Economics of pricing and decision making

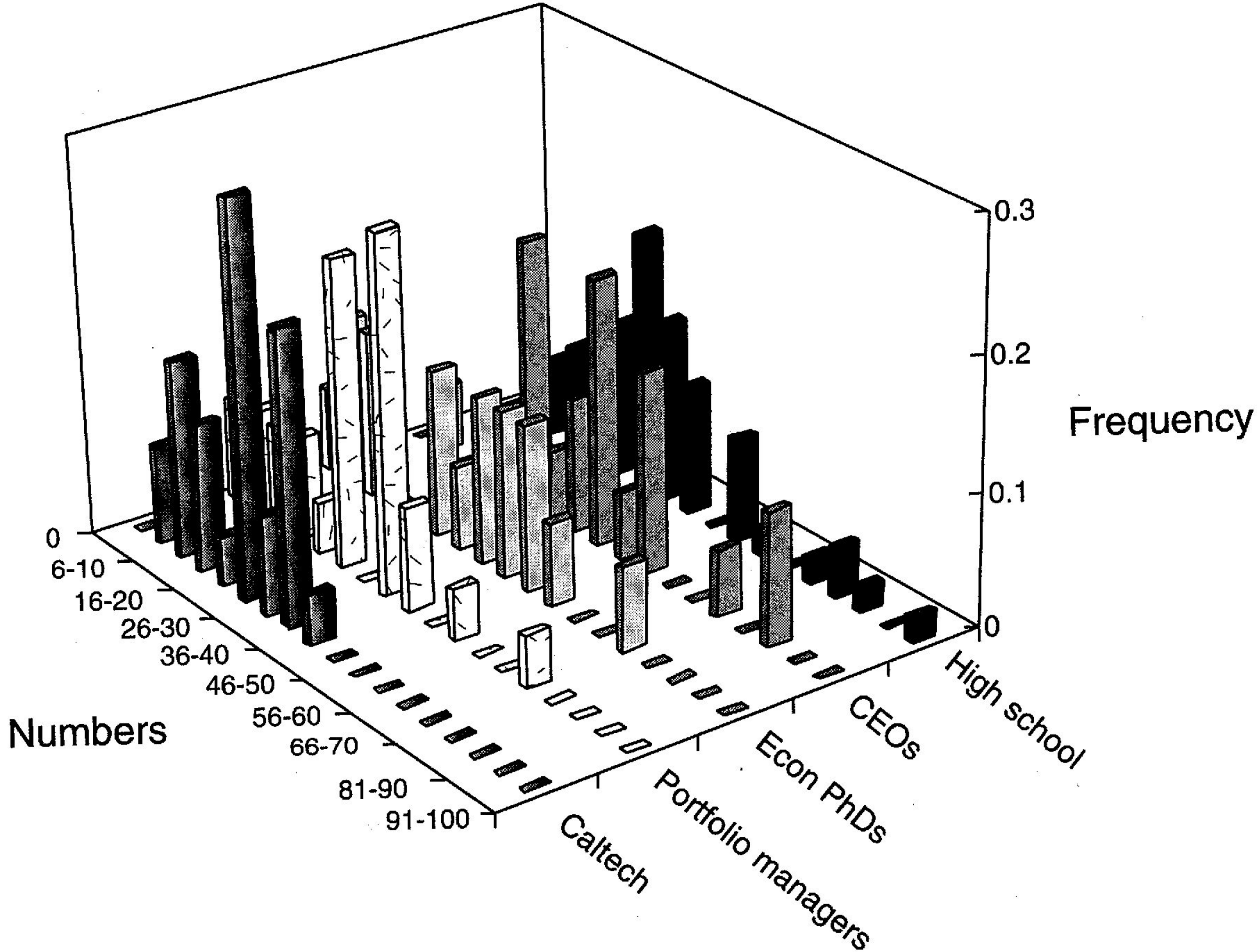
Seminar 1

The guessing game

- Each of you have to declare a number between 0 and 100.

  The winner is the person whose number is the closest to 2/3 of the average of all guesses.

  What is your guess?



