ECON4004 Lab 4: A Note on Differece-in-Difference

Feb 2024

1 Parametric DinD

1. Separating every thing out

$$
\begin{aligned}
Y(t=1, D(1)=1) &= \alpha + \pi(1)X + \theta + \mu + \beta + \epsilon(1) \\
Y(t=1, D(1)=0) &= \alpha + \pi(1)X + \mu + \epsilon(1) \\
Y(t=0, D(1)=1) &= \alpha + \pi(0)X + \theta + \epsilon(0) \\
Y(t=0, D(1)=0) &= \alpha + \pi(0)X + \epsilon(0)
\end{aligned}
$$

2. Pooling treated ($D(1)=1$) and non-treated ($D(1)=0$) by period

$$
\begin{aligned}
t=1 : Y(1) &= \alpha + \pi(1)X + \theta D(1) + \mu + \beta D(1) + \epsilon(1) \\
t=0 : Y(0) &= \alpha + \pi(0)X + \theta D(1) + \epsilon(0)
\end{aligned}
$$

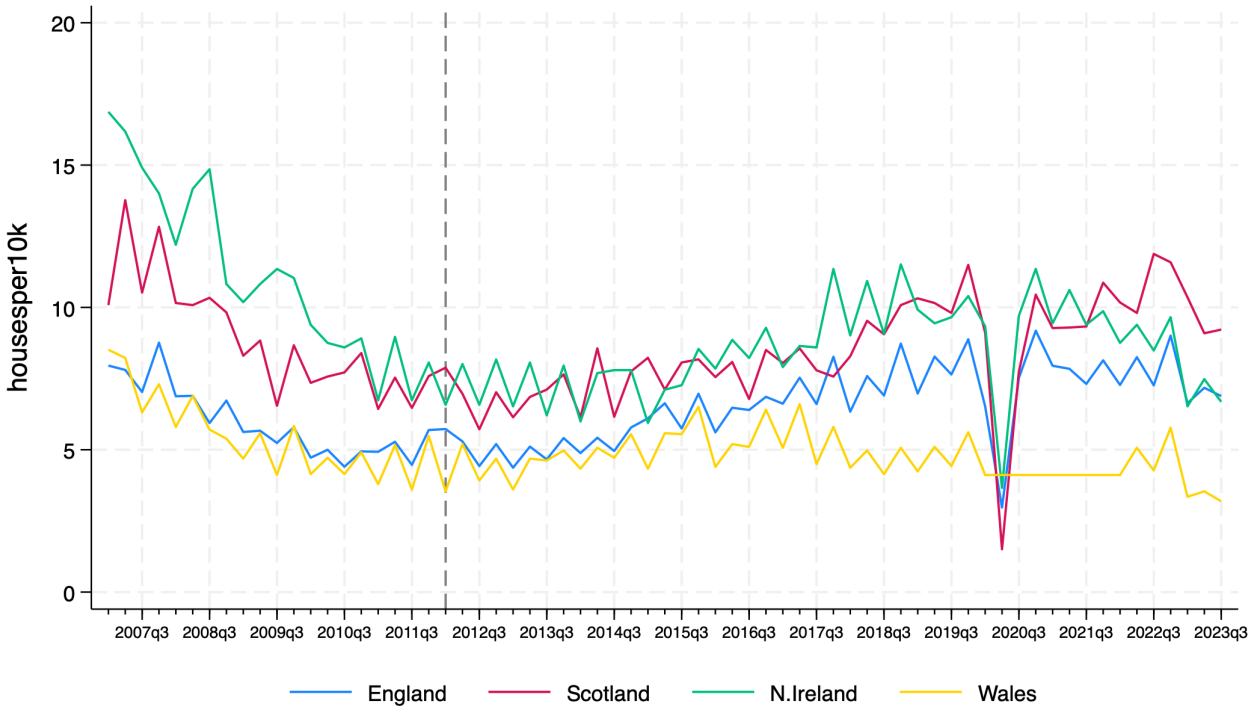
3. Pooling the 2 periods

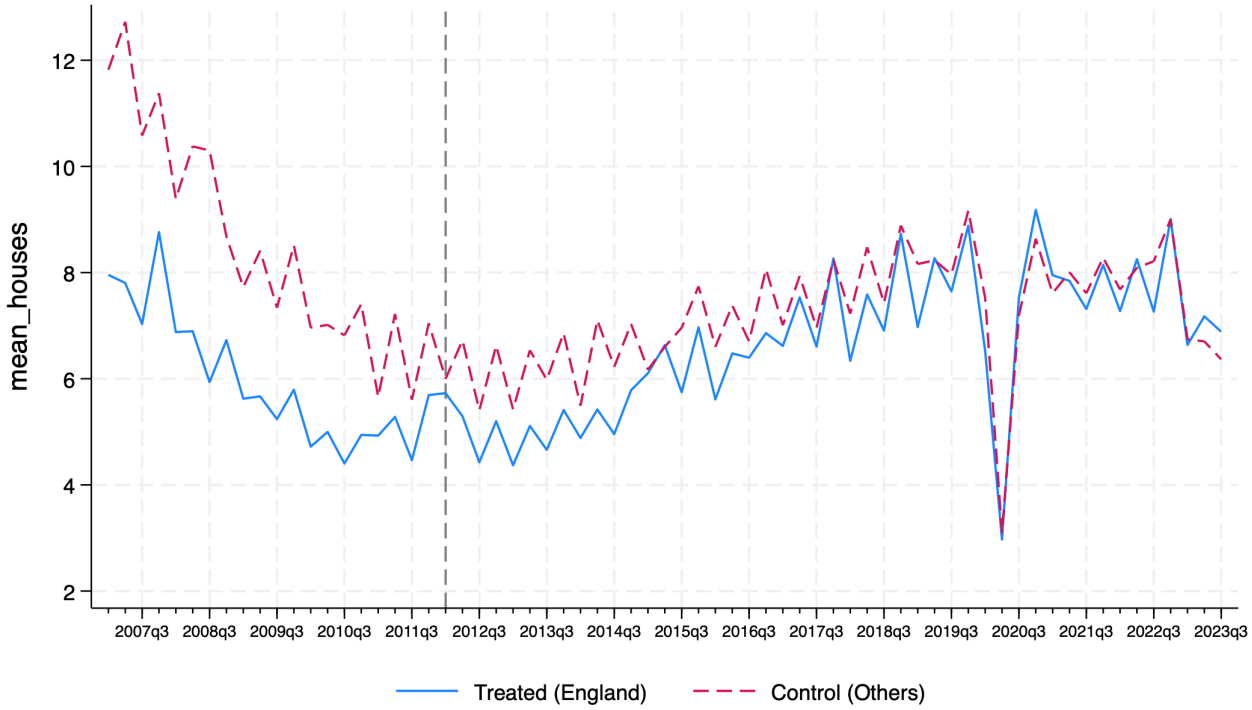
$$
\begin{aligned}
Y(t) &= \alpha + \pi(1)X \cdot t + \pi(0)X \cdot (1-t) + \theta D(1) + \mu \cdot t + \beta D(1) \cdot t + \epsilon(1) \\
Y(t) &= \alpha + \pi_0 X + \pi_{10} X \cdot t + \theta D(1) + \mu \cdot t + \beta D(1) \cdot t + \epsilon(0)
\end{aligned}
$$

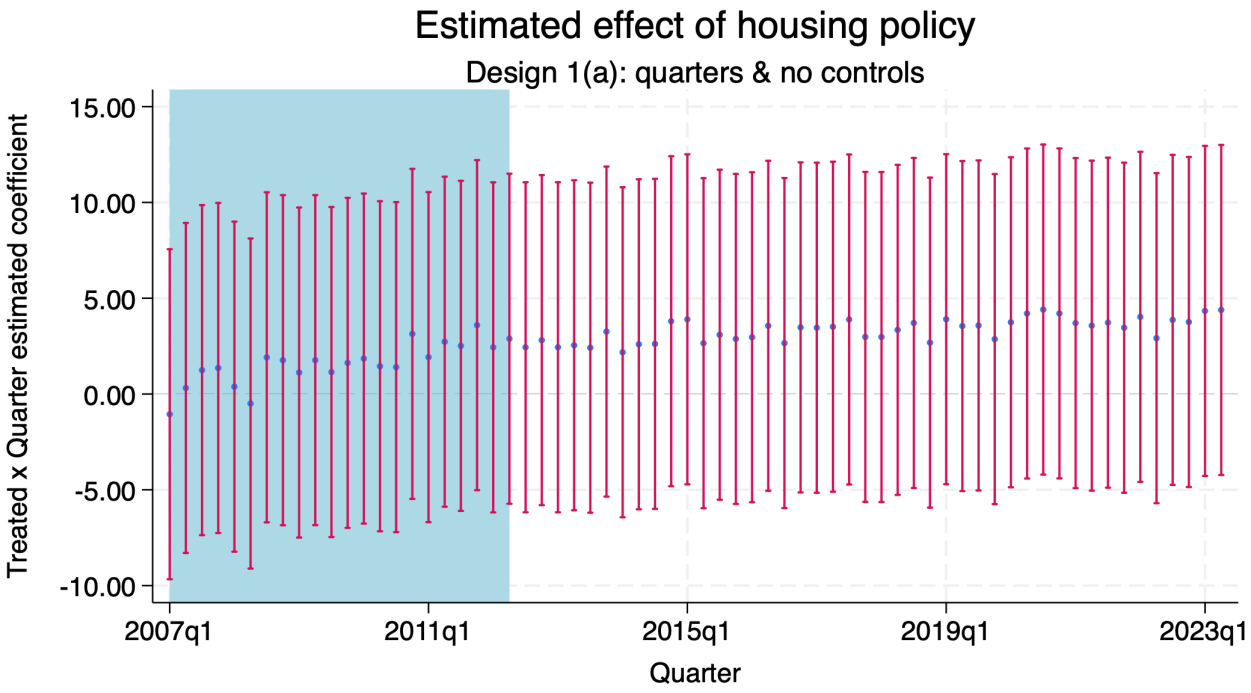
$\Rightarrow$ Estimation procedure: Stack data and regress $Y(t)$ on: ...

