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 $\overline{k_1}$
- if $x_1 \le \overline{k_1}$ total costs will be:

$$C_1 = f_1 + r_1 \overline{k_1} + w_1 x_1$$

- if $x_1 > \overline{k_1}$ total costs will be:

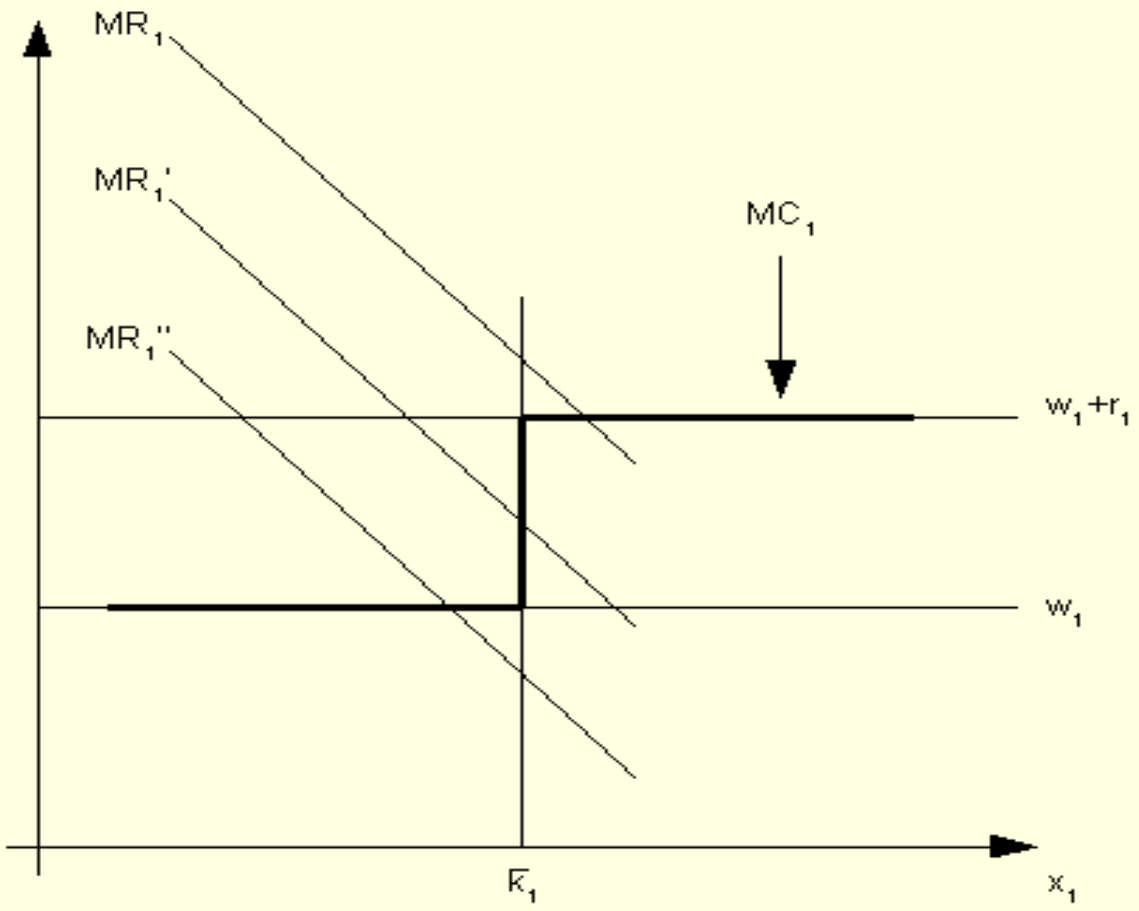
$$C_1 = f_1 + (w_1 + r_1) x_1$$

Rules of the game (2)

