Introduction to Experimental Economics

Olexandr Nikolaychuk

MW24.2 Experimental Economics (SS2023)

Lecture Plan

- What is an experiment?
- Why experiment in economics?
- Historical overview
- Current state of affairs

@ Handbook of Experimental Economics, edited by Kagel, J.H. and Roth, A.E., Princeton University Press, 1995 [sections 1.I-II]

@ Roth, Alvin E. The Early History of Experimental Economics, Journal of the History of Economic Thought, 1993

Participant Perspective

For the following task you will receive a small payoff. However, this payoff is not the same for every participant. You determine your own payoff by rolling your die as soon as you are asked to.

Your roll determines how much you receive. You can see the exact payoff from the following table. It will remain on the screen until you have reported your roll.

Report	1	2	3	4	5	6
Payoff	1	2	3	4	5	6

If you have any questions, please raise your hand.

For the following task you will receive a small payoff. However, this payoff is not the same for every participant. You determine your own payoff by rolling your die *three times* as soon as you are asked to.

Your *first* roll determines how much you receive. You can see the exact payoff from the following table. It will remain on the screen until you have reported your roll.

Report	1	2	3	4	5	6
Payoff	1	2	3	4	5	6

The second and third rolls only serve to make sure that the die is working properly. However, only the first roll counts.

If you have any questions, please raise your hand.

Researcher Perspective

Experiment is a systematic and scientific approach to research in which the researcher manipulates one or more variables, and controls and measures any changes in other variables

Do people lie more when justifications can be constructed?

(?) Observing desired counterfactual information modifies ethical perceptions and subsequent behavior

$\Rightarrow$ Manipulate *counterfactual information* available to the participants [treatment variable]

- control group: one die roll
- treatment group: three die rolls; only the first counts

(!) Measure the effect of the manipulation on the resulting *distribution of reports* [dependent variable]

@ Shalvi, S., Eldar, O., Bereby-Meyer, Y., 2012. Honesty requires time (and lack of justifications). Psychological Science 23 (10), 1264–1270

Methods (quantitative) of acquiring knowledge:

- observational study (e.g., labor force participation or household expenditure survey)
- natural experiment (e.g., US draft lottery of 1969)
- field experiment (e.g., charitable giving work by John A. List)
- laboratory experiment

* online experiment
* thought experiment (e.g., St. Petersburg Paradox) / vignette

Benefits of using economic experiments in the lab:

- the cause and effect are perfectly clear
- rare or novel scenarios can be explored
- counterfactual scenarios can be contrasted

Limitations of using economic experiments in the lab:

- unobserved loss of control (i.e., confounding factors)
- generalizability across situations
- generalizability across people

Use(s) of economic experiments:

* how are they motivated?
* to whom are they intended to be persuasive?

- "speaking to theorists": testing theories under precisely controlled and/or measured conditions that are typically unavailable in field data
- "searching for facts": looking for regularities, and exploring and documenting unanticipated regularities (including those that come from violations of the predictions of existing theories)
- "searching for meaning": formulating new theories, to explain newly observed regularities, and devising new experiments to help distinguish among such theories
- "whispering in the ears of princes": policy oriented experiments

Historical Overview

St. Petersburg Paradox

* Daniel Bernoulli (1738)

- A casino offers a game of chance for a single player in which a fair coin is tossed repeatedly until 'tails' appears. The stake starts at 2 dollars and is doubled on every coin toss.

(?) What would be a fair price to pay for playing this game?

$$\begin{aligned} EV &= \frac{1}{2} \cdot 2 + \frac{1}{4} \cdot 4 + \frac{1}{8} \cdot 8 + \frac{1}{16} \cdot 16 + ... \\ &= 1 + 1 + 1 + 1 + ... \\ &= \infty \end{aligned}$$

Theoretical foundations:

- Expected Utility by John von Neumann and Oskar Morgenstern (1944)
- Nash Equilibrium and Nash Bargaining solution by John Nash (1950s)
- Subgame Perfect Equilibrium by Reinhard Selten (1965)
- (In)complete information and Bayesian games by John Harsanyi (1967)

Early experimental work:

- individual choice
- game theoretic hypotheses
- markets and industrial organization

Indifference Curve Experiments

- Thurstone (1931): series of hypothetical choices b/w bundles of hats and coats, hats and shoes, and coats and shoes

  > "It is questionable whether a subject in so artificial an experimental situation could know what choices he would make in an economic situation; not knowing, it is almost inevitable that he would, in entire good faith, systematize his answers in such a way as to produce plausible but spurious results," Wallis and Friedman (1942)

