REPEATED INTERACTION AND TACIT COLLUSION

Symmetric duopoly; each firm's profits per period if:
Non-cooperative (Nash) equilibrium – $\pi(N)$
Collusive joint profit maximization – $\pi(J)$
One firm plays collusive while other plays best response:
Cheater – $\pi(C)$; Sucker – $\pi(S)$
$\pi(C) > \pi(J) > \pi(N) > \pi(S)$

Prisoners' Dilemma:

		Firm 2	
		cooperate	not cooperate
Firm 1	cooperate	$\pi(J)$, $\pi(J)$	$\pi(S)$, $\pi(C)$
	not cooperate	$\pi(C)$, $\pi(S)$	$\pi(N)$, $\pi(N)$

Dominant strategies: Then in Nash equilibrium
each gets $\pi(N)$; worse for both than $\pi(C)$
How to cooperate? Promises not automatically credible
Ongoing relationship – risk of future collapse?

Fixed finite no. of repetitions don't work in theory
But works in practice except for last few periods

Infinite and indefinite repetition:

Infinite repetition. Grim trigger strategy:
Attempt to cooperate collapses if any cheating occurs
"Play Cooperative if no history of cheating
Else play Non-cooperative"

Will cooperative play be an equilibrium?
Cheating (deviation of strategy) unprofitable if

$$\begin{aligned} & \pi(J)\ [1 + (1+r)^{-1} + (1+r)^{-2} + \ldots] \\ > \ & \pi(C) + \pi(N)\ [(1+r)^{-1} + (1+r)^{-2} + \ldots] \end{aligned}$$

(PDV of tacit collusion $>$ PDV of deviation) or

$$r\ [\pi(C) - \pi(J)] < \pi(J) - \pi(N)$$

(interest on one-time gain $<$ future per-period loss)

If industry growth rate g (negative if decline)
Game end probability z per period (indefinite rep)
Replace $(1+r)^{-1}$ by $(1-z)\,(1+g)\,(1+r)^{-1}$
or r by $r+z-g$

Some factors conducive to tacit collusion:
(1) Small and stable group of firms
(2) Stable or growing industry

Cartelization (tacit or explicit) usually hurts consumers
antitrust authorities should seek to deter it.

ENTRY DETERRENCE

Firm 1 incumbent; its entry costs are sunk (bygones)

Firm 2 contemplates entry; cost E

If entry accommodated, each gets $\pi(J)$; if price war, $\pi(W)$

Assume $\pi(J) > E > \pi(W)$

Simultaneous-move game:

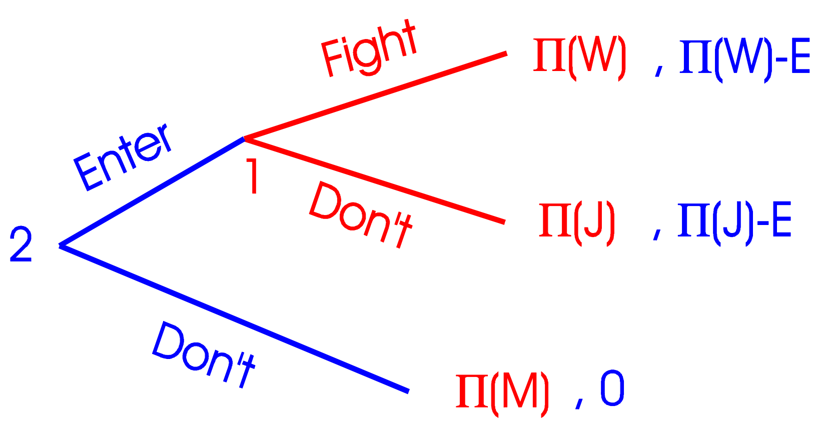
		Firm 2 Enter	Firm 2 Don't Enter
Firm 1	Fight	$\pi(W)$, $\pi(W) - E$	$\pi(M)$, 0
	Accommodate	$\pi(J)$, $\pi(J) - E$	$\pi(M)$, 0

Two Nash equil – (1) (Accomm,Enter), (2) (Fight,Don't)

In (2), firm 2's entry is deterred by firm 1's threat to fight.

