[Example13-3] DiD estimator

Kei Sakamoto

Difference in Difference estimator

```
load("~/計量経済学演習/R data sets for 5e/kielmc.RData")
kielmc<-data
```

Separate regs for 1978 and 1981 conditioning each year

```
coef( lm(rprice~nearinc, data=kielmc, subset=(year==1978)) ) #treatmentの前でconditioning
```

```
## (Intercept)     nearinc
##    82517.23   -18824.37
```

```
coef( lm(rprice~nearinc, data=kielmc, subset=(year==1981)) ) #treatmentの後でconditioning
```

```
## (Intercept)     nearinc
##   101307.51   -30688.27
```

この差 -30688.27 - (-18824.37) = -11863.9 がDiD estimator

Joint reg including an interaction term

```
library(lmtest)
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
DiD<-lm(rprice~nearinc*y81, data=kielmc)
coeftest(DiD)
```

```
##
## t test of coefficients:
##
##              Estimate Std. Error t value  Pr(>|t|)
## (Intercept)  82517.2     2726.9 30.2603 < 2.2e-16 ***
## nearinc     -18824.4     4875.3 -3.8612 0.0001368 ***
## y81          18790.3     4050.1  4.6395 5.117e-06 ***
## nearinc:y81 -11863.9     7456.6 -1.5911 0.1125948
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

DiD estimator(estimate) は interactionのcoefのestimateと一致する。

だが実際までgarbage incinarator construction の影響を過小評価。推定結果は10%ですらsignificantではない。おそらく理由gは constructionに伴うincidental changesを１つもmodelに含んでいないこと。要するにomitted variable bias 。これを改善しにいく。

```
DiD2<-lm(log(rprice)~nearinc*y81+age+I(age^2)+log(intst)+
                    log(land)+log(area)+rooms+baths, data=kielmc)
library(stargazer)
```

```
##
## Please cite as:
```

```
##  Hlavac, Marek (2018). stargazer: Well-Formatted Regression and Summary Statistics Tables.
```

```
##  R package version 5.2.2. https://CRAN.R-project.org/package=stargazer
```

```
stargazer(DiD,DiD2,type="text")
```

```
##
## ===============================================================
##                         Dependent variable:
##                 ----------------------------------------------
##                       rprice            log(rprice)
##                         (1)                (2)
## ---------------------------------------------------------------
## nearinc              -18,824.370***           0.032
##                     (4,875.322)           (0.047)
##
## y81                   18,790.290***          0.162***
##                     (4,050.065)           (0.028)
##
## age                                        -0.008***
##                                           (0.001)
##
## I(age2)                                     0.00004***
##                                           (0.00001)
##
## log(intst)                                  -0.061*
##                                           (0.032)
##
## log(land)                                    0.100***
##                                           (0.024)
##
## log(area)                                    0.351***
##                                           (0.051)
##
## rooms                                        0.047***
##                                           (0.017)
##
## baths                                        0.094***
##                                           (0.028)
##
## nearinc:y81            -11,863.900           -0.132**
##                     (7,456.646)           (0.052)
##
## Constant               82,517.230***          7.652***
##                     (2,726.910)           (0.416)
##
## ---------------------------------------------------------------
## Observations                321                   321
## R2                        0.174                 0.733
## Adjusted R2               0.166                 0.724
## Residual Std. Error  30,242.900 (df = 317)     0.204 (df = 310)
## F Statistic       22.251*** (df = 3; 317) 84.915*** (df = 10; 310)
## ===============================================================
## Note:                           *p<0.1; **p<0.05; ***p<0.01
```

nearinc:y81のcoefを見れば、**incidental changes**を**regressors**として含んだことにより改善したことがわかる。**5%significant**に変わった。もうちょいで**1%**も。