within themselves and with others can be calculated.

Computers and program language: This program is written for an IBM 709 with 32K storage. With the necessary modifications in the maximum size of matrix of transactions being analyzed, essentially the same FORTRAN program, which may be divided into two parts, can be used on IBM 650, 1620, 704, and 7090 computers.

Running time: Where N equals the total number of countries and groups, approximately $(70 + .2N^2)$ seconds are required on the 709 to compute KAs from Ps and Qs unchanging in the fifth decimal place on successive iterations.

Availability: Please address requests for a program write-up and FORTRAN listing to either Hayward Alker or Professor Karl W. Deutsch, Department of Political Science, Yale University.

REFERENCES

Savage, R., & Deutsch, K. A statistical model of the gross analysis of transaction flows. *Econometrica,* 1960, 28, 551-572.

Goodman, L. On the statistical analysis of transaction flows. *Econometrica,* in press.

Product Moment Correlation Programs for the Burroughs 205 Computer, *K. Warner Schaie, University of Nebraska.* (CPA 93-97)

The following five abstracts describe an integrated series of programs using maximum precision fixed point arithmetic programmed for the basic Burroughs 205 computer. All data are entered on cards via the 528 Card Reader and PCC unit. Results may be either punched on the high speed punch or printed directly by means of the flexowriter. Operating instructions and/or program listings may be obtained by writing to the University of Nebraska Computing Center, Lincoln 8, Nebraska, asking for UN-12, UN-13, UN-15, UN-16, or UN-17.

80 Variable Product Moment Correlation. (CPA 93)

This is program UN-12. It computes the means, S.D.s. and correlations for up to 80 variables and approximately 10,000 *Ss*, if scores are in 1- or 2-digit form. A minor modification permits use with 3- or 4-digit scores for 1000 to 10,000 *Ss* depending on the size of the largest mean score. Means and S.D.s are printed to two decimals. Correlations are printed to four decimals in descending row form, i.e., the output is in the form of the infradiagonal part of the correlation matrix plus the diagonal value for each row which provides a check. An option permits printing or punching out of the sums and cross-products (the sums of squares being printed as the diagonal elements of the cross-product matrix). The program is self-restoring and permits the successive computation of any number of correlation matrices of equal size without reloading.

80 × 40 Variable Rectangular Product Moment Correlation. (CPA 94)

This is program UN-13. It complements UN-12 by providing a convenient alternate routine for the investigator who is interested in the correlations between two sets of distinct variables but who does not require (or has already computed) the intercorrelations for each set. Together with UN-12 it permits computation of intercorrelation matrices containing any number of variables by partitioning into appropriate triangular submatrices computed by UN-12 and rectangular matrices computed by UN-13.

The program computes the means, S.D.s. and correlation for up to 80*s* with up to 40*t* variables and approximately 10,000 *Ss*, for 1- or 2-digit scores, and with minor modifications for from 1000 to 10,000 *Ss*, for 3- or 4-digit scores. Means and S.D.s are printed or punched to two decimals for the t variables followed by means and S.D.s for the s variables. Correlations are given to four decimals printed or punched in the form of s column vectors, each with t elements. An option permits printing or punching out of the Σt, Σs, Σt^2, Σs^2, and Σst.

Product Moment Correlations from Combined Triangular Cross-Product Matrices. (CPA 95)[1]

This is program UN-15. It is an auxiliary routine for UN-12 and requires use of that program. It permits the addition of several triangular cross-product matrices computed by UN-12 and punched out as specified in the optional feature of that program. The instructions for UN-15 also provide information on the necessary modification of constants prior to computing the final combined means, S.D.s, and correlation coefficients by UN-12. All matrices to be added must have the same dimensions which may not exceed 61 variables. The total number of *Ss*, which can be handled is governed by the limitations of UN-12.

[1] A similar program for the addition of cross-product matrices computed by UN-13 (Rectangular Product Moment Correlation) has been written and will be available at the time this abstract is published.

