



056

ESTIMATION OF A COBB-DOUGLAS PRODUCTION FUNCTION WITH RATS

by

Larry C. Morgan

Team Leader,  
Pakistan Economic Analysis Project

Chemonic International Consulting Division

Islamabad, Pakistan

April 4, 1987

## CREATION OF THE DATA FILE, PROD.DAT

A fictitious data set was created using the RATS editing procedure as follows:

1. In the interactive mode, the DEDIT command returned a request for the name of the file. The name, PROD.DAT was entered and accepted as a new file name.
2. The EDIT command returned a request for the name of the series. The name, Y, was entered, followed by a request for the type of series (undated, annual, monthly, weekly, daily). "Undated" was selected and the editor returned a screen for one observation of variable Y. F-10 was pressed and "keep changes" was selected.
3. The command, UPDATE 1 10, was entered, followed by a prompt line (?). On the prompt line, the 10 values of Y were entered, each separated by a space.
4. Steps 2-3 were repeated twice to create variables K and L.
5. The SAVE command was entered to save the PROD.DAT file in the RATS format, which differs from ASCII, WKS, FORTRAN, TROLL, and PRN formats.

## CREATION OF THE PROGRAM FILE, PROD.PGM

Wordstar 2000 was called and the data directory was set to \RATS\DATA. The unformatted file, PROD.PGM was created to estimate a Cobb-Douglas production function (Figure 1.). The program instructions are as follows:

ALL 0 10

(Allocate space data series of up to 10 periods, in this case, observations).

OPEN DATA PROD.DAT

(Open the data file, PROD.DAT)

DATA(UNIT=DATA,FORMAT=RATS,ORG=OBS) / Y K L

(The data are specified as follows:

UNIT=DATA [data supplied from a file]

FORMAT=RATS [data created with RATS editor]

ORG=OBS [data are listed by rows of observations, all variables in each row]

/ Y K L [series or variables are "Y", "K", "L"])

Figure 1. Listing of the Text File, PROD.PGM

```
-----  
ALL 0 10  
OPEN DATA PROD.DAT  
DATA(UNIT=DATA,FORMAT=RATS,ORG=OBS) / Y K L  
LOG Y 1 10 LY  
LOG K 1 10 LK  
LOG L 1 10 LL  
PRINT(DATES) / Y K L LY LK LL  
OLS LY  
# CONSTANT LK LL  
RESTRICT(CREATE) 1  
# 2 3  
# 1. 1. 1.  
END  
-----
```

```
LOG Y 1 10 LY  
LOG K 1 10 LK  
LOG L 1 10 LL  
(Log transformations of Y, K, L are created over observations 1-  
10 and named LY, LK, LL)
```

```
PRINT(DATES) / Y K L LY LK LL  
(Print all series or variables)
```

```
OLS LY  
# CONSTANT LK LL  
(Estimate an OLS model for,  $LY = \text{CONSTANT } LK \text{ LL}$ )
```

```
RESTRICT(CREATE) 1  
# 2 3  
# 1. 1. 1.  
(After estimating the OLS model, restrict the sum of the LK, LL  
coefficients to 1.0, the conditions for constant returns to  
scale, and re-estimate the model)
```

#### EXECUTION OF THE PROGRAM, PROD.PGM

In RATS interactive mode, the program was executed as:

```
RATS PROD.PGM,PROD.OUT
```

The output file, PROD.OUT, is shown in Figure 2.

