

Panel data analysis: Homework 1

Trinity Term 2016

In this homework, you will carry out the diff-in-diff analysis implied by Table XII of John Snow's *On the communication of cholera* (1855), which is reproduced on the next page.¹ The goal is to understand the various versions of diff-in-diff and the data structures required for each.

In 1852, the Lambeth Company moved its intake from Hungerford Bridge (near Westminster) to Thames Ditton, 22 miles upstream. Snow informally uses a diff-in-diff to argue that this change (and, more generally, clean water) reduced the risk of death from cholera.

1. Create a panel dataset based on the table. Each row should be a subdistrict-year.
2. Estimate the effect of the Lambeth Company's move (point estimate only) using the **group means version** of diff-in-diff.
3. State in words the *parallel trends assumption* that must be employed here. Is it likely to hold? Under what circumstances might it be problematically violated? What data would be necessary to assess it?
4. Estimate the diff-in-diff (point estimate and standard error) using the **interactions version** with and without clustered standard errors.
5. What is the argument for using clustered standard errors in the above analysis?
6. Estimate the diff-in-diff using the **least squares dummy variable version**, with and without clustering by sub-district.
7. Now estimate the diff-in-diff using the **fixed effects version**, with and without clustering by sub-district.
8. Finally, estimate the diff-in-diff using the **first-differences version**.

¹The book is available on Google Books.

TABLE XII.

Sub-Districts.	Deaths from Cholera in 1849.	Deaths from Cholera in 1854.	Water Supply.	
St. Saviour, Southwark .	283	371	Southwark & Vauxhall Company only.	
St. Olave	157	161		
St. John, Horsleydown .	192	148		
St. James, Bermondsey .	249	362		
St. Mary Magdalen . . .	259	244		
Leather Market	226	237		
Rotherhithe*	352	282		
Wandsworth	97	59		
Battersea	111	171		
Putney	8	9		
Camberwell	235	240		
Peckham	92	174		
Christchurch, Southwark	256	113		Lambeth Company, and Southwark and Vauxhall Compy.
Kent Road	267	174		
Borough Road	312	270		
London Road	257	93		
Trinity, Newington . . .	318	210		
St. Peter, Walworth . . .	446	388		
St. Mary, Newington . . .	143	92		
Waterloo Road (1st) . . .	193	58		
Waterloo Road (2nd) . . .	243	117		
Lambeth Church (1st) . . .	215	49		
Lambeth Church (2nd) . . .	544	193		
Kennington (1st)	187	303		
Kennington (2nd)	153	142		
Brixton	81	48		
Clapham	114	165		
St. George, Camberwell	176	132		
Norwood	2	10	Lambeth Company only.	
Streatham	154	15		
Dulwich	1	—		
Sydenham	5	12		
First 12 sub-districts . .	2261	2458	Southwk. & Vauxhall.	
Next 16 sub-districts . .	3905	2547	Both Companies.	
Last 4 sub-districts . . .	162	37	Lambeth Company.	