	0.2465E 02	0.0000E 00	0.1000E 03
A04	0.3497E 01	0.1537E 02	0.0000E 00	0.1000E 03
A05	0.1326E 02	0.2464E 02	0.0000E 00	0.1000E 03
A06	0.5052E 01	0.1740E 02	0.0000E 00	0.1000E 03
A07	0.1167E 01	0.2401E 01	0.0000E 00	0.2853E 02
W01	0.3632E 01	0.5309E 01	0.3086E-01	0.7143E 02
W02	0.8500E 02	0.2683E 02	0.1246E 01	0.1000E 03
W03	0.6726E 01	0.1717E 02	0.0000E 00	0.1000E 03
W04	0.1097E 02	0.2327E 02	0.0000E 00	0.1000E 03
W05	0.1822E 02	0.3218E 02	0.0000E 00	0.1000E 03
W06	0.4357E 02	0.4095E 02	0.0000E 00	0.1000E 03
W07	0.2051E 02	0.3450E 02	0.0000E 00	0.1000E 03
M01	0.2447E 00	0.4299E 00	0.0000E 00	0.1000E 01
M02	0.7967E-01	0.2708E 00	0.0000E 00	0.1000E 01
M03	0.7266E-01	0.2596E 00	0.0000E 00	0.1000E 01
M04	0.6329E 00	0.4820E 00	0.0000E 00	0.1000E 01
M05	0.1192E 00	0.3240E 00	0.0000E 00	0.1000E 01
M06	0.1331E 00	0.2054E 01	0.0000E 00	0.5714E 02
M07	0.5927E-01	0.2361E 00	0.0000E 00	0.1000E 01
M08	0.4475E 01	0.7343E 01	0.0000E 00	0.1000E 03
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1039E 01	0.2482E 00	0.1000E 01	0.4000E 01
H03	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H04	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H05	0.5569E 02	0.1304E 02	0.2000E 02	0.9100E 02
H06	0.1377E 00	0.3446E 00	0.0000E 00	0.1000E 01
G01	0.7314E 02	0.3901E 02	0.0000E 00	0.1000E 03
G02	0.2327E 02	0.3679E 02	0.0000E 00	0.1000E 03
G03	0.3595E 01	0.1814E 02	0.0000E 00	0.1000E 03
G04	0.7011E-01	0.2553E 00	0.0000E 00	0.1000E 01
G05	0.1632E 01	0.1361E 01	0.0000E 00	0.4000E 01
G06	0.4207E-01	0.2247E 00	0.0000E 00	0.3000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
262	385	113	212	483	114

POPULATION ASSIGNMENT BY CLASSIFICATION I

CLASS 6
NO. OF OBSERVATIONS = 1295

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.8516E 03	0.1215E 04	0.1300E 02	0.1200E 05
S02	0.6056E 03	0.9893E 03	0.8000E 01	0.9000E 04
S03	0.2087E 01	0.1158E 02	0.0000E 00	0.2000E 03
S04	0.1575E 01	0.1583E 01	0.1250E 00	0.2400E 02
S05	0.1244E 01	0.1117E 01	0.0000E 00	0.8000E 01
L01	0.1672E 02	0.2678E 02	0.0000E 00	0.1000E 03
L02	0.1466E 01	0.5487E 01	0.0000E 00	0.5070E 02
L03	0.8313E 00	0.6781E 01	0.0000E 00	0.1000E 03
L04	0.1309E 01	0.6792E 01	0.0000E 00	0.6294E 02
L05	0.4336E 01	0.1195E 02	0.0000E 00	0.1000E 03
L06	0.4437E 01	0.1365E 02	0.0000E 00	0.1000E 03
L07	0.9840E 00	0.3233E 01	0.0000E 00	0.4495E 02
L08	0.5331E 01	0.1497E 02	0.0000E 00	0.1000E 03
L09	0.2536E 02	0.3532E 02	0.0000E 00	0.1000E 03
L10	0.3372E 02	0.4055E 02	0.0000E 00	0.1000E 03
L11	0.4432E 01	0.1394E 02	0.0000E 00	0.9864E 02
L12	0.9543E 01	0.1675E 02	0.0000E 00	0.9680E 02
L13	0.2377E 00	0.4219E 00	0.0000E 00	0.1000E 01
L14	0.2085E-01	0.1429E 00	0.0000E 00	0.1000E 01
A01	0.1942E 02	0.3841E 02	0.0000E 00	0.1000E 03
A02	0.4081E 01	0.1642E 02	0.0000E 00	0.1000E 03
A03	0.5437E 01	0.1981E 02	0.0000E 00	0.1000E 03
A04	0.1623E 01	0.1132E 02	0.0000E 00	0.1000E 03
A05	0.5330E 01	0.2011E 02	0.0000E 00	0.1000E 03
A06	0.3495E 01	0.1656E 02	0.0000E 00	0.1000E 03
A07	0.4333E 00	0.2041E 01	0.0000E 00	0.2507E 02
W01	0.4116E 01	0.5009E 01	0.6210E-01	0.5270E 02
W02	0.7146E 02	0.3214E 02	0.1488E 01	0.1000E 03
W03	0.6714E 01	0.1683E 02	0.0000E 00	0.1000E 03
W04	0.9349E 01	0.2288E 02	0.0000E 00	0.1000E 03
W05	0.2163E 02	0.3486E 02	0.0000E 00	0.1000E 03
W06	0.5298E 02	0.4147E 02	0.0000E 00	0.1000E 03
W07	0.9331E 01	0.2316E 02	0.0000E 00	0.1000E 03
M01	0.2154E 00	0.4111E 00	0.0000E 00	0.1000E 01
M02	0.2247E 00	0.4174E 00	0.0000E 00	0.1000E 01
M03	0.3861E-02	0.6202E-01	0.0000E 00	0.1000E 01
M04	0.4772E 00	0.4995E 00	0.0000E 00	0.1000E 01
M05	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
M06	0.1427E 00	0.1489E 01	0.0000E 00	0.2740E 02
M07	0.4834E 00	0.4997E 00	0.0000E 00	0.1000E 01
M08	0.3556E 01	0.4869E 01	0.0000E 00	0.4000E 02
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1137E 01	0.4646E 00	0.1000E 01	0.4000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.5272E 02	0.1185E 02	0.2000E 02	0.8600E 02
H06	0.4162E 00	0.4929E 00	0.0000E 00	0.1000E 01
G01	0.8027E 02	0.2740E 02	0.0000E 00	0.1000E 03
G02	0.7900E 01	0.2329E 02	0.0000E 00	0.1000E 03
G03	0.2834E 01	0.1573E 02	0.0000E 00	0.1000E 03
G04	0.9730E-01	0.2964E 00	0.0000E 00	0.1000E 01
G05	0.6880E 00	0.1162E 01	0.0000E 00	0.4000E 01
G06	0.4093E-01	0.2020E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
226	70	87	70	810	32

CLASS 7
NO. OF OBSERVATIONS = 702

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1255E 03	0.1443E 03	0.2000E 01	0.1400E 04
S02	0.1044E 03	0.1287E 03	0.2000E 01	0.1368E 04
S03	0.4050E 00	0.4089E 01	0.0000E 00	0.9672E 02
S04	0.2051E 01	0.1696E 01	0.1250E 00	0.1400E 02
S05	0.1446E 01	0.2043E 01	0.0000E 00	0.4600E 02
L01	0.4127E 00	0.3316E 01	0.0000E 00	0.4444E 02
L02	0.2740E 01	0.7536E 01	0.0000E 00	0.5000E 02
L03	0.3238E-01	0.8572E 00	0.0000E 00	0.2273E 02
L04	0.8107E 02	0.2797E 02	0.0000E 00	0.1000E 03
L05	0.1652E 01	0.7685E 01	0.0000E 00	0.7353E 02
L06	0.2003E 01	0.8101E 01	0.0000E 00	0.6279E 02
L07	0.2073E 01	0.6804E 01	0.0000E 00	0.5714E 02
L08	0.2329E 01	0.9322E 01	0.0000E 00	0.6923E 02
L09	0.1476E 00	0.1719E 01	0.0000E 00	0.3243E 02
L10	0.7538E 01	0.2278E 02	0.0000E 00	0.1000E 03
L11	0.2142E 01	0.1077E 02	0.0000E 00	0.9202E 02
L12	0.1595E 02	0.1499E 02	0.0000E 00	0.9972E 02
L13	0.1852E-01	0.1348E 00	0.0000E 00	0.1000E 01
L14	0.3561E-01	0.1853E 00	0.0000E 00	0.1000E 01
A01	0.2032E 01	0.1350E 02	0.0000E 00	0.1000E 03
A02	0.7786E-01	0.2061E 01	0.0000E 00	0.5465E 02
A03	0.9861E 00	0.9340E 01	0.0000E 00	0.1000E 03
A04	0.7323E 00	0.8416E 01	0.0000E 00	0.1000E 03
A05	0.3665E 01	0.1802E 02	0.0000E 00	0.1000E 03
A06	0.2477E 01	0.1510E 02	0.0000E 00	0.1000E 03
A07	0.2241E 00	0.1704E 01	0.0000E 00	0.3900E 02
W01	0.2955E 02	0.3813E 02	0.1289E 01	0.6042E 03
W02	0.8125E 02	0.2785E 02	0.0000E 00	0.1000E 03
W03	0.1205E 02	0.2161E 02	0.0000E 00	0.1000E 03
W04	0.2053E 02	0.3327E 02	0.0000E 00	0.1000E 03
W05	0.2302E 02	0.3567E 02	0.0000E 00	0.1000E 03
W06	0.3472E 02	0.3838E 02	0.0000E 00	0.1000E 03
W07	0.9394E 01	0.2388E 02	0.0000E 00	0.1000E 03
M01	0.9259E-01	0.2899E 00	0.0000E 00	0.1000E 01
M02	0.5228E 00	0.4995E 00	0.0000E 00	0.1000E 01
M03	0.2849E-02	0.5330E-01	0.0000E 00	0.1000E 01
M04	0.4046E 00	0.4908E 00	0.0000E 00	0.1000E 01
M05	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
M06	0.3014E 02	0.3351E 02	0.0000E 00	0.1000E 03
M07	0.5413E-01	0.2263E 00	0.0000E 00	0.1000E 01
M08	0.1850E 02	0.3626E 02	0.0000E 00	0.5000E 03
H01	0.9729E 00	0.1623E 00	0.0000E 00	0.1000E 01
H02	0.1623E 01	0.6656E 00	0.1000E 01	0.4000E 01
H03	0.9330E 00	0.2499E 00	0.0000E 00	0.1000E 01
H04	0.3989E-01	0.1957E 00	0.0000E 00	0.1000E 01
H05	0.4891E 02	0.1306E 02	0.2300E 02	0.8700E 02
H06	0.1838E 00	0.3873E 00	0.0000E 00	0.1000E 01
G01	0.6597E 02	0.4380E 02	0.0000E 00	0.1000E 03
G02	0.3319E 02	0.4346E 02	0.0000E 00	0.1000E 03
G03	0.8366E 00	0.9021E 01	0.0000E 00	0.1000E 03
G04	0.6011E 00	0.4897E 00	0.0000E 00	0.1000E 01
G05	0.1662E 01	0.1521E 01	0.0000E 00	0.4000E 01
G06	0.2707E-01	0.1708E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
48	131	385	85	24	29

