

\$online

/*

*GAMS program used to estimate technical efficiency, using a directional distance function model.
The directional distance function seeks to simultaneously expand outputs and contract inputs*

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This version will estimate technical efficiency for each DMU, using directional distance functions.

Fare, R. and S. Grosskopf. 2000. "Theory and Application of Directional Distance Functions." Journal of Productivity Analysis, 13:93-103.

*/

/ The following line turns off listing of some elements in the GAMS listing file*/*

\$OFFSYMLIST OFFSYMREF OFFUELLIST OFFUELXREF

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

*/*NEXT DEFINE INPUTS AND OUTPUTS*/*

SET INOUT /out1*out6, fix1*fix3, var1, var2/
OUTPUT(INOUT) /out1*out6/
INPUT(INOUT) /fix1*fix3, var1, var2/

OBS /1*200/
SUBOBS(OBS) /1*82/
ACTOBS(OBS)

*/*We have allocated enough memory for 200 observations, but our data set only contains 82 observations (subobs)*/
;*

*/*Next, define an alias for the set SUBOBS */*

alias (subobs, subobs1)

/ The include statement below reads in an external datafile which contains a table of observations, inputs and outputs. The file is in comma separated value format (CSV) which can be written from, and read into spreadsheet programs*

The offlisting command means that the data won't be included in the listing file.

*/

\$OFFLISTING

TABLE ACT(OBS,INOUT) INPUT OUTPUT TABLE

\$ondelim

\$INCLUDE "cap1.csv"

\$offdelim

\$ONLISTING

PARAMETER

score1(obs) efficiency scores
;

VARIABLES

Beta objective value
weight(obs) weights;

POSITIVE Variable weight;

EQUATIONS

CONSTR1(OUTPUT, OBS) DEA constraint for each output
CONSTR2(INPUT,OBS) DEA Constraint for calculating TE;

CONSTR1(OUTPUT, ACTOBS).. SUM(SUBOBS,WEIGHT(SUBOBS)*ACT(SUBOBS,OUTPUT))
=G= (1+beta)*ACT(ACTOBS, OUTPUT);

CONSTR2(INPUT, ACTOBS).. SUM(SUBOBS,WEIGHT(SUBOBS)*ACT(SUBOBS,INPUT))
=L=(1-Beta)*ACT(ACTOBS,INPUT);

*/*Define a parameter to hold results for each pass through the loop*/*

*/*Define an external file to hold results which tell whether model solved
at each iteration*/*

file primal /te_res.txt/;

MODEL TE /CONSTR1, CONSTR2/;

te.solprint=2; */*Turn off writing results to solution file*/*
te.solvelink=2; */*Keep model in memory. Improves solution time*/*

LOOP(SUBOBS1,

ACTOBS(OBS)=NO;
ACTOBS(SUBOBS1)=YES;

SOLVE TE maximizing Beta USING LP;

```

score1(subobs1)=Beta.1;

put primal;

if ((te.modelstat eq 1 and te.solvestat eq 1),

    put @1, subobs1.tl, @10, "optimal", @20, "normal completion" /

else

    put @1, subobs1.tl, @10, te.modelstat:>2:0,
        @20, te.solvestat:>2:0/
);

);

```

*/*The next file is to output results to a file to be imported into a spreadsheet program. Results could also be printed to the listing file with the use of the display command*/*

```

file res /"dd_te_crs.csv"/ ;

res.pc=5;
res.pw=200;

put res;

put 'Obs', 'Beta',

put /

loop (subobs1,

    put /
    put subobs1.tl, score1(subobs1),

);

putclose;

```