ProblemSet5

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Data

There are two markets in this problem set: 2007 and 2008. There are 45 buyers and 45 targets in market 2007, and there are 54 buyers and 54 targets in market 2008. In each market, I need to compare 'observed' matches and 'counterfactual' matches. Therefore, in the new dataset df_match and df_match2, there are 2,421 unique comparisons.

Model 1

The first payoff function has the form

$$f_m(b,t) = x_{1bm}y_{1tm} + \alpha x_{2bm}y_{1tm} + \beta distance_{btm} + \varepsilon_{btm} \tag{1}$$

Therefore, the maximum score objective function is

$$Q(\alpha,\beta) = \sum_{m\in M}\sum_{i\in U_m}\sum_{j\in U_m\setminus i} 1[(f_{\alpha,\beta}(i,i) + f_{\alpha,\beta}(j,j)) > (f_{\alpha,\beta}(i,j) + f_{\alpha,\beta}(j,i))] \tag{2}$$

As ε_{btm} is independent across matches, so it can be eliminated in the inequation

For model 2, the first payoff function is

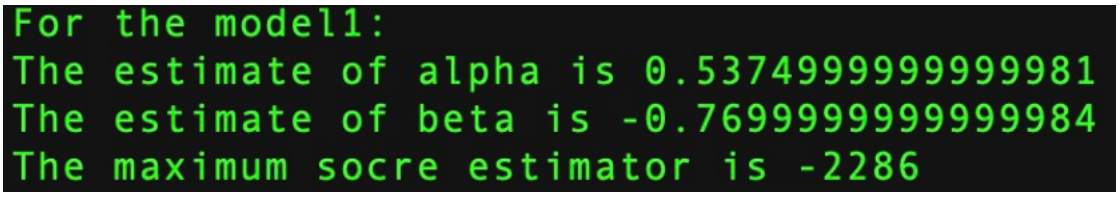
$$f_m(b,t) = \delta x_{1bm}y_{1tm} + \alpha x_{2bm}y_{1tm} + \gamma HHI_t m + \beta distance_{btm} + \varepsilon_{btm} \tag{3}$$

Therefore, the maximum score objective function is

$$Q(\delta,\alpha,\gamma,\beta) = \sum_{m\in M}\sum_{i\in U_m}\sum_{j\in U_m\setminus i} 1[(f_{\delta,\alpha,\gamma,\beta}(i,i) + f_{\delta,\alpha,\gamma,\beta}(j,j)) > (f_{\delta,\alpha,\gamma,\beta}(i,j) + f_{\delta,\alpha,\gamma,\beta}(j,i))] \tag{4}$$

Result

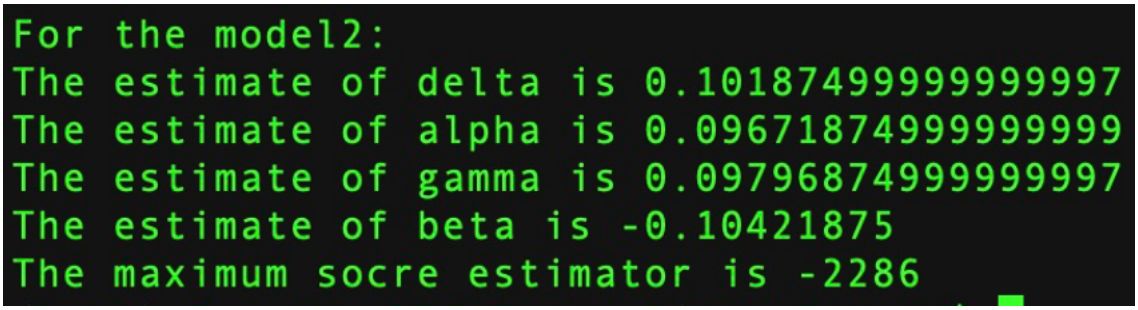
The result for model 1 is



This means that from all the 2,421 comparisons, my model estimates 2286 comparisons correctly. The estimated model is

$$f_m(b,t) = x_{1bm}y_{1tm} + 0.54x_{2bm}y_{1tm} - 0.77distance_{btm} + \varepsilon_{btm} \tag{5}$$

The result for model 1 is



This means that from all the 2,421 comparisons, my model estimates 2286 comparisons correctly. The estimated model is

$$f_m(b,t) = 0.1x_{1bm}y_{1tm} + 0.1x_{2bm}y_{1tm} + 0.1HHI_tm - 0.1distance_{btm} + \varepsilon_{btm} \tag{6}$$