

# *the* I.P.Sharp *newsletter*

APRIL/MAY 1975



Lib Gibson of I.P.Sharp Associates Ltd.  
Member of the Board of STAPL

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## *A Brief History of the APL Community*

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by LIB GIBSON

Many people ask us questions about the APL community at large, its activities, affiliations and membership. This article will try to trace its origins and tell you where it now stands.

The first semi-formalized APL group started within the SHARE organization (a collection of IBM users) in 1969, about the time when I. P. Sharp Associates Limited offered its pioneering APL time sharing service. The small SHARE group, chaired by Karl Korn, met as a project at the semi-annual SHARE conferences and Garth Foster persuaded Syracuse University to fund the publishing of a brief Newsletter, *SHARE\*APL\360* which was distributed

to around 35 interested people.

A meeting was held in Binghamton in 1969 (code name 'The March on Armonk') which was attended by 260 people. Another meeting in 1969, hosted in the Adirondacks by Garth Foster, brought together all the implementers working on *APL* at that time. This sign of cooperation among the implementers was typical of early *APL* development and probably accounts for the great consistency among implementations.

Garth Foster then took over the presidency of the *APL* Users' Group (which he still holds). The newsletter, now subsidized by membership fees to the *APL* Users' Group, was given the name "*APL* Quote Quad", with Al MacEwan and Don Watson of Lakehead University in Thunder Bay volunteering to handle the editorship. Under their editorship, *APL* Quote Quad maintained its goal of disseminating news, but grew to be a much better vehicle for technical papers as well.

A formalized Users' Group was first proposed during 1970 and the creation of a special interest group within the Association for Computing Machinery (ACM) was requested. This was turned down by the ACM. A motion was brought to the floor of the biggest *APL* meeting so far (at Berkeley in 1971) to incorporate an autonomous *APL* group for the purposes of education and the publishing of *APL* Quote Quad. After vigorous discussion it was decided to re-initiate efforts to join ACM. Meetings were immediately held with Walter Carlson, the president of ACM and an ardent *APL* fan, and preparations were made to change the bylaws to allow formation of a Technical Committee within ACM to accommodate this strange bunch of enthusiasts.

While the long process of actually achieving this goal continued, several successful conferences were held. A conference was organized in Paris in 1971, which 250 attended. Atlanta, or *APL*4, with 170 attendees, represented the first North American conference with formal sessions and proceedings. At this time, the editorship of *APL* Quote Quad passed to Lib Gibson of the University of Guelph and a new policy of reviewing papers was instituted to try to raise further the quality of the publication.

Meanwhile, the Users' Group continued to grow and be active, with *APL*5 in Toronto attracting 280 delegates, *CONGRESS* 73 in Copenhagen 321, and *APL*6 in Los Angeles 535. The subscriptions to Quote Quad grew to over 500, with copies going to over 30 countries in North America, South America, Europe, the Middle East and Australia.

The *APL* community is now finally established in its new niche as *STAPL*, (Sigplan Technical Committee on *APL*). Membership in this group (which entitles you to receive *APL* Quote Quad) can be obtained by writing to:

Association for Computing Machinery,  
P. O. Box 12105,  
Church Street Station,  
New York, N.Y. 10249.

Dick Mercer is the new editor of *APL Quote Quad*, and submissions to that journal should be addressed to him at:

Mr. R. L. Mercer,  
Managing Editor, *APL Quote Quad*,  
Golden West College,  
15744 Golden West Street,  
Huntington Beach, Ca 92647.

The present executive of *STAPL* is as follows:

Chairman - Dr. G. H. Foster, University of Syracuse.

Vice-Chairman - Jim Ryan, Burroughs Corporation.

Board of Directors - Ted Edwards, Micro Computer Machines  
Lib Gibson, I. P. Sharp Associates Limited  
Phil Abrams, Scientific Time Sharing Corp.

*APL Quote Quad* Editor - Dick Mercer.

Secretary Treasurer - John Clark, Orange Coast Community,  
College District.

The *APL* community is still relatively small and there is great opportunity for real contribution to the progress of the language. Therefore, participate in its exciting future by reading and contributing to *APL Quote Quad*, joining *STAPL*, and attending conferences when possible. The next conference is *APL75* in Pisa on June 11, 12 and 13.