CLASS 8
NO. OF OBSERVATIONS = 1004

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.2608E 04	0.7270E 04	0.1500E 02	0.1694E 06
S02	0.1680E 04	0.1936E 04	0.1200E 02	0.1200E 05
S03	0.1067E 02	0.2158E 02	0.0000E 00	0.2329E 03
S04	0.2123E 01	0.2299E 01	0.7273E-02	0.3003E 02
S05	0.2165E 01	0.2001E 01	0.0000E 00	0.1000E 02
L01	0.2427E 02	0.2572E 02	0.0000E 00	0.1000E 03
L02	0.5608E 01	0.1121E 02	0.0000E 00	0.1000E 03
L03	0.5530E 00	0.4254E 01	0.0000E 00	0.7376E 02
L04	0.1364E 01	0.8356E 01	0.0000E 00	0.9530E 02
L05	0.1147E 02	0.1974E 02	0.0000E 00	0.1000E 03
L06	0.1973E 01	0.8473E 01	0.0000E 00	0.8696E 02
L07	0.7476E 00	0.2587E 01	0.0000E 00	0.4000E 02
L08	0.3185E 02	0.3612E 02	0.0000E 00	0.1000E 03
L09	0.7594E 01	0.1975E 02	0.0000E 00	0.1000E 03
L10	0.1457E 02	0.2946E 02	0.0000E 00	0.1000E 03
L11	0.2836E 01	0.1068E 02	0.0000E 00	0.9275E 02
L12	0.1397E 02	0.2027E 02	0.0000E 00	0.9941E 02
L13	0.2042E 00	0.4031E 00	0.0000E 00	0.1000E 01
L14	0.1355E 00	0.3422E 00	0.0000E 00	0.1000E 01
A01	0.4636E 01	0.1813E 02	0.0000E 00	0.1000E 03
A02	0.2084E 02	0.2952E 02	0.0000E 00	0.1000E 03
A03	0.1699E 02	0.2580E 02	0.0000E 00	0.1000E 03
A04	0.3255E 01	0.1466E 02	0.0000E 00	0.1000E 03
A05	0.9990E 01	0.2172E 02	0.0000E 00	0.1000E 03
A06	0.3749E 01	0.1542E 02	0.0000E 00	0.1000E 03
A07	0.6852E 00	0.1848E 01	0.0000E 00	0.2534E 02
W01	0.2559E 01	0.6886E 01	0.1581E-02	0.1796E 03
W02	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
W03	0.4563E 01	0.1539E 02	0.0000E 00	0.1000E 03
W04	0.1243E 02	0.2582E 02	0.0000E 00	0.1000E 03
W05	0.1695E 02	0.3139E 02	0.0000E 00	0.1000E 03
W06	0.3487E 02	0.4087E 02	0.0000E 00	0.1000E 03
W07	0.6984E 01	0.2083E 02	0.0000E 00	0.1000E 03
M01	0.3755E 00	0.4843E 00	0.0000E 00	0.1000E 01
M02	0.1863E 00	0.3893E 00	0.0000E 00	0.1000E 01
M03	0.1195E 00	0.3244E 00	0.0000E 00	0.1000E 01
M04	0.6106E 00	0.4876E 00	0.0000E 00	0.1000E 01
M05	0.1614E 00	0.3679E 00	0.0000E 00	0.1000E 01
M06	0.1363E 00	0.1287E 01	0.0000E 00	0.1961E 02
M07	0.1116E 00	0.3148E 00	0.0000E 00	0.1000E 01
M08	0.2506E 01	0.4038E 01	0.0000E 00	0.4615E 02
H01	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H02	0.1326E 01	0.7228E 00	0.1000E 01	0.4000E 01
H03	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.5200E 02	0.0000E 00	0.5200E 02	0.5200E 02
H06	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
G01	0.7368E 02	0.4060E 02	0.0000E 00	0.1000E 03
G02	0.1285E 02	0.2883E 02	0.0000E 00	0.1000E 03
G03	0.1347E 02	0.3400E 02	0.0000E 00	0.1000E 03
G04	0.2291E 00	0.4202E 00	0.0000E 00	0.1000E 01
G05	0.9731E 00	0.1365E 01	0.0000E 00	0.4000E 01
G06	0.8765E-01	0.3160E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
80	35	131	172	578	8

POPULATION ASSIGNMENT BY CLASSIFICATION I

CLASS 9
NO. OF OBSERVATIONS = 2540

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.8393E 03	0.1141E 04	0.7000E 01	0.1184E 05
S02	0.6893E 03	0.8580E 03	0.5000E 01	0.9250E 04
S03	0.7777E 01	0.1062E 02	0.0000E 00	0.1835E 03
S04	0.1200E 01	0.8034E 00	0.1250E 00	0.9216E 01
S05	0.1179E 01	0.9376E 00	0.0000E 00	0.4000E 01
L01	0.1722E 02	0.2104E 02	0.0000E 00	0.1000E 03
L02	0.6439E 01	0.9664E 01	0.0000E 00	0.1000E 03
L03	0.2072E 00	0.2354E 01	0.0000E 00	0.6333E 02
L04	0.3626E 00	0.4065E 01	0.0000E 00	0.6316E 02
L05	0.6201E 01	0.1360E 02	0.0000E 00	0.1000E 03
L06	0.9137E 00	0.4703E 01	0.0000E 00	0.5165E 02
L07	0.1099E 01	0.2677E 01	0.0000E 00	0.4074E 02
L08	0.6387E 02	0.3157E 02	0.0000E 00	0.1000E 03
L09	0.1571E 01	0.6414E 01	0.0000E 00	0.7353E 02
L10	0.1911E 01	0.7334E 01	0.0000E 00	0.6612E 02
L11	0.2303E 01	0.9115E 01	0.0000E 00	0.8935E 02
L12	0.9753E 01	0.1507E 02	0.0000E 00	0.9741E 02
L13	0.5079E-01	0.2196E 00	0.0000E 00	0.1000E 01
L14	0.2209E 00	0.4148E 00	0.0000E 00	0.1000E 01
A01	0.6868E 01	0.1688E 02	0.0000E 00	0.1000E 03
A02	0.3601E 02	0.3280E 02	0.0000E 00	0.1000E 03
A03	0.2192E 02	0.2630E 02	0.0000E 00	0.1000E 03
A04	0.6299E 01	0.2090E 02	0.0000E 00	0.1000E 03
A05	0.1027E 02	0.1819E 02	0.0000E 00	0.1000E 03
A06	0.4701E 01	0.1655E 02	0.0000E 00	0.1000E 03
A07	0.1468E 01	0.2219E 01	0.0000E 00	0.2462E 02
W01	0.2868E 01	0.3294E 01	0.2155E-01	0.5357E 02
W02	0.9614E 02	0.1238E 02	0.1356E 01	0.1000E 03
W03	0.4435E 01	0.1270E 02	0.0000E 00	0.6667E 02
W04	0.2663E 01	0.1012E 02	0.0000E 00	0.6667E 02
W05	0.3666E 01	0.1252E 02	0.0000E 00	0.6667E 02
W06	0.8752E 02	0.2131E 02	0.1429E 02	0.1000E 03
W07	0.1716E 01	0.8181E 01	0.0000E 00	0.5000E 02
M01	0.9646E-01	0.2952E 00	0.0000E 00	0.1000E 01
M02	0.8346E-01	0.2766E 00	0.0000E 00	0.1000E 01
M03	0.1496E-01	0.1214E 00	0.0000E 00	0.1000E 01
M04	0.6464E 00	0.4775E 00	0.0000E 00	0.1000E 01
M05	[illegible]	0.1403E 00	0.0000E 00	0.1000E 01
M06	0.5908E-01	0.8269E 00	0.0000E 00	0.2126E 02
M07	0.1024E-01	0.1007E 00	0.0000E 00	0.1000E 01
M08	0.2861E 01	0.3522E 01	0.0000E 00	0.2778E 02
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1085E 01	0.3092E 00	0.1000E 01	0.4000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.5613E 02	0.6082E 01	0.1800E 02	0.8500E 02
H06	0.3996E 00	0.4898E 00	0.0000E 00	0.1000E 01
G01	0.6543E 02	0.3933E 02	0.0000E 00	0.1000E 03
G02	0.3379E 02	0.3907E 02	0.0000E 00	0.1000E 03
G03	0.7747E 00	0.7739E 01	0.0000E 00	0.1000E 03
G04	0.1492E 00	0.3563E 00	0.0000E 00	0.1000E 01
G05	0.9776E 00	0.1265E 01	0.0000E 00	0.4000E 01
G06	0.5906E-01	0.2503E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
436	754	509	195	571	75

CLASS 10
NO. OF OBSERVATIONS = 2334

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1758E 04	0.1224E 04	0.1200E 02	0.1040E 05
S02	0.1647E 04	0.1103E 04	0.1200E 02	0.7806E 04
S03	0.1955E 02	0.1501E 02	0.0000E 00	0.1596E 03
S04	0.2188E 01	0.9799E 00	0.1250E 00	0.1140E 02
S05	0.3513E 01	0.1436E 01	0.0000E 00	0.1000E 02
L01	0.4081E 02	0.1851E 02	0.0000E 00	0.1000E 03
L02	0.1245E 02	0.1049E 02	0.0000E 00	0.1000E 03
L03	0.1243E 01	0.3891E 01	0.0000E 00	0.3676E 02
L04	0.4120E 00	0.3357E 01	0.0000E 00	0.6028E 02
L05	0.1158E 02	0.1497E 02	0.0000E 00	0.9449E 02
L06	0.5815E 00	0.3163E 01	0.0000E 00	0.4175E 02
L07	0.2951E 00	0.6450E 00	0.0000E 00	0.1316E 02
L08	0.3017E 02	0.2062E 02	0.0000E 00	0.8950E 02
L09	0.9992E 00	0.4340E 01	0.0000E 00	0.5540E 02
L10	0.1471E 01	0.7892E 01	0.0000E 00	0.1000E 03
L11	0.8942E 00	0.4456E 01	0.0000E 00	0.6598E 02
L12	0.4433E 01	0.6571E 01	0.0000E 00	0.9500E 02
L13	0.4799E-01	0.2137E 00	0.0000E 00	0.1000E 01
L14	0.5437E 00	0.4981E 00	0.0000E 00	0.1000E 01
A01	0.2769E 01	0.7583E 01	0.0000E 00	0.1000E 03
A02	0.4028E 02	0.2315E 02	0.0000E 00	0.1000E 03
A03	0.3156E 02	0.2173E 02	0.0000E 00	0.1000E 03
A04	0.1425E 01	0.8990E 01	0.0000E 00	0.1000E 03
A05	0.1566E 02	0.1865E 02	0.0000E 00	0.1000E 03
A06	0.3225E 01	0.1167E 02	0.0000E 00	0.1000E 03
A07	0.1351E 01	0.1191E 01	0.0000E 00	0.2224E 02
W01	0.1828E 01	0.2123E 01	0.5000E-01	0.6250E 02
W02	0.9424E 02	0.1326E 02	0.7301E 01	0.1000E 03
W03	0.1143E 02	0.1973E 02	0.0000E 00	0.1000E 03
W04	0.2179E 02	0.3135E 02	0.0000E 00	0.1000E 03
W05	0.3470E 02	0.3714E 02	0.0000E 00	0.1000E 03
W06	0.2562E 02	0.3058E 02	0.0000E 00	0.1000E 03
W07	0.6461E 01	0.1526E 02	0.0000E 00	0.6667E 02
M01	0.7785E 00	0.4153E 00	0.0000E 00	0.1000E 01
M02	0.1084E 00	0.3109E 00	0.0000E 00	0.1000E 01
M03	0.1654E 00	0.3715E 00	0.0000E 00	0.1000E 01
M04	0.9002E 00	0.2998E 00	0.0000E 00	0.1000E 01
M05	0.3436E 00	0.4749E 00	0.0000E 00	0.1000E 01
M06	0.3651E-01	0.6561E 00	0.0000E 00	0.2248E 02
M07	0.3428E-02	0.5845E-01	0.0000E 00	0.1000E 01
M08	0.2859E 01	0.2178E 01	0.0000E 00	0.2113E 02
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1162E 01	0.4014E 00	0.1000E 01	0.4000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.4442E 02	0.1111E 02	0.1700E 02	0.8100E 02
H06	0.1071E 00	0.3093E 00	0.0000E 00	0.1000E 01
G01	0.2171E 02	0.2862E 02	0.0000E 00	0.1000E 03
G02	0.7812E 02	0.2868E 02	0.0000E 00	0.1000E 03
G03	0.1698E 00	0.2062E 01	0.0000E 00	0.4822E 02
G04	0.9426E-01	0.2922E 00	0.0000E 00	0.1000E 01
G05	0.1322E 01	0.1420E 01	0.0000E 00	0.4000E 01
G06	0.1260E 00	0.3731E 00	0.0000E 00	0.4000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
495	1123	181	192	310	33