- Rousseas and Hart (1951): menu of breakfasts with various numbers of scrambled eggs and strips of bacon
- Mosteller and Nogee (1951): menu of lotteries with various success probabilities

  > "It is possible to construct subjects' utility functions experimentally, and although the predictions derived from these utility functions are not so good as might be hoped, their general direction is correct," Mosteller and Nogee (1951)

Allais Paradox

* Maurice Allais (1953)

A : Certainty of receiving 100M

or

B : Probability .10 of receiving 500M
Probability .89 of receiving 100M
Probability .01 of receiving nothing

C : Probability .11 of receiving 100M
Probability .89 of receiving nothing

or

D : Probability .10 of receiving 500M
Probability .90 of receiving nothing

Allais Paradox

* Maurice Allais (1953)

Prefer A to B:
$1 \cdot U(100M) > 0.89 \cdot U(100M) + 0.01 \cdot U(0M) + 0.1 \cdot U(500M)$

Prefer D to C:
$0.11 \cdot U(100M) + 0.89 \cdot U(0M) < 0.1 \cdot U(500M) + 0.9 \cdot U(0M)$

Alternatively:
$0.11 \cdot U(100M) < 0.1 \cdot U(500M) + 0.01 \cdot U(0M)$
$1 \cdot U(100M) - 0.89 \cdot U(100M) < 0.1 \cdot U(500M) + 0.01 \cdot U(0M)$
$1 \cdot U(100M) < 0.89 \cdot U(100M) + 0.1 \cdot U(500M) + 0.01 \cdot U(0M)$

Prisoner's Dilemma

* Melvin Dresher and Merill Flood (1952, 1958)

	1	2
1	$-1, 2$	$\frac{1}{2}, 1$
2	$0, \frac{1}{2}$	$1, -1$

- 100 repetitions in *fixed* pairs
- predicted earnings of 0 and 50
- observed earnings of 40 and 65

> "If this experiment were conducted with various different players rotating the competition and with no information given to a player of what choices the others have been making until the end of all the trials, then the experimental results would have been quite different, for this modification of procedure would remove the interaction between the trials," Nash

Decentralized Market(s)

* Edward H. Chamberlin (1948)

You are **buyer** [2]: At the beginning of the game you do not own any objects. During the game you can buy objects. Objects that you own at the end of the game have a value according to the following table

	Value	Price	Profit
1.	300		
2.	250		
all remaining	0		

You are **seller** [4]. At the beginning of the game you own two objects. During the game you can sell these objects. Objects that you own at the end of the game have a value according to the following table

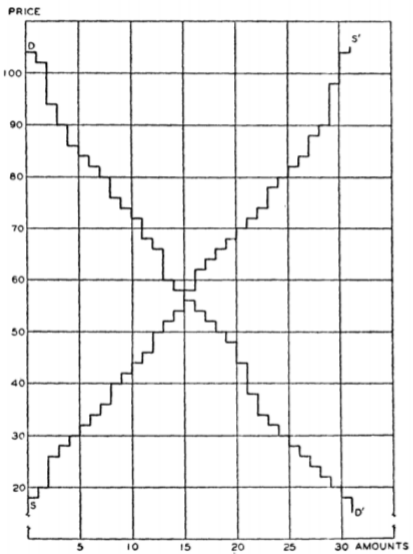
	Value	Price	Profit
1.	150		
2.	100		
all remaining	0		

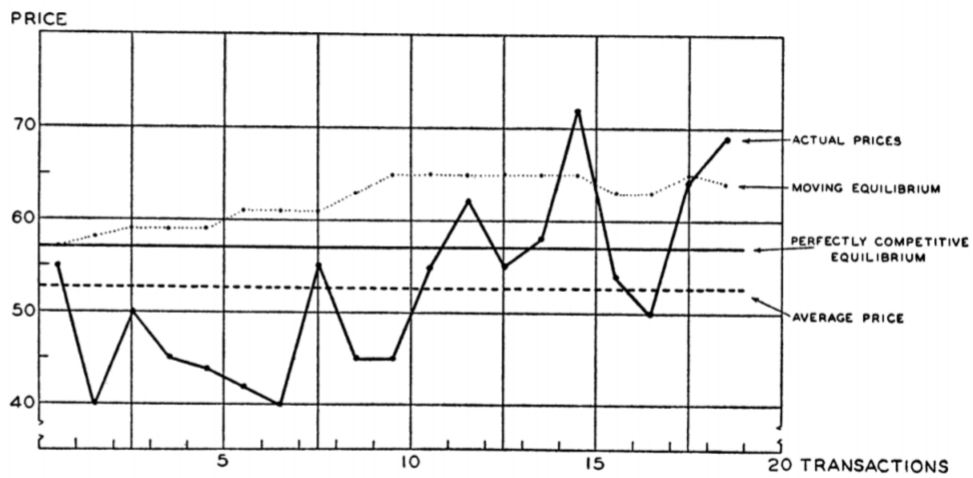
- bilateral bargaining
- one-shot interaction