#### DATA BASE UPDATE

*THE CHARTERED BANK DATA BASE*: has been made more complete and comprehensive by the addition of data from January 1966 to May 1971. This gives *SHARP APL* users access to data from January 1966 to date, with updates being added on a quarterly basis. The access functions for the data base have not changed and are available in the workspace 54 *BANKS*. The data is comprised of the various assets and liabilities of the ten Chartered Banks in Canada as defined in the supplement to the Bank of Canada Gazette. Further Bank data can be obtained by referencing the *CANSIM* data base.

*NEW ACCESS FUNCTIONS FOR TWO CANSIM DATA BASE SUBSETS*: The Canadian Statistical Review subset of the *CANSIM* data base and the *CANSIM* Labour data base now use access functions with the prefix *CS*. Previously, in order to access time series within the Labour data base it was necessary to use access functions with the prefix *LAB* (e.g. *LABGET*, *LABMAT*, etc.). Now all *CANSIM* series stored on the *SHARP APL* system should be accessed by *CSGET*, *CSMAT*, etc. These access functions are still stored in Library 81 *CSUSAGE*.

Interested users who are not familiar with the use of these access functions should ask for the publication "*SHARP APL MASSAGER PLUS*". Please contact your Sharp representative for any additional information on either the *CHARTERED BANK* data base or *CANSIM*.



# THE USE AND MISUSE OF ECONOMETRICS

(With Reference to SHARP APL)

by

DAVID K. FOOT *and* ANDREW NORTH

This practical, clear guide to the use of econometrics within the *SHARP APL* system, was published recently by I. P. Sharp Associates Limited in conjunction with the Quantitative Analysis Course in Ottawa. The book discusses a wide variety of econometric techniques, considering the fundamental concepts underlying the techniques, the practical applications of these techniques and their implementation in *APL*.

The authors, David Foot of the Institute for Policy Analysis at the University of Toronto and Andrew North of I. P. Sharp Associates Limited in Ottawa, developed the book from material used in the Quantitative Analysis Course - an intensive teaching program for Federal Government staff involved in policy analysis.

It is designed to aid the business analyst, economist and others who use econometrics as a tool, or those who are familiarizing themselves with econometrics. The authors also attempt to provide an insight into the difficulties of relating statistical techniques meaningfully to concrete problems of public policy or program management.

Each section of the guide outlines a theoretical problem, provides a brief development of the solution and displays the theoretical result needed for application. Where possible, the result is then applied to a specific example which is accompanied by the relevant computer output. All sample computer outputs have been produced by functions available in the public libraries of the *SHARP APL* system. A brief section outlining the practical problems that may be encountered in the application of the theory is presented in all sections of the book.

The topics discussed include:

- Terminology and notation.
- Data matrices, including the construction of data matrices using *APL*, entry of example data, identification of data and the importance of differentiating between cross sections and time series.
- Estimation, with definitions and the execution of estimation procedure using *APL*.
- Data manipulation. Various transformations on data are discussed, resulting in such concepts as scaling, polynomial regression, reciprocal regression, log linear regression, lags, seasonality, inter-

- active dummy variables and the incorporation of prior restrictions.
- Hypothesis Testing including the selection of a confidence interval and discussions of t- and F-tests and their uses.
- Regression Problems commonly encountered in practice. Possible difficulties such as multicollinearity, heteroscedasticity, autocorrelation, misspecification and errors in variables are discussed. An explanation of the *APL* function which employs the method of Hildreth-Lu to overcome the difficulties associated with autocorrelated residuals is included.
- Prediction and Distributed Lags. Various distributed lag patterns are discussed, including the geometric pattern and the polynomial distributed lag technique. Examples demonstrating the use of *APL* functions which perform prediction and polynomial distributed lag analysis accompany the appropriate text.
- Instrumental Variables. Instrumental variables analysis involving lagged dependent variables, indirect least squares, recursive models, two-stage least squares, structurally ordered instrumental variables and principal components analysis are among the topics discussed in this section. The use of the *APL* functions which perform two-stage least squares and principal components analysis is demonstrated in conjunction with the corresponding textual material.
- Non-Linear Estimation. This final section discusses the use of the *APL* function which performs analysis of those models into which the parameters, as distinct from the variables, enter non-linearly.

The emphasis is on the application of various econometric techniques since the theory fundamental to them is readily available elsewhere. The guide gives the analyst familiarity with:

- the appropriate diagnostic tests and tests of significance
- the pertinent *APL* functions available in the *SHARP APL* public libraries
- the interpretation attached to those outputs provided by the *APL* functions
- the data available in databanks such as *CANSIM* and
- the procedures necessary for retrieving data series and building data matrices.