Completing a Symmetric Matrix. (CPA 96)

This is program UN-16. It is an auxiliary routine for UN-12, although it can be used to convert any symmetric matrix with omitted supradiagonal elements to a complete square symmetric matrix provided its dimension is equal to or less than 80 variables.

The program will complete a matrix punched in fixed or floating point, or it will convert a fixed point matrix into a completed floating point matrix. The resulting matrix will be punched in column form, with read-in instruction (permitting storage with any desired interval between first column of elements) punched ahead of each column.

Augmenting a Product Moment Correlation Matrix by Additional Row Vectors. (CPA 97)

This procedure is specifically written for the case of product moment correlation matrices but will be equally applicable for any symmetric product matrix. It will augment a symmetric matrix of dimension n by up to m row vectors, where $m \leqslant 40$ and $m + n \leqslant 80$. It forms program UN-17.

It frequently happens that a matrix of correlation coefficients has been computed for a set of n variables which are now to be used for further multivariate analysis. At this point the investigator discovers that he would like to augment his matrix by additional m variables. It is therefore necessary to compute the additional $m \times m$ and $n \times m$ correlations in such a form that they may be added to the output for the already available correlations without requiring further manipulations of the original data. If the original matrix has been computed by UN-12 it is possible to compute the required additional correlations in one operation by means of UN-13. However, a simple conversion routine is required to transform the UN-13 output into a trailer-tape which may be spliced behind the UN-12 output so as to produce the augmented $n + m$ correlation matrix. This program provides the conversion operation and the instructions for its use include the necessary modifications for the UN-13 operating procedure applicable to the augmenting operation.

IBM 7070 Rater Reliability Program, *A. W. Bendig, University of Pittsburgh.* **(CPA 98)**

Description: This program reads in single-digit ratings (0-9) of n ratees ($n = 2$ to 600) by m raters ($m = 2$ to approximately 1,000) and computes a two-way analysis of variance of the complete n by m matrix. Intraclass reliability coefficients for the group and single raters (average intercorrelation among the raters) are computed from the ANOVA. Output gives (a) the mean squares and df from the analysis of variance, (b) the reliability coefficients and the F ratio test of their significance, and (c) the mean and standard deviation of the ratings for each of the ratees. Input-output is by tape units or by online card reader and printer.

Computer: IBM 7070 with 5K or 10K storage, tape units, and (optional) online card reader and printer. **Program language:** Modified Four-Tape Autocorder. A condensed object deck and test problem are available from the author.

Frequency Tabulator Program for the IBM 650, *Donald L. Hartford, The Florida State University.* **(CPA 99)**

This program (entitled FRETAB II) accumulates frequency counts on the occurrence of data values within specified class intervals. It calculates cumulative frequencies, relative frequencies, and percentiles for each class interval and the mean and standard deviation for each variable. There may be as many as 96 class intervals per variable and up to eight variables may be tabulated in one run. The data values must be five digits or less in size.

Computer: FRETAB II requires an IBM 650 equipped with 60 words of core storage and three index registers. Provision is made for selecting an online printer (407) for output if one is available. Output tables are labeled and the class boundaries are printed to the left of the data for the class. The user may provide a title for each study processed, and multifile processing is possible. **Running time:** A test deck of 60 intervals with seven variables and identification was run. The program takes approximately 15 seconds per card to tabulate seven variables on the 96th interval. Tabulating seven variables on the 21st step interval takes about five seconds per card. Lower values run more quickly. Over 450 studies have been run using this program including some distributions in which all the data were missing. Operating writeups (including I/O wiring specifications), SOAP listings and seven-per-card program decks are available from the author. Write to the Department of Research and Testing, Florida State University, 426 Education Building, Tallahassee, Florida.

Burroughs 205 Program for Time Series Components Analysis, *N. D. Schroller, Computer Center, Corpus Christi, Texas, and A. Javelosa.*