Experimental Economics
Markets and strategic environment

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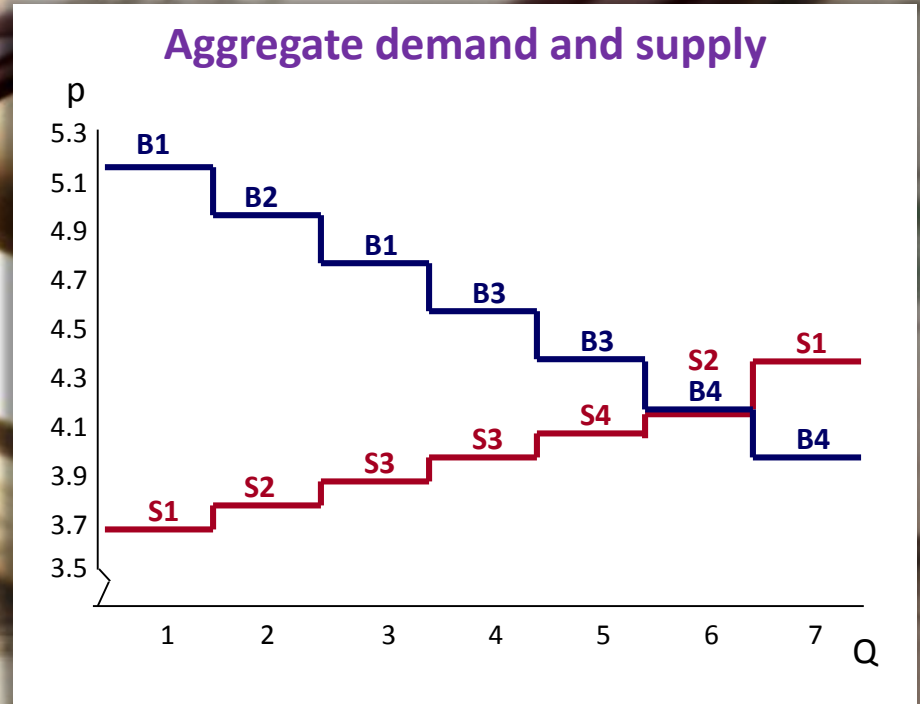# THE DOUBLE AUCTION

Typical rules in an experiment

- Both buyers and sellers can post prices to buy/sell goods

- Buyers receive marginal values per good bought
  - Buyer i's profit of buying a kth good: $\pi_{ik} = v_{ik} - p$

- Sellers receive marginal costs per good sold
  - Seller j's profit of selling a kth good: $\pi_{jk} = p - c_{jk}$

- Players only know their own marginal values/cost

- During trading players see the highest bid, the lowest ask, and the prices at which goods are sold

- Sequence of trading periods, each lasting a preset time (e.g. 2 min)

- In each period there are new units to buy/sell and units do not carry over periods