CLASS 11
NO. OF OBSERVATIONS = 924

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.2708E 03	0.4148E 03	0.8000E 01	0.6000E 04
S02	0.2322E 03	0.3205E 03	0.7000E 01	0.4195E 04
S03	0.3984E 01	0.1143E 02	0.0000E 00	0.1268E 03
S04	0.9198E 00	0.7904E 00	0.1250E 00	0.7000E 01
S05	0.2051E 01	0.1174E 01	0.0000E 00	0.1300E 02
L01	0.2901E 02	0.2695E 02	0.0000E 00	0.1000E 03
L02	0.1576E 02	0.1938E 02	0.0000E 00	0.1000E 03
L03	0.3467E 00	0.2894E 01	0.0000E 00	0.4167E 02
L04	0.3525E 01	0.1140E 02	0.0000E 00	0.6235E 02
L05	0.8997E 01	0.1778E 02	0.0000E 00	0.1000E 03
L06	0.1752E 01	0.7103E 01	0.0000E 00	0.7568E 02
L07	0.3487E 01	0.6256E 01	0.0000E 00	0.5188E 02
L08	0.1438E 02	0.2199E 02	0.0000E 00	0.1000E 03
L09	0.1297E 02	0.2707E 02	0.0000E 00	0.1000E 03
L10	0.9776E 01	0.2283E 02	0.0000E 00	0.1000E 03
L11	0.1820E 01	0.8455E 01	0.0000E 00	0.9342E 02
L12	0.9100E 01	0.1237E 02	0.0000E 00	0.9909E 02
L13	0.1050E 00	0.3065E 00	0.0000E 00	0.1000E 01
L14	0.1066E 00	0.3009E 00	0.0000E 00	0.1000E 01
A01	0.1401E 01	0.8595E 01	0.0000E 00	0.1000E 03
A02	0.6573E 01	0.1813E 02	0.0000E 00	0.1000E 03
A03	0.4943E 01	0.1619E 02	0.0000E 00	0.1000E 03
A04	0.2107E 01	0.1194E 02	0.0000E 00	0.1000E 03
A05	0.5512E 02	0.4350E 02	0.0000E 00	0.1000E 03
A06	0.5397E 01	0.1788E 02	0.0000E 00	0.1000E 03
A07	0.1738E 01	0.3448E 01	0.0000E 00	0.2276E 02
W01	0.6607E 01	0.8841E 01	0.2102E 00	0.1323E 03
W02	0.9494E 02	0.1288E 02	0.3323E 01	0.1000E 03
W03	0.5408E 01	0.1565E 02	0.0000E 00	0.1000E 03
W04	0.1102E 02	0.2424E 02	0.0000E 00	0.1000E 03
W05	0.2451E 02	0.3640E 02	0.0000E 00	0.1000E 03
W06	0.5198E 02	0.4158E 02	0.0000E 00	0.1000E 03
W07	0.7091E 01	0.1939E 02	0.0000E 00	0.1000E 03
M01	0.3074E 00	0.4614E 00	0.0000E 00	0.1000E 01
M02	0.2684E 00	0.4431E 00	0.0000E 00	0.1000E 01
M03	0.5628E-01	0.2305E 00	0.0000E 00	0.1000E 01
M04	0.7597E 00	0.4272E 00	0.0000E 00	0.1000E 01
M05	0.1082E-01	0.1035E 00	0.0000E 00	0.1000E 01
M06	0.3114E 00	0.1713E 01	0.0000E 00	0.1892E 02
M07	0.7576E-02	0.8671E-01	0.0000E 00	0.1000E 01
M08	0.1719E 02	0.1597E 02	0.0000E 00	0.1250E 03
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1177E 01	0.4449E 00	0.1000E 01	0.4000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.5042E 02	0.1117E 02	0.1900E 02	0.8700E 02
H06	0.6797E 00	0.4666E 00	0.0000E 00	0.1000E 01
G01	0.7574E 02	0.3576E 02	0.0000E 00	0.1000E 03
G02	0.2333E 02	0.3534E 02	0.0000E 00	0.1000E 03
G03	0.9232E 00	0.8062E 01	0.0000E 00	0.1000E 03
G04	0.1288E 00	0.3350E 00	0.0000E 00	0.1000E 01
G05	0.1384E 01	0.1452E 01	0.0000E 00	0.4000E 01
G06	0.4004E-01	0.1961E 00	0.0000E 00	0.1000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
109	135	162	295	139	84

POPULATION ASSIGNMENT BY CLASSIFICATION I

CLASS 12
NO. OF OBSERVATIONS = 2183

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1680E 04	0.1212E 04	0.9500E 02	0.1405E 05
S02	0.1458E 04	0.9947E 03	0.8000E 02	0.9329E 04
S03	0.2025E 02	0.1603E 02	0.0000E 00	0.1767E 03
S04	0.2070E 01	0.8138E 00	0.1250E 00	0.6630E 01
S05	0.3199E 01	0.1187E 01	0.0000E 00	0.1100E 02
L01	0.2794E 02	0.1777E 02	0.0000E 00	0.9968E 02
L02	0.6704E 01	0.7413E 01	0.0000E 00	0.7297E 02
L03	0.3349E 00	0.2394E 01	0.0000E 00	0.7149E 02
L04	0.1700E 00	0.1939E 01	0.0000E 00	0.6232E 02
L05	0.1077E 02	0.1451E 02	0.0000E 00	0.1000E 03
L06	0.8415E 00	0.3674E 01	0.0000E 00	0.4963E 02
L07	0.4114E 00	0.6477E 00	0.0000E 00	0.1028E 02
L08	0.5032E 02	0.2705E 02	0.0000E 00	0.1000E 03
L09	0.1596E 01	0.6036E 01	0.0000E 00	0.5984E 02
L10	0.9162E 00	0.5211E 01	0.0000E 00	0.8654E 02
L11	0.1370E 01	0.5989E 01	0.0000E 00	0.7816E 02
L12	0.7684E 01	0.1078E 02	0.0000E 00	0.7970E 02
L13	0.4704E-01	0.2130E 00	0.0000E 00	0.1000E 01
L14	0.3289E 00	0.4698E 00	0.0000E 00	0.1000E 01
A01	0.1896E 01	0.5972E 01	0.0000E 00	0.1000E 03
A02	0.4513E 02	0.2251E 02	0.0000E 00	0.1000E 03
A03	0.2886E 02	0.2003E 02	0.0000E 00	0.1000E 03
A04	0.1582E 01	0.9657E 01	0.0000E 00	0.1000E 03
A05	0.1536E 02	0.1723E 02	0.0000E 00	0.1000E 03
A06	0.5028E 01	0.1320E 02	0.0000E 00	0.1000E 03
A07	0.1533E 01	0.1572E 01	0.0000E 00	0.1848E 02
W01	0.1772E 01	0.1414E 01	0.9058E-01	0.2237E 02
W02	0.9589E 02	0.1193E 02	0.1885E 01	0.1000E 03
W03	0.1095E 02	0.1815E 02	0.0000E 00	0.7500E 02
W04	0.1058E 02	0.1990E 02	0.0000E 00	0.1000E 03
W05	0.1398E 02	0.2571E 02	0.0000E 00	0.1000E 03
W06	0.5748E 02	0.3318E 02	0.0000E 00	0.1000E 03
W07	0.7229E 01	0.1537E 02	0.0000E 00	0.6667E 02
M01	0.8131E 00	0.3898E 00	0.0000E 00	0.1000E 01
M02	0.1104E 00	0.3134E 00	0.0000E 00	0.1000E 01
M03	0.7558E-01	0.2643E 00	0.0000E 00	0.1000E 01
M04	0.8360E 00	0.3703E 00	0.0000E 00	0.1000E 01
M05	0.5584E 00	0.4966E 00	0.0000E 00	0.1000E 01
M06	0.1060E-01	0.2141E 00	0.0000E 00	0.6996E 01
M07	0.4581E-03	0.2140E-01	0.0000E 00	0.1000E 01
M08	0.2849E 01	0.2226E 01	0.0000E 00	0.2041E 02
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1339E 01	0.5382E 00	0.1000E 01	0.3000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.5454E 02	0.9735E 01	0.2200E 02	0.8700E 02
H06	0.1370E 00	0.3438E 00	0.0000E 00	0.1000E 01
G01	0.8087E 02	0.2390E 02	0.0000E 00	0.1000E 03
G02	0.1800E 02	0.2313E 02	0.0000E 00	0.1000E 03
G03	0.1131E 01	0.6714E 01	0.0000E 00	0.8885E 02
G04	0.2671E 00	0.4424E 00	0.0000E 00	0.1000E 01
G05	0.2628E 01	0.1176E 01	0.0000E 00	0.4000E 01
G06	0.8887E-01	0.3137E 00	0.0000E 00	0.4000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
525	259	592	386	101	320

CLASS 13
NO. OF OBSERVATIONS = 789

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.4836E 04	0.2327E 04	0.3450E 03	0.2263E 05
S02	0.4528E 04	0.2002E 04	0.3210E 03	0.1167E 05
S03	0.1629E 02	0.2005E 02	0.0000E 00	0.1805E 03
S04	0.3062E 01	0.1592E 01	0.5205E 00	0.1409E 02
S05	0.6368E 01	0.2348E 01	0.2000E 01	0.5400E 02
L01	0.4772E 02	0.1678E 02	0.0000E 00	0.9807E 02
L02	0.2714E 02	0.1598E 02	0.0000E 00	0.1000E 03
L03	0.4234E 01	0.6323E 01	0.0000E 00	0.3896E 02
L04	0.5409E 00	0.3795E 01	0.0000E 00	0.5824E 02
L05	0.9059E 01	0.1111E 02	0.0000E 00	0.8000E 02
L06	0.1756E 00	0.1195E 01	0.0000E 00	0.1557E 02
L07	0.1490E 00	0.2545E 00	0.0000E 00	0.2634E 01
L08	0.9409E 01	0.1233E 02	0.0000E 00	0.8074E 02
L09	0.3134E 00	0.2235E 01	0.0000E 00	0.2837E 02
L10	0.1263E 01	0.6995E 01	0.0000E 00	0.9208E 02
L11	0.8610E-01	0.1136E 01	0.0000E 00	0.2741E 02
L12	0.5257E 01	0.6970E 01	0.1333E-01	0.8009E 02
L13	0.3169E-01	0.1752E 00	0.0000E 00	0.1000E 01
L14	0.4436E 00	0.4968E 00	0.0000E 00	0.1000E 01
A01	0.4825E 01	0.1717E 02	0.0000E 00	0.1000E 03
A02	0.2360E 02	0.2913E 02	0.0000E 00	0.1000E 03
A03	0.3555E 02	0.3472E 02	0.0000E 00	0.1000E 03
A04	0.4785E 01	0.1798E 02	0.0000E 00	0.1000E 03
A05	0.4288E 01	0.1520E 02	0.0000E 00	0.1000E 03
A06	0.8443E 01	0.2366E 02	0.0000E 00	0.1000E 03
A07	0.3625E 00	0.4334E 00	0.0000E 00	0.3145E 01
W01	0.7224E 00	0.4469E 00	0.9273E-01	0.4606E 01
W02	0.5548E 02	0.2697E 02	0.2901E 01	0.1000E 03
W03	0.1221E 02	0.1935E 02	0.0000E 00	0.1000E 03
W04	0.1916E 02	0.2679E 02	0.0000E 00	0.1000E 03
W05	0.2394E 02	0.2916E 02	0.0000E 00	0.1000E 03
W06	0.4060E 02	0.3107E 02	0.0000E 00	0.1000E 03
W07	0.4094E 01	0.1162E 02	0.0000E 00	0.6667E 02
M01	0.9747E 00	0.1572E 00	0.0000E 00	0.1000E 01
M02	0.7605E-01	0.2651E 00	0.0000E 00	0.1000E 01
M03	0.6667E 00	0.4714E 00	0.0000E 00	0.1000E 01
M04	0.9240E 00	0.2651E 00	0.0000E 00	0.1000E 01
M05	0.2231E 00	0.4163E 00	0.0000E 00	0.1000E 01
M06	0.1435E-01	0.2736E 00	0.0000E 00	0.5457E 01
M07	0.1394E-01	0.1172E 00	0.0000E 00	0.1000E 01
M08	0.1627E 01	0.1553E 01	0.1190E 00	0.3564E 02
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.2318E 01	0.8127E 00	0.1000E 01	0.4000E 01
H03	0.9975E 00	0.5028E-01	0.0000E 00	0.1000E 01
H04	0.2535E-02	0.5028E-01	0.0000E 00	0.1000E 01
H05	0.4817E 02	0.1090E 02	0.2000E 02	0.8500E 02
H06	0.9759E-01	0.2968E 00	0.0000E 00	0.1000E 01
G01	0.3321E 02	0.3989E 02	0.0000E 00	0.1000E 03
G02	0.6672E 02	0.3990E 02	0.0000E 00	0.1000E 03
G03	0.6344E-01	0.1543E 01	0.0000E 00	0.4277E 02
G04	0.8441E 00	0.3628E 00	0.0000E 00	0.1000E 01
G05	0.2470E 01	0.1312E 01	0.0000E 00	0.4000E 01
G06	0.2763E 00	0.5032E 00	0.0000E 00	0.3000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
42	65	607	38	34	3

