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# Semana 9: Control sintético

Universidad de San Andrés  
Economía Aplicada

2022

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>
*****/
*      Bronstein      García Vassallo      López      Riottini
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Este archivo sigue la siguiente estructura:

```

0) Set up environment

1) Replicación de gráficos

```

*****/
* 0) Set up environment
*=====

```

```

global main "C:\Users\felip\Documents\UdeSA\Maestría\Aplicada\Problem-Sets\PS 8"
global output "$main/output"
global input "$main/input"

```

```

cd "$main"

```

\* 1) Empiezo a replicar

```

* Uso el csv en forma de panel
import delimited "$input/df.csv", encoding(UTF-8) clear

```

```

* Defino el panel
tsset code year

```

```

* Instalo el paquete para controles sintéticos
*ssc install synth

```

```

line homiciderates year

```

```

collapse (mean) homiciderates if code!=35, by(year)

```

```

gen code=1

```

```

save "$input/brasil.dta", replace

```

```

import delimited "$input/df.csv", encoding(UTF-8) clear

```

```

append using "$input/brasil.dta"

```

```

twoway (line homiciderates year if code==1, lcolor(grey) lpattern(dash)) (line homicid
> erates year if code==35, lcolor(black)), ytitle("Homicide Rates") xtitle("Year") xli
> ne(1999, lpattern(shortdash) lcolor(grey)) legend(label(1 "Sao Paulo") label(2 "Braz
> il (average)"))
graph export "$output/1.png", replace

```

\* Gráfico 2

```

drop if code==1

```

```

synth homiciderates yearsschoolingimp statgdpcapita homiciderates proportionextremepo
> verty giniimp populationprojectionln statgdpgrowthpercent, trunit(35) trperiod(1999
> ) nested fig keep(loo-resout28, replace)

```

\* Gráfico 3

```

matrix gaps=e(Y_treated) -e(Y_synthetic)
matrix Y_treated=e(Y_treated)
matrix Y_synthetic=e(Y_synthetic)
keep year
svmat gaps
svmat Y_treated
svmat Y_synthetic

twoway (line gaps1 year, lcolor(black)), xline(1999, lpattern(shortdash) lcolor(grey))
> yline(0, lpattern(dash) lcolor(black)) ytitle("Gap in Homicide Rates") xtitle("Year"
> )
graph export "$output/3.png", replace

* Gráfico 4

import delimited "$input/df.csv", encoding(UTF-8) clear

tsset code year

synth homiciderates yearsschoolingimp stategdpcapita homiciderates proportionextremepo
> verty giniimp populationprojectionln stategdpgrowthpercent, trunit(35) trperiod(1995
> ) resultsperiod(1990(1)1998) nested fig

* Gráfico 5

egen id=group(code)

save "$input/df.dta", replace

use "$input/df.dta", clear

tsset id year

cd "$input/loo"

tempname resmat
local i 20
qui synth homiciderates yearsschoolingimp stategdpcapita homiciderates proport
> ionextremepoverty giniimp populationprojectionln stategdpgrowthpercent, trunit(`i')
> trperiod(1999) keep(loo-resout`i', replace)

        forvalues j=1/27 {
            if `j'==20 {
                continue
            }
            use "$input/df.dta", clear
            tsset id year
            drop if id==`j'
            qui synth homiciderates yearsschoolingimp stategdpcapita homiciderates proport
> ionextremepoverty giniimp populationprojectionln stategdpgrowthpercent, trunit(20) t
> rperiod(1999) keep(loo-resout`j', replace)
        }

forvalues i = 1/28 {
    use "$input/loo/loo-resout`i'.dta", clear
    ren _Y_synthetic _Y_synthetic`i'
    ren _Y_treated _Y_treated`i'
    gen _Y_gap`i'=_Y_treated`i'-_Y_synthetic`i'
    save "$input/loo/loo-resout`i'.dta", replace
}

use "$input/loo/loo-resout1.dta", clear
forvalues i = 2/28 {
    merge 1:1 _Co_Number _time using "$input/loo/loo-resout`i'.dta", nogen
}

```

