

Output example

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Introduction

This progress report gives output for all crime of the whole population

Preamble

First, we need to read in packages, my own functions and the two datasets

```
setwd("C:/Users/tgf200/Dropbox/Thomas/papers/Crime")
library("dplyr")
library("tidyr")
library("foreign")
library("ggplot2")
library("rootSolve")
library("AER")
library("reshape2")
library("quantreg")
library("zoo")
source("./prog/R/iterationBayer.R")
source("./prog/R/CharacteristicsEq.R")
source("./prog/R/MakeFig.R")
source("./prog/R/FindEquilibria.R")

cr <- "crime"
#####
# Choose whether estimation for only the youth
#####
youth <- 0
#####
# Choose whether only for municipality averages
#####
mun <- 0
#####
# Read and manipulate data (still manual selection!)
#####
datatemp <- 0
  if (youth) {
    data <- read.csv("./Data/Thomas_data_PC4_crime_youth.csv", header=TRUE, sep = ",")
  } else {
    data <- read.csv("./Data/Thomas_data_PC4_crime.csv", header=TRUE, sep = ",")
  }
data <- data %>% # fill in crime type
  mutate(pfield = pfieldcrime,
         interaction = pfield * addrdens,
         alpha = alpha_crime,
         se = sealpha_crime)
```

```

    ) %>%
    filter(!is.na(pfield))
dataindividual <- read.dta(paste0("./Data/hat_any",cr,"2006.dta"))
dataindividual_j <- read.dta(paste0("./Data/hat_any",cr,"2006_jongeren.dta"))
data <- data %>%
  group_by(gemcode) %>%
  mutate(
    onepermean=weighted.mean(oneperdens, tot_bev, na.rm = TRUE),
    oneparentmean=weighted.mean(oneparentdens, tot_bev, na.rm = TRUE),
    perperhhmean=weighted.mean(perperhh, tot_bev, na.rm = TRUE),
    educationmean=weighted.mean(opleiding, tot_bev, na.rm = TRUE),
    socclassmean=weighted.mean(socklasse, tot_bev, na.rm = TRUE),
    twoearnmean=weighted.mean(k_tweeverd, tot_bev, na.rm = TRUE),
    outmigmean=weighted.mean(v_uit_perc, tot_bev, na.rm = TRUE),
    inmigmean=weighted.mean(v_in_perc, tot_bev, na.rm = TRUE),
    houseownmean=weighted.mean(perchouseown, tot_bev, na.rm = TRUE),
    polavailmean=weighted.mean(polavail_mean_2005, tot_bev, na.rm = TRUE)
  )
### New dataset to be used for quantile regression, keep only the missing values
data_total <- data %>% filter(is.na(alpha))
data_total$alpha <- na.fill(data_total$alpha,-3.5)
data_total$se <- na.fill(data_total$se, 1)