CLASS 14
NO. OF OBSERVATIONS = 1335

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.2975E 04	0.1803E 04	0.2500E 03	0.1250E 05
S02	0.2815E 04	0.1712E 04	0.2100E 03	0.1073E 05
S03	0.4730E 02	0.3328E 02	0.0000E 00	0.3719E 03
S04	0.2115E 01	0.7814E 00	0.3750E 00	0.7820E 01
S05	0.3479E 01	0.1320E 01	0.0000E 00	0.1290E 02
L01	0.1120E 02	0.1484E 02	0.0000E 00	0.1000E 03
L02	0.2477E 01	0.5112E 01	0.0000E 00	0.5015E 02
L03	0.1688E 00	0.1203E 01	0.0000E 00	0.1653E 02
L04	0.5311E-01	0.6928E 00	0.0000E 00	0.1305E 02
L05	0.3598E 01	0.8146E 01	0.0000E 00	0.7659E 02
L06	0.2336E 00	0.2728E 01	0.0000E 00	0.8569E 02
L07	0.1535E 00	0.2621E 00	0.0000E 00	0.2492E 01
L08	0.8104E 02	0.2290E 02	0.0000E 00	0.1000E 03
L09	0.6095E-01	0.1114E 01	0.0000E 00	0.3037E 02
L10	0.1016E 01	0.6991E 01	0.0000E 00	0.1000E 03
L11	0.1695E 00	0.1348E 01	0.0000E 00	0.3455E 02
L12	0.5078E 01	0.5712E 01	0.0000E 00	0.7519E 02
L13	0.4345E-01	0.2039E 00	0.0000E 00	0.1000E 01
L14	0.1521E 00	0.3591E 00	0.0000E 00	0.1000E 01
A01	0.1055E 01	0.3238E 01	0.0000E 00	0.1000E 03
A02	0.5381E 02	0.1998E 02	0.0000E 00	0.1000E 03
A03	0.2980E 02	0.1631E 02	0.0000E 00	0.1000E 03
A04	0.1680E 01	0.7464E 01	0.0000E 00	0.1000E 03
A05	0.1038E 02	0.1763E 02	0.0000E 00	0.9401E 02
A06	0.2913E 01	0.1068E 02	0.0000E 00	0.1000E 03
A07	0.2046E 01	0.1914E 01	0.0000E 00	0.2097E 02
W01	0.9266E 00	0.5841E 00	0.6272E-01	0.7722E 01
W02	0.8658E 02	0.2144E 02	0.5882E 01	0.1000E 03
W03	0.1240E 02	0.2088E 02	0.0000E 00	0.1000E 03
W04	0.2440E 02	0.3321E 02	0.0000E 00	0.1000E 03
W05	0.3401E 02	0.3793E 02	0.0000E 00	0.1000E 03
W06	0.2463E 02	0.3007E 02	0.0000E 00	0.1000E 03
W07	0.4554E 01	0.1287E 02	0.0000E 00	0.6667E 02
M01	0.8464E 00	0.3605E 00	0.0000E 00	0.1000E 01
M02	0.2247E-01	0.1482E 00	0.0000E 00	0.1000E 01
M03	0.1199E-01	0.1088E 00	0.0000E 00	0.1000E 01
M04	0.8240E 00	0.3808E 00	0.0000E 00	0.1000E 01
M05	0.9408E 00	0.2360E 00	0.0000E 00	0.1000E 01
M06	0.6611E-02	0.1863E 00	0.0000E 00	0.6619E 01
M07	0.7491E-03	0.2736E-01	0.0000E 00	0.1000E 01
M08	0.1617E 01	0.1162E 01	0.0000E 00	0.1200E 02
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1771E 01	0.6966E 00	0.1000E 01	0.4000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.4427E 02	0.1091E 02	0.2100E 02	0.8600E 02
H06	0.5768E-01	0.2331E 00	0.0000E 00	0.1000E 01
G01	0.2977E 02	0.3729E 02	0.0000E 00	0.1000E 03
G02	0.6986E 02	0.3744E 02	0.0000E 00	0.1000E 03
G03	0.3662E 00	0.3753E 01	0.0000E 00	0.5751E 02
G04	0.6989E 00	0.4587E 00	0.0000E 00	0.1000E 01
G05	0.2188E 01	0.1374E 01	0.0000E 00	0.4000E 01
G06	0.6742E-01	0.2624E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
122	232	847	43	14	77

POPULATION ASSIGNMENT BY CLASSIFICATION I

CLASS 15
NO. OF OBSERVATIONS = 1291

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.9567E 03	0.1462E 04	0.8000E 01	0.1800E 05
S02	0.7804E 03	0.1055E 04	0.6000E 01	0.8555E 04
S03	0.9733E 01	0.1316E 02	0.0000E 00	0.1370E 03
S04	0.1171E 01	0.7987E 00	0.1250E 00	0.5884E 01
S05	0.1282E 01	0.9916E 00	0.0000E 00	0.6000E 01
L01	0.1457E 02	0.2074E 02	0.0000E 00	0.1000E 03
L02	0.4869E 01	0.8653E 01	0.0000E 00	0.7683E 02
L03	0.1427E 00	0.2526E 01	0.0000E 00	0.7018E 02
L04	0.9537E 00	0.5488E 01	0.0000E 00	0.5902E 02
L05	0.5546E 01	0.1362E 02	0.0000E 00	0.1000E 03
L06	0.1133E 01	0.5584E 01	0.0000E 00	0.7313E 02
L07	0.1021E 01	0.2626E 01	0.0000E 00	0.3333E 02
L08	0.6734E 02	0.3194E 02	0.0000E 00	0.1000E 03
L09	0.1571E 01	0.7098E 01	0.0000E 00	0.7761E 02
L10	0.2907E 01	0.1231E 02	0.0000E 00	0.1000E 03
L11	0.1741E 01	0.8063E 01	0.0000E 00	0.8558E 02
L12	0.9646E 01	0.1509E 02	0.0000E 00	0.9187E 02
L13	0.7901E-01	0.2698E 00	0.0000E 00	0.1000E 01
L14	0.1146E 00	0.3186E 00	0.0000E 00	0.1000E 01
A01	0.4589E 01	0.1463E 02	0.0000E 00	0.1000E 03
A02	0.3636E 02	0.3296E 02	0.0000E 00	0.1000E 03
A03	0.2374E 02	0.2781E 02	0.0000E 00	0.1000E 03
A04	0.6620E 01	0.2179E 02	0.0000E 00	0.1000E 03
A05	0.1127E 02	0.1947E 02	0.0000E 00	0.1000E 03
A06	0.4409E 01	0.1642E 02	0.0000E 00	0.1000E 03
A07	0.1869E 01	0.3081E 01	0.0000E 00	0.2781E 02
W01	0.2921E 01	0.3701E 01	0.6410E-01	0.4688E 02
W02	0.9610E 02	0.1290E 02	0.9091E 01	0.1000E 03
W03	0.7249E 01	0.1884E 02	0.0000E 00	0.1000E 03
W04	0.2738E 02	0.3813E 02	0.0000E 00	0.1000E 03
W05	0.5748E 02	0.4118E 02	0.0000E 00	0.1000E 03
W06	0.4773E 01	0.1313E 02	0.0000E 00	0.6667E 02
W07	0.3569E 01	0.1173E 02	0.0000E 00	0.6667E 02
M01	0.2355E 00	0.4243E 00	0.0000E 00	0.1000E 01
M02	0.1255E 00	0.3313E 00	0.0000E 00	0.1000E 01
M03	0.2866E-01	0.1668E 00	0.0000E 00	0.1000E 01
M04	0.5778E 00	0.4939E 00	0.0000E 00	0.1000E 01
M05	0.3176E-01	0.1754E 00	0.0000E 00	0.1000E 01
M06	0.2293E 00	0.2172E 01	0.0000E 00	0.4815E 02
M07	0.1084E-01	0.1036E 00	0.0000E 00	0.1000E 01
M08	0.3186E 01	0.3983E 01	0.0000E 00	0.3000E 02
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1163E 01	0.4207E 00	0.1000E 01	0.4000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.3837E 02	0.7147E 01	0.1700E 02	0.7100E 02
H06	0.6522E 00	0.4763E 00	0.0000E 00	0.1000E 01
G01	0.5456E 02	0.4307E 02	0.0000E 00	0.1000E 03
G02	0.4512E 02	0.4309E 02	0.0000E 00	0.1000E 03
G03	0.3200E 00	0.3892E 01	0.0000E 00	0.7148E 02
G04	0.1549E 00	0.3618E 00	0.0000E 00	0.1000E 01
G05	0.1101E 01	0.1313E 01	0.0000E 00	0.4000E 01
G06	0.6274E-01	0.2754E 00	0.0000E 00	0.5000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
231	377	237	155	255	36

CLASS 16
NO. OF OBSERVATIONS = 326

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.4633E 03	0.1239E 04	0.2000E 01	0.1463E 05
S02	0.2505E 03	0.6067E 03	0.1000E 01	0.6497E 04
S03	0.1968E 03	0.7427E 03	0.0000E 00	0.1096E 05
S04	0.8549E 00	0.8049E 00	0.1250E 00	0.4375E 01
S05	0.6288E 00	0.9690E 00	0.0000E 00	0.6000E 01
L01	0.4637E 01	0.1458E 02	0.0000E 00	0.1000E 03
L02	0.3550E 01	0.1206E 02	0.0000E 00	0.9615E 02
L03	0.2636E 00	0.3232E 01	0.0000E 00	0.5128E 02
L04	0.1914E 01	0.1019E 02	0.0000E 00	0.1000E 03
L05	0.4368E 01	0.1452E 02	0.0000E 00	0.1000E 03
L06	0.1246E 01	0.7563E 01	0.0000E 00	0.8801E 02
L07	0.4301E 02	0.4600E 02	0.0000E 00	0.1000E 03
L08	0.2831E 02	0.3972E 02	0.0000E 00	0.1000E 03
L09	0.8298E 01	0.2473E 02	0.0000E 00	0.1000E 03
L10	0.4403E 01	0.1670E 02	0.0000E 00	0.1000E 03
L11	0.1012E 02	0.2264E 02	0.0000E 00	0.9962E 02
L12	0.3471E 02	0.2784E 02	0.0000E 00	0.9709E 02
L13	0.2761E-01	0.1638E 00	0.0000E 00	0.1000E 01
L14	0.3988E-01	0.1957E 00	0.0000E 00	0.1000E 01
A01	0.9138E-01	0.6403E 00	0.0000E 00	0.8451E 01
A02	0.2576E 01	0.1237E 02	0.0000E 00	0.1000E 03
A03	0.5724E 01	0.2032E 02	0.0000E 00	0.1000E 03
A04	0.1027E 01	0.9018E 01	0.0000E 00	0.1000E 03
A05	0.5774E 02	0.4464E 02	0.0000E 00	0.1000E 03
A06	0.2272E 02	0.3713E 02	0.0000E 00	0.1000E 03
A07	0.5160E 02	0.9709E 02	0.0000E 00	0.9643E 03
W01	0.2243E 02	0.3599E 02	0.9445E-01	0.2500E 03
W02	0.9371E 02	0.1932E 02	0.0000E 00	0.1000E 03
W03	0.4100E 01	0.1396E 02	0.0000E 00	0.1000E 03
W04	0.1329E 02	0.3063E 02	0.0000E 00	0.1000E 03
W05	0.2055E 02	0.3681E 02	0.0000E 00	0.1000E 03
W06	0.4474E 02	0.4600E 02	0.0000E 00	0.1000E 03
W07	0.1732E 02	0.3556E 02	0.0000E 00	0.1000E 03
M01	0.1043E 00	0.3056E 00	0.0000E 00	0.1000E 01
M02	0.1196E 00	0.3245E 00	0.0000E 00	0.1000E 01
M03	0.3067E-02	0.5530E-01	0.0000E 00	0.1000E 01
M04	0.2761E 00	0.4471E 00	0.0000E 00	0.1000E 01
M05	0.1227E-01	0.1101E 00	0.0000E 00	0.1000E 01
M06	0.3379E 00	0.3426E 01	0.0000E 00	0.5000E 02
M07	0.7362E-01	0.2612E 00	0.0000E 00	0.1000E 01
M08	0.3299E 01	0.9646E 01	0.0000E 00	0.9091E 02
H01	0.9724E 00	0.1638E 00	0.0000E 00	0.1000E 01
H02	0.1181E 01	0.4510E 00	0.1000E 01	0.3000E 01
H03	0.8742E 00	0.3316E 00	0.0000E 00	0.1000E 01
H04	0.9816E-01	0.2975E 00	0.0000E 00	0.1000E 01
H05	0.5238E 02	0.1381E 02	0.1500E 02	0.8700E 02
H06	0.5000E 00	0.5000E 00	0.0000E 00	0.1000E 01
G01	0.8448E 02	0.3425E 02	0.0000E 00	0.1000E 03
G02	0.1478E 02	0.3360E 02	0.0000E 00	0.1000E 03
G03	0.7447E 00	0.8149E 01	0.0000E 00	0.1000E 03
G04	0.2485E 00	0.4321E 00	0.0000E 00	0.1000E 01
G05	0.9571E 00	0.1248E 01	0.0000E 00	0.4000E 01
G06	0.2025E 00	0.4521E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
108	63	113	32	6	4