Numerous references have been made, largely to a single textual source for purposes of convenience. Cross references are provided where appropriate. An annotated bibliography of alternative texts is provided at the end of the book.

The facility of matrix manipulation in *APL* makes the language ideal for statistical work. Many common statistical operations can be performed conveniently and efficiently using this language. The interactive feature of *APL* makes it ideal for econometric analysis. For example, the immediate feedback to the analyst doing hypothesis testing allows him to derive and test new hypotheses. In addition, trivial errors on input can be caught and corrected without incurring long delays for batch submission. Many of the common statistical operations such as summation, multiplication, division, logarithmic transformation, exponentiation, as well as transposition, inversion and multiplication of matrices, are simple, easy and efficient.

This publication is useful to analysts attempting to solve problems in quantitative analysis, as well as those who might wish to familiarize themselves with the flexibility and power of the *APL* language itself. A copy of the book may be obtained from your local Sharp representative.

# APL STAT

Since the original publication of the book "A Programming Language", *APL* has been acknowledged by all as a superb language for statistical analysis. Sharp has a significant user group of statisticians and has consistently put strong emphasis on developing and maintaining good statistical functions, as well as incorporating the best of packages available in the public domain.

Over the past year, considerable effort has been devoted to consolidating and expanding this material and providing comprehensive, detailed documentation. The result is *APLSTAT*, a collection of 21 workspaces, covering applications in virtually every area of statistical analysis:

- Regression Analysis, including various techniques to handle special problems such as Hildreth-Lu, two-stage least squares, polynomial distributed lags, etc.
- Analysis of Variance (multi-way), including user-specified error-term, completely randomized and randomized complete block designs
- Principal Component Analysis
- Analysis of Covariance
- Descriptive Statistics, Cross Tabulation, Frequency Analysis
- Simple and Partial Correlation, including binary data, rank ordering and other special cases
- Parametric Statistics, including various t-tests, Bartlett's test and Duncan's test
- Nonparametric Statistical Techniques
- Probability Distribution Calculations
- Random Number Generators for 35 different distributions.

Existing systems for financial analysis, inventory control, forecasting, economic analysis, engineering, simulation, biological analysis and others can benefit from incorporating functions from the *APLSTAT* package.

The workspaces are all found in public libraries 31-34, which are categorized as follows:

- 31 General Statistical Functions
- 32 Correlation and Regression
- 33 Probability Distributions
- 34 Analysis of Variance and Covariance

*APLSTAT* is documented according to the standards laid down by the *APL* Users' Group, and each workspace has a *DESCRIBE* outlining all the functions available and giving a brief description of each. Each function is documented by means of a *FUNCTIONHOW* which gives detailed running instructions. Furthermore, an extensive hard-copy manual includes documentation and an example for each function in the package, as well as a brief section on the *APL* language and system, a glossary, table of error messages and suggestions for recovery, cross reference index and bibliography. This 300 page manual is available from your local Sharp representative.



*APLSTAT* was designed to meet the needs of our users and will be continually supported, updated and expanded by considerable expertise within Sharp, in the areas of statistics, mathematics and information science. We would appreciate hearing from you about the ways in which you would like to see this package enhanced.

### SHARP APL EDUCATIONAL PROGRAM

TORONTO: A new schedule of courses in the *APL* language and the *SHARP APL* time-sharing system has been introduced. This program is more flexible so as to accommodate the various needs and objectives of those attending courses.

#### Introduction to *APL*:

A three-day course covering workspace management, basic *APL* operators and basic function definition. Each afternoon session is reserved for practice at the terminal. This course is being held during the weeks of June 9th and July 14th.

Libraries and File subsystem: A one-day course offered on request.  
Operator Training course: A one-day course offered on request.

Special interest courses are also available. Please contact Vera Milec at the Toronto office for further information.

### OTTAWA:

Introduction to <i>APL</i> (one-day):	June 2	July 7
Intermediate course (three days):	June 3-4-5	July 8-9-10
Libraries course (one-day):	June 24	July 22

### ROCHESTER:

Introduction to <i>APL</i> (five days):	June 16-20	July 7-11
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### NEWPORT BEACH, LOS ANGELES:

Introduction to <i>APL</i> (five days, limited to six people):	June 2-6	July 7-11
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### LONDON, ENGLAND:

Introduction to <i>APL</i> :	June 2-6	July 7-11 (on behalf of Infotech)
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SHARP APL IN FINANCIAL ANALYSIS

by MARVIN MANDELBAUM.

