**Directions:** Today’s exercises together will be a series of applications using the baker dataset to implement TWFE, Callaway and Sant’anna, de Chaisemartin and d’Haultfoeille, Sun and Abraham, stacking, robust efficient imputation estimation and matrix completion. We will only be using the y variable, which is the variable that was generated with dynamic treatment effects.

Data Location:

<https://github.com/scunning1975/mixtape/raw/master/baker.dta>

Code Locations: A variety of example code using castle dataset have been placed in saved subdirectory under /Code/Coding Together:

Goal: To better understand the concept of the group-time ATT, its calculation and its estimation using a variety of robust and non-robust estimators.

Exercise: Make basic calculations (Table 1) followed by a table of coefficients (Table 2) using the baker dataset

When:

* Last hour before lunch (whatever stopping point)
* Last hour of day (whatever stopping point)

Coding Together exercise 1: I want us to *manually* calculate the total number of parameters and the overall ATT so that we understand it better

* + Calculate by hand how many group-time ATT parameters there are
  + Calculate by hand overall ATT
  + Calculate by hand all four group’s ATT
  + Calculate by hand relative time ATT

**Table 1: Manual calculations**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Overall** | **1986** | **1992** | **1998** | **2004** |
| Number of parameters | 60 | 24 | 18 | 12 | 6 |
| ATT | 82, 63.5 | 125 | 76 | 39 | 14 |

**Table 1b: Averages using only Not-yet-treated as comparisons**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Overall** | **1986** | **1992** | **1998** | **2004** |
| Number of parameters |  |  |  |  |  |
| ATT |  |  |  |  |  |

Coding together exercise 2: Estimate overall ATT using

* + TWFE (repeat of yesterday)
  + CS (compare with what you found). Also look at the group ATT since we can pull it off.
  + SA (may be tricky)
  + Stacking (may be tricky)
  + Imputation
  + Matrix completion with nuclear norm regularization (may be next week)

**Table 2: Coefficients and standard errors from estimators**

**Baker dataset:** [**https://github.com/scunning1975/mixtape/raw/master/baker.dta**](https://github.com/scunning1975/mixtape/raw/master/baker.dta)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Manually | TWFE | CS | SA | dCdH | Stacking | Efficient Imputation | MCNN |
| Overall ATT | 82 or 63.5 |  |  |  |  |  |  |  |
| No of ATT(g,t) identified | Group time paramers=60 |  |  |  |  |  |  |  |

**Table 3: Illustrative purposes**

**Castle dataset:** [**https://github.com/scunning1975/mixtape/raw/master/castle.dta**](https://github.com/scunning1975/mixtape/raw/master/castle.dta)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Manually | TWFE | CS | SA | dCdH | Stacking | Efficient Imputation | MCNN |
| Overall ATT | n/a | 0.076\*\* | 0.108\*\*  Or  0.09 |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

Cool – CS gave us ATTs for each group of states treated from 2005 to 2009. What were they:

2005: 0.093

2006: 0.110

2007: 0.128

2008: 0.122

2009: -0.003

Which is on average equal to 0.09 (or 9% increase)

If we just added those together and divided by 5, that would be equally weighted ATT based on the ATT(g)