POPULATION ASSIGNMENT BY CLASSIFICATION II

TOTAL
NO. OF OBSERVATIONS =21743

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.2015E 04	0.7427E 04	0.2000E 01	0.7513E 06
S02	0.1655E 04	0.4397E 04	0.1000E 01	0.4131E 06
S03	0.1890E 02	0.9663E 02	0.0000E 00	0.1096E 05
S04	0.1961E 01	0.2164E 01	0.7273E-02	0.1346E 03
S05	0.2580E 01	0.2074E 01	0.0000E 00	0.5400E 02
L01	0.2561E 02	0.2358E 02	0.0000E 00	0.1000E 03
L02	0.7338E 01	0.1121E 02	0.0000E 00	0.1000E 03
L03	0.6172E 00	0.3499E 01	0.0000E 00	0.1000E 03
L04	0.3274E 01	0.1586E 02	0.0000E 00	0.1000E 03
L05	0.9627E 01	0.1619E 02	0.0000E 00	0.1000E 03
L06	0.1185E 01	0.6126E 01	0.0000E 00	0.1000E 03
L07	0.1538E 01	0.8156E 01	0.0000E 00	0.1000E 03
L08	0.4008E 02	0.3479E 02	0.0000E 00	0.1000E 03
L09	0.4524E 01	0.1595E 02	0.0000E 00	0.1000E 03
L10	0.6219E 01	0.1977E 02	0.0000E 00	0.1000E 03
L11	0.2007E 01	0.8962E 01	0.0000E 00	0.9962E 02
L12	0.9473E 01	0.1461E 02	0.0000E 00	0.9972E 02
L13	0.1110E 00	0.3141E 00	0.0000E 00	0.1000E 01
L14	0.2277E 00	0.4193E 00	0.0000E 00	0.1000E 01
A01	0.4378E 01	0.1577E 02	0.0000E 00	0.1000E 03
A02	0.3069E 02	0.2965E 02	0.0000E 00	0.1000E 03
A03	0.2458E 02	0.2632E 02	0.0000E 00	0.1000E 03
A04	0.3167E 01	0.1454E 02	0.0000E 00	0.1000E 03
A05	0.1414E 02	0.2369E 02	0.0000E 00	0.1000E 03
A06	0.4611E 01	0.1583E 02	0.0000E 00	0.1000E 03
A07	0.1956E 01	0.1351E 02	0.0000E 00	0.9643E 03
W01	0.3758E 01	0.1056E 02	0.1452E-03	0.6042E 03
W02	0.8425E 02	0.2922E 02	0.0000E 00	0.1000E 03
W03	0.8525E 01	0.1768E 02	0.0000E 00	0.1000E 03
W04	0.1413E 02	0.2605E 02	0.0000E 00	0.1000E 03
W05	0.2154E 02	0.3336E 02	0.0000E 00	0.1000E 03
W06	0.4109E 02	0.3591E 02	0.0000E 00	0.1000E 03
W07	0.1322E 02	0.2786E 02	0.0000E 00	0.1000E 03
M01	0.4844E 00	0.4998E 00	0.0000E 00	0.1000E 01
M02	0.1387E 00	0.3456E 00	0.0000E 00	0.1000E 01
M03	0.1778E 00	0.3823E 00	0.0000E 00	0.1000E 01
M04	0.6366E 00	0.4439E 00	0.0000E 00	0.1000E 01
M05	0.2316E 00	0.4498E 00	0.0000E 00	0.1000E 01
M06	0.1048E 01	0.8110E 01	0.0000E 00	0.1000E 03
M07	0.4797E-01	0.2137E 00	0.0000E 00	0.1000E 01
M08	0.3077E 01	0.9162E 01	0.0000E 00	0.5000E 03
H01	0.9479E 00	0.2222E 00	0.0000E 00	0.1000E 01
H02	0.1291E 01	0.5943E 00	0.1000E 01	0.4000E 01
H03	0.8722E 00	0.3338E 00	0.0000E 00	0.1000E 01
H04	0.7566E-01	0.2644E 00	0.0000E 00	0.1000E 01
H05	0.5541E 02	0.1248E 02	0.1500E 02	0.9400E 02
H06	0.2160E 00	0.4115E 00	0.0000E 00	0.1000E 01
G01	0.6107E 02	0.4162E 02	0.0000E 00	0.1000E 03
G02	0.3423E 02	0.4027E 02	0.0000E 00	0.1000E 03
G03	0.4701E 01	0.2023E 02	0.0000E 00	0.1000E 03
G04	0.2200E 00	0.4142E 00	0.0000E 00	0.1000E 01
G05	0.1518E 01	0.1506E 01	0.0000E 00	0.4000E 01
G06	0.8858E-01	0.3179E 00	0.0000E 00	0.5000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
3346	4240	4411	2671	5093	1982

CLASS 1
NO. OF OBSERVATIONS = 3533

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.3146E 04	0.2750E 04	0.1050E 03	0.5813E 05
S02	0.2777E 04	0.2168E 04	0.9500E 02	0.2926E 05
S03	0.3494E 02	0.3062E 02	0.0000E 00	0.3838E 03
S04	0.2702E 01	0.1072E 01	0.2500E 00	0.2068E 02
S05	0.4399E 01	0.1451E 01	0.0000E 00	0.1600E 02
L01	0.3670E 02	0.1586E 02	0.0000E 00	0.1000E 03
L02	0.7159E 01	0.7095E 01	0.0000E 00	0.4447E 02
L03	0.3271E 00	0.1906E 01	0.0000E 00	0.3123E 02
L04	0.7231E-01	0.9942E 00	0.0000E 00	0.2680E 02
L05	0.1048E 02	0.1202E 02	0.0000E 00	0.7794E 02
L06	0.5258E 00	0.2723E 01	0.0000E 00	0.5587E 02
L07	0.3299E 00	0.7242E 00	0.0000E 00	0.1872E 02
L08	0.4368E 02	0.2296E 02	0.0000E 00	0.1000E 03
L09	0.6967E 00	0.3984E 01	0.0000E 00	0.6175E 02
L10	0.5344E 00	0.2973E 01	0.0000E 00	0.6588E 02
L11	0.6049E 00	0.3519E 01	0.0000E 00	0.7816E 02
L12	0.8541E 01	0.1214E 02	0.0000E 00	0.8703E 02
L13	0.4982E-01	0.2176E 00	0.0000E 00	0.1000E 01
L14	0.2417E 00	0.4281E 00	0.0000E 00	0.1000E 01
A01	0.1046E 01	0.5524E 01	0.0000E 00	0.7500E 02
A02	0.4080E 02	0.1815E 02	0.0000E 00	0.1000E 03
A03	0.3528E 02	0.1823E 02	0.0000E 00	0.1000E 03
A04	0.5625E 00	0.4587E 01	0.0000E 00	0.9549E 02
A05	0.1807E 02	0.1768E 02	0.0000E 00	0.1000E 03
A06	0.4012E 01	0.1092E 02	0.0000E 00	0.1000E 03
A07	0.1351E 01	0.1271E 01	0.0000E 00	0.1713E 02
W01	0.1349E 01	0.1139E 01	0.7302E-01	0.1698E 02
W02	0.9140E 02	0.1686E 02	0.4835E 01	0.1000E 03
W03	0.1375E 02	0.2006E 02	0.0000E 00	0.1000E 03
W04	0.1029E 02	0.2552E 02	0.0000E 00	0.1000E 03
W05	0.2318E 02	0.2954E 02	0.0000E 00	0.1000E 03
W06	0.3377E 02	0.2844E 02	0.0000E 00	0.1000E 03
W07	0.1001E 02	0.1664E 02	0.0000E 00	0.7500E 02
M01	0.9307E 00	0.2540E 00	0.0000E 00	0.1000E 01
M02	0.8633E-01	0.2808E 00	0.0000E 00	0.1000E 01
M03	0.7010E 00	0.4583E 00	0.0000E 00	0.1000E 01
M04	0.6785E 00	0.4671E 00	0.0000E 00	0.1000E 01
M05	0.8324E 00	0.3735E 00	0.0000E 00	0.1000E 01
M06	0.1100E-01	0.4072E 00	0.0000E 00	0.2266E 02
M07	0.2830E-03	0.1682E-01	0.0000E 00	0.1000E 01
M08	0.2312E 01	0.2146E 01	0.0000E 00	0.3333E 02
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1510E 01	0.7124E 00	0.1000E 01	0.4000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.4998E 02	0.1241E 02	0.1600E 02	0.9100E 02
H06	0.8746E-01	0.2825E 00	0.0000E 00	0.1000E 01
G01	0.7033E 02	0.3148E 02	0.0000E 00	0.1000E 03
G02	0.2689E 02	0.3050E 02	0.0000E 00	0.1000E 03
G03	0.2781E 01	0.1103E 02	0.0000E 00	0.1000E 03
G04	0.1673E 00	0.3732E 00	0.0000E 00	0.1000E 01
G05	0.2900E 01	0.1150E 01	0.0000E 00	0.4000E 01
G06	0.8548E-01	0.3166E 00	0.0000E 00	0.4000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
396	356	412	965	101	1323

CLASS 2
NO. OF OBSERVATIONS = 1821

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.8365E 03	0.3504E 04	0.5000E 01	0.1402E 06
S02	0.6295E 03	0.1132E 04	0.4000E 01	0.2006E 05
S03	0.5017E 01	0.9874E 01	0.0000E 00	0.1923E 03
S04	0.1069E 01	0.8389E 00	0.1250E 00	0.1106E 02
S05	0.1308E 01	0.1161E 01	0.0000E 00	0.1300E 02
L01	0.1951E 02	0.2413E 02	0.0000E 00	0.1000E 03
L02	0.6701E 01	0.1109E 02	0.0000E 00	0.8000E 02
L03	0.1966E 00	0.2192E 01	0.0000E 00	0.4068E 02
L04	0.7144E 00	0.4922E 01	0.0000E 00	0.5488E 02
L05	0.7785E 01	0.1662E 02	0.0000E 00	0.1000E 03
L06	0.1168E 01	0.6465E 01	0.0000E 00	0.8584E 02
L07	0.1728E 01	0.4044E 01	0.0000E 00	0.4359E 02
L08	0.4684E 02	0.3734E 02	0.0000E 00	0.1000E 03
L09	0.6691E 01	0.1941E 02	0.0000E 00	0.1000E 03
L10	0.8668E 01	0.2271E 02	0.0000E 00	0.1000E 03
L11	0.3482E 01	0.1224E 02	0.0000E 00	0.9404E 02
L12	0.1078E 02	0.1607E 02	0.0000E 00	0.9854E 02
L13	0.9995E-01	0.2999E 00	0.0000E 00	0.1000E 01
L14	0.1378E 00	0.3447E 00	0.0000E 00	0.1000E 01
A01	0.6607E 01	0.1903E 02	0.0000E 00	0.1000E 03
A02	0.2415E 02	0.3200E 02	0.0000E 00	0.1000E 03
A03	0.1988E 02	0.2887E 02	0.0000E 00	0.1000E 03
A04	0.5292E 01	0.1934E 02	0.0000E 00	0.1000E 03
A05	0.1233E 02	0.2453E 02	0.0000E 00	0.1000E 03
A06	0.5153E 01	0.1706E 02	0.0000E 00	0.1000E 03
A07	0.1020E 01	0.1903E 01	0.0000E 00	0.2870E 02
W01	0.3566E 01	0.5112E 01	0.1337E-01	0.7500E 02
W02	0.9161E 02	0.2046E 02	0.3323E 01	0.1000E 03
W03	0.9619E 00	0.6388E 01	0.0000E 00	0.6667E 02
W04	0.4420E 01	0.1363E 02	0.0000E 00	0.7500E 02
W05	0.5229E 01	0.1452E 02	0.0000E 00	0.6667E 02
W06	0.6078E 01	0.1786E 02	0.0000E 00	0.6667E 02
W07	0.8131E 02	0.2464E 02	0.2500E 02	0.1000E 03
M01	0.1565E 00	0.3633E 00	0.0000E 00	0.1000E 01
M02	0.8786E-01	0.2831E 00	0.0000E 00	0.1000E 01
M03	0.2087E-01	0.1429E 00	0.0000E 00	0.1000E 01
M04	0.6354E 00	0.4813E 00	0.0000E 00	0.1000E 01
M05	0.5327E-01	0.2246E 00	0.0000E 00	0.1000E 01
M06	0.1933E-01	0.3065E 00	0.0000E 00	0.9091E 01
M07	0.5491E-01	0.2278E 00	0.0000E 00	0.1000E 01
M08	0.4596E 01	0.7795E 01	0.0000E 00	0.1111E 03
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1079E 01	0.2999E 00	0.1000E 01	0.4000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.7078E 02	0.5588E 01	0.3100E 02	0.9300E 02
H06	0.1186E 00	0.3233E 00	0.0000E 00	0.1000E 01
G01	0.7833E 02	0.3543E 02	0.0000E 00	0.1000E 03
G02	0.2009E 02	0.3424E 02	0.0000E 00	0.1000E 03
G03	0.1577E 01	0.1188E 02	0.0000E 00	0.1000E 03
G04	0.1345E 00	0.3412E 00	0.0000E 00	0.1000E 01
G05	0.9973E 00	0.1317E 01	0.0000E 00	0.4000E 01
G06	0.3405E-01	0.1987E 00	0.0000E 00	0.3000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
341	354	358	167	472	129