```

We then specify the specifications:

```

forminit <- alpha~addrdens + oneperdens +oneparentdens +
  perperhh + opleiding + socklasse + k_tweeverd +
  v_uit_perc + v_in_perc + schooldens + perchouseown + shops + polavail_mean_2005+pfield+interaction
formcrime <- alpha~addrdens + oneperdens + oneparentdens+
  perperhh + opleiding + socklasse + k_tweeverd +
  v_uit_perc + v_in_perc + schooldens + perchouseown + shops + polavail_mean_2005+pfield+interaction
addrdens + oneperdens + oneparentdens +
  perperhh + opleiding + socklasse + k_tweeverd + v_uit_perc + v_in_perc +
  schooldens + perchouseown + shops + polavail_mean_2005+instrument+instrinter
forminitmun <- alpha~addrdens + schooldens + shops + onepermean + oneparentmean + perperhhmean +
  educationmean + socclassmean + twoearnmean + outmigmean + inmigmean + houseownmean +
  polavailmean+pfield+interaction
formcrimemun <- alpha ~ addrdens + schooldens + shops + onepermean + oneparentmean + perperhhmean +
  educationmean + socclassmean + twoearnmean + outmigmean + inmigmean + houseownmean + polavailmean
addrdens + schooldens + shops + onepermean + oneparentmean + perperhhmean +
  educationmean + socclassmean + twoearnmean + outmigmean + inmigmean + houseownmean + polavailmean

formhelprq1 <- pfield~addrdens + oneperdens + oneparentdens +
  perperhh + opleiding + socklasse + k_tweeverd +
  v_uit_perc + v_in_perc + schooldens + perchouseown + shops + polavail_mean_2005 + instrument + instrinter
formhelprq2 <- interaction~addrdens + oneperdens + oneparentdens +
  perperhh + opleiding + socklasse + k_tweeverd +
  v_uit_perc + v_in_perc + schooldens + perchouseown + shops + polavail_mean_2005+ instrument + instrinter
formrq <- alpha~addrdens + oneperdens + oneparentdens +
  perperhh + opleiding + socklasse + k_tweeverd +
  v_uit_perc + v_in_perc + schooldens + perchouseown + shops + polavail_mean_2005+

```

```

pfield+interaction + poly(v1,4) + poly(v2,4)

formhelprq1mun <- pfield+addrdens + schooldens + shops + onepermean + oneparentmean +
  perperhhmean + educationmean + socclassmean + twoearnmean + outmigmean + inmigmean + houseownmean
  polavailmean + instrument + instrinter
formhelprq2mun <- interaction+addrdens + schooldens + shops + onepermean + oneparentmean +
  perperhhmean + educationmean + socclassmean + twoearnmean + outmigmean + inmigmean + houseownmean
  polavailmean + instrument + instrinter
formrqmun <- alpha+addrdens + schooldens + shops + onepermean + oneparentmean +
  perperhhmean + educationmean + socclassmean + twoearnmean + outmigmean + inmigmean + houseownmean
  polavailmean+pfield+interaction + poly(v1,4) + poly(v2,4)
data_total<- select(data_total, pc4, alpha, se, addrdens, oneperdens, oneparentdens,
  perperhh, opleiding,
  socklasse,k_tweeverd, v_uit_perc, v_in_perc,
  schooldens, perchouseown, shops, polavail_mean_2005, pfield, interaction,
  onepermean, oneparentmean, perperhhmean,
  educationmean, socclassmean, twoearnmean, outmigmean, inmigmean, houseownmean,
  polavailmean)
data <- select(data, pc4, alpha, se, addrdens, oneperdens, oneparentdens,
  perperhh, opleiding,
  socklasse,k_tweeverd, v_uit_perc, v_in_perc,
  schooldens, perchouseown, shops, polavail_mean_2005, pfield, interaction,
  onepermean, oneparentmean, perperhhmean,
  educationmean, socclassmean, twoearnmean, outmigmean, inmigmean, houseownmean,
  polavailmean)
dataindividual$directions.foreign <- factor(dataindividual$foreign)
dataindividual$foreign <- as.numeric(dataindividual$directions.foreign) - 1
dataindividual_j$directions.foreign <- factor(dataindividual_j$foreign)
dataindividual_j$foreign <- as.numeric(dataindividual_j$directions.foreign) - 1

```

And then the estimation procedure:

```

output <- iteration2sls(dataindividual, data, data_total, formcrime, forminit, formhelprq1, formh

```

```

##
## Call:
## lm(formula = formols, data = datahat, weights = 1/se)
##
## Weighted Residuals:
##      Min       1Q   Median       3Q      Max
## -3.5012 -0.2315  0.0557  0.2651  3.8245
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.5309953   0.0945707    5.615 2.14e-08 ***
## addrdens       0.5833420   0.0521077   11.195 < 2e-16 ***
## oneperdens    -1.3967511   0.0744710  -18.756 < 2e-16 ***
## oneparentdens -2.4518129   0.1963668  -12.486 < 2e-16 ***
## perperhh      -0.3837827   0.0292435  -13.124 < 2e-16 ***
## opleiding      0.0606807   0.0150937    4.020 5.95e-05 ***
## socklasse      0.0668969   0.0093701    7.139 1.16e-12 ***

