Empirical Analysis of the Role of Energy in Economic Growth

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Abstract

*********** Add abstract ***********

Keywords: economic growth, energy, cobb-douglas, CES, LINEX

Caleb, put your LaTeX code here.

1. Cobb-Douglas Without Energy

```
createCDParamsGraph <- function(){
  # Create a data table with the following columns:
  # country abbrev, parameter (lambda, alpha, or beta), -95% CI, value, +95% CI
  dataTable <- do.call("rbind",
                        lapply(countryAbbrevs,
                               cobbDouglasCountryRowsForParamsGraph))
  print(class(dataTable))
  print(dataTable)
  # Make a graph. I want the following:
  ### two-letter country abbreviation on the horizontal axis
  ### dots for the values of each parameter
  ### error bars to the top and bottom of the dots representing the 95% CI
  ### three panels, one for each parameter (lambda, alpha, and beta)
  #
```

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```
  # Note that "segplot" is in the "latticeExtra" package.
  # But, at this point, I obtain the following error:
  # "Error:  range not meaningful for factors"
  graph <- segplot(country ~ upperCI + lowerCI | parameter,
                   data = dataTable,
                   centers = value)
  return(graph)
}
createCDParamsGraph()

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[1] "data.frame"
     country parameter                 lowerCI                    value
US.1      US    lambda    0.00867713811541703      0.0101554649771947
US.2      US     alpha      0.213128596976903       0.274182451792623
US.3      US      beta      0.664533917792339       0.725817548207377
UK.1      UK    lambda    -0.0104339533284891      0.0097166097229806
UK.2      UK     alpha     -0.245055231216114       0.444076431841734
UK.3      UK      beta     -0.126474527059773       0.555923568158266
JP.1      JP    lambda    0.00214925937049534     0.00517407901182134
JP.2      JP     alpha      0.437044349900555       0.515630717914427
JP.3      JP      beta      0.405869151146723       0.484369282085573
CN.1      CN    lambda    -0.0405221051255718      0.0187921739305594
CN.2      CN     alpha      0.108505956239368       0.712431541207713
CN.3      CN      beta     -0.319614564678439       0.287568458792287
ZA.1      ZA    lambda -0.000717427211566538 0.000771177746585204
ZA.2      ZA     alpha      0.461441497491662       0.597466553596658
ZA.3      ZA      beta      0.264697791730982       0.402533446403342
SA.1      SA    lambda    -0.0159263027425623     -0.0123103576408377
```

SA.2	SA	alpha	0.214820434186193	0.448455179197524
SA.3	SA	beta	0.319930296839117	0.551544820802476
IR.1	IR	lambda	0.0031544365568454	0.00385069982960034
IR.2	IR	alpha	0.49113172479408	0.596672406132716
IR.3	IR	beta	0.297079321606455	0.403327593867284
TZ.1	TZ	lambda	-0.0039141998823917	0.00149948729754192
TZ.2	TZ	alpha	0.504166911618199	0.726578989422795
TZ.3	TZ	beta	0.0490171189358977	0.273421010577205
ZM.1	ZM	lambda	0.0217845209774593	0.0249136301557912
ZM.2	ZM	alpha	1.24947924633067	1.41002169368921
ZM.3	ZM	beta	-0.57145350717947	-0.410021693689214

	upperCI
US.1	0.0116267632506195
US.2	0.335458612778305
US.3	0.787101178622416
UK.1	0.0302750369133842
UK.2	1.119149013819
UK.3	1.23832166337631
JP.1	0.0081926858312227
JP.2	0.594141371854355
JP.3	0.562869413024423
CN.1	0.0779058376028465
CN.2	1.31814921490484
CN.3	0.894751482263012
ZA.1	0.00222325751849382
ZA.2	0.733549304597543
ZA.3	0.540369101075701
SA.1	-0.00873591015395777
SA.2	0.68279397709528
SA.3	0.783159344765835
IR.1	0.00453844391610371
IR.2	0.702639779772847
IR.3	0.509575866128113
TZ.1	0.00678367569691732
TZ.2	0.951643458591323
TZ.3	0.497824902218513
ZM.1	0.0280398287326144

```
ZM.2      1.5728851355369
ZM.3   -0.248589880198959

Error:  range not meaningful for factors
```

2. Cobb-Douglas With Energy

We can force α, β, and γ to be in $[0, 1]$ by a reparameterization:

$$a \in [0, 1], b \in [0, 1], \alpha = \min(a, b), \beta = |b - a|, \gamma = 1 - \max(a, b)$$

2.1. Cobb-Douglas with Q

2.2. Cobb-Douglas With X

2.3. Cobb-Douglas With U

3. CES

3.1. CES with Q