Subsampling

Cleaned and matched space heat demand and energy prices panel dataset

Years: 2007-2019, N = 2,718,246 (annual billing observations)

- Create a random stratified sub-sample by energy carrier group
- N = 400 buildings per energy carrier group (Gas, oil, district heating)

Stratified random subsample of space heat demand and energy prices panel dataset

Years: 2007-2019, N = 8,031 (annual billing observations)

Bayesian regression analysis, Heterogeneity analysis

Bayesian Regression Analysis (Re-create models, based on stratified subsample)

Years: 2007-2019, N = 8,031

Single level structure models:

- ***b.1:*** Space heat demand as response variable (RV), energy price as only explanatory variable (EV) (approach mirrors ***m1.ols***).
- ***b.2:*** Adding additional EVs to ***b.1***; no grouping terms used (approach mirrors ***m2.ols***).

Multilevel structure models:

- ***bm.1:*** Space heat consumption as RV, only price as EV, building ID and year as multilevel grouping terms with varying intercepts.
- ***bm.2:*** Adding additional EVs to ***bm.1***, population density and heating surface EVs not included so that the model converges, building ID and year remain as multilevel grouping terms with varying intercepts.
- ***bm.2 Lagged:*** Model mirroring ***bm.2*** but using ln(price) from t-1 and not from t-0 as in the previous models.

Bayesian Regression Analysis (Investigate heterogeneity in price responsiveness)

Years: 2007-2019, N = 8,031

***Step 1: Graphical investigation of* heterogeneity**

- Scatterplots of ln(price) against ln(demand).
- Grouped by third variable to see if heterogeneity can be detected (EVs considered: Year, state, energy carrier group, degree days, heating surface, regional income, and regional retirement share).
- Scatterplots indicate no group-level heterogeneity for all variables investigated except for energy carrier group.

Step 2: Regression with interaction term

- Construct model (***bm.3***) with interaction between ln(price) and energy carrier group.
- ***bm.3:*** Model mirroring ***bm.2*** which is extended by an interaction term between ln(price) and energy carrier group.