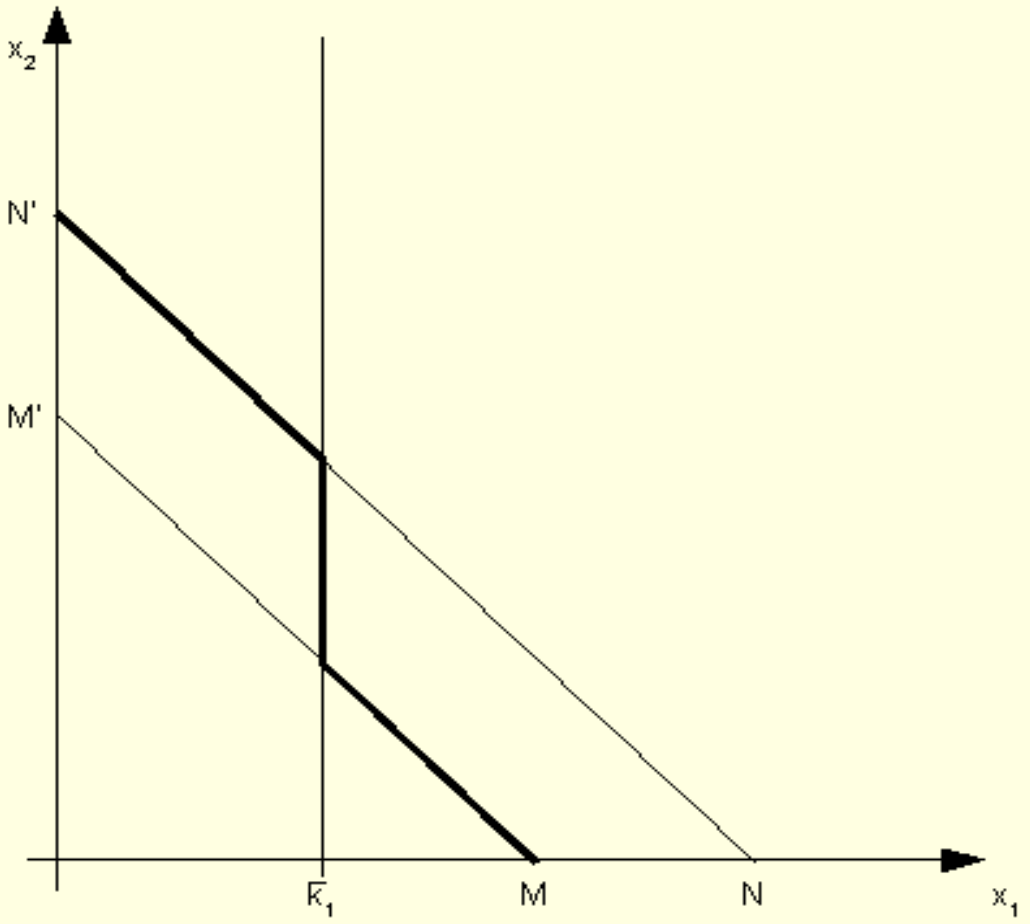
- firms (2) «buy» for any x_2 a productive capacity k_2:

$$C_2 = f_2 + (w_2 + r_2)x_2$$

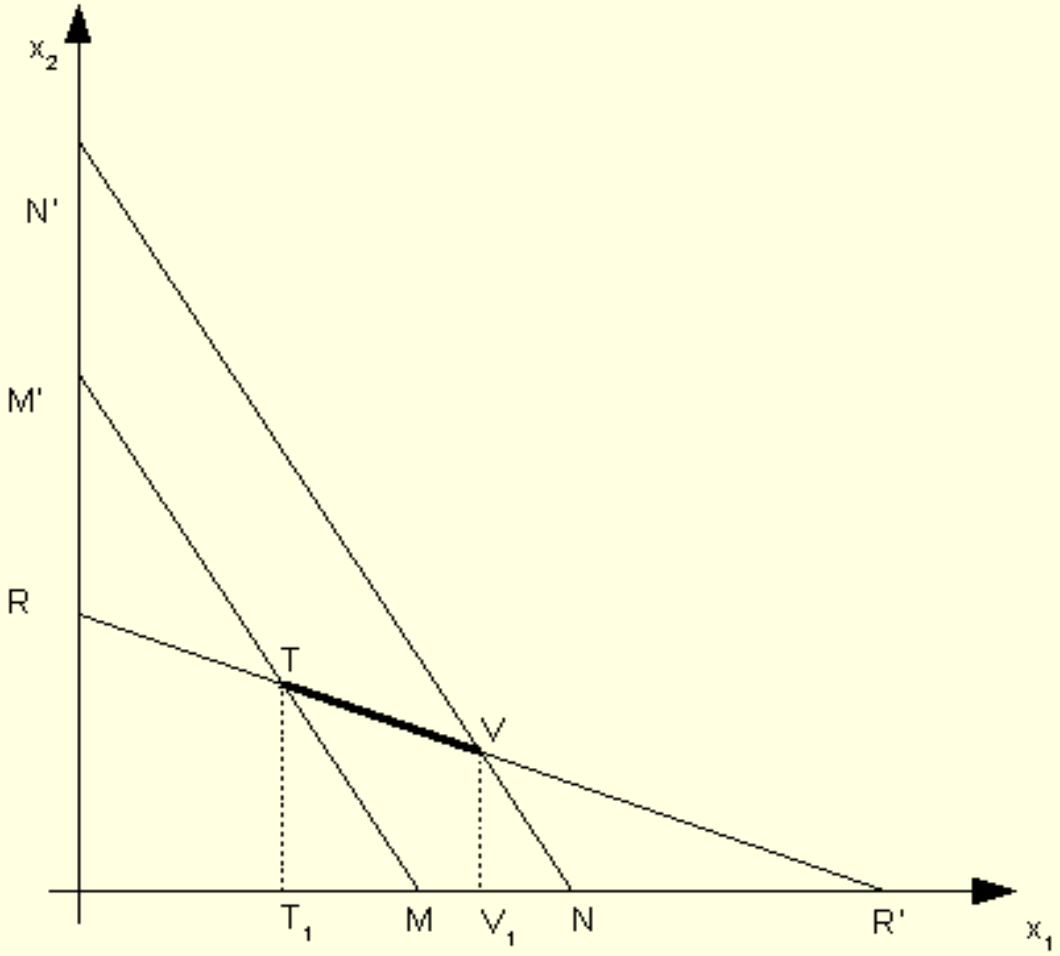
Marginal cost and revenue curves firm (1)



