

\$oninline

/*

GAMS program used to estimate technical efficiency.

Author: John B. Walden
NMFS/NEFSC
166 Water St.
Woods Hole, MA 02543
(508) 495-2355
John.Walden@Noaa.Gov

This version will estimate technical efficiency based on an output oriented DEA model, with variable returns to scale. Models can be found in Fare, Grosskopf and Lovell (1994)

This version utilizes the GUSS solver in GAMS. For more information on the GUSS solver see the GAMS web site www.gams.com*/

\$OFFSYMLIST OFFSYMXREF OFFUELLIST OFFUELXREF

OPTION SOLPRINT=OFF, SYSOUT=OFF, LIMROW=0, LIMCOL=0;

/*NEXT DEFINE INPUTS AND OUTPUTS. There are 6 inputs x1,x2,x3,x4,x5 and x6; there are 3 outputs y1,y2,y3. The data has 201 observations*/

SET INOUT /x1*x6, y1*y3/

OUTPUT(INOUT) /y1*y3/

INPUT(INOUT) /x1*x6/

OBS /1*201/

SUBOBS(OBS) /1*201/

;

/*Next, define an alias for the set SUBOBS, and read in the data*/

alias (subobs, subobs1);

\$OFFLISTING

TABLE ACT(OBS,INOUT) INPUT OUTPUT TABLE

\$ondelim

\$INCLUDE "data2.csv"

\$offdelim

\$ONLISTING

parameter slice(inout) slice of input output data
eff_k(obs) efficiency report;

VARIABLES

theta efficiency score
weight(obs) weights;

```
POSITIVE Variable weight;
```

```
EQUATIONS
```

```
CONSTR1(output) DEA constraint for each output
```

```
CONSTR2(input) DEA constraint for each input
```

```
CONSTR3 DEA Constraint for variable returns to scale
```

```
;
```

```
CONSTR1(output).. sum(subobs, weight(subobs)*ACT(subobs,output)) =G= Theta*slice(output);
```

```
CONSTR2(input).. sum(subobs, weight(subobs)*ACT(subobs,input)) =L= slice(input);
```

```
CONSTR3.. sum(subobs, weight(subobs)) =E= 1;
```

```
MODEL TE /all/;
```

```
set h headers /modelstat, solvestat, objval/;
```

```
parameter scenrep(obs,h) solution report summary
```

```
scopt /SkipBaseCase 1/;
```

```
set dict /subobs. scenario. ''
```

```
scopt. opt. scenrep
```

```
slice. param. ACT
```

```
theta. level. eff_k/;
```

```
slice(inout)=0;
```

```
option lp=cbc;
```

```
solve te maximizing theta using lp scenario dict;
```

```
display scenrep, eff_k;
```

```
/*results are printed out to the file 'results_test.csv'*/
```

```
file sr /results_test.csv/;
```

```
sr.pc=5;
```

```
put sr;
```

```
put 'obs', 'theta';
```

```
put /;
```

```
loop(subobs, put subobs.tl, scenrep(subobs,'objval'):4;
```

```
put /;
```

```
);
```

```
putclose;
```