NOTE ON THE ECONOMETRIC METHODS

Yasuo Ohe[1]

For efficient economic analysis econometric methods have become necessary tools. Correct application, however, is not always easy because an analyst must have enough statistical and mathematical knowledge to correctly use these methods. On the other hand recent rapid progress in computer hardware and software enable economists to use various economic methods. Thus it is important for a well trained economist to master the use of this software.

In this paper TSP (Time Series Processor), one of the most popular econometric software packeges developed in U.S.A., is introduced and explained for use with a personal computer. TSP in this paper is assumed to be used on a NEC 9800 RX which is equipped with an 80286 CPU. Regrettably, it is not compatible with IBM machines due to software differences.

1. Major Features of TSP

TSP has been used for more than twenty years in the U.S. and world wide due to its user friendly features. Some of these basic features are:

Both data and commands are entered in free format.

- Leads and Lags are specified in a natural way.
- There are few restrictions on the order of the operations in a run.
- All standard econometric techniques are available in an accurate and efficient form: ordinary least squares, two-stage least squares (instrumental variables), limited information maximum likelihood (LIML), polynomial distributed lags, autoregressive correction, and weighted least squares.
- Advanced techniques are available, including nonlinear least squares, multivariate regression, three stage least squares, full information maximum likelihood, estimation with qualitative dependent variables, and solutions of nonlinear models.
- A full set of matrix operations makes it possible for you to program your own estimators.

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[1] Economic Analysis Specialist, Consultant from EMBRAPA/JICA.

- Up to 3000 observations can be handled. But some necessary conditions for the personal computer must be satisfied.

These are as follows:

1) Main memory: more than 640KB is necessary.

TSP uses the maximum memory of MS-DOS of 640KB. The message, `Insufficient RAM for "COMMAND.COM" in subroutine "SYSTEM"', appears when you need more memory to run TSP. It is necessary to increase main memory to 640KB. The available memory for user can be confirmed by CHKDSK of MS-DOS command.

2) A math co-processor is required.

The role of the math co-processor, (8087 or 80287) is to speed up mathematical data processing by a factor of ten. Don't forget TSP can not run without the co-processor.

3) A hard disk is a desirable.

The hard disk is not an absolute condition but is desirable for more efficient use.

4) Setting of CONFIG.SYS file.

CONFIG.SYS file is to be set as follows:

```
FILES = 20
BUFFERS = 15
BREAK = ON
SHELL = A:COMMAND.COM A: ¥/P
```

2. Running TSP

There are three ways to start TSP:

1) > tsp

In this way TSP can be run interactively from a terminal to a screen. This is the easiest way to run TSP. You can get a hard copy with CTRL+P command of MS-DOS.