The Financial Analysis package provides the financial analyst with a versatile and high-powered tool for the solution of problems in financial planning and analysis, project analysis, loan management and capital budgeting. A recent request for bond yield curves is used to illustrate the ease with which the new financial analysis libraries handle a problem of this nature.

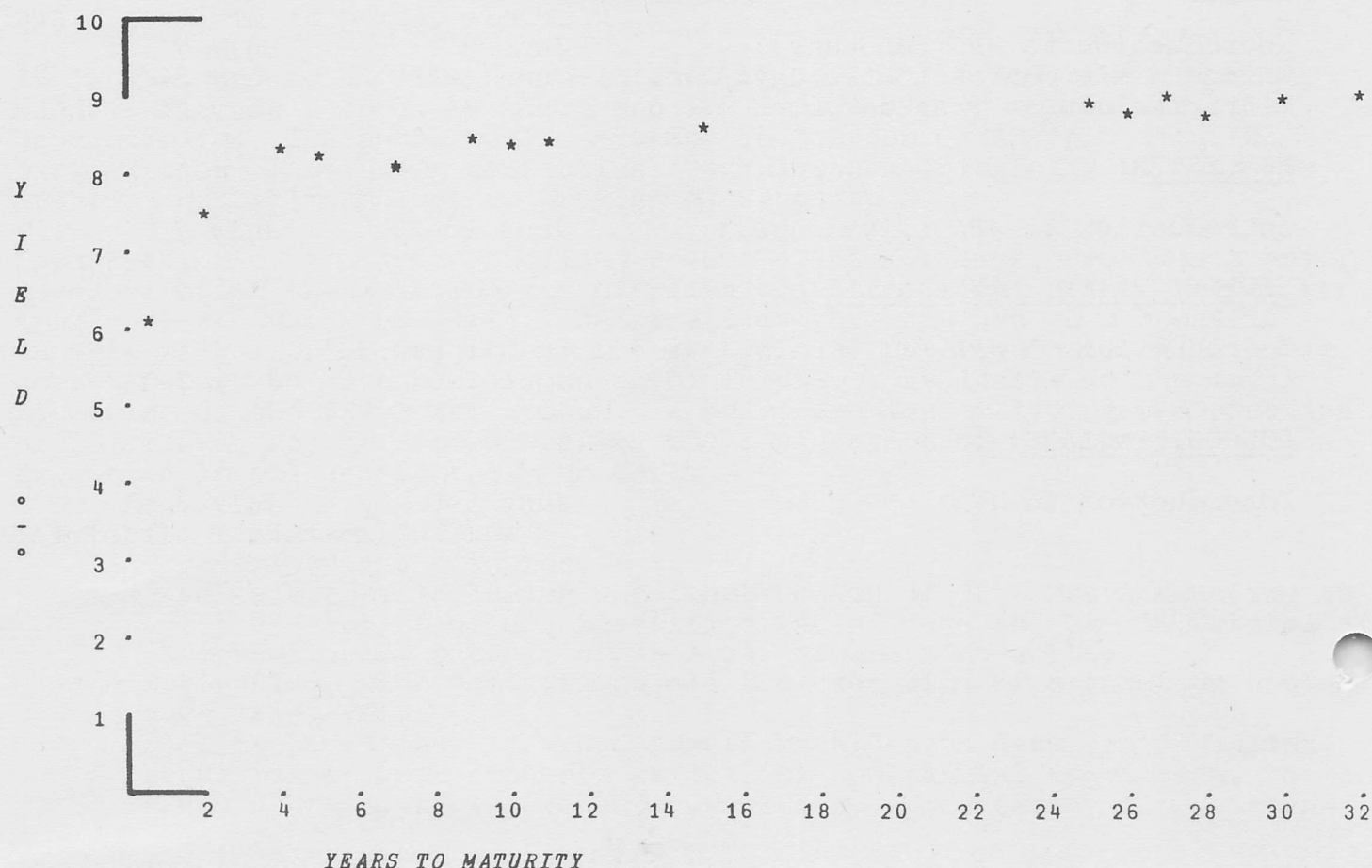
In order to get bond yield curves which show the relationship between the yield to maturity of bonds of similar risk and the length of time until they mature, proceed as follows:

The function *YM* (in workspace 54 *BONDS*) calculates the yield to maturity of a bond given its coupon interest rate, current market price and the number of years until the bond matures. To find the yield to maturity of a bond with a 7% coupon, purchased at 82 1/2 and maturing in the year 2001 simply type:

```
YM .07 82.5 26
0.08710773339
```

A bond yield curve can easily be found once enough data has been gathered. For example, the yields for sixteen ATT bond issues were calculated from their closing prices on Friday May 2nd, 1975, using the function *YM*. While a functional relationship between yield and term can be found using a regression program from the statistical analysis libraries, a simple plot of the data is often sufficient to describe this relationship. The graph below is a plot of the ATT data, produced on a GSI-300 terminal.

YIELDS ON ATT ISSUES, 2 MAY 1975





There are three user-oriented forms of all functions in the financial analysis libraries. The conversational function (*YMC* in this case) requests the arguments required by the primitive function and returns the result of the calculation in a formatted statement:

```

      YMC
ENTER COUPON RATE AND BOND PRICE.
      .07 82.5
ENTER EITHER NUMBER OF YEARS TO MATURITY OR DATES OF PURCHASE AND MATURITY.
      26

THE YIELD TO MATURITY IS 8.71%/.
```

The next option (*YMP* in this case) is without conversational prompts but again returns the formatted reply.

```

      YMP .07 82.5 26
THE YIELD TO MATURITY IS 8.71%/.
```

Finally, the primitive function *YM* is available to the more sophisticated APL programmer. The primitive function returns an explicit result which may be used in further calculations.

```

      R←YM .07 82.5 26
      R
0.08710773339
```

There are more than 40 basic functions in the financial analysis libraries. Documentation accompanies each function in its workspace: *YMHOW* returns a description of the syntax and parameters of *YM*, the auxiliary functions and variables it uses and an example or two of its use. As an aid to the sophisticated programmer who wishes to copy financial analysis functions from several workspaces into his own, the three forms of each function, the auxiliary functions and variables it uses and its documentation are grouped together. Thus *GYM* includes *YM*, *YMP*, *YMC*, *RND*, *DS*, *C* and *YMHOW*.

Please contact your *SHARP APL* representative for further information regarding this package.



Suite 1400, 145 King Street West, Toronto, Canada M5H 1J8

## Update

- ☐ Please amend my mailing address as indicated.
- ☐ Add to your mailing list the following name(s).
- ☐ Send me SHARP APL manuals and product literature as listed.

☐ Note my comments: \_\_\_\_\_

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The Newsletter is a regular publication of I.P. Sharp Associates Limited. Contributions and comments are welcomed and should be addressed to: The Editor, I.P. Sharp Newsletter, Suite 1400, York Centre, 145 King Street West, Toronto, Ontario, M5H 1J8.



### I.P. Sharp Associates Limited

#### Canada — Regional Offices

**Calgary**  
Suite 1000,  
615 — 2nd Street S.E.,  
Calgary, Alberta  
T2G 4T8  
(403) 265-7730

**Vancouver**  
Suite 604  
1112 West Pender St.  
Vancouver, B.C.  
V6E 2S1  
(604) 682-7158

**Ottawa**  
Suite 2003,  
210 Gladstone Avenue,  
Ottawa, Ontario  
K2P 0Y6  
(613) 236-9942

**Montreal**  
Suite 1610  
555 Dorchester Blvd. West  
Montreal, Quebec  
H2Z 1B1  
(514) 866-4981

#### Europe

**I.P. Sharp Associates Limited**  
118-119 Piccadilly,  
Mayfair, London W1V 9FJ  
England.  
(01) 629-1564

**Intersystems, B.V.**  
Herengracht 244,  
Amsterdam 1002,  
The Netherlands  
(020) 250401

**APL Europa S.A.**  
146 Avenue Louise  
1050 Brussels  
Belgium  
(322) 49 96 53

Head Office: Suite 1400, 145 King St. West, Toronto, Canada. M5H 1J8 (416) 364-5361

#### U.S.A. — I.P. Sharp Associates, Inc.

**Boston**  
21 Merchants Row,  
Boston,  
Mass. 02109  
(617) 523-2506

**Rochester**  
Suite 1150  
183 Main Street East,  
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**Minneapolis**  
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(714) 644-5112

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Suite C409,  
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Sharp APL Operator: (416) 363-2051 (voice)