> "The purpose ... is to describe an actual experiment with a 'market' under laboratory conditions and to set forth some of the conclusions indicated by it," Chamberlin (1948)

Decentralized Market(s)

* Edward H. Chamberlin (1948)

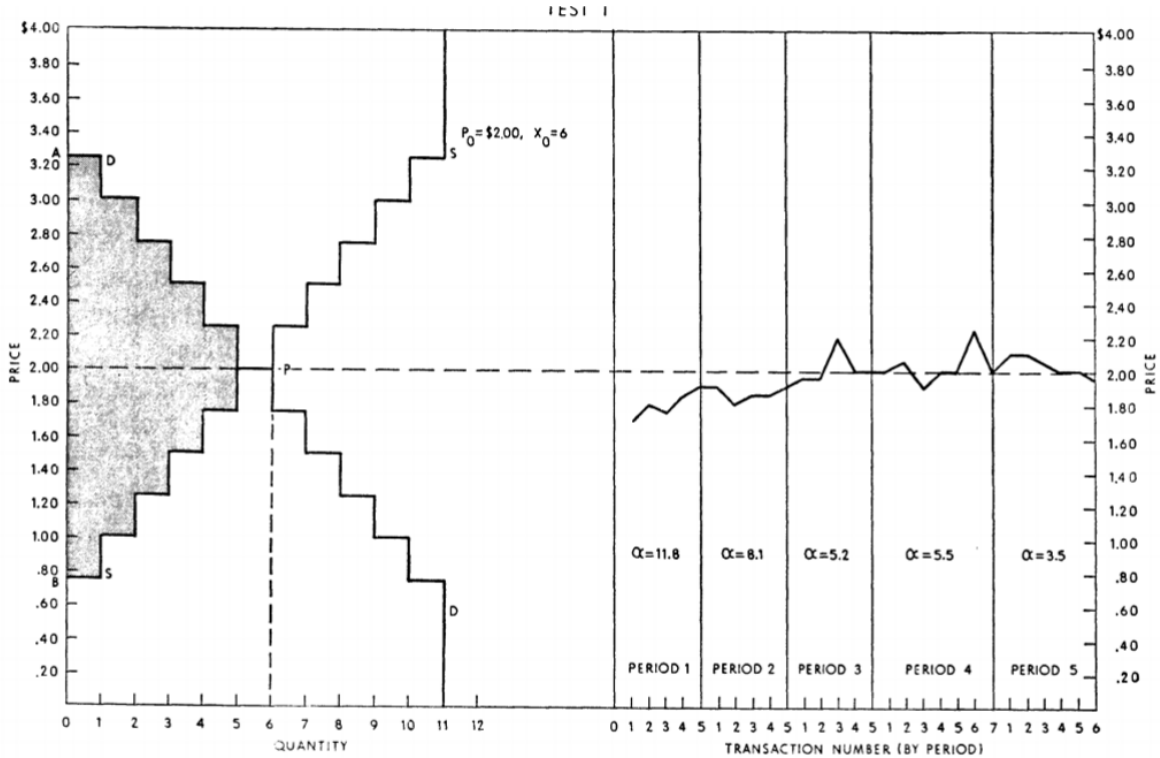




- $Q > Q^*$ in 42 markets, $Q = Q^*$ in 4 markets
- $P < P^*$ in 39 markets, $P = P^*$ in 7 markets