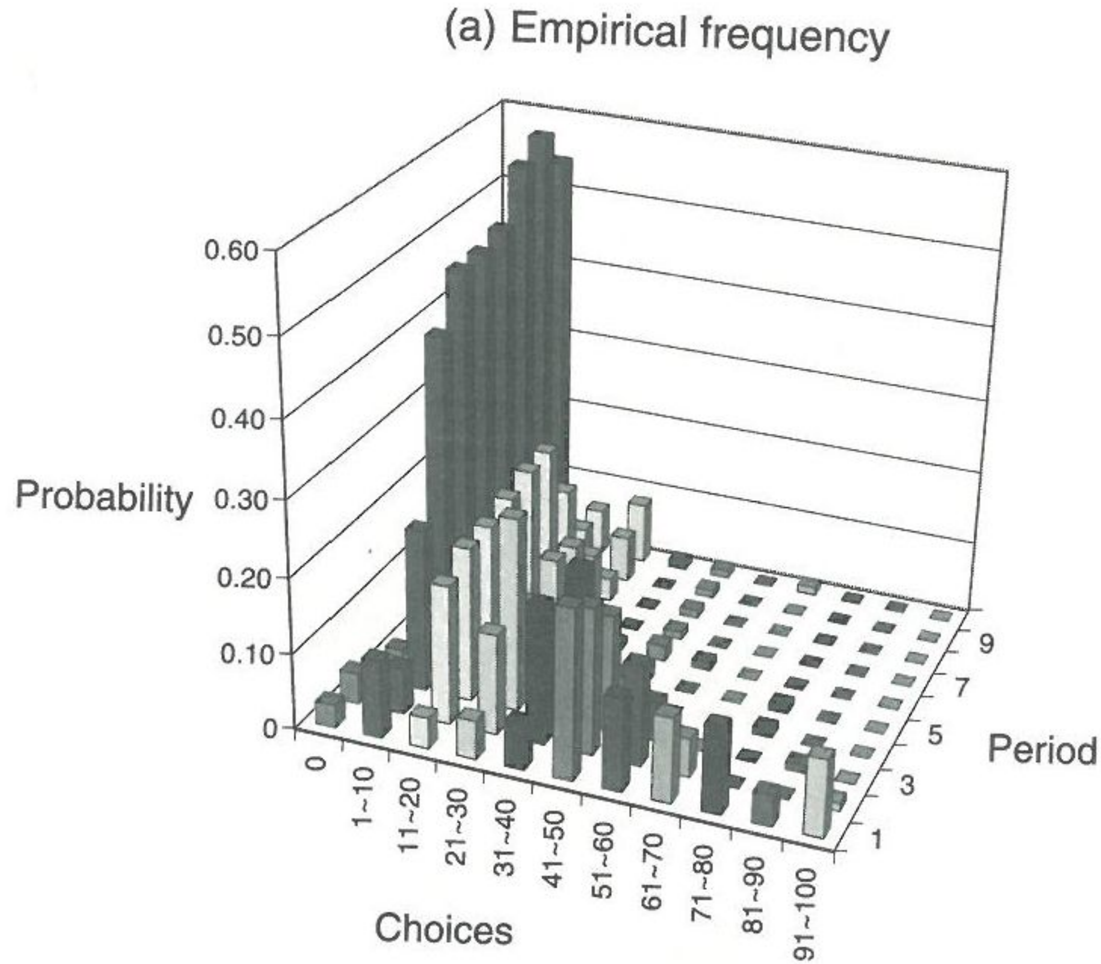
0.3
0.2
0.1
0
Frequency
0
6-10
16-20
26-30
36-40
46-50
56-60
66-70
81-90
91-100
Numbers
Caltech
Portfolio managers
Econ PhDs
CEOs
High school

The guessing game
Discussion

- Bounded rationality
  - People do not naturally use deep levels of strategic thinking. They just think 2-3 steps ahead.
- Players may be fully rational, however if a player believes that all other players will say a number N>0, that player will declare N*2/3>0.
  - If all players believe that the average guess will be high, this becomes a self-fulfilling prophecy.

The guessing game
Importance of repetition

- When the game is repeated, the average guess eventually goes down to 0.



Q1

	V	W	X	Y	Z
A	9,5	8,7	5,6	3,6	9,2
~~B~~	~~2,5~~	~~7,6~~	~~3,5~~	~~8,5~~	~~0,8~~
C	7,3	1,4	5,2	4,1	9,7
~~D~~	~~5,0~~	~~1,6~~	~~8,9~~	~~0,0~~	~~0,9~~
~~E~~	~~4,4~~	~~3,8~~	~~9,6~~	~~2,9~~	~~1,2~~

Q1

	V	W	X	Y	Z
A	$\underline{9}$,5	**$\underline{8,7}$**	5,6	3,6	$\underline{9}$,2
B	2,5	7,6	3,5	$\underline{8}$,5	0,$\underline{8}$
C	7,3	1,4	5,2	4,1	**$\underline{9,7}$**
D	5,0	1,6	8,$\underline{9}$	0,0	0,$\underline{9}$
E	4,4	3,8	$\underline{9}$,6	2,$\underline{9}$	1,2

Q2

	q	1-q
p	2,2	4,3
1-p	4,5	3,3

- Player 1:

  $2q+4(1-q)=4q+3(1-q)$

  Implies $q=1/3$

- Player 2:

  $2p+5(1-p)=3$ implies $p=2/3$

Q3

- Monopoly:

$$\pi_M = Q(100 - 0.5Q) - 20Q = 80Q - 0.5Q^2$$

$$\frac{\partial \pi_M}{\partial Q} = 0 \Rightarrow 80 - Q = 0 \Rightarrow Q = 80$$

$$P = 60$$

$$\pi_M = 3200$$

- Perfect competition:

P=100-1/2Q=20, thus Q=160 and zero profit.