POPULATION ASSIGNMENT BY CLASSIFICATION II

CLASS 3
NO. OF OBSERVATIONS = 1738

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.7570E 03	0.1239E 04	0.1200E 02	0.1680E 05
S02	0.6764E 03	0.9708E 03	0.8000E 01	0.1321E 05
S03	0.2169E 01	0.1345E 02	0.0000E 00	0.3242E 03
S04	0.1387E 01	0.1309E 01	0.1250E 00	0.1204E 02
S05	0.1471E 01	0.1167E 01	0.0000E 00	0.8000E 01
L01	0.2083E 02	0.2009E 02	0.0000E 00	0.1000E 03
L02	0.2475E 01	0.6587E 01	0.0000E 00	0.5116E 02
L03	0.3075E 00	0.2617E 01	0.0000E 00	0.3922E 02
L04	0.1804E 01	0.7977E 01	0.0000E 00	0.6000E 02
L05	0.5143E 01	0.1305E 02	0.0000E 00	0.1000E 03
L06	0.4130E 01	0.1256E 02	0.0000E 00	0.1000E 03
L07	0.1427E 01	0.3887E 01	0.0000E 00	0.3636E 02
L08	0.5866E 01	0.1642E 02	0.0000E 00	0.1000E 03
L09	0.2599E 02	0.3452E 02	0.0000E 00	0.1000E 03
L10	0.3292E 02	0.3870E 02	0.0000E 00	0.1000E 03
L11	0.4251E 01	0.1360E 02	0.0000E 00	0.9864E 02
L12	0.9162E 01	0.1565E 02	0.0000E 00	0.9680E 02
L13	0.2135E 00	0.4098E 00	0.0000E 00	0.1000E 01
L14	0.3567E-01	0.1855E 00	0.0000E 00	0.1000E 01
A01	0.1802E 02	0.3669E 02	0.0000E 00	0.1000E 03
A02	0.1953E 01	0.1124E 02	0.0000E 00	0.1000E 03
A03	0.3490E 01	0.1607E 02	0.0000E 00	0.1000E 03
A04	0.2427E 01	0.1348E 02	0.0000E 00	0.1000E 03
A05	0.13[illegible]5E 02	0.3120E 02	0.0000E 00	0.1000E 03
A06	0.4608E 01	0.1892E 02	0.0000E 00	0.1000E 03
A07	0.4537E 00	0.1913E 01	0.0000E 00	0.2507E 02
W01	0.4448E 01	0.5317E 01	0.6210E-01	0.5919E 02
W02	0.7826E 02	0.2912E 02	0.1488E 01	0.1000E 03
W03	0.6433E 01	0.1665E 02	0.0000E 00	0.1000E 03
W04	0.1126E 02	0.2511E 02	0.0000E 00	0.1000E 03
W05	0.2510E 02	0.3651E 02	0.0000E 00	0.1000E 03
W06	0.57[illegible]3E 02	0.4131E 02	0.0000E 00	0.1000E 03
W07	0.5080E 01	0.1439E 02	0.0000E 00	0.1000E 03
M01	0.2486E 00	0.4322E 00	0.0000E 00	0.1000E 01
M02	0.2635E 00	0.4405E 00	0.0000E 00	0.1000E 01
M03	0.6329E-02	0.7930E-01	0.0000E 00	0.1000E 01
M04	0.5253E 00	0.4994E 00	0.0000E 00	0.1000E 01
M05	0.5754E-03	0.2398E-01	0.0000E 00	0.1000E 01
M06	0.1824E 00	0.1489E 01	0.0000E 00	0.2500E 02
M07	0.3493E 00	0.4767E 00	0.0000E 00	0.1000E 01
M08	0.6413E 01	0.1025E 02	0.0000E 00	0.1000E 03
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1158E 01	0.4842E 00	0.1000E 01	0.4000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.5037E 02	0.1133E 02	0.2000E 02	0.8600E 02
H06	0.4971E 00	0.5000E 00	0.0000E 00	0.1000E 01
G01	0.8906E 02	0.2711E 02	0.0000E 00	0.1000E 03
G02	0.8775E 01	0.2421E 02	0.0000E 00	0.1000E 03
G03	0.2165E 01	0.1347E 02	0.0000E 00	0.1000E 03
G04	0.1013E 00	0.3017E 00	0.0000E 00	0.1000E 01
G05	0.8064E 00	0.1291E 01	0.0000E 00	0.4000E 01
G06	0.3337E-01	0.1828E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
318	109	151	164	909	87

CLASS 4
NO. OF OBSERVATIONS = 1117

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.6341E 04	0.3009E 05	0.1500E 02	0.7513E 06
S02	0.4061E 04	0.1656E 05	0.1200E 02	0.4131E 06
S03	0.1705E 02	0.4803E 02	0.0000E 00	0.7316E 03
S04	0.2828E 01	0.4552E 01	0.7273E-02	0.7163E 02
S05	0.2541E 01	0.2875E 01	0.0000E 00	0.3600E 02
L01	0.2447E 02	0.2570E 02	0.0000E 00	0.1000E 03
L02	0.5775E 01	0.1133E 02	0.0000E 00	0.1000E 03
L03	0.7019E 00	0.4279E 01	0.0000E 00	0.7376E 02
L04	0.2053E 01	0.1157E 02	0.0000E 00	0.1000E 03
L05	0.1133E 02	0.1943E 02	0.0000E 00	0.1000E 03
L06	0.1880E 01	0.8112E 01	0.0000E 00	0.8696E 02
L07	0.6882E 00	0.2462E 01	0.0000E 00	0.4000E 02
L08	0.3222E 02	0.3647E 02	0.0000E 00	0.1000E 03
L09	0.7247E 01	0.1932E 02	0.0000E 00	0.1000E 03
L10	0.1363E 02	0.2850E 02	0.0000E 00	0.1000E 03
L11	0.2737E 01	0.1040E 02	0.0000E 00	0.9275E 02
L12	0.1416E 02	0.2041E 02	0.0000E 00	0.9941E 02
L13	0.1916E 00	0.3935E 00	0.0000E 00	0.1000E 01
L14	0.1397E 00	0.3466E 00	0.0000E 00	0.1000E 01
A01	0.4558E 01	0.1807E 02	0.0000E 00	0.1000E 03
A02	0.2041E 02	0.2908E 02	0.0000E 00	0.1000E 03
A03	0.1744E 02	0.2620E 02	0.0000E 00	0.1000E 03
A04	0.3630E 01	0.1528E 02	0.0000E 00	0.1000E 03
A05	0.1019E 02	0.2213E 02	0.0000E 00	0.1000E 03
A06	0.3846E 01	0.1550E 02	0.0000E 00	0.1000E 03
A07	0.6974E 00	0.2018E 01	0.0000E 00	0.2876E 02
W01	0.2521E 01	0.6865E 01	0.1452E-03	0.1798E 03
W02	0.8953E-01	0.2991E 01	0.0000E 00	0.1000E 03
W03	0.4638E 01	0.1504E 02	0.0000E 00	0.1000E 03
W04	0.1263E 02	0.2536E 02	0.0000E 00	0.1000E 03
W05	0.1789E 02	0.3116E 02	0.0000E 00	0.1000E 03
W06	0.3526E 02	0.4023E 02	0.0000E 00	0.1000E 03
W07	0.6593E 01	0.2002E 02	0.0000E 00	0.1000E 03
M01	0.4011E 00	0.4901E 00	0.0000E 00	0.1000E 01
M02	0.1996E 00	0.3997E 00	0.0000E 00	0.1000E 01
M03	0.1553E 00	0.3583E 00	0.0000E 00	0.1000E 01
M04	0.6034E 00	0.4892E 00	0.0000E 00	0.1000E 01
M05	0.1728E 00	0.3781E 00	0.0000E 00	0.1000E 01
M06	0.2445E 00	0.2473E 01	0.0000E 00	0.5000E 02
M07	0.1038E 00	0.3051E 00	0.0000E 00	0.1000E 01
M08	0.2399E 01	0.4183E 01	0.0000E 00	0.5000E 02
H01	0.8953E-03	0.2991E-01	0.0000E 00	0.1000E 01
H02	0.1397E 01	0.7958E 00	0.1000E 01	0.4000E 01
H03	0.8953E-03	0.2991E-01	0.0000E 00	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.5198E 02	0.7776E 00	0.2600E 02	0.5200E 02
H06	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
G01	0.7391E 02	0.4033E 02	0.0000E 00	0.1000E 03
G02	0.1381E 02	0.2984E 02	0.0000E 00	0.1000E 03
G03	0.1229E 02	0.3269E 02	0.0000E 00	0.1000E 03
G04	0.2731E 00	0.4455E 00	0.0000E 00	0.1000E 01
G05	0.1011E 01	0.1383E 01	0.0000E 00	0.4000E 01
G06	0.1164E 00	0.3842E 00	0.0000E 00	0.3000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
92	30	154	192	632	8

CLASS 5
NO. OF OBSERVATIONS = 1079

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.4972E 04	0.6176E 04	0.1200E 02	0.9676E 05
S02	0.4632E 04	0.5231E 04	0.8000E 01	0.6387E 05
S03	0.1518E 02	0.2250E 02	0.0000E 00	0.2718E 03
S04	0.2777E 01	0.1933E 01	0.1250E 00	0.2099E 02
S05	0.5617E 01	0.2934E 01	0.0000E 00	0.5400E 02
L01	0.4375E 02	0.2033E 02	0.0000E 00	0.9807E 02
L02	0.2907E 02	0.2010E 02	0.0000E 00	0.1000E 03
L03	0.5667E 01	0.1038E 02	0.0000E 00	0.1000E 03
L04	0.1271E 01	0.6979E 01	0.0000E 00	0.6181E 02
L05	0.7640E 01	0.9901E 01	0.0000E 00	0.5433E 02
L06	0.3921E 00	0.2538E 01	0.0000E 00	0.3899E 02
L07	0.3955E 00	0.1716E 01	0.0000E 00	0.2143E 02
L08	0.9551E 01	0.1367E 02	0.0000E 00	0.1000E 03
L09	0.1629E 00	0.1576E 01	0.0000E 00	0.3642E 02
L10	0.1195E 01	0.5902E 01	0.0000E 00	0.6849E 02
L11	0.2486E 00	0.2875E 01	0.0000E 00	0.6236E 02
L12	0.5598E 01	0.8186E 01	0.0000E 00	0.9909E 02
L13	0.2873E-01	0.1670E 00	0.0000E 00	0.1000E 01
L14	0.3601E 00	0.4817E 00	0.0000E 00	0.1000E 01
A01	0.4327E 01	0.1590E 02	0.0000E 00	0.1000E 03
A02	0.1874E 02	0.2660E 02	0.0000E 00	0.1000E 03
A03	0.3085E 02	0.3469E 02	0.0000E 00	0.1000E 03
A04	0.5043E 01	0.1845E 02	0.0000E 00	0.1000E 03
A05	0.7493E 01	0.2068E 02	0.0000E 00	0.1000E 03
A06	0.8525E 01	0.2347E 02	0.0000E 00	0.1000E 03
A07	0.5070E 00	0.1175E 01	0.0000E 00	0.1848E 02
W01	0.1434E 01	0.3501E 01	0.1327E-01	0.6250E 02
W02	0.6304E 02	0.2994E 02	0.1056E 01	0.1000E 03
W03	0.1161E 02	0.1927E 02	0.0000E 00	0.1000E 03
W04	0.1871E 02	0.2716E 02	0.0000E 00	0.1000E 03
W05	0.2322E 02	0.2986E 02	0.0000E 00	0.1000E 03
W06	0.4169E 02	0.3252E 02	0.0000E 00	0.1000E 03
W07	0.4768E 01	0.1366E 02	0.0000E 00	0.1000E 03
M01	0.8489E 00	0.3581E 00	0.0000E 00	0.1000E 01
M02	0.6302E-01	0.2430E 00	0.0000E 00	0.1000E 01
M03	0.5472E 00	0.4983E 00	0.0000E 00	0.1000E 01
M04	0.8795E 00	0.3255E 00	0.0000E 00	0.1000E 01
M05	0.1687E 00	0.3745E 00	0.0000E 00	0.1000E 01
M06	0.3682E-01	0.4639E 00	0.0000E 00	0.8333E 01
M07	0.1019E-01	0.1005E 00	0.0000E 00	0.1000E 01
M08	0.3555E 01	0.1076E 02	0.0000E 00	0.2857E 03
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1983E 01	0.8609E 00	0.1000E 01	0.4000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.4965E 02	0.1149E 02	0.2000E 02	0.8700E 02
H06	0.1659E 00	0.3720E 00	0.0000E 00	0.1000E 01
G01	0.3422E 02	0.3980E 02	0.0000E 00	0.1000E 03
G02	0.6543E 02	0.3990E 02	0.0000E 00	0.1000E 03
G03	0.3465E 00	0.5473E 01	0.0000E 00	0.1000E 03
G04	0.7312E 00	0.4433E 00	0.0000E 00	0.1000E 01
G05	0.2167E 01	0.1452E 01	0.0000E 00	0.4000E 01
G06	0.2298E 00	0.4667E 00	0.0000E 00	0.3000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
87	152	723	52	62	3