Reaction function (kinked) firm (1)



post entry game eqilibria (1)



post entry game equilibria (2)

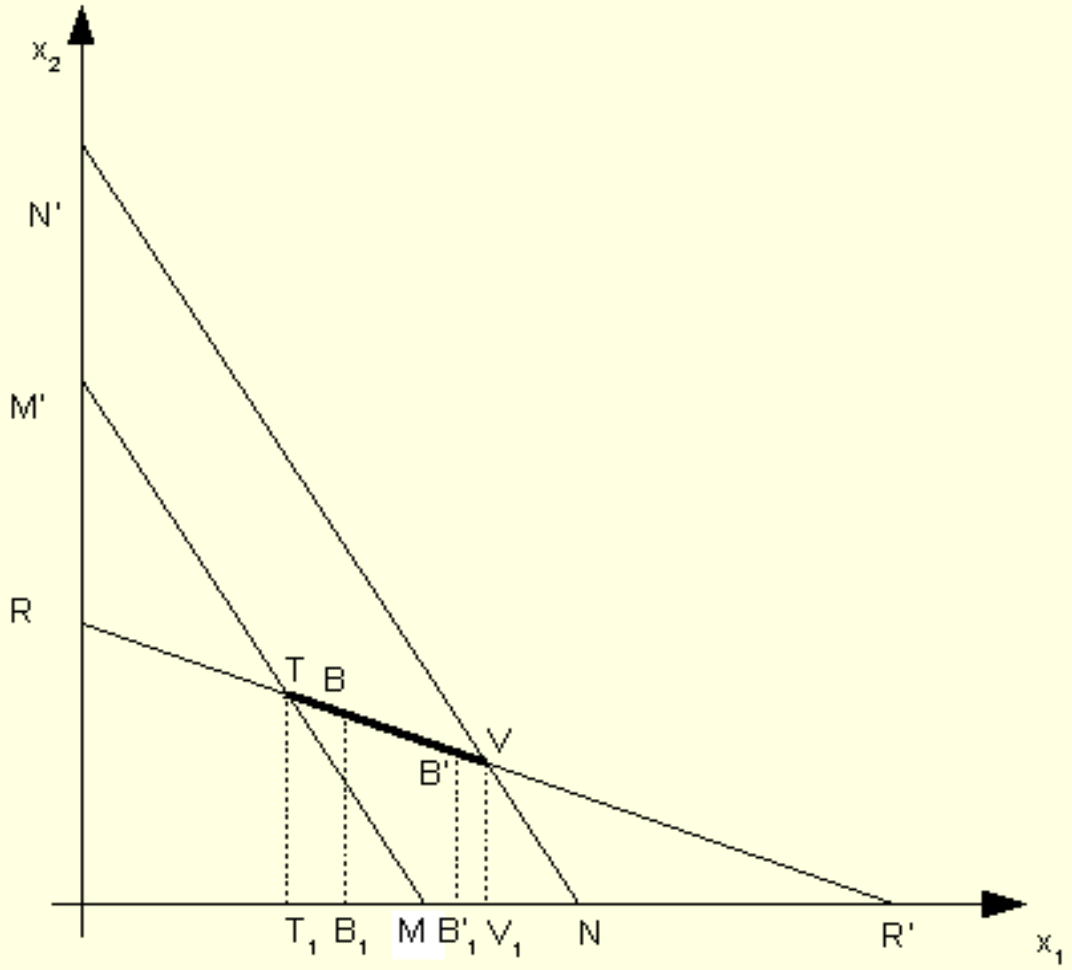
- If $\overline{k_1} \le T_1$ equilibrium T (Nash-Cournot)
- If $\overline{k_1} \ge V_1$ equilibrium V (Nash-Cournot)
- If $T_1 \le \overline{k_1} \le V_1$ firm (1) produces $x_1 = \overline{k_1}$ and firm (2) will act as a follower in Stackelberg

Classification of outcomes (1)

- Either firm (2) will enter or not, firm (1) will procuce $x_1 = \overline{k_1}$
- 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

Classification of outcomes (6)

- 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