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 + insti
formhelprq2 <- interaction~addrdens + oneperdens + oneparentdens +
  perperhh + opleiding + socklasse + k_tweeverd +
  v_uit_perc + v_in_perc + schooldens + perchouseown + shops + polavail_mean_2005+ instrument + instri
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 equilibra occuring per iteration

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

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

Then we want to know the number of low equiblibra (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

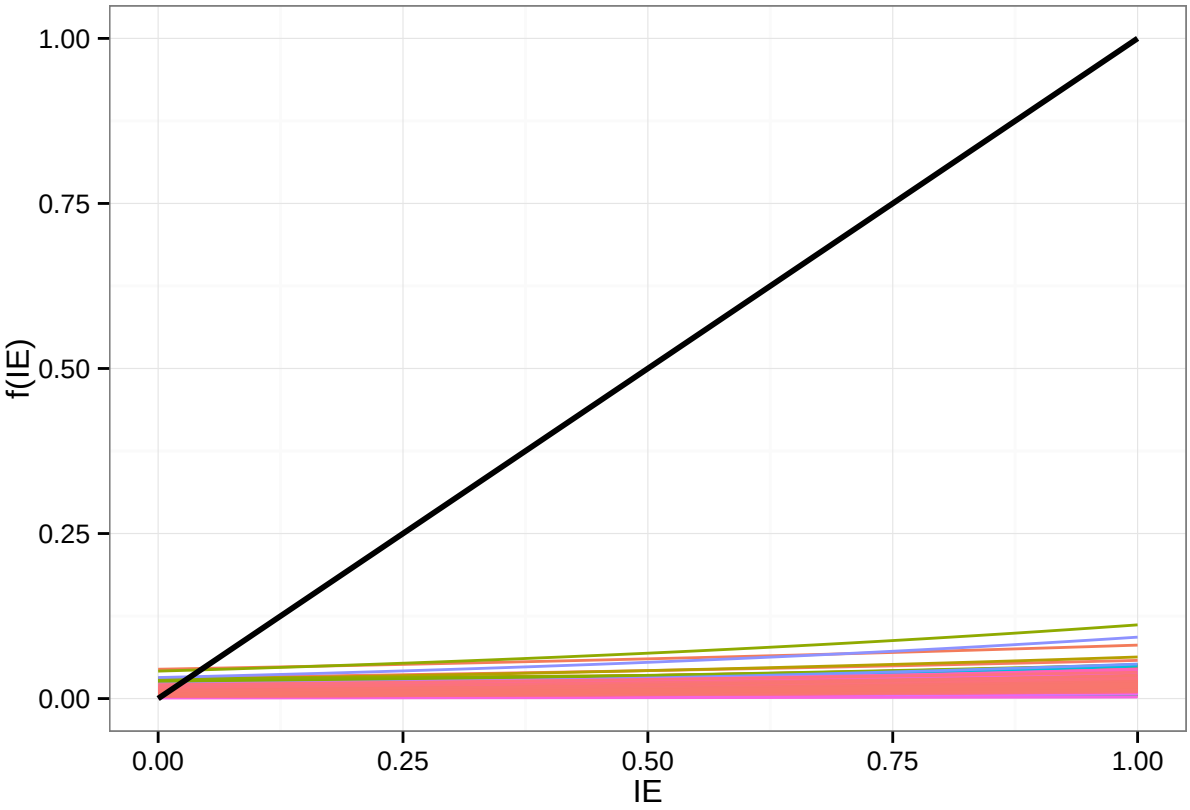
```
percclose(datatemp$pfield, output$instrument, 0.025)
```

```
##
## 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)
```


1.00
0.75
0.50
0.25
0.00
f(IE)
0.00
0.25
0.50
0.75
1.00
IE