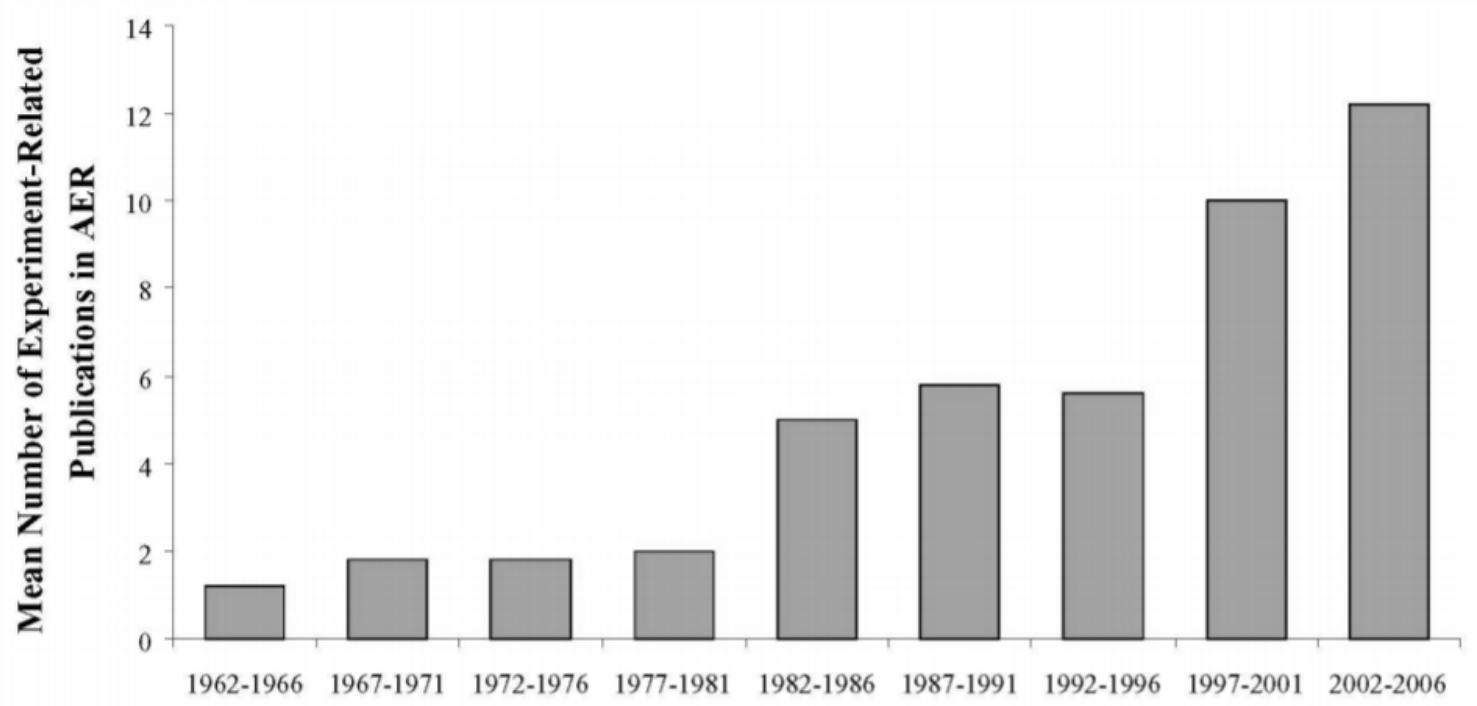
Centralized Market(s)

* Vernon Smith (1962)



- double auction
- repeated interaction

Experimental Economics Today



- in 2000s and early 2010s, ca. 11% of the most-cited papers are experimental, which is roughly the same number as theoretical papers
- the 2002 Nobel Prize in Economics awarded to Vernon Smith and Daniel Kahneman for their experimental work

Popular Research Topics

* Charles Noussair (2011)

- publishing patterns in the field of experimental economics during the decade of Jan. 2001 – Dec. 2010
- journals considered:
  - American Economic Review
  - Econometrica
  - Review of Economic Studies
  - The Economic Journal
  - The Quarterly Journal of Economics
  - Journal of Political Economy
  - Games and Economic Behavior
  - Journal of Economic Behavior and Organization
  - Experimental Economics
- total of 716 papers reporting new data (laboratory experiments)

Popular Research Topics

* Charles Noussair (2011)

- Social preferences (35.4%):
  - social dilemmas (13.1%) – determinants of cooperation
  - Dictator and Ultimatum games (9.6%) – altruism, envy
  - Trust and gift exchange games (9.5%) – reciprocity
- Individual decision making (14.2%):
  - risk (4.6%) – choice under uncertainty, measuring risk tolerance
  - consumer behavior and willingness-to-pay (2.9%) – preferences over commercial products, eliciting WTP

Popular Research Topics

* Charles Noussair (2011)

- Markets (24.3%):
  - auctions (9.9%) – bidding behavior, welfare properties of various auction types
  - asset markets (4.7%) – informational efficiency, bubble formation
  - Industrial Organization (5.5%) – interaction among firms as market agents
- Games (21%):
  - coordination (6.2%) – equilibrium selection
  - Beauty Contest games (1.9%) – common knowledge of rationality