But is this threat credible? Test of that is

Sequential-move game:



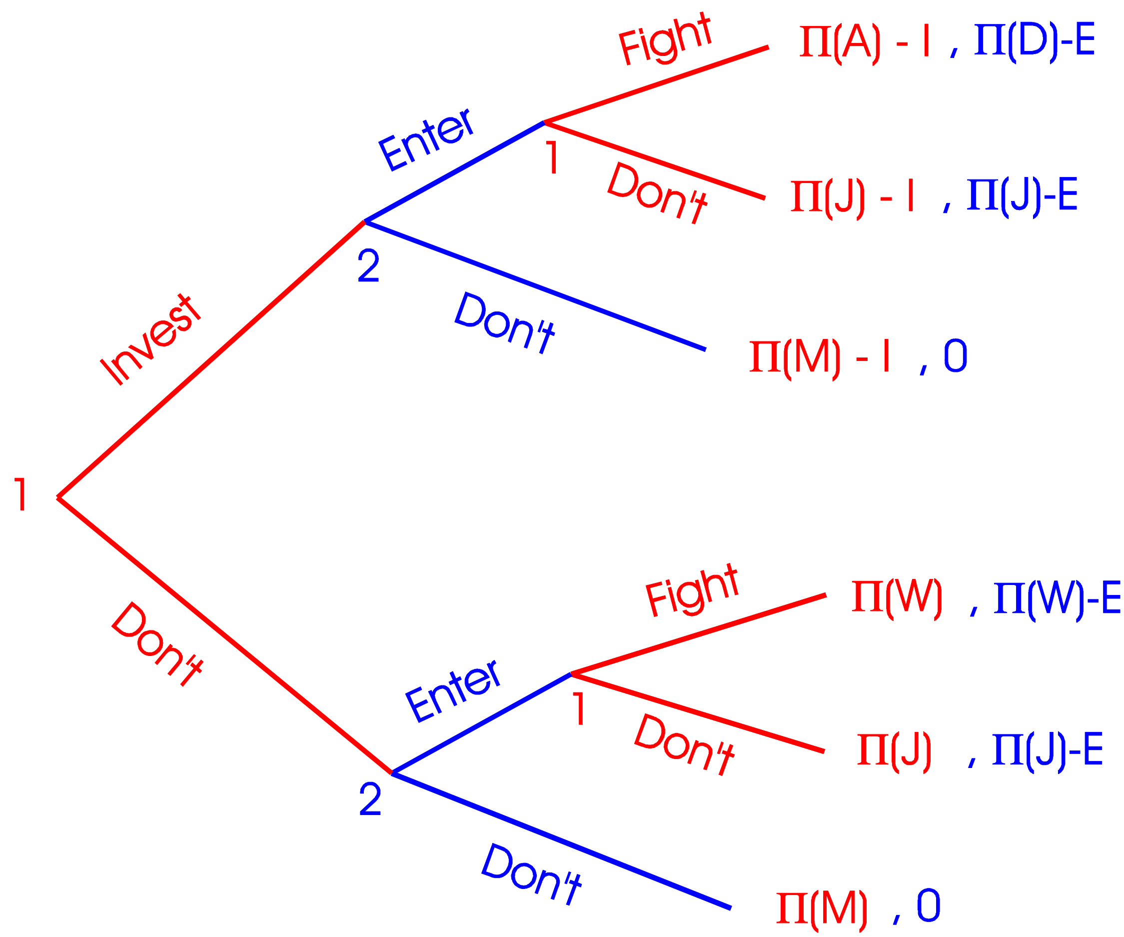
Subgame-perfect equilibrium by backward analysis –

Firm 1 accommodates if entry, so Firm 2 enters

Firm 1 would like to make threat credible

Costly action (investment) I that would
  create asymmetric price-war game:
  profits $\pi(A)$ to firm 1; $\pi(D)$ to firm 2

New game tree



Fight credible if $\pi(A) > \pi(J)$
  This keeps firm 2 out if $\pi(D) < E$

Entry-deterrence by investment strategy is
  optimal for firm 1 if $\pi(M) - I > \pi(J)$