The Role of Investment in Entry-Deterrence

(Avinash Dixit 1980)
References

- **Bain Sylos**: entrant assumes established firm doesn’t change production level so Stackelberg duopoly (sort of). Problems: predatory pricing – accommodating strategy

- **Schelling (1960)**: a costly threat can be credible

- **Spence (1977)**: an irrevocable investment decision by the incumbent could be a credible commitment
The model

- *post-entry rules are* **exogenous**

- First mover advantage: the incumbent firm can change the initial condition to improve its competitive position
Hypothesis

- Lags are ignored
- Sequential game in two steps (not repeated)
- Constant stream of profits
- Simplified production costs:

\[ C_i = f_i + w_i x_i + r_i k_i \]

- Revenue:

\[ R^i = (x_1, x_2) \]
Rules of the game (1)

- firm (1) choose \( k_1 \)

- if \( x_1 \leq k_1 \) total costs will be:
  \[ C_1 = f_1 + r_1 k_1 + w_1 x_1 \]

- if \( x_1 > k_1 \) total costs will be:
  \[ C_1 = f_1 + (w_1 + r_1) x_1 \]
firms (2) «buy» for any $x_2$ a productive capacity $k_2$:

$$C_2 = f_2 + (w_2 + r_2)x_2$$
Marginal cost and revenue curves firm (1)
Reaction function (kinked) firm (1)
post entry game eqilibria (1)
post entry game equilibria (2)

- If $\bar{k}_1 \leq T_1$ equilibrium T (Nash-Cournot)
- If $\bar{k}_1 \geq V_1$ equilibrium V (Nash-Cournot)
- If $T_1 \leq \bar{k}_1 \leq V_1$ firm (1) produces $x_1 = \bar{k}_1$ and firm (2) will act as a follower in Stackelberg
Classification of outcomes (1)

- Either firm (2) will enter or not, firm (1) will produce $x_1 = \bar{k}_1$

- Firms profit functions:

$$\pi_i(x_1, x_2) = R^i(x_1, x_2) - f_i - (w_i + r_i)x_i$$
Classification of outcomes (2)
Classification of outcomes (3)

- Case 1: \( \pi_2(T) < 0 \)
- Firm (2) doesn’t enter
- Firm (1) act as a monopolist with productive capacity and output \( M_1 \)
Classification of outcomes (4)

- Case 2: $\pi_2(V) > 0$
- Firm (1) cannot prevent entry
- Firm (1) will lock for the best duopoly equilibrium
Classification of outcomes (5)

Case 3: \( \pi_2(T) > 0 > \pi_2(V) \)

There is a point in TV, \( B = (B_1, B_2) \)
where \( \pi_2(B) = 0 \)

\( B_1 \) is a capacity level that can be considered a barrier to entry
Sub case i:

- $B_1 < M_1$ the optimal choice of the Incumbent / monopolist is enough to stop entry

- $B_1 > M_1$ firm (1) can deter entry only with a high capacity level compared with the one that a monopolist would choose.
Classification of outcomes (6)

- Sub case ii \( \pi_1(S) < \pi_1(B_1,0) \)
  it is better to deter entry choosing output in \( B_1 \)

- Sub case iii \( \pi_1(S) > \pi_1(B_1,0) \)
  it is better to allow entry
Conclusions

- An investment commitment can deter entry and change the initial conditions giving advantages to firm (1)
- Spence strategy not always possible (1977)
- Models has to adapted to real world