Keio Business School

Price Competition Game

This game is designed for players to experience how prices change when there is price competition, and how companies participating in price competition behave. Similar to the "Setting the Price of a Special Mixed Gas," this game assumes the following situation.

The game is played in groups of 3–7 players. If there are eight or more participants, please divide them into multiple groups. The ideal number of players in each group is 4–6. During the game, each group represents a single industry, and the players in that group represent companies in the industry.

Players engage in price competition within their respective group (industry). Each industry is competing in the market for special mixed gas, and each company determines the price of its own product. A company's profit margin equals its price less a unit cost of 80 yen. The price each company sets determines its market share, which determines its profit. Market share and profit are determined as follows.

1. First, each company declares the current price of its own product. Any industry-accepted practice can be used to declare prices, including players submitting their prices in writing, each player taking turns to state their price, or all players yelling out their prices at once on the count of three.

2. Calculate the simple average of the declared prices.

3. Any company that has declared a price exactly equal to the average shall receive the average market share. This is 25% if there are four companies in the industry, 20% if there are five companies, or 16.7% if there are six companies. As for other companies, for each 1 yen lower than the average price, their market share shall rise 2 percentage points. Conversely, for each 1 yen higher than the average price, their market share shall fall 2 percentage points.

For example, suppose there are five companies in the industry, and their declared prices are as follows:

Company A: 110 yen, Company B: 105 yen, Company C: 100 yen, Company D: 95 yen, Company E: 90 yen.

The average price equals 100 yen, and each company's market share is as follows:

Company A: 0%, Company B: 10%, Company C: 20%, Company D: 30%, Company E: 40%.

If there is a large variation in declared prices, this method of calculation could result in companies with a negative market share. In this case, market shares would need to be adjusted. Please refer to the note at the end of this document.

4. Next, calculate each company's profit margin. Profit margin equals the declared price less the 80-yen unit cost. Using the example above, profit margins are as follows:

   Company A: 30 yen, Company B: 25 yen, Company C: 20 yen, Company D: 15 yen, Company E: 10 yen.

5. Calculate each company's profit. Profit equals market share (percentage value) multiplied by that company's profit margin (yen). Using the example above, profits are as follows:

   Company A: 0, Company B: 250, Company C: 400, Company D: 450, Company E: 400.

While it is possible to obtain an accurate magnitude of profit by aligning the unit of profit according to the setting in the case study, such calculations are not necessary to achieve the objective of this game. Round 1 of the game can therefore be concluded at this point.

6. Round 1 of the price competition concludes once steps 1–5 are complete. Based on these results, move on to the next round, keeping in mind that the objective of each company is to maximize its own profit.

   For instance, using the example above, suppose that Company A and Company B change their declared prices as follows:

   Company A: 100 yen, Company B: 102 yen, Company C: 100 yen, Company D: 95 yen, Company E: 90 yen.

The average price would now be 97.4 yen, and each company's market share would be as follows:

Company A: 14.8%, Company B: 10.8%, Company C: 14.8%, Company D: 24.8%, Company E: 34.8%.

Their respective profits would be as follows:
Company A: 296, Company B: 237, Company C: 296, Company D: 372, Company E: 348.

Compared to the profits in step 5, Company A's profit has recovered, while Company B's profit has not changed all that much. The profits of Companies C, D and E have each decreased, although they have not changed their prices.

Following this outline, repeat the above steps for as many rounds as you like. Try for at least three rounds. While the first round may take about 15 minutes to complete, each round will gradually get quicker as you get used to the process. For your own reference, make notes of how the average price changes in each round. This will be the topic for class discussion.

Note: If the calculations in step 3 result in companies with a negative market share, please make the following adjustments.
Starting from the company with the lowest declared price, establish their respective market shares as per the calculations in step 3. However, if the running total of the individual market shares exceeds 100%, set that company's market share so that the total equals exactly 100%. For any companies with a declared price higher than this, set their market share at 0%.

For example, suppose the declared prices of five companies are as follows:
Company A: 115 yen, Company B: 108 yen, Company C: 100 yen, Company D: 92 yen, Company E: 85 yen.
The average price would be 100 yen, and according to the calculations in step 3, each company's market share would be as follows:
Company A: -10%, Company B: 4%, Company C: 20%, Company D: 36%,
Company E: 50%.

Starting from the company with the lowest declared price, the market shares of Companies E and D are set because the running total does not exceed 100%. However, if we were to add Company C's market share of 20%, the total would exceed 100%. Therefore, we adjust this company's share to 14% so that the total equals exactly 100%. The running total is now 100%, so we adjust the market shares of the remaining companies (A and B) to zero. This gives us the following adjusted market shares:
Company A: 0%, Company B: 0%, Company C: 14%, Company D: 36%, Company E: 50%.

At the point the running total exceeds 100%, if there are multiple companies with the same declared price, they should be given equal market shares so that the total equals exactly 100%.

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