

Applying Panel Data Methods to Other Data Structures

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Motivation

- ▶ Panel data methods can be used with data structures that do not involve time
- ▶ Hierarchical data structures contain clusters of observation which share common characteristics
- ▶ When these characteristics are unobservable and correlated with other explanatory variables, pooled OLS will give us estimates that are biased and inefficient

Motivation

- ▶ Consider a geographical dataset that observes variables for small areas (in this case MSOAs, or Middle Layer Super Output Areas)
- ▶ Each small area belongs to a local authority
- ▶ If local authority attributes that we cannot observe affect our other variables, we will get biased and inefficient estimates using OLS

Pooled OLS

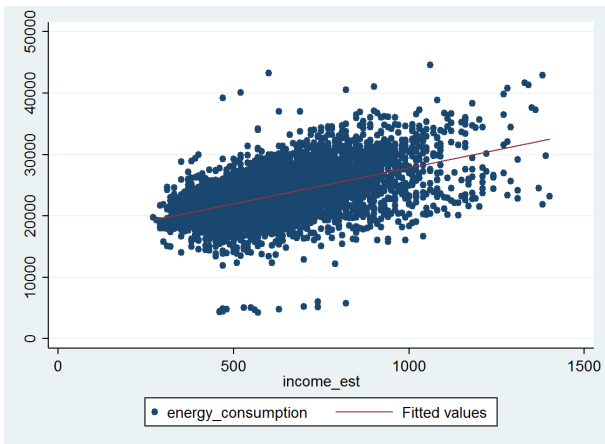
```
reg energy_consumption income_est
outtex, file(ols.tex) labels level detail legend key(stab) replace
est store ols
```

Table : Estimation results : regress

Variable	Coefficient	(Std. Err.)
income_est	11.681**	(0.222)
Intercept	16142.067**	(139.382)
N	7133	
R ²	0.28	
F _(1,7131)	2766.551	
Significance levels : † : 10% * : 5% ** : 1%		

Pooled OLS

```
graph twoway (scatter energy_consumption income_est) ///  
(lfit energy_consumption income_est)
```



Fixed Effects

```
xtset LA_CODE MSOA_CODE
xtreg energy_consumption income_est, fe
outtex, file(fe.tex) labels level detail legend key(stab) replace
est store fe
```

Table : Estimation results : xtreg

Variable	Coefficient	(Std. Err.)
income_est	20.111**	(0.237)
Intercept	11040.143**	(145.751)
<hr/>		
N	7133	
R ²	0.516	
F _(376,6756)	7201.692	
<hr/>		
Significance levels :	† : 10%	* : 5% ** : 1%

Fixed Effects

```
xi: regress energy_consumption income_est i.LA_CODE
predict energy_consumption_fitted
separate energy_consumption, by(LA_CODE)
separate energy_consumption_fitted, by(LA_CODE)
graph twoway (scatter energy_consumption1-energy_consumption80 income_est) /// (line energy_consumption_fit
income_est), legend(off)
```

