Exercício 1

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The dataset Data_TravelCosts.csv contains information on travel costs from several municipalities to a national park in Brazil (see MAIA, A. G. , ROMEIRO, A. . Validade e confiabilidade do método de custo de viagem: um estudo aplicado ao Parque Nacional da Serra Geral. Revista de Economia Aplicada, v. 12, p. 103-123, 2008):

a) Analyze the relation between travel costs and the visit rate;
b) Add control variables in the linear model;
c) Are the estimates consistent with the microeconomic theory?

Leitura de dados

```
library(readxl)
library(stargazer)

Data_TravelCosts <- read_excel("~/Videos/Inverno 2019/Exercicios/Data_TravelCosts.xls")

Dados = Data_TravelCosts

head(Dados)
```

```
## # A tibble: 6 x 5
##      code  cost incpc   age rvisit
##     <dbl> <dbl> <dbl> <dbl>  <dbl>
## 1 2611606 2370.  551.  29.7 0.0339
## 2 3106200 1084.  773.  30.2 0.266
## 3 3300209  681.  367.  29.8 1.25
## 4 3303302  791. 1133.  34.1 0.451
## 5 3303500  920.  334.  28.7 0.0645
## 6 3304557  909.  837.  32.9 0.126
```

a) Analyze the relation between travel costs and the visit rate;

```
linearsimples = lm(rvisit ~ cost, data = Dados)

#stargazer(linearsimples, type = "text", digits = 8, column.labels = c("Linear model"),
 #         keep.stat = c('n','rsq','adj.rsq','f'), out = "mrd.txt")
```

b) Add control variables in the linear model;

```
linear = lm(rvisit ~ cost + incpc + age, data = Dados)
```

```r
#stargazer(linear, type = "text", digits = 8, column.labels = c("Multiple model"),
         # keep.stat = c('n','rsq','adj.rsq','f'), out = "mrd.txt")
```

c) Are the estimates consistent with the microeconomic theory?

d) Model Lin-log

```r
linearlog = lm(rvisit ~ log(cost) + log(incpc) + age, data = Dados)
```

e) Model Log-lin

```r
loglinear = lm(log(rvisit) ~ cost + incpc + age, data = Dados)
```

f) Model Log-log

```r
logloglinear = lm(log(rvisit) ~ log(cost) + log(incpc) + age, data = Dados)

stargazer(linear, linearlog, loglinear, logloglinear, type = "text", digits = 8,
          column.labels = c("Linear", "Lin-log", "Log-lin", "Log-log"),
          keep.stat = c('n','rsq','adj.rsq','f'), out = "mrd.txt")
```

```
##
## ===================================================================================
##                                              Dependent variable:
##                              ------------------------------------------------------
##                                         rvisit                      log(rvisit)
##                                  Linear        Lin-log        Log-lin        Log-log
##                                   (1)            (2)            (3)            (4)
## -----------------------------------------------------------------------------------
## cost                         -0.00162944***                -0.00148588***
##                               (0.00058673)                  (0.00025012)
##
## incpc                         -0.00258441                  -0.00140844**
##                               (0.00160916)                  (0.00068599)
##
## log(cost)                                   -0.90632090***                -0.76144730***
##                                              (0.28255670)                  (0.11938750)
##
## log(incpc)                                   -1.59988000*                  -0.90982200**
##                                              (0.90038580)                  (0.38043630)
##
## age                            0.13894400     0.15499460     0.10628910     0.12567860*
##                               (0.15940810)   (0.15249000)   (0.06795613)   (0.06443096)
##
## Constant                       0.03907665    12.62017000**  -1.68187100     6.35538900**
##                               (4.50569900)   (5.77636200)   (1.92079300)   (2.44066300)
##
## -----------------------------------------------------------------------------------
## Observations                       93             93             93             93
```

```
## R2                         0.14505490     0.17437600     0.38254920     0.41424430
## Adjusted R2                0.11623650     0.14654590     0.36173620     0.39449970
## F Statistic (df = 3; 89) 5.03341700***  6.26575000***  18.38034000*** 20.98016000***
## ============================================================================================
## Note:                                                          *p<0.1; **p<0.05; ***p<0.01
```

Nous choisissons le modèle log-log où le R^2 est supérieur aux autres modèles.

Model with binary variable

```
code = Dados$code
n = length(code)
binary = rep(0, n)

for (i in 1:n) {if(code[i]>=4301000 & (code[i]<4399999))binary[i] = 1}
```

Log-log model with binary

```
loglogbinary = lm(log(rvisit) ~ log(cost) + log(incpc) + age + binary, data = Dados)

stargazer(loglogbinary, type = "text", digits = 8, column.labels = c("binary model"),
          keep.stat = c('n','rsq','adj.rsq','f'), out = "mrd.txt")
```

```
##
## ========================================
##                   Dependent variable:
##               ---------------------------
##                        log(rvisit)
##                      binary model
## ----------------------------------------
## log(cost)           -0.60600940***
##                      (0.14808100)
##
## log(incpc)           -0.64449080
##                      (0.40595590)
##
## age                   0.06958644
##                      (0.07141249)
##
## binary                0.52691690*
##                      (0.30303840)
##
## Constant             5.23328500**
##                      (2.49817600)
##
## ----------------------------------------
## Observations              93
## R2                     0.43370030
## Adjusted R2            0.40795940
## F Statistic  16.84869000*** (df = 4; 88)
## ========================================
## Note:         *p<0.1; **p<0.05; ***p<0.01
```

```r
exp(loglogbinary$coefficients[5]) - 1
```

```
##    binary
## 0.6937024
```

$\frac{\Delta ln(visit)}{\Delta riogranddosud}$ la population de rio grande do sul visita mais doque o outro estado (69%).

```r
stargazer(linear, linearlog, loglinear, logloglinear, loglogbinary, type = "text",
          digits = 5, column.labels = c("Linear", "Lin-log", "Log-lin",
                                        "Log-log", "Loglog-binary"),
          keep.stat = c('n','rsq','adj.rsq','f'), out = "mrd.txt")
```

```
##
## ====================================================================================================
##                                                                  Dependent variable:
##              ---------------------------------------------------------------------------------------
##                                   rvisit                                                    log(rvisi
##                     Linear              Lin-log             Log-lin              Log-lo
##                      (1)                  (2)                 (3)                  (4)
## ----------------------------------------------------------------------------------------------------
## cost             -0.00163***                              -0.00149***
##                  (0.00059)                                (0.00025)
##
## incpc             -0.00258                                -0.00141**
##                  (0.00161)                                (0.00069)
##
## log(cost)                             -0.90632***                              -0.76145
##                                        (0.28256)                               (0.1193
##
## log(incpc)                             -1.59988*                               -0.9098
##                                        (0.90039)                               (0.3804
##
## age                0.13894              0.15499             0.10629              0.1256
##                  (0.15941)            (0.15249)           (0.06796)            (0.0644
##
## binary
##
##
## Constant           0.03908             12.62017**          -1.68187              6.35539
##                  (4.50570)             (5.77636)           (1.92079)            (2.4406
##
## ----------------------------------------------------------------------------------------------------
## Observations          93                   93                  93                   93
## R2                 0.14505              0.17438             0.38255              0.4142
## Adjusted R2        0.11624              0.14655             0.36174              0.3945
## F Statistic  5.03342*** (df = 3; 89) 6.26575*** (df = 3; 89) 18.38034*** (df = 3; 89) 20.98016*** (d
## ====================================================================================================
## Note:
```