- Cournot:

$$\pi_1 = q_1 \times (100 - 0.5 \times (q_1 + q_2)) - 20q_1$$

$$= 80q_1 - \frac{1}{2}q_1^2 - \frac{1}{2}q_1 q_2$$

$$\frac{\partial \pi_1}{\partial q_1} = 80 - q_1 - \frac{1}{2}q_2 = 0 \Rightarrow q_1 = 80 - \frac{1}{2}q_2$$

  - q1=q2=53.3
  - P=46.6
  - Π1=Π2=1422

- Cournot with unequal costs:

$$\pi_1 = q_1 \times (100 - 0.5 \times (q_1 + q_2)) - 10q_1$$

$$= 90q_1 - \frac{1}{2}q_1^2 - \frac{1}{2}q_1q_2$$

$$\frac{\partial \pi_1}{\partial q_1} = 90 - q_1 - \frac{1}{2}q_2 = 0 \Rightarrow q_1 = 90 - \frac{1}{2}q_2$$

  - q1=66.6; q2=46.6
  - P=44.1

- Stackelberg:

$$\pi_1 = 80q_1 - \frac{1}{2}q_1^2 - \frac{1}{2}q_1 q_2$$

$$= 80q_1 - \frac{1}{2}q_1^2 - \frac{1}{2}q_1(80 - \frac{1}{2}q_1) = 40q_1 - \frac{1}{4}q_1^2$$

$$\frac{\partial \pi_1}{\partial q_1} = 40 - \frac{1}{2}q_1 = 0 \Rightarrow q_1 = 80$$

  - q1=80; q2=40
  - P=40
  - Π1=1600; Π2=800

Q4

- Table:

Candidate	Technical	~~Presentation~~	Motivation
~~A~~	~~1~~	~~0~~	~~0~~
~~B~~	~~0~~	~~1~~	~~0~~
C	1	~~1~~	0
~~D~~	~~0~~	~~0~~	~~1~~
E	0	~~1~~	1

Candidate	Technical	Motivation
C	1	0
E	0	1

Q5

incumbent

entrant

	TV	Sales reps
TV	1,9	3,7
Sales reps	3,7	1,9

entrant

	TV	Sales reps
TV	-2,-2	-2,-1
Sales reps	-1,-2	-1,-1

entrant

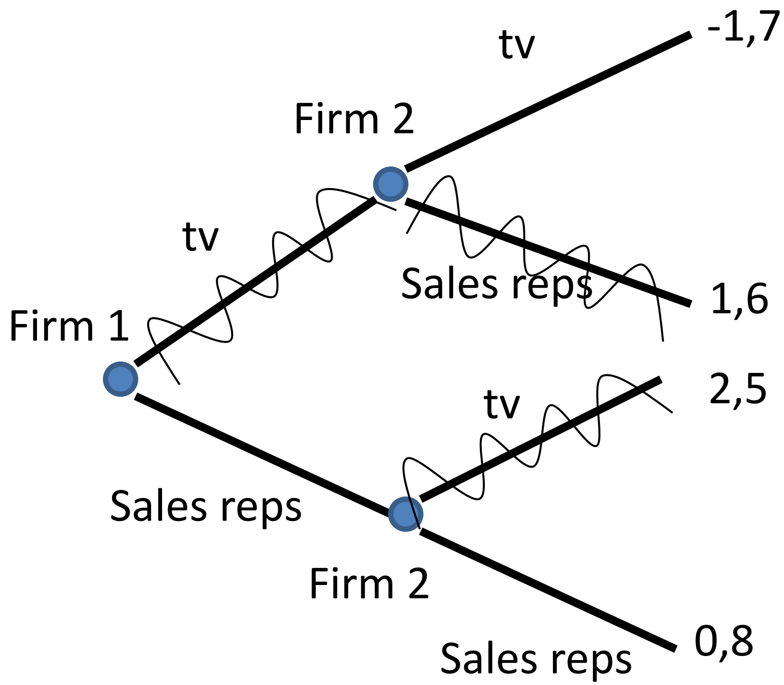
	TV	Sales reps
TV	-1,**7**	**1**,6
Sales reps	**2**,5	0,**8**

- Mixed strategies

	TV **p**	**Sales reps** **1-p**
TV q	-1,**7**	**1**,6
Sales reps 1-q	**2**,5	0,**8**

- Entrant: -1p+1-p=2p, p=1/4
- Incumbent: 7q+5(1-q)=6q+8(1-q), q=3/4
- Entrant: π=0.5
- Incumbent: π =6.5

Q6



tv
-1,7
Firm 2
tv
Sales reps
1,6
Firm 1
2,5
tv
Sales reps
Firm 2
Sales reps
0,8