POPULATION ASSIGNMENT BY CLASSIFICATION II

CLASS 9
NO. OF OBSERVATIONS = 3185

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1634E 04	0.1703E 04	0.8000E 01	0.2000E 05
S02	0.1518E 04	0.1566E 04	0.6000E 01	0.1960E 05
S03	0.1961E 02	0.1851E 02	0.0000E 00	0.2068E 03
S04	0.1567E 01	0.7723E 00	0.1250E 00	0.6125E 01
S05	0.2651E 01	0.1618E 01	0.0000E 00	0.9000E 01
L01	0.2479E 02	0.2238E 02	0.0000E 00	0.1000E 03
L02	0.7474E 01	0.9121E 01	0.0000E 00	0.6364E 02
L03	0.4623E 00	0.2352E 01	0.0000E 00	0.3333E 02
L04	0.4119E 00	0.3524E 01	0.0000E 00	0.5595E 02
L05	0.7466E 01	0.1272E 02	0.0000E 00	0.1000E 03
L06	0.6762E 00	0.3855E 01	0.0000E 00	0.8569E 02
L07	0.6469E 00	0.2118E 01	0.0000E 00	0.4111E 02
L08	0.5572E 02	0.3175E 02	0.0000E 00	0.1000E 03
L09	0.6769E 00	0.5025E 01	0.0000E 00	0.7761E 02
L10	0.1467E 01	0.8132E 01	0.0000E 00	0.1000E 03
L11	0.1172E 01	0.5924E 01	0.0000E 00	0.8558E 02
L12	0.6100E 01	0.1003E 02	0.0000E 00	0.8998E 02
L13	0.5559E-01	0.2297E 00	0.0000E 00	0.1000E 01
L14	0.3002E 00	0.4583E 00	0.0000E 00	0.1000E 01
A01	0.2236E 01	0.7147E 01	0.0000E 00	0.1000E 03
A02	0.4235E 02	0.2701E 02	0.0000E 00	0.1000E 03
A03	0.2785E 02	0.2307E 02	0.0000E 00	0.1000E 03
A04	0.3203E 01	0.1507E 02	0.0000E 00	0.1000E 03
A05	0.1561E 02	0.2224E 02	0.0000E 00	0.1000E 03
A06	0.3161E 01	0.1244E 02	0.0000E 00	0.1000E 03
A07	0.1727E 01	0.2022E 01	0.0000E 00	0.2224E 02
W01	0.2067E 01	0.3622E 01	0.5000E-01	0.1323E 03
W02	0.9427E 02	0.1369E 02	0.1028E 02	0.1000E 03
W03	0.4458E 01	0.1412E 02	0.0000E 00	0.1000E 03
W04	0.2814E 02	0.3713E 02	0.0000E 00	0.1000E 03
W05	0.5836E 02	0.3948E 02	0.0000E 00	0.1000E 03
W06	0.4799E 01	0.1321E 02	0.0000E 00	0.6667E 02
W07	0.4538E 01	0.1315E 02	0.0000E 00	0.6667E 02
M01	0.5334E 00	0.4930E 00	0.0000E 00	0.1000E 01
M02	0.7159E-01	0.2578E 00	0.0000E 00	0.1000E 01
M03	0.5651E-01	0.2309E 00	0.0000E 00	0.1000E 01
M04	0.7872E 00	0.4135E 00	0.0000E 00	0.1000E 01
M05	0.3724E 00	0.4834E 00	0.0000E 00	0.1000E 01
M06	0.8568E-01	0.1349E 01	0.0000E 00	0.4815E 02
M07	0.2512E-02	0.5005E-01	0.0000E 00	0.1000E 01
M08	0.3294E 01	0.4972E 01	0.0000E 00	0.1250E 03
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1299E 01	0.5499E 00	0.1000E 01	0.4000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.3771E 02	0.5738E 01	0.1700E 02	0.7500E 02
H06	0.3165E 00	0.4651E 00	0.0000E 00	0.1000E 01
G01	0.3367E 02	0.3911E 02	0.0000E 00	0.1000E 03
G02	0.6566E 02	0.3929E 02	0.0000E 00	0.1000E 03
G03	0.4695E 00	0.5348E 01	0.0000E 00	0.1000E 03
G04	0.2182E 00	0.4130E 00	0.0000E 00	0.1000E 01
G05	0.1487E 01	0.1419E 01	0.0000E 00	0.4000E 01
G06	0.6038E-01	0.3014E 00	0.0000E 00	0.5000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
663	1103	674	310	286	83

CLASS 10
NO. OF OBSERVATIONS = 1590

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1007E 04	0.1918E 04	0.6000E 01	0.2685E 05
S02	0.8513E 03	0.1710E 04	0.6000E 01	0.2685E 05
S03	0.7788E 01	0.1568E 02	0.0000E 00	0.2042E 03
S04	0.1310E 01	0.1298E 01	0.1250E 00	0.1681E 02
S05	0.1638E 01	0.1592E 01	0.0000E 00	0.1300E 02
L01	0.2117E 02	0.2425E 02	0.0000E 00	0.1000E 03
L02	0.6531E 01	0.1104E 02	0.0000E 00	0.1000E 03
L03	0.3006E 00	0.2958E 01	0.0000E 00	0.8667E 02
L04	0.7145E 00	0.5477E 01	0.0000E 00	0.7500E 02
L05	0.8426E 01	0.1710E 02	0.0000E 00	0.1000E 03
L06	0.1521E 01	0.7726E 01	0.0000E 00	0.9600E 02
L07	0.1549E 01	0.4384E 01	0.0000E 00	0.5000E 02
L08	0.4338E 02	0.3705E 02	0.0000E 00	0.1000E 03
L09	0.6967E 01	0.2045E 02	0.0000E 00	0.1000E 03
L10	0.9566E 01	0.2469E 02	0.0000E 00	0.1000E 03
L11	0.3371E 01	0.1204E 02	0.0000E 00	0.9557E 02
L12	0.1021E 02	0.1573E 02	0.0000E 00	0.9249E 02
L13	0.1107E 00	0.3138E 00	0.0000E 00	0.1000E 01
L14	0.1484E 00	0.3555E 00	0.0000E 00	0.1000E 01
A01	0.3423E 01	0.1353E 02	0.0000E 00	0.1000E 03
A02	0.2850E 02	0.3318E 02	0.0000E 00	0.1000E 03
A03	0.1702E 02	0.2472E 02	0.0000E 00	0.1000E 03
A04	0.3572E 01	0.1552E 02	0.0000E 00	0.1000E 03
A05	0.1324E 02	0.2468E 02	0.0000E 00	0.1000E 03
A06	0.5068E 01	0.1746E 02	0.0000E 00	0.1000E 03
A07	0.1156E 01	0.2632E 01	0.0000E 00	0.3304E 02
W01	0.3677E 01	0.5163E 01	0.3086E-01	0.5937E 02
W02	0.8452E 02	0.2733E 02	0.1246E 01	0.1000E 03
W03	0.6727E 01	0.1716E 02	0.0000E 00	0.1000E 03
W04	0.1109E 02	0.2330E 02	0.0000E 00	0.1000E 03
W05	0.1866E 02	0.3206E 02	0.0000E 00	0.1000E 03
W06	0.4354E 02	0.4082E 02	0.0000E 00	0.1000E 03
W07	0.2038E 02	0.3440E 02	0.0000E 00	0.1000E 03
M01	0.2503E 00	0.4332E 00	0.0000E 00	0.1000E 01
M02	0.8113E-01	0.2730E 00	0.0000E 00	0.1000E 01
M03	0.7799E-01	0.2682E 00	0.0000E 00	0.1000E 01
M04	0.6327E 00	0.4821E 00	0.0000E 00	0.1000E 01
M05	0.1214E 00	0.3266E 00	0.0000E 00	0.1000E 01
M06	0.2366E 00	0.3175E 01	0.0000E 00	0.6667E 02
M07	0.5912E-01	0.2358E 00	0.0000E 00	0.1000E 01
M08	0.4451E 01	0.7349E 01	0.0000E 00	0.1000E 03
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1042E 01	0.2584E 00	0.1000E 01	0.4000E 01
H03	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H04	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H05	0.5571E 02	0.1299E 02	0.2000E 02	0.9100E 02
H06	0.1358E 00	0.3426E 00	0.0000E 00	0.1000E 01
G01	0.7315E 02	0.3899E 02	0.0000E 00	0.1000E 03
G02	0.2324E 02	0.3676E 02	0.0000E 00	0.1000E 03
G03	0.3610E 01	0.1818E 02	0.0000E 00	0.1000E 03
G04	0.7296E-01	0.2601E 00	0.0000E 00	0.1000E 01
G05	0.1036E 01	0.1362E 01	0.0000E 00	0.4000E 01
G06	0.4340E-01	0.2299E 00	0.0000E 00	0.3000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
269	380	115	215	488	114

CLASS 11
NO. OF OBSERVATIONS = 354

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.4540E 03	0.1193E 04	0.2000E 01	0.1463E 05
S02	0.2549E 03	0.5901E 03	0.1000E 01	0.6497E 04
S03	0.1796E 03	0.7135E 03	0.0000E 00	0.1096E 05
S04	0.8900E 00	0.8424E 00	0.1250E 00	0.5000E 01
S05	0.6723E 00	0.9886E 00	0.0000E 00	0.6000E 01
L01	0.5141E 01	0.1499E 02	0.0000E 00	0.1000E 03
L02	0.3907E 01	0.1226E 02	0.0000E 00	0.9615E 02
L03	0.2373E 00	0.3092E 01	0.0000E 00	0.5128E 02
L04	0.1822E 01	0.9753E 01	0.0000E 00	0.1000E 03
L05	0.4679E 01	0.1495E 02	0.0000E 00	0.1000E 03
L06	0.1415E 01	0.8959E 01	0.0000E 00	0.1000E 03
L07	0.4039E 02	0.4519E 02	0.0000E 00	0.1000E 03
L08	0.3091E 02	0.4039E 02	0.0000E 00	0.1000E 03
L09	0.7431E 01	0.2364E 02	0.0000E 00	0.1000E 03
L10	0.4063E 01	0.1605E 02	0.0000E 00	0.1000E 03
L11	0.9156E 01	0.2182E 02	0.0000E 00	0.9962E 02
L12	0.3332E 02	0.2745E 02	0.0000E 00	0.9709E 02
L13	0.2542E-01	0.1574E 00	0.0000E 00	0.1000E 01
L14	0.4520E-01	0.2077E 00	0.0000E 00	0.1000E 01
A01	0.1076E 00	0.6680E 00	0.0000E 00	0.8451E 01
A02	0.2429E 01	0.1189E 02	0.0000E 00	0.1000E 03
A03	0.5951E 01	0.2025E 02	0.0000E 00	0.1000E 03
A04	0.9742E 00	0.8458E 01	0.0000E 00	0.1000E 03
A05	0.5757E 02	0.4419E 02	0.0000E 00	0.1000E 03
A06	0.2336E 02	0.3731E 02	0.0000E 00	0.1000E 03
A07	0.4883E 02	0.9367E 02	0.0000E 00	0.9643E 03
W01	0.2078E 02	0.3369E 02	0.9445E-01	0.2500E 03
W02	0.9407E 02	0.1843E 02	0.0000E 00	0.1000E 03
W03	0.4369E 01	0.1436E 02	0.0000E 00	0.1000E 03
W04	0.1392E 02	0.3117E 02	0.0000E 00	0.1000E 03
W05	0.2136E 02	0.3734E 02	0.0000E 00	0.1000E 03
W06	0.4403E 02	0.4574E 02	0.0000E 00	0.1000E 03
W07	0.1632E 02	0.3472E 02	0.0000E 00	0.1000E 03
M01	0.1073E 00	0.3096E 00	0.0000E 00	0.1000E 01
M02	0.1215E 00	0.3267E 00	0.0000E 00	0.1000E 01
M03	0.2825E-02	0.5307E-01	0.0000E 00	0.1000E 01
M04	0.3051E 00	0.4604E 00	0.0000E 00	0.1000E 01
M05	0.1412E-01	0.1180E 00	0.0000E 00	0.1000E 01
M06	0.3881E 00	0.4016E 01	0.0000E 00	0.5455E 02
M07	0.6780E-01	0.2514E 00	0.0000E 00	0.1000E 01
M08	0.3653E 01	0.9856E 01	0.0000E 00	0.9091E 02
H01	0.9802E 00	0.1392E 00	0.0000E 00	0.1000E 01
H02	0.1212E 01	0.4845E 00	0.1000E 01	0.3000E 01
H03	0.8983E 00	0.3022E 00	0.0000E 00	0.1000E 01
H04	0.8192E-01	0.2742E 00	0.0000E 00	0.1000E 01
H05	0.5153E 02	0.1377E 02	0.1500E 02	0.8700E 02
H06	0.5028E 00	0.5000E 00	0.0000E 00	0.1000E 01
G01	0.8232E 02	0.3589E 02	0.0000E 00	0.1000E 03
G02	0.1699E 02	0.3535E 02	0.0000E 00	0.1000E 03
G03	0.6858E 00	0.7823E 01	0.0000E 00	0.1000E 03
G04	0.2768E 00	0.4474E 00	0.0000E 00	0.1000E 01
G05	0.1031E 01	0.1274E 01	0.0000E 00	0.4000E 01
G06	0.2175E 00	0.4641E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
110	69	131	33	6	5

