
Problem Set # 4
Maximum Score Estimation

The given model is a one-to-one matching market representing radio station mergers. There is a national market for each year (2007 and 2008) where radio station owners target new stations.

The payoff to the merger between radio station buyer b and target t in market m is given by,

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

Here, x_{1bm} is the number of stations owned by the parent company and y_{1tm} is the population in range of the target in market m , x_{2bm} is an indicator for corporate ownership, and $distance_{btm}$ is the distance (mile) between the buyer and target. Here, our maximum score function will look like as below,

$$Q_1 = \sum_{m=1}^m \sum_{b=1}^{M_m-1} \sum_{b'=b+1}^{M_m} 1[x_{1bm}y_{1tm} + \alpha x_{2bm}y_{1tm} + \beta x_{1bm}y_{1tm} + distance_{btm} + x_{1b'm}y_{1t'm} + \alpha x_{2b'm}y_{1t'm} + \beta x_{1b'm}y_{1t'm} + distance_{b't'm} \geq x_{1bm}y_{1t'm} + \alpha x_{2bm}y_{1t'm} + \beta x_{1bm}y_{1t'm} + distance_{bt'm} + x_{1b'm}y_{1tm} + \alpha x_{2b'm}y_{1tm} + \beta x_{1b'm}y_{1tm} + distance_{b'tm}]$$

The estimation result,

Table 1: Maximum Score Estimates for Match Value Function(Q_1)

Variables	Estimates
Population range of target*Corporate Ownership	0.4375
Distance between buyer and target	-0.125

The result shows that the buyers with corporate ownership values the radio station with higher population more and the payoff size drops as the distance between buyer and target increase which indicates a concentrated market. Now, we can expect that buyers with corporate ownership is associated with a \$0.4375 million increase in the effect of an additional target radio station with one million more population on merger match value. For distance, we expect the merger match value to drop by 0.125 for an additional mile in the distance

between buyer and target. Here, we got 93.39 percent satisfied inequality.

Now, we consider the following payoff function,

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

Here, HHI_{tm} is the Hindahl-Hirschman Index measuring market concentration in the location of the target in market, m. Now, our maximum score function will look like as below,

$$Q_2 = \sum_{m=1}^m \sum_{b=1}^{M_m-1} \sum_{b'=b+1}^{M_m} 1[\{(\delta x_{1bm} y_{1tm} + \alpha x_{2bm} y_{1tm} + \gamma HHI_{tm} + \beta distance_{btm}) - (\delta x_{1bm} y_{1t'm} + \alpha x_{2bm} y_{1t'm} + \gamma HHI_{t'm} + \beta distance_{bt'm}) \geq (P_{bt} - P_{b't'})\} \& \{(\delta x_{1b'm} y_{1t'm} + \alpha x_{2b'm} y_{1t'm} + \gamma HHI_{t'm} + \beta distance_{b't'm}) - (\delta x_{1b'm} y_{1tm} + \alpha x_{2b'm} y_{1tm} + \gamma HHI_{tm} + \beta distance_{b'tm}) \geq (P_{b't'} - P_{bt})\}]$$

Here, P_{bt} and $P_{b't'}$ are the price paid in the actual mergers.

The estimation result,

Table 2: Maximum Score Estimates for Match Value Function (Q_2)

Variables	Estimates
Buyer's parent company's radio station number*Population range of target	0.9702135
Corporate Ownership*Population range of target	0.0413125
HHI	0.05164063
Distance between buyer and target	0.0490625

Here, the result is little different from the one without using price. Table 2 shows that the buyers with higher stations owned by the parent company values radio station with higher population range more, more specifically, we can expect that one station increase in the buyer's parent company's radio station number is associated with \$0.97 million increase in the effect of an additional radio station with one more million people. For corporate ownership, we can expect that buyers with corporate ownership is associated with a \$0.4131 million increase in the effect of an additional target radio station with one million more population on merger match value. The result indicates that we can expect the merger match value to increase by 0.0516 for an additional unit of Hindahl-Hirschman Index. Lastly, we can expect the merger match value to increase by 0.049 for an addition mile in the distance between the buyer and the target. Here, we got 0.021 percent satisfied inequality.