- Buyers buy their high-value units first

- Sellers sell their low-cost units first

- Subjects can accept the current bid/ask or place new one

- Unprofitable trades are not allowed

THE DOUBLE AUCTION

Buyer's v_{ik}	1st unit	2nd unit
B1	5.2	4.4
B2	5.0	–
B3	4.6	4.8
B4	4.2	4.0

Seller's c_{ik}	1st unit	2nd unit
S1	3.7	4.4
S2	3.8	4.2
S3	3.9	4.0
S4	4.1	–

Aggregate demand and supply

THE DOUBLE AUCTION

Typical experimental results

Typical experimental results (Smith 1991)
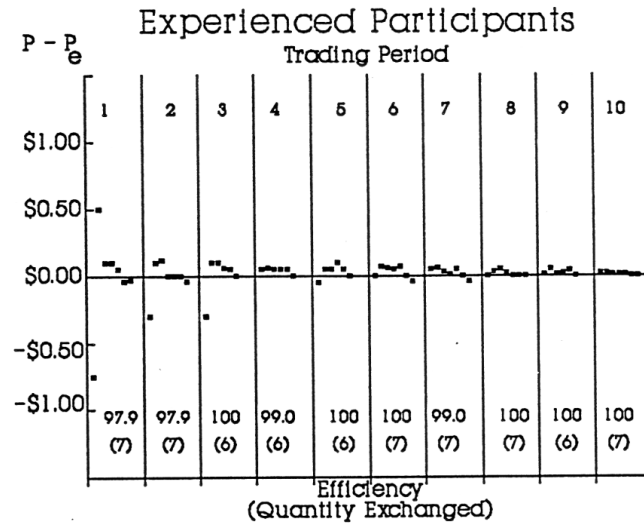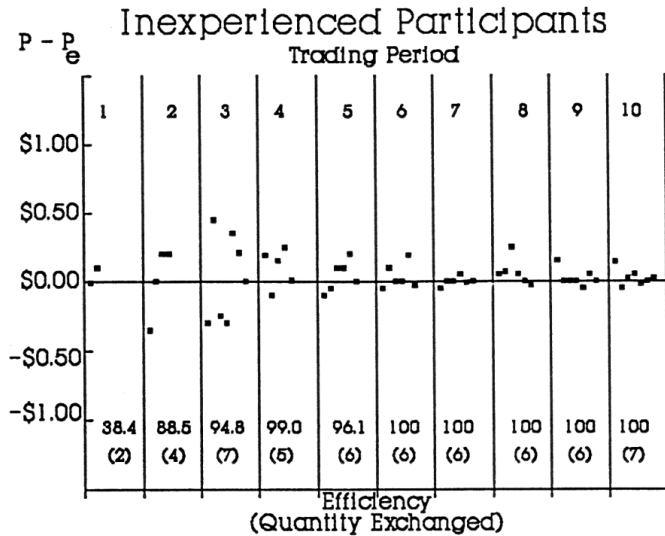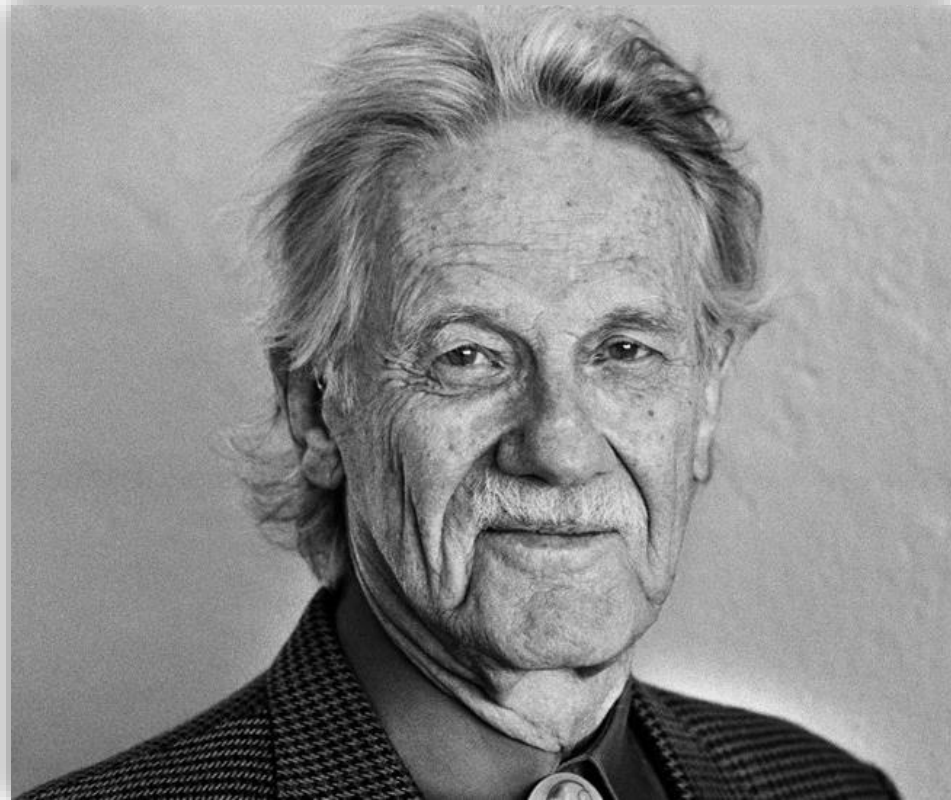
Quick adjustment to equilibrium prices

