

\$online

/*

GAMS program used to estimate capacity output using a distance function with both desirable and undesirable outputs, and weak disposability for the undesirable outputs.

Source: Färe, R., J.E. Kirkley, and J.B. Walden. 2007. "Estimating Capacity and Efficiency in Fisheries with Undesirable Outputs." VIMS Marine resource Report N. 2007-6. August 2007.

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*/

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

\$OFFSYMLIST OFFSYMREF OFFUELLIST OFFUELXREF

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

*/*NEXT DEFINE INPUTS AND OUTPUTS. GOUTPUT are the desirable outputs and BOUTPUT are the undesirable outputs.*/*

SET INOUT /fix1*fix3, var1*var3, out1*out8/

OUTPUT(INOUT) /out1*out8/

Goutput(OUTPUT) /out1*out6/

Boutput(OUTPUT) /out7, out8/

FIXED(INOUT) /fix1*fix3/

VAR(INOUT) /var1*var3/

OBS /1*1000/

SUBOBS(OBS) /1*102/

ACTOBS(OBS)

;

/ OBS sets up memory for 1000 observations. SUBOBS is the actual number of observations in the data set*/*

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

alias (subobs, subobs1)

\$OFFLISTING

TABLE ACT(OBS,INOUT) INPUT OUTPUT TABLE

\$ondelim

\$INCLUDE "disc1.csv"

\$offdelim

\$ONLISTING

*/*Reads in a csv formatted data set.*/*

VARIABLES

Beta efficiency score
lambda(obs,var) variuable input utilization rate
weight(obs) weights
;

POSITIVE Variable weight, lambda;

EQUATIONS

CONSTR1(GOUTPUT, OBS) DEA constraint for each output
CONSTR2(BOUTPUT, OBS) DEA constraint for BAD Outputs
CONSTR3(FIXED, OBS) DEA constraint for Fixed Inputs
CONSTR4(VAR,OBS) DEA Constraint for Variable Outputs;

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

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

CONSTR3(FIXED, ACTOBS).. SUM(SUBOBS,WEIGHT(SUBOBS)*ACT(SUBOBS,FIXED)) =L=
ACT(ACTOBS,FIXED);

CONSTR4(VAR, ACTOBS).. SUM(SUBOBS, WEIGHT(SUBOBS)*ACT(SUBOBS, VAR)) =E=
LAMBDA(ACTOBS,VAR)*ACT(ACTOBS,VAR);

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

PARAMETER

score1(obs) efficiency scores
;

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

file primal2 /dd_res_crs.txt/

MODEL CAP /ALL/; */*Use all the equations. Alternatively, the model could be solved with just the first three equations*/*

cap.solprint=2;
cap.sovelink=2;

```
LOOP(SUBOBS1,
```

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

```
    SOLVE CAP maximizing beta USING LP;
```

```
    score1(SUBOBS1) = beta.1
```

```
    put primal2;
```

```
    if ((cap.modelstat eq 1 and cap.solvestat eq 1),
```

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

```
    else
```

```
        put @1, subobs1.tl, @10, cap.modelstat:>2:0,  
            @20, cap.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_crs_wd.csv' / ;
```

```
res.pc=5;  
res.pw=500;
```

```
put res;
```

```
put 'Obs','BETA';
```

```
put //
```

```
loop (subobs1,
```

```
    put /
```

```
        put subobs1.tl,score1(subobs1):5:2
```

```
    );
```

```
putclose;
```