ECON 815 - Problem Set 4

Destan KIRIMHAN

(Explaining the code and making the interpretation.)

In order to create a dataframe with all the variables in the payoff function, one has to take the natural logarithm of the variable as a first step. Number of radio stations and market concentration are represented in their natural log versions. Also, prices and population are represented in their natural logarithm values of thousands dollars and persons.

As the second step, the corresponding variables for the observed matches are calculated to be used in the payoff function. As a third step, here one has to define two different but with the similar logic functions to calculate the distance between the observed pairs and counterfactual matches.

As a fourth step, the dataset is split into two years with regards to the two markets in two years. The corresponding payoff function values are calculated separately for these years.

As a final step, one has to loop over the already defined two markets and construct the final data frame to be used in calculating the payoff function values and comparing the inequalities. As noted in the code, arrays are defined to store the variables for all the comparisons specific for each year. There is a need for a function, which is defined outside of the loop to obtain the two dataframes, 2007 and 2008. Then, two dataframes are combined together, which resulted in the final data frame to do the comparisons.

Interpretation of Results

The results of maximum score estimation, which are found via NelderMead method, are interpreted here. For the first model, the results are presented as follows:

$$f_m(b,t) = x_{1bm}y_{1tm} + 7.375x_{2bm}y_{1tm} - 11.7distance_{btm} + \epsilon_{btm}$$

The interaction of buyer corporate ownership and target population is positively associated with the merger payoff. However, the reverse is true for the distance between buyer and target since it is negatively associated with the merger payoff. Second, since the coefficient of the first variable, size is normalized to 1, the other coefficients can only be interpreted as the relative effect rather than the absolute effect. Thus, buyer corporate ownership and distance are more crucial than the size of the buyer in determining the value of the merge between radio stations. Therefore, the weight of corporate ownership of the buyer is approximately 7.38 times more than that of the buyer size. For the geographic distance, this weight is about 12 times more. Since the price effects are not incorporated into the model, the marginal effects are not going to be interpreted here. But for the second model, this will make more sense. For model 2, the estimated model is:

$$f_m(b,t) = 11.855x_{1bm}y_{1tm} + 38x_{2bm}y_{1tm} + 15.1HHI_{tm} - 99.46distance_{btm} + \epsilon_{btm}$$

Coefficient on the size of the buyer suggests that size match is a crucial element for the merger value (note that the interaction is positive).By looking at the second coefficient, we can say that when the buyer has corporate ownership and the target size gets bigger, the merger value increases. Also, the coefficient on HHI reveals that market concentration of target is positively associated with the merger value.

Distance has the same effect as in model 1 since it is the most crucial determinant of the merger value. Now, we are able to interpret the coefficients as marginal effects on merger value in terms of dollars. A one unit increase in x_{1bm} y_{1tm} will increase the merger value by $e^{11.86}$ times 1000 dollars since the price is scaled as the natural logarithm of price over a thousand dollars. For the second variable, a one unit increase in x_{2bm} y_{1tm} will lead to an increase in merger value by e^{38} times 1000 dollars. A one unit increase in market concentration of target (HHI) will increase the merger value by $e^{15.1}$ times 1000 dollars. Lastly, a one-unit increase in the distance will cause $e^{99.46}$ times 1000 dollars increase in the merger value.