Typical experimental results (Davis & Holt 1993)

The effect of experience

THE DOUBLE AUCTION

"I am still recovering from the shock of the experimental results. The outcome was unbelievably consistent with competitive price theory. … But the result **can't** be believed, I thought. It must be an accident, so I will … do a new experiment with different supply and demand schedules." – Smith 1991

The double auction

Zero-intelligence traders (Großer & Reuben 2013)

- Compare human traders to zero-intelligence traders: robots who post random prices to buy/sell and buy at random prices as long as trade is profitable (see also Gode & Sunder 1993)
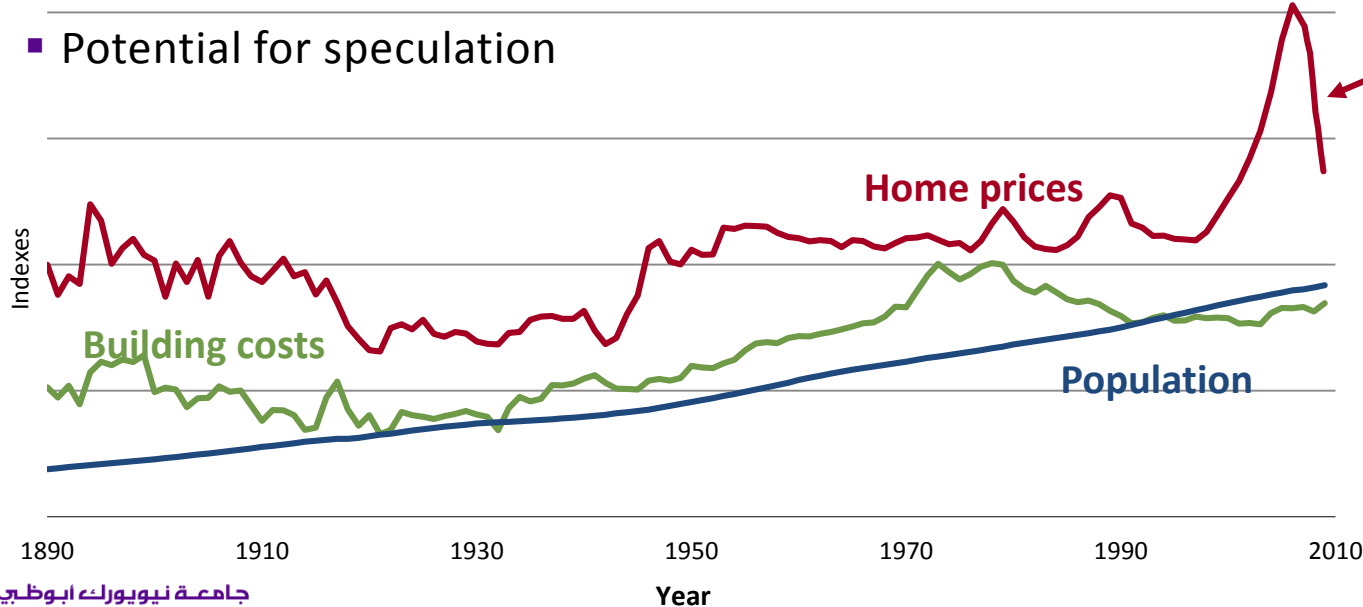
ASSET MARKETS

Asset markets are different

- Most of an asset's value depends on its future price
- Errors in beliefs play a crucial role
- Potential for speculation

Was this a speculative bubble?

