## Appendix E: DEA Model

**Data File**

# Number of DMUs 124 countries

param N := 124;

# Number of inputs

param M := 12;

# Number of outputs

param S := 3;

# Input Variables: 12 Pillars of GCI

param input : 1 2 3 4 5 6 7 8 9 10 11 12:=

**[GCI DATA INSERTED HERE]**

# Output Variables: IHDI Subindices

param output : 1 2 3:=

**[IHDI DATA INSERTED HERE]**

# Country in question

param DMUanalysed := 1;

**Model File**

# Number of DMUs

param N;

# Number of Inputs

param M;

# Number of Outputs

param S;

# Set of DMUs

set DMUs := 1..N;

# Set of Input Data

set Inputs := 1..M;

# Set of Output Data

set Outputs := 1..S;

# Input data

param input{i in DMUs, j in Inputs};

# Output data

param output{i in DMUs, j in Outputs};

# DMU in question

param DMUanalysed;

# Lambdas as decision variables

var lambda{DMUs} >=0;

# Eta - objective function value

var eta;

# Objective function

minimize efficiency: eta;

# Input equations

subject to inputEqs{i in Inputs}: sum {j in DMUs} lambda[j]\*input[j,i] <= eta \* input[DMUanalysed,i];

# Output equations

subject to outputEqs{r in Outputs}: sum {j in DMUs} lambda[j] \* output[j,r] >= output[DMUanalysed,r];

# Remove the country in question from the set

subject to cons: lambda[DMUanalysed] = 0;

**Run File**

reset;

# select solver

option solver cplex;

# output width for easy copying to Excel

option display\_width 12;

# superefficiency model

model superefficiency.mod;

# GCI/IHDI data;

data superefficiency.dat;

# country in question

set DMUanalysedset;

# record objective function of the country in question

param dmu\_obj {DMUanalysedset};

# record peers of the country

param peers {DMUanalysedset, DMUs};

# country iterator

let DMUanalysedset := DMUanalysed .. N by 1;

# Solve for each country

for {a in DMUanalysedset} {

# record country for which the model is solved

let DMUanalysed := a;

# solve model

solve;

# record objective function value

let dmu\_obj[a] := eta;

# write in to text file

display dmu\_obj> "superefficiencyresults.txt";

# change output width to write large peer matrix

option display\_width 1000;

# write peer matrix

display peers > "superefficiencyresults.txt";

dmu\_obj [\*]

:=**[SUPEREFFICIENCY SCORES GENERATED HERE]**