Oligopoly as a coalitional game

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> "The difficult problem that arises from the relations of a very small number of competing firms has been much studied in recent years, but there has not yet developed any very close agreement on the solution."
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> – John R Hicks (1935, p.12)

Strategic games

Mainstream (Cournot/Bertrand) oligopoly theory assumes:

- Prices exist in and out of equilibrium.
- Oligopolists have a priori market power.
- Oligopolists have very limited trading possibilities with each other, and cannot create explicit cartels or mergers.

Coalitional games

- Shitovitz (1973) and Gabszewicz and Mertens (1971)
- Kaneko (1978)

The C3-game:
consumer-wise competitive coalitional game

An oligopoly as a coalitional game, where coalitions may consider only consumer-wise competitive allocations. In such allocations, prices exist for every realized good, and every consumer maximizes his utility within his budget set.

- Like in mainstream theory: prices exist in and out of equilibrium.
- Market power is not a priori assigned.
- No limitation on cooperation among oligopolists is imposed.

The model may predict:
- Extent of market power.
- When collusion among oligopolists is sustainable.

The worse than JPM outcome paradox

JPM = joint profit maximization.

Theorem 1 The core of a C3-game never contains an allocation that is Pareto dominated by a JPM outcome.

On the other hand Cournot and Bertrand often predict outcomes that are dominated by the unique JPM outcome.

Competitive price equilibria

Theorem 2 Any competitive equilibrium allocation is a member of the core of the C3-game.

There are often many other core outcomes, in addition to the competitive one.

Shapley-Shubik (1969) oligopoly

The **consumers** all have a utility function:

$$U(y,x_1,\ldots,x_k)=y+\alpha\sum_i x_i-0.5(\sum_i x_i^2+2\gamma\sum_{i<j}x_i x_j),$$

where $\alpha>0$, $-(1/(k-1))<\gamma<1$.

There is a finite set of oligopolists F. Every oligopolist can produce some of the k goods, at no cost.

General properties of core outcomes

- Prices of all goods are identical.
- Prices always belong to a closed interval, with $p=0$ being the minimum price, and the maximum price is no higher than $p=\alpha/2$.
- The price interval may be computed using Shapley-Bondareva conditions on a Davis-Maschler reduced game, involving only the firms.

Monopoly

Textbook monopoly

Predicts that prices of all goods are identical. $p=\alpha/2$.

Core of 3c-game

Predicts that prices of all goods are identical, but $0 \leq p \leq \alpha/2$.

Symmetric oligopoly

k oligopolists each producing a different commodity.

Price range becomes smaller: $0 \leq p \leq \bar{p}$, $\bar{p} \leq \alpha/2$.

Model is not exposed to the worse than JPM outcome paradox.

When the k goods are complements or poor substitutes in the consumers' preferences the model predicts the same outcome like in monopoly, thus predicting endogenous merger or cartelization of the oligopolists.

Asymmetric duopoly

- k=2.
- One oligopolist can produce both goods.
- Other only one good.

The profit of the "weak" firm is zero. The maximum price of the two goods is determined by the utility of the consumer consuming only one good at zero price.

In strategic models prices of the two goods are different: prices are a mechanism to transfer surplus among the oligopolists.

Conclusions

- New ideas about oligopoly.
- Using existing game theoretic tools.
- Essentially every one-period oligopoly model can be re-modeled as a C3-game.
- May be useful for studying mergers, both horizontal and vertical.