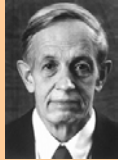


## Nash Equilibrium



Lectures in Microeconomics-Charles W. Upton

## Modeling an Industry

- Competitive Industry – Many Firms
- Monopoly – One Firm
- Duopoly (Oligopoly) – A Few Firms

## Modeling an Industry

- Competitive Industry – Many Firms
- Monopoly – One Firm
- Duopoly (Oligopoly) – A Few Firms
  - Cournot
  - Bertrand
  - Might there be other approaches?

## Different Problems

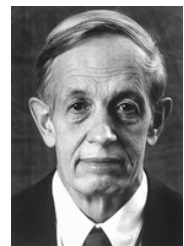
- A can build an expensive or cheap car.
- B can build an expensive or cheap car.
- There are four possible outcomes (E,E), (E,C), (C,E), (C,C)
- What will happen?

## Different Problems

- Firm A can build an expensive or a cheap car.
- Firm B can build an expensive or a cheap car.
- There are four possible outcomes (E,E), (E,C), (C,E), (C,C). Which, if any of those outcomes is a Nash Equilibrium?
- What will happen?

## Nash Equilibrium

- Firms must end up at a **Nash Equilibrium**, named after John Nash
- A Nash Equilibrium
  - *Each person or firm is acting rationally*



## A Nash Equilibrium

- Each person or firm is acting rationally
- *No one believes his actions will change other decisions*

## A Nash Equilibrium

- Each person or firm is acting rationally
- No one believes his actions will change other decisions
- *No one has an incentive to change*

## Cournot

$$q_A = 45 - (1/2)q_B$$

$$q_B = 45 - (1/2)q_A$$

## Cournot

Does the Cournot model predict we will end up at a Nash Equilibrium? Yes

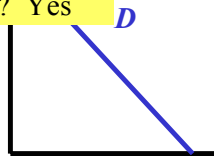
## Cournot

$$q_A = 45 - (1/2)q_B$$

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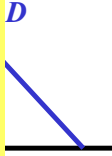
## The Bertrand Model

- Does the Bertrand Model predict we will end up at a Nash Equilibrium? Yes
- bid gets all the market.
- In case of tie, firms split market
- $MC = 0$



## The Bertrand Model

- Each person or firm is acting rationally
- No one believes his actions will change other decisions
- No one has an incentive to change



## Some Questions about Nash Equilibrium

- Nash Equilibrium is useful for studying problems where there are just a couple of players.

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## Nash and Duopolies

- Does there have to be a Nash Equilibrium?  
*No*

## Nash and Duopolies

- Does there have to be a Nash Equilibrium?
- Does there have to be only one Nash Equilibrium? *No*

End

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