```

twoway (line _Y_synthetic_1 _time, lcolor(gray)) (line _Y_synthetic_2 _time, lcolor(gr
> ay)) (line _Y_synthetic_3 _time, lcolor(gray)) (line _Y_synthetic_4 _time, lcolor(gr
> ay)) (line _Y_synthetic_5 _time, lcolor(gray)) (line _Y_synthetic_6 _time, lcolor(gr
> ay)) (line _Y_synthetic_7 _time, lcolor(gray)) (line _Y_synthetic_8 _time, lcolor(gr
> ay)) (line _Y_synthetic_9 _time, lcolor(gray)) (line _Y_synthetic_10 _time, lcolor(g
> ray)) (line _Y_synthetic_11 _time, lcolor(gray)) (line _Y_synthetic_12 _time, lcolor
> (gray)) (line _Y_synthetic_13 _time, lcolor(gray)) (line _Y_synthetic_14 _time, lcol
> or(gray)) (line _Y_synthetic_15 _time, lcolor(gray)) (line _Y_synthetic_16 _time, lc
> olor(gray)) (line _Y_synthetic_17 _time, lcolor(gray)) (line _Y_synthetic_18 _time,
> lcolor(gray)) (line _Y_synthetic_19 _time, lcolor(gray)) (line _Y_synthetic_21 _time
> , lcolor(gray)) (line _Y_synthetic_22 _time, lcolor(gray)) (line _Y_synthetic_23 _ti
> me, lcolor(gray)) (line _Y_synthetic_24 _time, lcolor(gray)) (line _Y_synthetic_25 _ti
> me, lcolor(gray)) (line _Y_synthetic_26 _time, lcolor(gray)) (line _Y_synthetic_27
> _time, lcolor(gray)) (line _Y_treated_20 _time, lcolor(black) lwidth(thick)) (line
> _Y_synthetic_28 _time, lcolor(black) lpattern(dash)), xline(1999, lpattern(shortdash
> ) lcolor(grey)) legend(order(27 "Sao Paulo" 28 "Synthetic Sao Paulo" 3 "Synthetic Sa
> o Paulo (leave-one-out)")) xtitle("Year") ytitle("Homicide Rates")

```

\* Gráfico 6

```

use "$input/df.dta", clear
tsset id year

cd "$input/pt"

tempname resmat
local i 20
qui synth homiciderates yearsschoolingimp stategdpcapita homiciderates proport
> ionextremepoverty giniimp populationprojectionln stategdpgrowthpercent, trunit(`i')
> trperiod(1999) keep(resout`i', replace)
matrix `resmat' = nullmat(`resmat') \ e(RMSPE)
local names ``names' ``i'""
mat colnames `resmat' = "RMSPE"
mat rownames `resmat' = `names'
matlist `resmat' , row("Treated Unit")

drop if id==20

forvalues i = 1/27 {
    if `i'==20 {
        continue
    }
    qui synth homiciderates yearsschoolingimp stategdpcapita homiciderates proport
> ionextremepoverty giniimp populationprojectionln stategdpgrowthpercent, trunit(`i')
> trperiod(1999) keep(resout`i', replace)
matrix `resmat' = nullmat(`resmat') \ e(RMSPE)
local names ``names' ``i'""
}

mat colnames `resmat' = "RMSPE"
mat rownames `resmat' = `names'
matlist `resmat' , row("Treated Unit")

forvalues i = 1/27 {
    use "$input/pt/resout`i'.dta", clear
    ren _Y_synthetic _Y_synthetic_`i'
    ren _Y_treated _Y_treated_`i'
    gen _Y_gap_`i' = _Y_treated_`i' - _Y_synthetic_`i'
    save "$input/pt/resout`i'.dta", replace
}

use "$input/pt/resout1.dta", clear
forvalues i = 2/27 {
    merge 1:1 _Co_Number _time using "$input/pt/resout`i'.dta", nogen
}

save "$input/pt.dta", replace

use "$input/df.dta", clear

tsset id year

```

```
synth homiciderates yearsschoolingimp stategdpcapita homiciderates proportionextremepo
> verty giniimp populationprojectionln stategdpgrowthpercent, trunit(20) trperiod(1999
> ) nested
```

```
matrix gaps=e(Y_treated) -e(Y_synthetic)
matrix Y_treated=e(Y_treated)
matrix Y_synthetic=e(Y_synthetic)
keep year
svmat gaps
svmat Y_treated
svmat Y_synthetic
gen _Co_Number=_n
gen _time=year
save "$input/pt/resout28", replace

use "$input/pt/resout1.dta", clear
forvalues i = 2/28 {
merge 1:1 _Co_Number _time using "$input/pt/resout`i'.dta", nogen
}
```