Home prices

Building costs

Population

Indexes

Year

1890   1910   1930   1950   1970   1990   2010

ASSET MARKETS IN THE LABORATORY

Hard to study speculation without seeing fundamental values → use an experiment!

- Sell and buy shares of an asset with a **commonly-known expected value** and no private values or costs

  - **Dividends per share** are distributed at the end of **each period**

    - e.g., $10 with p = 0.25, $25 with p = 0.5, and $40 with p = 0.25
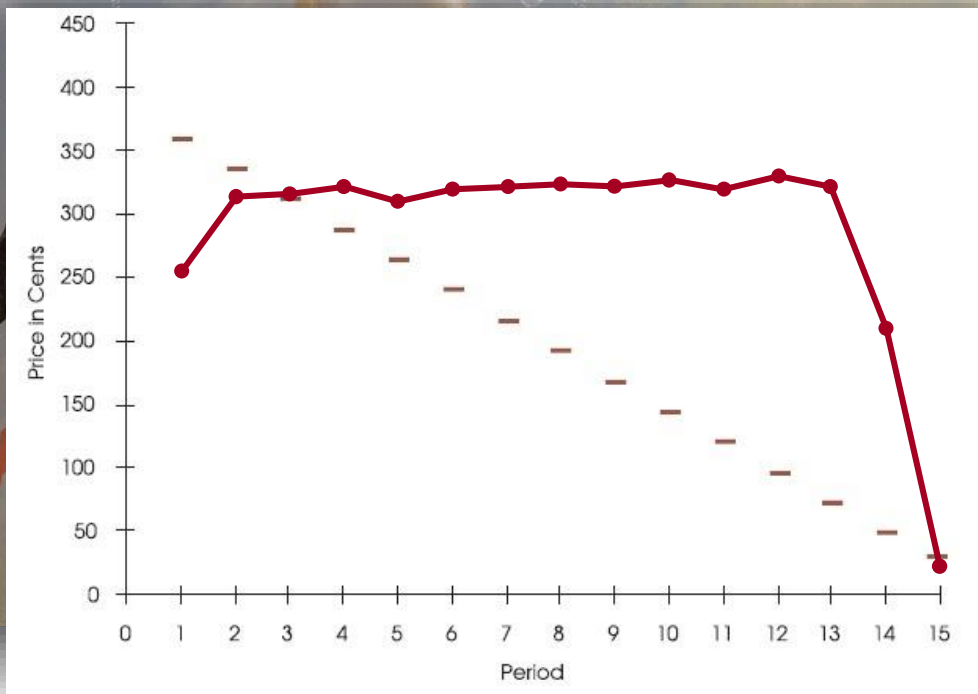
  - Shares carry over from one period to the next

ASSET MARKETS IN THE LABORATORY

Typical experimental results (Porter & Smith 2003)

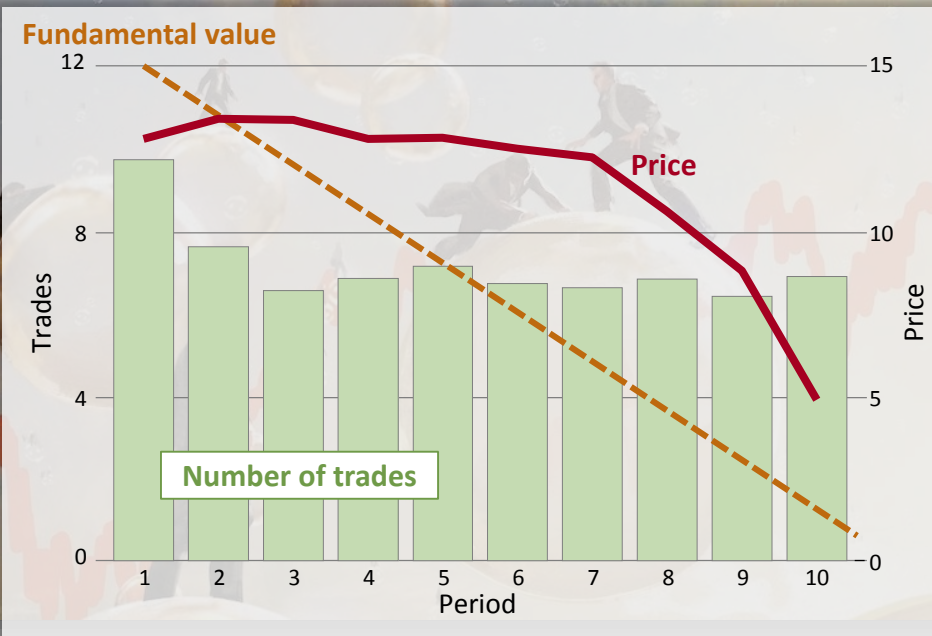- Price bubble (deviation from fundamentals) emerges and then crashes

