Lecture 15
Implicit Cartels

14.12 Game Theory

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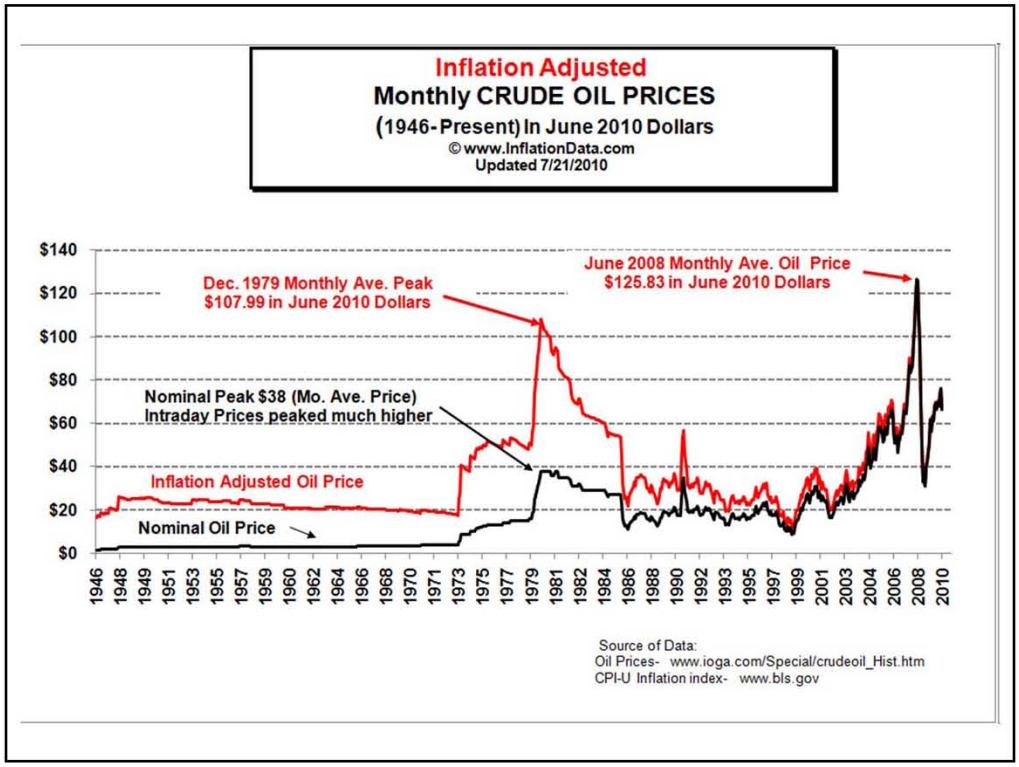

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Road Map/Model

Model: Infinitely Repeated Cournot Oligopoly:

- n firms, MC = 0;
- Zero marginal cost;
- $P = \max\{1-Q,0\}$;

Road map:

