Problem Set #4

This problem set focuses on radio station mergers. More precisely, we want to know whether an array of explanatory variables (number of stations owned, population...) have an impact on the value of the mergers. The method of estimation used is the maximum score estimator (MSE), which is a technique that incorporates revealed utility from the agents and keeps "score" of the frequency in which the merger happens due to a higher utility obtained over any alternative merger. To do so, we use an indicator function

$$I[f(b,t) + f(b',t') > f(b,t') + f(b',t)] \tag{1}$$

where the indicator function I is equal to 1 if the inequality holds true, 0 otherwise. For the first estimation, we use the payoff function

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

where x_{1bm} is the number of stations owned by the parent company; y_{1tm} is the population in range of the target in market m; x_{2bm} is an indicator for corporate ownership; $distance_{btm}$ is the distance in miles between the buyer and the target; ϵ_{btm} is the error term. The second payoff function to use for the second estimation is,

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

where HHI_{tm} is the Hindahl-Hirschman Index measuring market concentration in location of the target in market m. In a similar fashion to how Akkus, Cookson, and Hortacsu (2016) estimated their model, the MSE estimator we have is

$$\hat{\beta} = \text{argmax } Q(\beta) = \sum_{y=1}^{Y} \sum_{b=1}^{M_y-1} \sum_{b'=b+1}^{M_y} I[f(b,t|\beta) + f(b',t'|\beta) \geq f(b',t|\beta) + f(b,t'|\beta)]$$

where $Q(\beta)$ is the objective function we want to maximize; y is the year; Y is the total number of years; b is the buyer; t is the target; M_y is the number of mergers; b' is the counterfactual buyer; t' is the counterfactual target.

We would expect to get a positive coefficient on the number of stations owned by the parent company, as a larger company that has more stations would be more inclined to value the merger higher thus get involved in the merger, due to having more experience and efficiency in terms of maintaining its operations; also a positive coefficient on the population since more populated areas would attract more businesses; positive coefficient on corporate ownership as those companies would be more organized and prepared for any possible mergers; and a negative coefficient on the distance between the buyer and the target since it would be easier for a merger to occur between a buyer and a target who are closer to each other.

My results from the first estimation are,

$$\hat{f}_m(b,t) = x_{1bm}y_{1tm} + 0.39 * x_{2bm}y_{1tm} - 0.97 * distance_{btm} + \epsilon_{btm} \tag{4}$$

hence the interaction, corporate ownership and population in range of target is positively associated with the value of the merger. This makes sense as corporate ownership would drive the value of the merger up; and the target being located in a location with a higher population would also drive the value of the merger up since it gives the buyer the opportunity to operate in a more populated environment which is typically desired for businesses. Having higher distance between the buyer and the target has a negative impact on the value of the merger. This also makes sense as it is easier for a merger to take place if the buyer and the target are closer to each other.

My results from the second estimation are,

$$\hat{f}_m(b,t) = 0.11 * x_{1bm}y_{1tm} - 0.06 * x_{2bm}y_{1tm} - 0.07 * HHI_{tm} + 0.70 * distance_{btm} + \epsilon_{btm} \tag{5}$$

which implies that the interaction, number of stations owned by the parent company and

population in range of target and the value of the merger is positively associated and that the coefficient is less than 1 in magnitude, which is what we had in our previous estimation. We now have a negative association between the interaction, corporate ownership and population in range of target and the value of the merger. Market concentration has a negative impact on the value of the merger. This implies that mergers tend to expand towards less dense markets. The coefficient on distance is positive. This could indicate that due to companies trying to expand towards different locations, they value targets that are distant relatively higher.