ASSET MARKETS IN THE LABORATORY

Typical experimental results

- Price bubble (deviation from fundamentals) emerges and then crashes

Even occurs with MBA students of the University of Chicago!

ASSET MARKETS IN THE LABORATORY

Typical experimental results (Williams 2008)

▪ Price bubble (deviation from fundamentals) emerges and then crashes

Occurs in markets with a large number of traders (304)

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Typical experimental results (Deck et al. 2014)

▪ Price bubble (deviation from fundamentals) emerges and then crashes

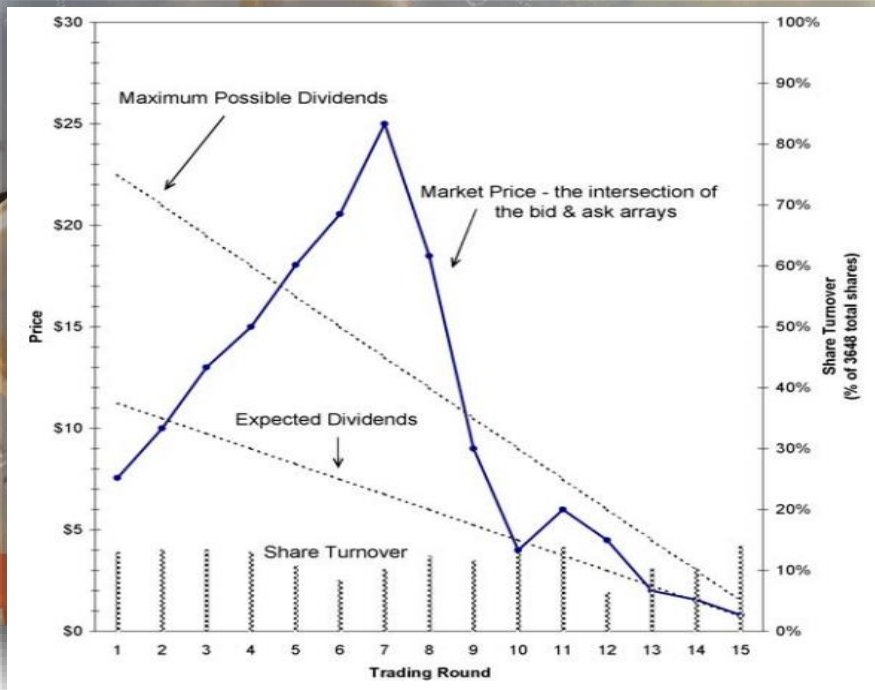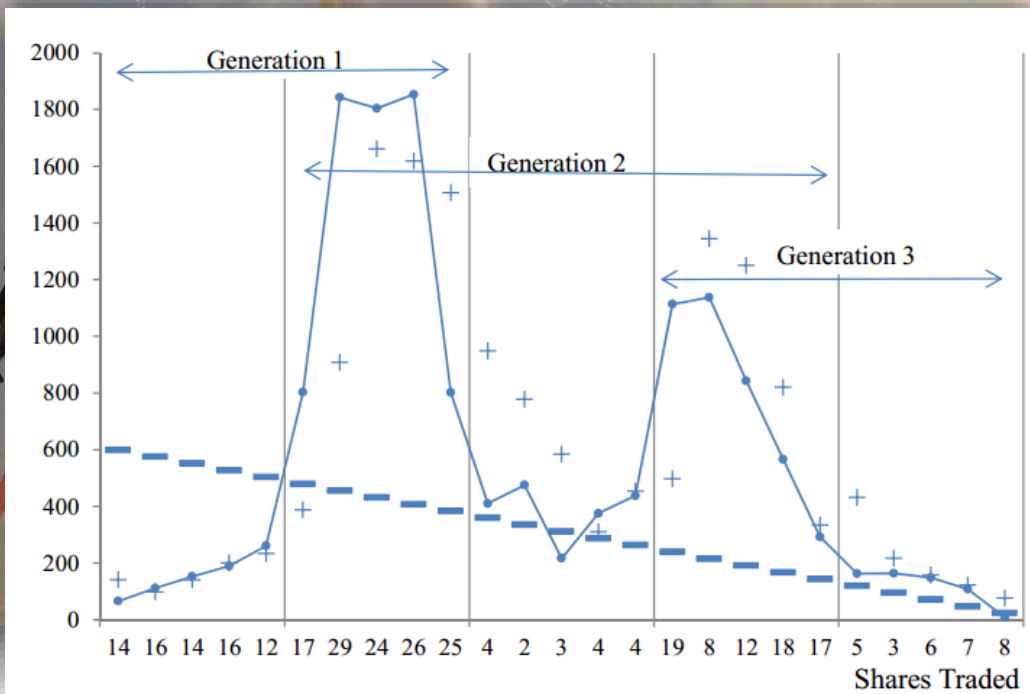Occurs even after previous generations experienced a crash