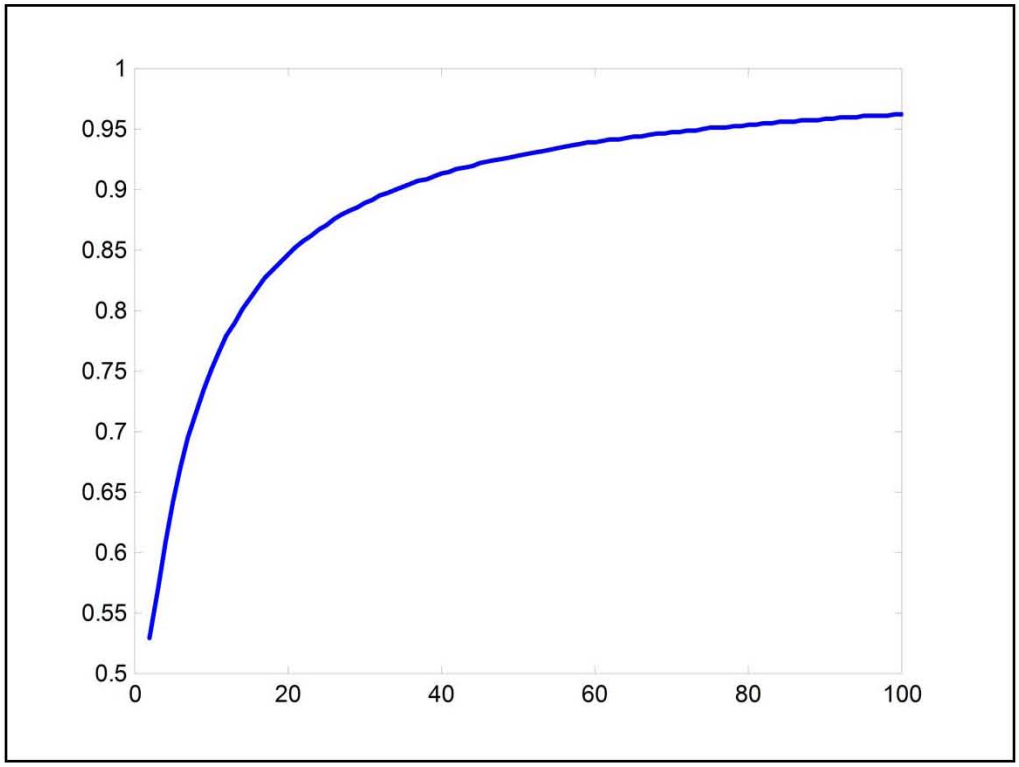
1. Monopoly Production for patient firms
2. Optimal Cartel production
3. Carrot and Stick Strategies
4. Price Wars

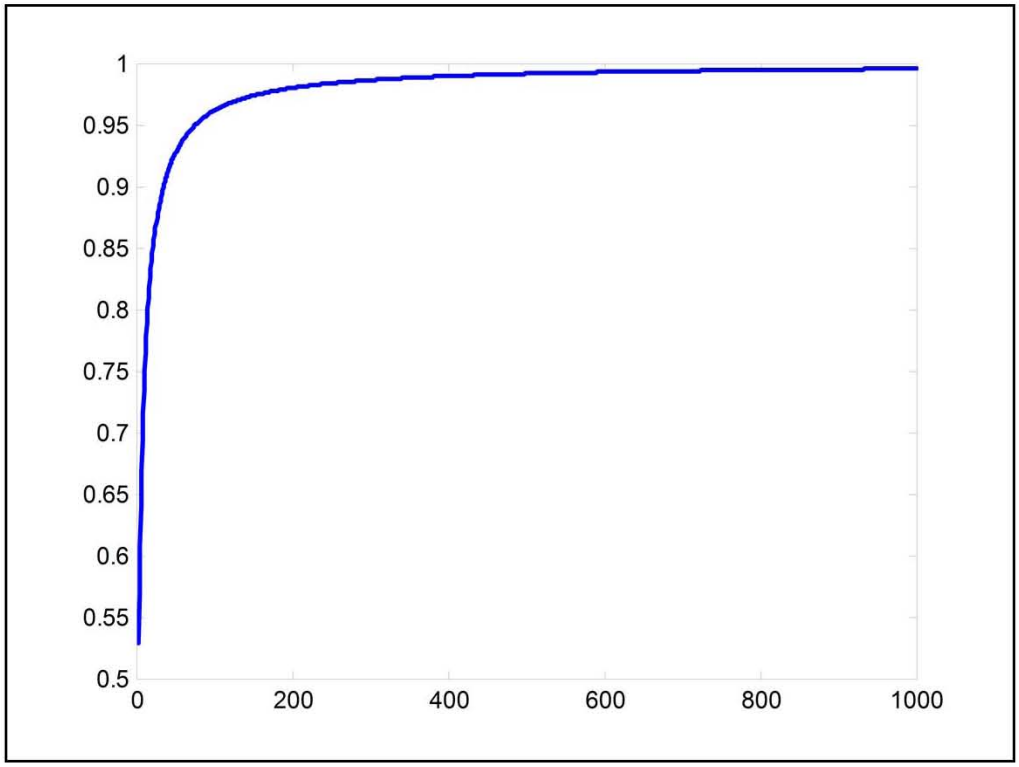
Monopoly Production

Strategy: Each is to produce $q = 1/(2n)$; if any firm defects produce $q = 1/(1+n)$ forever.