```
twoway (line _Y_gap_1 _time, lcolor(gray)) (line _Y_gap_2 _time, lcolor(gray)) (line _
> Y_gap_3 _time, lcolor(gray)) (line _Y_gap_4 _time, lcolor(gray)) (line _Y_gap_5 _tim
> e, lcolor(gray)) (line _Y_gap_6 _time, lcolor(gray)) (line _Y_gap_7 _time, lcolor(gr
> ay)) (line _Y_gap_8 _time, lcolor(gray)) (line _Y_gap_9 _time, lcolor(gray)) (line _
> Y_gap_10 _time, lcolor(gray)) (line _Y_gap_11 _time, lcolor(gray)) (line _Y_gap_12 _
> time, lcolor(gray)) (line _Y_gap_13 _time, lcolor(gray)) (line _Y_gap_14 _time, lcol
> or(gray)) (line _Y_gap_15 _time, lcolor(gray)) (line _Y_gap_16 _time, lcolor(gray))
> (line _Y_gap_17 _time, lcolor(gray)) (line _Y_gap_18 _time, lcolor(gray)) (line _Y_g
> ap_19 _time, lcolor(gray)) (line _Y_gap_21 _time, lcolor(gray)) (line _Y_gap_22 _tim
> e, lcolor(gray)) (line _Y_gap_23 _time, lcolor(gray)) (line _Y_gap_24 _time, lcolor(
> gray)) (line _Y_gap_25 _time, lcolor(gray)) (line _Y_gap_26 _time, lcolor(gray)) (li
> ne _Y_gap_27 _time, lcolor(gray)) (line gaps1 _time, lcolor(black) lwidth(thick)), x
> line(1999, lpattern(shortdash) lcolor(grey)) legend(order(27 "Sao Paulo" 2 "Control
> States")) xtitle("Year") ytitle("Gap in Homicide Rates") yline(0, lcolor(black))
```

```
graph export "$output/6.png", replace
```

```
* Gráfico 7
```

```
use "$input/df.dta", clear
tsset id year
```

```
keep if code==13 | code==15 |code==17|code==21|code==23|code==24|code==25|code==31|cod
> e==41|code==42|code==43|code==53|code==35
```

```
cd "$input/pt2"
```

```
egen id2=group(code)
```

```
tsset id2 year
```

```
tempname resmat
local i 9
qui synth homiciderates yearsschoolingimp stategdpcapita homiciderates proport
> ionextremepoverty giniimp populationprojectionln stategdpgrowthpercent, trunit(`i')
> trperiod(1999) keep(resout`i', replace)
matrix `resmat' = nullmat(`resmat') \ e(RMSPE)
local names ``names' ``i'""""
mat colnames `resmat' = "RMSPE"
mat rownames `resmat' = `names'
matlist `resmat' , row("Treated Unit")
```

```
drop if id2==9
```

```
forvalues i = 1/13 {
if `i'==9 {
continue
}
qui synth homiciderates yearsschoolingimp stategdpcapita homiciderates proport
> ionextremepoverty giniimp populationprojectionln stategdpgrowthpercent, trunit(`i')
> trperiod(1999) keep(resout`i', replace)
```

```

matrix `resmat' = nullmat(`resmat') \ e(RMSPE)
local names ``names' ``i'""'
}

mat colnames `resmat' = "RMSPE"
mat rownames `resmat' = `names'
matlist `resmat' , row("Treated Unit")

forvalues i = 1/13 {
use "$input/pt2/resout`i'.dta", clear
ren _Y_synthetic _Y_synthetic`i'
ren _Y_treated _Y_treated`i'
gen _Y_gap`i'=_Y_treated`i'-_Y_synthetic`i'
save "$input/pt2/resout`i'.dta", replace
}

use "$input/pt2/resout1.dta", clear
forvalues i = 2/13 {
merge 1:1 _Co_Number _time using "$input/pt2/resout`i'.dta", nogen
}

save "$input/pt2.dta", replace

use "$input/df.dta", clear

tsset id year

synth homiciderates yearsschoolingimp statgdpcapita homiciderates proportionextremepo
> verty giniimp populationprojectionln statgdpgrowthpercent, trunit(20) trperiod(1999
> ) nested

matrix gaps=e(Y_treated) -e(Y_synthetic)
matrix Y_treated=e(Y_treated)
matrix Y_synthetic=e(Y_synthetic)
keep year
svmat gaps
svmat Y_treated
svmat Y_synthetic
gen _Co_Number=_n
gen _time=year
save "$input/pt2/resout14", replace

use "$input/pt2/resout1.dta", clear
forvalues i = 2/14 {
merge 1:1 _Co_Number _time using "$input/pt2/resout`i'.dta", nogen
}

twoway (line _Y_gap_1 _time, lcolor(gray)) (line _Y_gap_2 _time, lcolor(gray)) (line _
> _Y_gap_3 _time, lcolor(gray)) (line _Y_gap_4 _time, lcolor(gray)) (line _Y_gap_5 _tim
> e, lcolor(gray)) (line _Y_gap_6 _time, lcolor(gray)) (line _Y_gap_7 _time, lcolor(gr
> ay)) (line _Y_gap_8 _time, lcolor(gray)) (line _Y_gap_10 _time, lcolor(gray)) (line
> _Y_gap_11 _time, lcolor(gray)) (line _Y_gap_12 _time, lcolor(gray)) (line gaps1 _tim
> e, lcolor(black) lwidth(thick)), xline(1999, lpattern(shortdash) lcolor(grey)) legen
> d(order(12 "Sao Paulo" 2 "Control States (MSPE)") xtitle("Year") ytitle("Gap in Hom
> icide Rates") yline(0, lcolor(black))

```