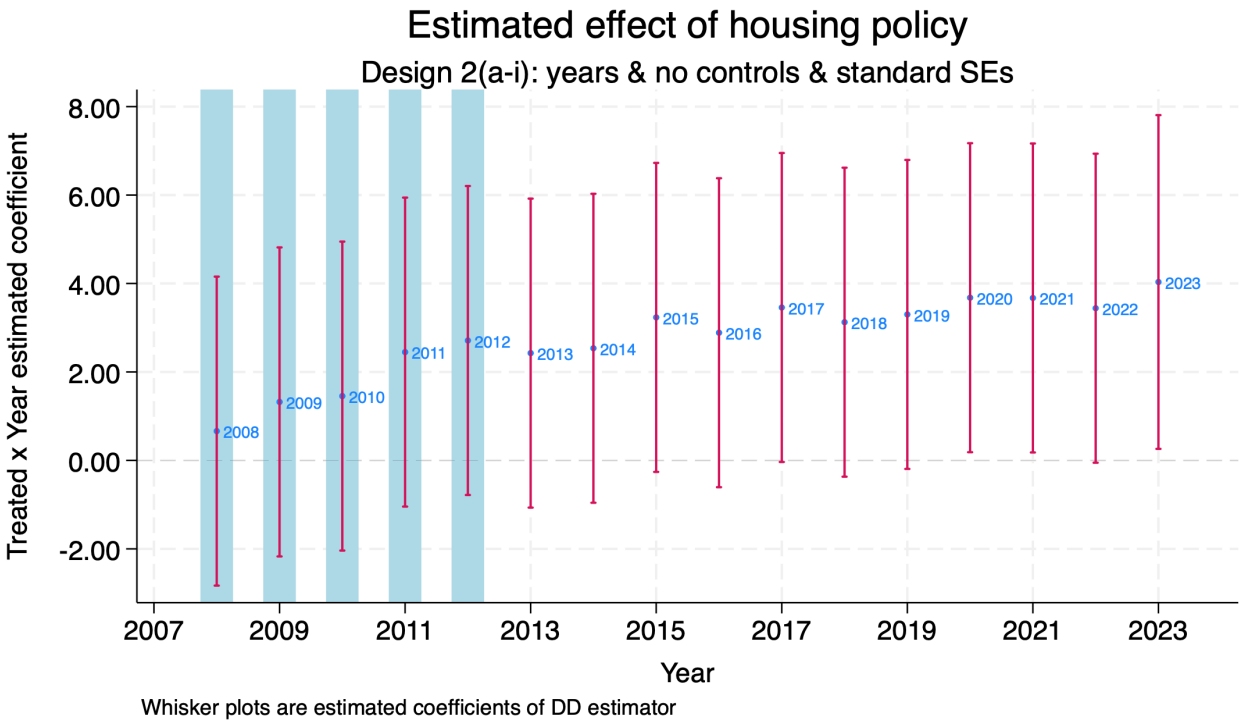
```
use "/Users/duongtrinh/Dropbox/GTA/ECON4004/GTA-ECON4004-Econometrics2/COMPUTER LAB 4/data/nsw_psid.dta"
des
generate dre = re78 - re75
regress dre if treated==1
ttest re78=re75 if treated==1
```

2 Empirical Example - Housing Policy






Estimated effect of housing policy
Design 1(a): quarters & no controls
Treated x Quarter estimated coefficient
15.00
10.00
5.00
0.00
-5.00
-10.00
2007q1
2011q1
2015q1
2019q1
2023q1
Quarter
Whisker plots are estimated coefficients of DD estimator


Estimated effect of housing policy
Design 2(a-i): years & no controls & standard SEs
Treated x Year estimated coefficient
8.00
6.00
4.00
2.00
0.00
-2.00
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2007
2009
2011
2013
2015
2017
2019
2021
2023
Year
Whisker plots are estimated coefficients of DD estimator