ASSET MARKETS IN THE LABORATORY

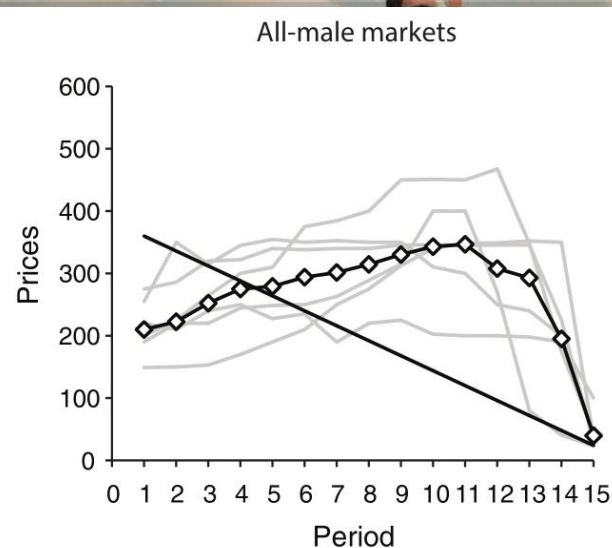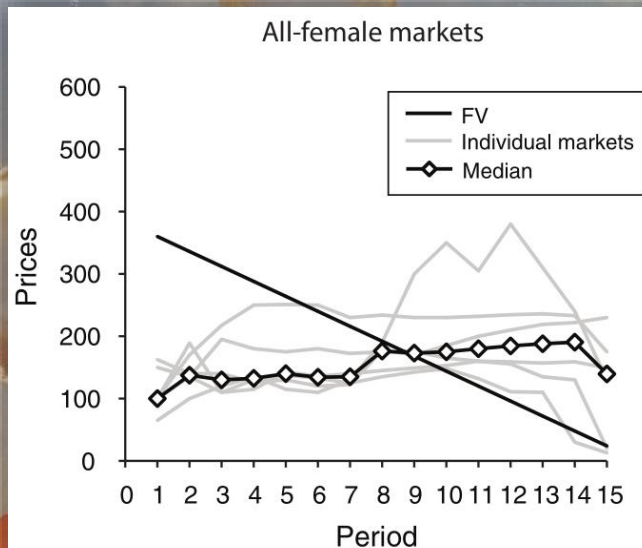**Typical experimental results (Eckel & Füllbrunn 2015)**