2) > tsp input-file

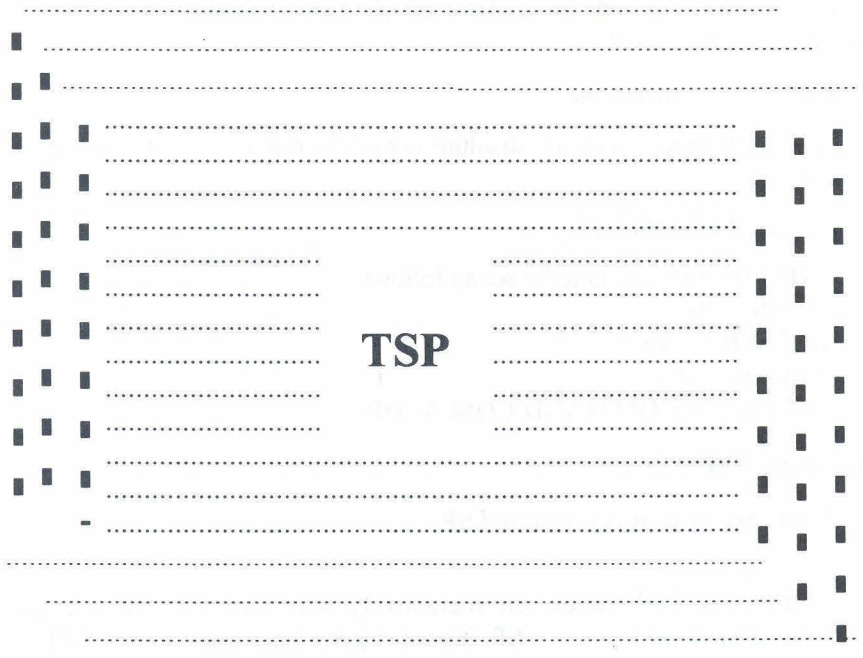
3) > tsp input-file output-file

TSP can be run non-interactively in 2) and 3) At first you create the

data or program file, which can be easily done with a text editor. These input files always have a file discriptor named `TSP', for example: ILLUST41.TSP, ARMA.TSP, which are included in the original floppy disk. Secondly you name the output file for the result. When you don't specify a name, output file will be automatically created with `OUT' as file descriptor. You can also use the `CON' or `PRN' commands when you want to get output on the screen or printer respectively.

When you have a printer of 80 columns, you have to input the command "PTION CRT" this is unnecessary with 132 columns. Finally don't forget that you always need to place a semicolon at the end of every TSP command.

3. Example of running TSP by interactive mode



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Mr.

TSP Version 4.1B
JUN 2 1988 IBM PC 640K
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11/03/88 4:00 PM

In case of questions or problems, see your local TSP consultant or send a description of the problem and the associated TSP output to:

TSP International,
P.O. Box 61015, Station A,
Palo Alto, CA 94306,
USA

Enter TSP statements:

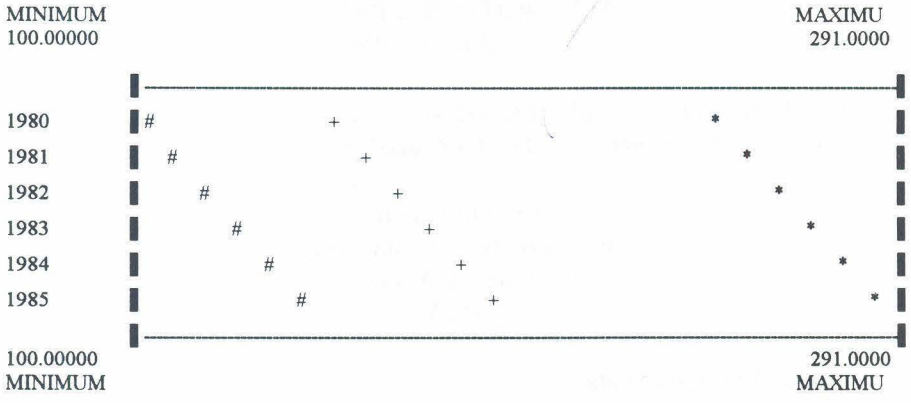
```
1  ? FREQ A;                    Specifies annual frequency for the data
2  ? SMPL 80 85;                Sets the Range of Data ... from 1980 t
                                1985
3  ? LOAD CH;                   Inputs of Data CH
3  ? 140 141 147 152 156 160;
4  ? LADO GNP;                  Inputs of Data GNP
4  ? 240 249 256 265 278 291;
5  ? GENR G=GNP-CH;             Creates a New Variable G
6  ? PRINT CH G GNP;            Prints CH.G.GNP
```

	CH	G	GNP
1980	140.00000	100.00000	240.00000
1981	141.00000	108.00000	249.00000
1982	147.00000	109.00000	256.00000
1983	152.00000	113.00000	265.00000
1984	156.00000	122.00000	278.00000
1985	160.00000	131.00000	291.00000

```
7  ? PLOT CH + G # GNP *;       Plot of CH,G,GNP
```