```

```
## k_tweeverd      -0.0543651  0.0061699  -8.811  < 2e-16 ***
## v_uit_perc      0.0024325  0.0007568   3.214  0.00132 **
## v_in_perc       0.0010885  0.0006677   1.630  0.10317
## schooldens      0.0016036  0.0009446   1.698  0.08967 .
## perchouseown    0.0395940  0.0370468   1.069  0.28526
## shops           0.0059205  0.0031777   1.863  0.06253 .
## polavail_mean_2005 -0.0079323  0.0027966  -2.836  0.00459 **
## pfield          0.6026580  0.0074705  80.672  < 2e-16 ***
## interaction     -0.4011735  0.0173724 -23.093  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4501 on 3194 degrees of freedom
## Multiple R-squared:  0.8152, Adjusted R-squared:  0.8143
## F-statistic: 939.3 on 15 and 3194 DF,  p-value: < 2.2e-16
##
## [1] "Criterium value is now : 0.0145150496826069"
## [1] "Criterium value is now : 0.00147327579974175"
## [1] "Criterium value is now : 2.21676846031067e-06"
## [1] "Criterium value is now : 7.65759099097282e-09"
```

```
summary(output$iv)
```

```
##
## Call:
## ivreg(formula = formiv, data = datahat, weights = 1/se)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -4.34169 -0.54884 -0.05238  0.43603  4.37259
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.562331   0.170168   3.305 0.000962 ***
## addrdens      -0.019878   0.125402  -0.159 0.874062
## oneperdens    -0.144825   0.153903  -0.941 0.346768
## oneparentdens  3.840731   0.521556   7.364 2.26e-13 ***
## perperhh      -0.198909   0.053357  -3.728 0.000196 ***
## opleiding     -0.262805   0.033463  -7.854 5.47e-15 ***
## socklasse      0.074671   0.016619   4.493 7.26e-06 ***
## k_tweeverd    -0.056882   0.011003  -5.170 2.49e-07 ***
## v_uit_perc     0.004069   0.001362   2.988 0.002833 **
## v_in_perc      0.005497   0.001214   4.529 6.15e-06 ***
## schooldens    -0.002296   0.001696  -1.354 0.175818
## perchouseown   0.064975   0.065873   0.986 0.324027
## shops          0.017354   0.005709   3.040 0.002386 **
## polavail_mean_2005 0.002096   0.004996   0.419 0.674932
## pfield         0.011441   0.038743   0.295 0.767791
## interaction    -0.013815   0.048614  -0.284 0.776301
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7977 on 3194 degrees of freedom
## Multiple R-Squared:  0.4196, Adjusted R-squared:  0.4168
```

```
## Wald test: 148.7 on 15 and 3194 DF,  p-value: < 2.2e-16
```

With final analysis of the output

We first want to find all equilibria for all iterations

```
matrices <- findequilibria(output)
```

Then we want to find the percentages of 3 equilibria occuring per iteration

```
counteq(matrices$cmat)
```

```
## [1] 0 0 0 0
```

Then we want to know the number of low equilibria (smaller than 50%). This also indicates the number of equilibria changing from low to high (larger than 50%)

```
counteqlow(output$instrument)
```

```
##
```

```
## 1 1 1 1
```

And finally, we want to know whether our found equilibria are close (in this case the difference should be smaller than 2.5% in an absolute sence) to the real crime rates

```
percclose(datatemp$pfield, output$instrument, 0.025)
```

```
##
```

```
## 0.9607477 0.9616822 0.9619938 0.9607477
```

Figure equilibria

And finally, we end with a figure of the equilibria, which for this case is not very exiting.

```
makefig(output)
```