- Price bubble (deviation from fundamentals) emerges and then crashes

Occurs less with female traders

"if Lehman Brothers had been Lehman Sisters the results would have been very different"

Christine Lagarde

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WHY ARE THERE BUBBLES IN EXPERIMENTAL ASSET MARKETS?

The outcome of three trading strategies (Haruvy & Noussair 2006)

- **Trend followers**

  - Demand more if prices have been increasing and less if they have been decreasing: $Q_T = -\delta + \beta(p_{t-1} - p_{t-2})$

36%
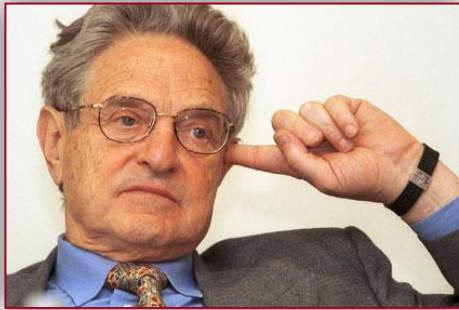
33%

- **Speculators**

  - Demand more if they think the bubble is growing and less if they think it will crash: $Q_S = \gamma(\text{E}[p_{t+1}] - p_t)$

- **Value investors**

  - Demand more if prices are below the fundamental value and less if they are above: $Q_P = -\alpha(p_t - v_t)$

25%

Strategic environment

Why do boundedly rational/irrational individuals have a big impact in asset markets and not in other markets?

Strategic complements

Sophisticated players have an incentive to **mimic** what naïf players do

- e.g., coordination games, asset markets, **price competition**
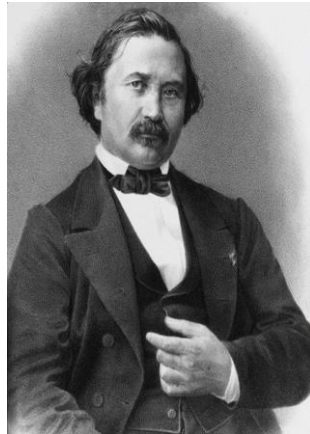
Strategic substitutes

Sophisticated players have an incentive to do the **opposite** of what naïf players do

- e.g., anti-coordination games, charitable giving, **quantity competition**

STRATEGIC ENVIRONMENT

Potters & Suetens (2009) & Boone et al. 2008

- Study collusion under **price competition** (strategic complements) vs. **quantity competition** (strategic substitutes)

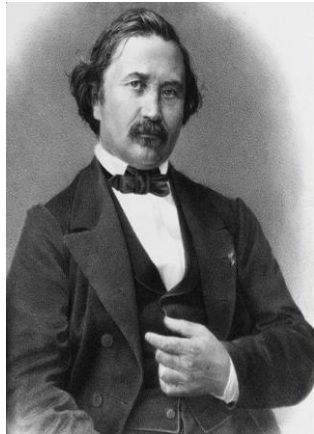 - Keeping constant: the **Nash equilibrium choice and payoff**, the **joint-payoff-maximizing choice and payoff**, the **optimal defection payoff**, and the steepness of the best response functions

Complements

	0	1	2	3	4	5	6
0	6	6	6	24	28	45	65
1	6	10	10	25	40	45	65
2	10	24	30	34	40	54	90
3	3	10	34	40	48	54	90
4	2	3	30	34	45	71	100
5	1	2	17	32	40	56	75
6	1	1	15	15	15	45	65