POPULATION ASSIGNMENT BY CLASSIFICATION II

CLASS 6
NO. OF OBSERVATIONS = 1576

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.2055E 04	0.3243E 04	0.1800E 02	0.5430E 05
S02	0.1687E 04	0.2638E 04	0.1800E 02	0.4780E 05
S03	0.1365E 02	0.2928E 02	0.0000E 00	0.5982E 03
S04	0.3617E 01	0.5227E 01	0.1250E 00	0.1346E 03
S05	0.2654E 01	0.2041E 01	0.0000E 00	0.2500E 02
L01	0.3714E 02	0.2183E 02	0.0000E 00	0.1000E 03
L02	0.3618E 01	0.6610E 01	0.0000E 00	0.5455E 02
L03	0.6260E 00	0.3329E 01	0.0000E 00	0.4000E 02
L04	0.5285E 00	0.3509E 01	0.0000E 00	0.5000E 02
L05	0.3422E 02	0.2319E 02	0.0000E 00	0.1000E 03
L06	0.1082E 01	0.4719E 01	0.0000E 00	0.5000E 02
L07	0.6249E 00	0.1760E 01	0.0000E 00	0.3279E 02
L08	0.1050E 02	0.1821E 02	0.0000E 00	0.1000E 03
L09	0.5860E 01	0.1281E 02	0.0000E 00	0.1000E 03
L10	0.6116E 01	0.1670E 02	0.0000E 00	0.1000E 03
L11	0.1058E 01	0.7847E 01	0.0000E 00	0.8096E 02
L12	0.1250E 02	0.1622E 02	0.0000E 00	0.9187E 02
L13	0.5152E 00	0.4998E 00	0.0000E 00	0.1000E 01
L14	0.4067E 00	0.4912E 00	0.0000E 00	0.1000E 01
A01	0.3471E 01	0.1146E 02	0.0000E 00	0.1000E 03
A02	0.2614E 02	0.3053E 02	0.0000E 00	0.1000E 03
A03	0.4311E 02	0.3171E 02	0.0000E 00	0.1000E 03
A04	0.3622E 01	0.1275E 02	0.0000E 00	0.1000E 03
A05	0.1062E 02	0.1744E 02	0.0000E 00	0.1000E 03
A06	0.4255E 01	0.1307E 02	0.0000E 00	0.1000E 03
A07	0.7767E 00	0.8034E 00	0.0000E 00	0.1039E 02
W01	0.5472E 01	0.4910E 01	0.1464E 00	0.1172E 03
W02	0.6444E 02	0.2790E 02	0.6156E 00	0.1000E 03
W03	0.1429E 02	0.2004E 02	0.0000E 00	0.1000E 03
W04	0.1597E 02	0.2276E 02	0.0000E 00	0.1000E 03
W05	0.2113E 02	0.2777E 02	0.0000E 00	0.1000E 03
W06	0.4185E 02	0.3283E 02	0.0000E 00	0.1000E 03
W07	0.6701E 01	0.1497E 02	0.0000E 00	0.1000E 03
M01	0.4549E 00	0.4980E 00	0.0000E 00	0.1000E 01
M02	0.4511E 00	0.4976E 00	0.0000E 00	0.1000E 01
M03	0.9645E-01	0.2952E 00	0.0000E 00	0.1000E 01
M04	0.7462E 00	0.4352E 00	0.0000E 00	0.1000E 01
M05	0.8566E-01	0.2799E 00	0.0000E 00	0.1000E 01
M06	0.1210E 00	0.1225E 01	0.0000E 00	0.2647E 02
M07	0.1777E-01	0.1321E 00	0.0000E 00	0.1000E 01
M08	0.2824E 01	0.3800E 01	0.0000E 00	0.6383E 02
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1067E 01	0.3562E 00	0.1000E 01	0.4000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.5344E 02	0.1165E 02	0.1700E 02	0.9000E 02
H06	0.8479E-01	0.2780E 00	0.0000E 00	0.1000E 01
G01	0.4353E 02	0.4710E 02	0.0000E 00	0.1000E 03
G02	0.1831E 02	0.3555E 02	0.0000E 00	0.1000E 03
G03	0.3817E 02	0.4837E 02	0.0000E 00	0.1000E 03
G04	0.1060E 00	0.3078E 00	0.0000E 00	0.1000E 01
G05	0.5641E 00	0.1037E 01	0.0000E 00	0.4000E 01
G06	0.2367E 00	0.5203E 00	0.0000E 00	0.4000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
107	27	19	25	1395	9

CLASS 7
NO. OF OBSERVATIONS = 5048

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1412E 04	0.1752E 04	0.7000E 01	0.3000E 05
S02	0.1264E 04	0.1562E 04	0.5000E 01	0.2143E 05
S03	0.1544E 02	0.1755E 02	0.0000E 00	0.2146E 03
S04	0.1595E 01	0.9264E 00	0.1250E 00	0.8739E 01
S05	0.2056E 01	0.1434E 01	0.0000E 00	0.1000E 02
L01	0.2165E 02	0.2154E 02	0.0000E 00	0.1000E 03
L02	0.7064E 01	0.9014E 01	0.0000E 00	0.6753E 02
L03	0.2557E 00	0.1646E 01	0.0000E 00	0.2874E 02
L04	0.4080E 00	0.3252E 01	0.0000E 00	0.5726E 02
L05	0.6897E 01	0.1273E 02	0.0000E 00	0.1000E 03
L06	0.7497E 00	0.4000E 01	0.0000E 00	0.5165E 02
L07	0.8472E 00	0.2275E 01	0.0000E 00	0.4074E 02
L08	0.5937E 02	0.3143E 02	0.0000E 00	0.1000E 03
L09	0.1214E 01	0.5338E 01	0.0000E 00	0.7353E 02
L10	0.1561E 01	0.7126E 01	0.0000E 00	0.1000E 03
L11	0.1523E 01	0.6841E 01	0.0000E 00	0.8935E 02
L12	0.7894E 01	0.1253E 02	0.0000E 00	0.9741E 02
L13	0.4952E-01	0.2170E 00	0.0000E 00	0.1000E 01
L14	0.2690E 00	0.4434E 00	0.0000E 00	0.1000E 01
A01	0.3800E 01	0.1657E 02	0.0000E 00	0.1000E 03
A02	0.4170E 02	0.2948E 02	0.0000E 00	0.1000E 03
A03	0.2539E 02	0.2393E 02	0.0000E 00	0.1000E 03
A04	0.4225E 01	0.1677E 02	0.0000E 00	0.1000E 03
A05	0.1347E 02	0.2196E 02	0.0000E 00	0.1000E 03
A06	0.3979E 01	0.1371E 02	0.0000E 00	0.1000E 03
A07	0.1528E 01	0.1925E 01	0.0000E 00	0.2229E 02
W01	0.2379E 01	0.2789E 01	0.2155E-01	0.5357E 02
W02	0.9499E 02	0.1433E 02	0.3971E 01	0.1000E 03
W03	0.9638E 01	0.1816E 02	0.0000E 00	0.1000E 03
W04	0.4621E 01	0.1320E 02	0.0000E 00	0.7500E 02
W05	0.5209E 01	0.1422E 02	0.0000E 00	0.6667E 02
W06	0.7802E 02	0.2577E 02	0.0000E 00	0.1000E 03
W07	0.2511E 01	0.9699E 01	0.0000E 00	0.5000E 02
M01	0.4134E 00	0.4924E 00	0.0000E 00	0.1000E 01
M02	0.6438E-01	0.2454E 00	0.0000E 00	0.1000E 01
M03	0.2595E-01	0.1590E 00	0.0000E 00	0.1000E 01
M04	0.7480E 00	0.4342E 00	0.0000E 00	0.1000E 01
M05	0.2355E 00	0.4243E 00	0.0000E 00	0.1000E 01
M06	0.5287E-01	0.9765E 00	0.0000E 00	0.5128E 02
M07	0.3764E-02	0.6123E-01	0.0000E 00	0.1000E 01
M08	0.3214E 01	0.4826E 01	0.0000E 00	0.7692E 02
H01	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H02	0.1192E 01	0.4516E 00	0.1000E 01	0.4000E 01
H03	0.1000E 01	0.0000E 00	0.1000E 01	0.1000E 01
H04	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
H05	0.5531E 02	0.6858E 01	0.1800E 02	0.9400E 02
H06	0.2892E 00	0.4534E 00	0.0000E 00	0.1000E 01
G01	0.5819E 02	0.3991E 02	0.0000E 00	0.1000E 03
G02	0.4112E 02	0.3983E 02	0.0000E 00	0.1000E 03
G03	0.6938E 00	0.7005E 01	0.0000E 00	0.1000E 03
G04	0.2334E 00	0.4230E 00	0.0000E 00	0.1000E 01
G05	0.1412E 01	0.1428E 01	0.0000E 00	0.4000E 01
G06	0.6577E-01	0.2573E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
919	1471	1292	456	718	192

CLASS 8
NO. OF OBSERVATIONS = 702

VARIABLE	MEAN	STAN.DEV.	MINIMUM	MAXIMUM
S01	0.1257E 03	0.1474E 03	0.2000E 01	0.1400E 04
S02	0.1044E 03	0.1312E 03	0.2000E 01	0.1368E 04
S03	0.4124E 00	0.4092E 01	0.0000E 00	0.9672E 02
S04	0.2055E 01	0.1681E 01	0.1250E 00	0.1400E 02
S05	0.1393E 01	0.1198E 01	0.0000E 00	0.7000E 01
L01	0.4730E 00	0.3558E 01	0.0000E 00	0.4444E 02
L02	0.2908E 01	0.7936E 01	0.0000E 00	0.5000E 02
L03	0.3916E-01	0.8755E 00	0.0000E 00	0.2273E 02
L04	0.8095E 02	0.2748E 02	0.0000E 00	0.1000E 03
L05	0.1470E 01	0.6957E 01	0.0000E 00	0.6494E 02
L06	0.2171E 01	0.8603E 01	0.0000E 00	0.6535E 02
L07	0.1986E 01	0.6666E 01	0.0000E 00	0.6667E 02
L08	0.2327E 01	0.9434E 01	0.0000E 00	0.6923E 02
L09	0.1755E 00	0.1808E 01	0.0000E 00	0.3243E 02
L10	0.7498E 01	0.2273E 02	0.0000E 00	0.1000E 03
L11	0.2239E 01	0.1105E 02	0.0000E 00	0.9202E 02
L12	0.1580E 02	0.1484E 02	0.0000E 00	0.9972E 02
L13	0.1994E-01	0.1398E 00	0.0000E 00	0.1000E 01
L14	0.3561E-01	0.1853E 00	0.0000E 00	0.1000E 01
A01	0.1665E 01	0.1188E 02	0.0000E 00	0.1000E 03
A02	0.7786E-01	0.2061E 01	0.0000E 00	0.5465E 02
A03	0.1129E 01	0.1006E 02	0.0000E 00	0.1000E 03
A04	0.5898E 00	0.7535E 01	0.0000E 00	0.1000E 03
A05	0.3950E 01	0.1874E 02	0.0000E 00	0.1000E 03
A06	0.2620E 01	0.1554E 02	0.0000E 00	0.1000E 03
A07	0.2289E 00	0.1713E 01	0.0000E 00	0.3900E 02
W01	0.3017E 02	0.3876E 02	0.1289E 01	0.6042E 03
W02	0.6214E 02	0.2549E 02	0.0000E 00	0.1000E 03
W03	0.1216E 02	0.2155E 02	0.0000E 00	0.1000E 03
W04	0.2082E 02	0.3333E 02	0.0000E 00	0.1000E 03
W05	0.2238E 02	0.3526E 02	0.0000E 00	0.1000E 03
W06	0.3510E 02	0.3833E 02	0.0000E 00	0.1000E 03
W07	0.9394E 01	0.2388E 02	0.0000E 00	0.1000E 03
M01	0.9259E-01	0.2899E 00	0.0000E 00	0.1000E 01
M02	0.5214E 00	0.4995E 00	0.0000E 00	0.1000E 01
M03	0.4274E-02	0.6523E-01	0.0000E 00	0.1000E 01
M04	0.4060E 00	0.4911E 00	0.0000E 00	0.1000E 01
M05	0.0000E 00	0.0000E 00	0.0000E 00	0.0000E 00
M06	0.2967E 02	0.3353E 02	0.0000E 00	0.1000E 03
M07	0.4986E-01	0.2177E 00	0.0000E 00	0.1000E 01
M08	0.1820E 02	0.3498E 02	0.0000E 00	0.5000E 03
H01	0.9858E 00	0.1185E 00	0.0000E 00	0.1000E 01
H02	0.1615E 01	0.6647E 00	0.1000E 01	0.4000E 01
H03	0.9487E 00	0.2206E 00	0.0000E 00	0.1000E 01
H04	0.3704E-01	0.1889E 00	0.0000E 00	0.1000E 01
H05	0.4965E 02	0.1312E 02	0.2300E 02	0.8700E 02
H06	0.1895E 00	0.3919E 00	0.0000E 00	0.1000E 01
G01	0.6659E 02	0.4347E 02	0.0000E 00	0.1000E 03
G02	0.3268E 02	0.4320E 02	0.0000E 00	0.1000E 03
G03	0.7333E 00	0.8269E 01	0.0000E 00	0.1000E 03
G04	0.6026E 00	0.4894E 00	0.0000E 00	0.1000E 01
G05	0.1652E 01	0.1520E 01	0.0000E 00	0.4000E 01
G06	0.2707E-01	0.1708E 00	0.0000E 00	0.2000E 01

FRANCE	BELGIUM	HOLLAND	GERMANY	ITALY	LUXEMBOURG
50	151	382	86	24	29

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