- $V_C =$
- $V_D =$
- $V(D|C) =$
- Equilibrium $\Leftrightarrow$

$$\delta \geq \frac{\frac{(n+1)^2}{4n} - 1}{\frac{(n+1)^2}{4n} - \frac{4n}{(n+1)^2}}$$


1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0.55
0.5
0
20
40
60
80
100

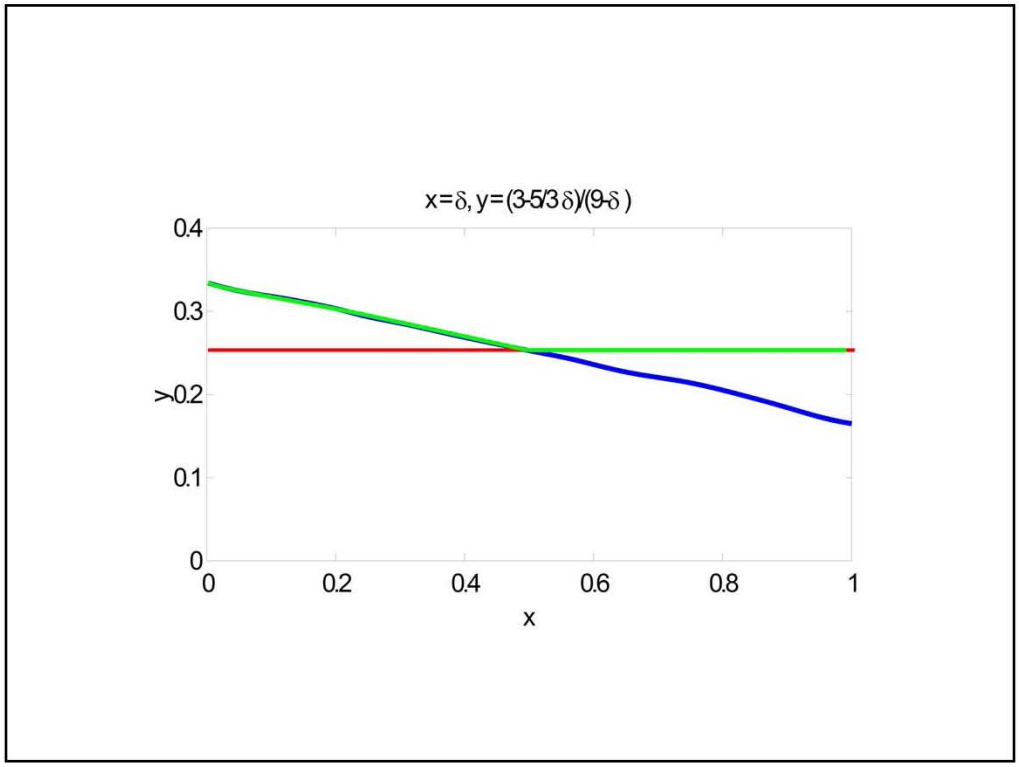

1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0.55
0.5
0
200
400
600
800
1000

Optimal Production (n=2)

Strategy: Each firm is to produce q^*; if any one deviates, each produce $1/(n+1)$ thereafter.

- V_C =
- V_D =
- $V_{D|C}$ =
- Equilibrium iff

- $\Leftrightarrow$


x=δ, y=(3-5/3δ)/(9-δ)
0.4
0.3
0.2
0.1
0
y
0
0.2
0.4
0.6
0.8
1
x

Carrot and Stick

- Produce ¼ at the beginning;
- at any $t > 0$,
  - produce ¼ if both produced ¼ or both produced x at t-1;
  - otherwise, produce x.

Price Wars

- (2007 Midterm 2, P3)
- Stage Game: Linear Bertrand Duopoly (c=0; Q=1-p)
- **Strategy:** n + 1 modes: Collusion, W1, W2, ..., Wn. Game starts at Collusion. Both charge 1/2 in the Collusion mode and p*<1/2 in W1,. . . , Wn. Without deviation, Collusion leads to Collusion, W1 leads to W2,. . . , W(n-1) leads to Wn, and Wn leads to Collusion. Any deviation leads to W1.

14.12 Economic Applications of Game Theory

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