Substitutes

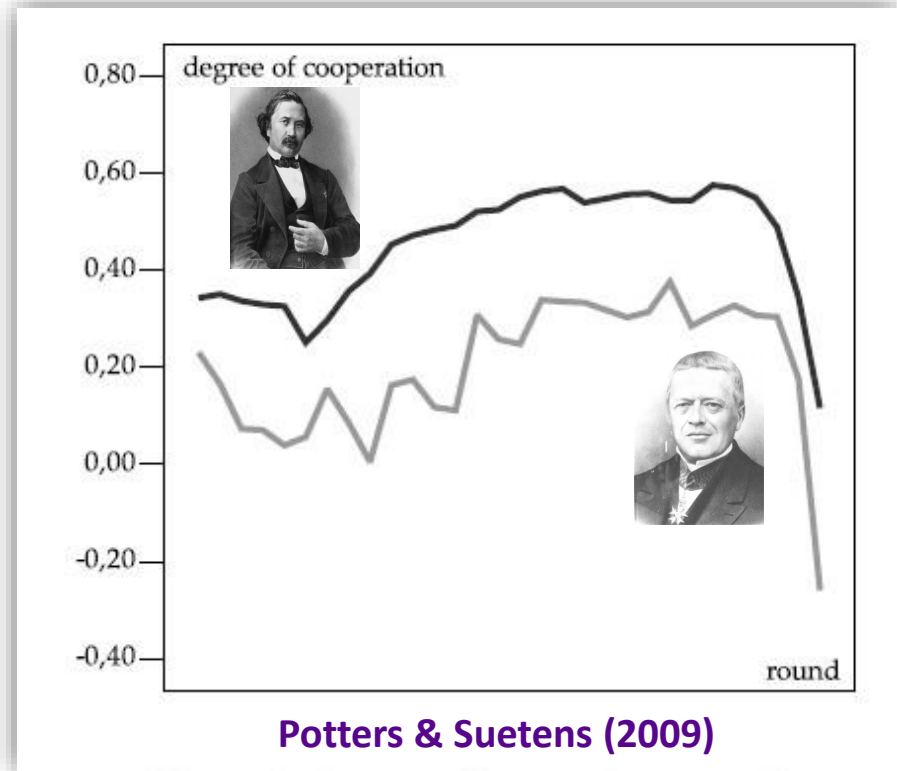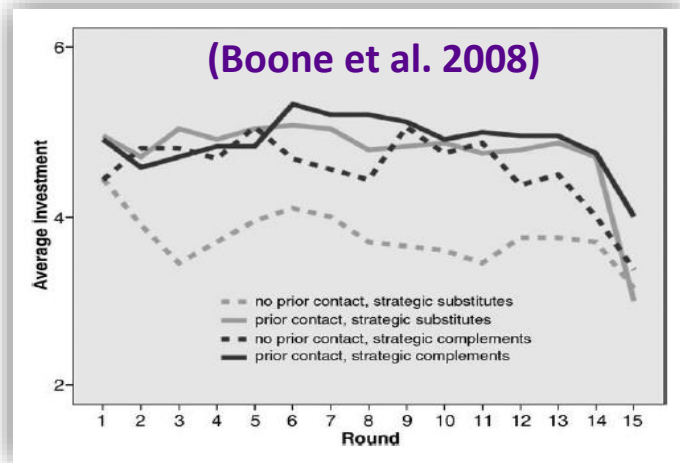|	0	1	2	3	4	5	6
0	6	6	6	24	28	45	65
1	6	10	10	25	40	54	75
2	6	10	30	34	40	71	100
3	6	10	34	40	48	56	90
4	10	24	30	34	45	56	90
5	3	10	15	32	40	56	75
6	1	1	15	30	30	45	65

Potters & Suetens (2009) & Boone et al. (2008)

- Considerably more collusion under quantity competition

- Face-to-face contact boosts cooperation only for substitutes

(Boone et al. 2008)

Potters & Suetens (2009)

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