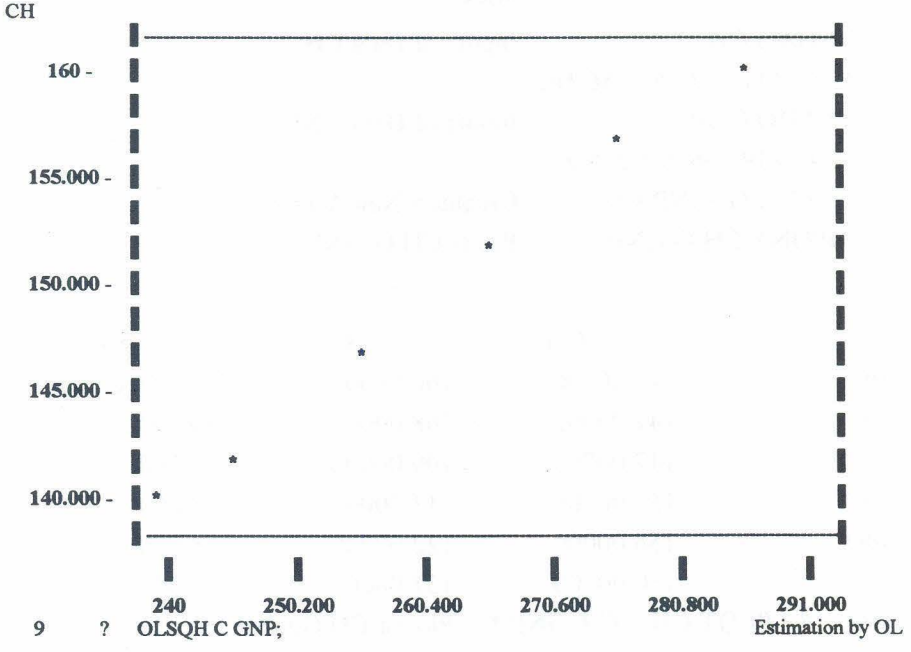
TIMES SERIES PLOT

CH PLOTTED WITH +
G PLOTTED WITH #
GNP PLOTTED WITH *



8 ? GRAPH CH GNP; Plot of CH versus GN

PLOT OF CH versus GNP



9 ? OLSQH C GNP; Estimation by OL

EQUATION 1

METHOD OF ESTIMATION = ORDINARY LEAST SQUARES

DEPENDENT VARIABLE: CH

SUM OF SQUARED RESIDUALS	11.1299
STANDARD ERROR OF THE REGRESSION	1.66808
MEAN OF DEPENDENT VARIABLE	149.333
STANDARD DEVIATION	8.09115
R-SQUARED	0.965998
ADJUSTED R-SQUARED	0.957498
DURBIN-WATSON STATISTIC	2.0561
F-STATISTIC (1, 4)	113.641
LOG OF LIKELHOOD FUNCTION	-10.3673
NUMBER OF OBSERVATION	6

VARIABLE	ESTIMATED COEFFICIENT	STARDAND ERROR	T-STATISTIC
C	38.627	10.407	3.7115
GNP	0.42067	0.39462E-01	10.660

10 ? INST(INST=(C G)) CH C GNP; Estimation by Instrumental Variable Method

EQUATION 2

METHOD OF ESTIMATION = INSTRUMENTAL VARIABLE

INSTRUMENTAL VARIABLES: C G
DEPENDENT VARIABLE: CH

SUM OF SQUARED RESIDUALS	11.3365
STANDARD ERROR OF THE REGRESSION	1.68349
MEAN OF DEPENDENT VARIABLE	149.333
STANDARD DEVIATION	8.09115
R-SQUARED	0.965998
ADJUSTED R-SQUARED	0.957498
DURBIN-WATSON STATISTIC	1.9656
F-STATISTIC (1, 4)	111.497
E'HH'E	0.105998E-29
NUMBER OF OBSERVATIONS	6

VARIABLE	ESTIMATED COEFFICIENT	STANDARD ERROR	T-STATISTIC
C	41.457	10.600	3.9110
GNP	0.40992	0.40194E-01	10.199

11 ? FORM EQCH — Creates Equations
12 ? IDENT EQGNP GNP=CH+G — Creates Identities
13 ? PRINT EQCH EQGNP — Prints Equations and Identities

EQUATION: EQCH
FRML EQCH CH = 41.4566+ 0.4099* GNP
EQUATION: EQGNP
IDENT EQGNP GNP = CH + G
14 ? SIML(ENDOG = (CH, GNP))EQCH EQGNP; — Model Simulatio

MODEL SIMULATION

NUMBER OF EQUATIONS: 2

METHOD: NEWTON STEPSIZE METHOD: BARD

PRINT OPTIONS: PRINT = F PRNRES = F PRNDAT = F PRNSIM = T
STATIC SIMULATION

NOTE ⇨ The model is linear in the variables.

Working space used by SIML = 184

SIMULATIONS RESULTS

	CH	GNP
1980	139.72360	239.72360
1981	145.28104	253.28104
1982	145.97572	254.97572
1983	148.75443	261.75443
1984	155.00655	277.00655
1985	161.25866	292.25866

15 ? END End of TSP

References

TSP User's Guide Version 4.1, TSP International, 1987.
TSP Reference Manual 4.1, TSP International 1987.