Figure 2. Listing of the Output File, PROD.OUT

```

-----
RATS Version 2.02. 08/06/86
Copyright (C) 1986,1985,1984 by VAR Econometrics
ALL 0 10
OPEN DATA PROD.DAT
DATA(UNIT=DATA,FORMAT=RATS,ORG=OBS) / Y K L
Y
K
L
LDG Y 1 10 LY
LDG K 1 10 LK
LDG L 1 10 LL
PRINT(DATES) / Y K L LY LK LL

```

ENTRY	Y	1	K	2	L	3	LY	4
1	1.00000		2.00000		4.00000		.000000	
2	2.00000		4.00000		6.00000		.693147	
3	3.00000		5.00000		8.00000		1.09861	
4	4.00000		6.00000		9.00000		1.38629	
5	5.00000		4.00000		12.0000		1.60944	
6	6.00000		7.00000		13.0000		1.79176	
7	7.00000		9.00000		14.0000		1.94591	
8	0.00000		10.0000		16.0000		2.07944	
9	9.00000		13.0000		18.0000		2.19722	
10	10.0000		14.0000		19.0000		2.30259	
ENTRY	LK	5	LL	6				
1	.693147		1.38629					
2	1.38629		1.79176					
3	1.60944		2.07944					
4	1.79176		2.19722					
5	1.38629		2.48491					
6	1.94591		2.56495					
7	2.19722		2.63906					
8	2.30259		2.77259					
9	2.56495		2.89037					
10	2.63906		2.94444					

OLS LY  
# CONSTANT LK LL

DEPENDENT VARIABLE	4	LY				
OBSERVATIONS	10	DEGREES OF FREEDOM 7				
R**2	.99380247	RBAR**2 .99203174				
SSR	.29970757E-01	SEE .65433453E-01				
DURBIN-WATSON	1.33559939					
Q( 5)=	4.40883	SIGNIFICANCE LEVEL .492174				
NO.	LABEL	VAR	LAG	COEFFICIENT	STAND. ERROR	T-STATISTIC
***	*****	***	***	*****	*****	*****
1	CONSTANT	0	0	-1.829876	.1284265	-14.24843
2	LK	5	0	.1138298	.9558533E-01	1.190871
3	LL	6	0	1.317645	.1143967	11.51820

Figure 2. Continued

```

-----
RESTRICT(CREATE) 1
# 2 3
# 1. 1. 1.
F( 1 , 7) = 94.64155      SIGNIFICANCE LEVEL .2568560E-04

DEPENDENT VARIABLE      4      LY
OBSERVATIONS            10      DEGREES OF FREEDOM      8
R**2                    .91001042      RBAR**2                .89876172
SSR                     .43518205      SEE                    .23323326
DURBIN-WATSON           .26132784
Q( 5) = 7.83343      SIGNIFICANCE LEVEL .165658
NO. LABEL VAR LAG COEFFICIENT STAND. ERROR T-STATISTIC
*** ***** *** *** ***** *****
1 CONSTANT 0 0 -.6912454 .1884278 -3.668489
2 LK 5 0 .3313035 .3312591 1.000134
3 LL 6 0 .6686965 .3312591 2.018651

```

END

```

NORMAL COMPLETION OF JOB
HALT AT 0
0 ERRORS 0 WARNINGS

```

A MORE CONVENIENT METHOD OF CREATING THE DATA FILE, PROD.DAT

The RATS editor should probably be used to create a data set only as a last resort. A more convenient method of creating the PROD.DAT file would be to use the word processor to create an unformatted file, PROD.DAT, and enter the ASCII data as follows:

```

-----FILE BEGINS-----
1.00000 2.00000 4.00000
2.00000 4.00000 6.00000
3.00000 5.00000 8.00000
4.00000 6.00000 9.00000
5.00000 4.00000 12.00000
6.00000 7.00000 13.00000
7.00000 9.00000 14.00000
8.00000 10.00000 16.00000
9.00000 13.00000 18.00000
10.00000 14.00000 19.00000
-----FILE ENDS-----

```

The program listing for the ASCII data set is shown in Figure 3.

Figure 3. Listing of the Text File, PROD.PGM, Using ASCII DATA

---

```
ALL 0 10
OPEN DATA PROD.DAT
DATA(UNIT=DATA,ORG=OBS) / Y K L
LOG Y 1 10 LY
LOG K 1 10 LK
LOG L 1 10 LL
PRINT(DATES) / Y K L LY LK LL
OLS LY
# CONSTANT LK LL
RESTRICT(CREATE) 1
# 2 3
# 1. 1. 1.
END
```

---