Experimental Economics

Susana Peralta

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Based in part on course materials by Sandra Maximiano

ISEG
Lisbon School
of Economics
& Management
Universidade de Lisboa

This course

"Taking a course in experimental economics is a little like going to dinner at a cannibal's house.
Sometimes you will be the diner, sometimes you will be part of the dinner, sometimes both."

Theodore Bergstrom and John H. Miller

This course

IT'S ALL ABOUT CHOICES

This course

As experimentalists:

- What type of experiment should we conduct?
- What subject pool do we use?
- How to reward subjects?
- What design should we implement?
- How many sessions?
- ...

This course

As economic agents/human beings:

- How do we decide in competitive and non-competitive markets?
- How to coordinate in games?
- What do we believe others do?
- Should we cooperate in social dilemmas?
- What sort of biases do we suffer in individual decision making?

Outline for today

- Experimental Economics vs. Behavioral Economics
- Economics as an experimental discipline
- Brief history of Experimental Economics
- The purpose of Economic Experiments
- Syllabus: overview, goals, course outline, grading, readings

The Ultimatum Game

You will be randomly matched with another participant.

One person is the Proposer and the other is the Responder.

- The Proposer receives €10 and decides how to divide it between the two participants.
- The Responder observes the proposed division and chooses to Accept or Reject.
- If the Responder accepts, both participants receive the proposed amounts.
- If the Responder rejects, both participants receive €0.

Proposers

Take a piece of paper and write:

"Out of the €10, I offer you €_____."

Can a simple message increase tax compliance?

Imagine you work for the UK tax authority.

A large number of taxpayers have declared how much tax they owe, but have not yet paid.

You are going to send them a reminder letter.

What message would you add to the letter to increase the probability that they pay?

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What do you think would work?

What would you tell taxpayers?

The researchers tested five different messages:

1. **Basic social norm**
   "Nine out of ten people pay their tax on time."
2. **Country social norm**
   "Nine out of ten people in the UK pay their tax on time."
3. **Minority social norm**
   "Nine out of ten people in the UK pay their tax on time. You are currently in the very small minority of people who have not paid us yet."
4. **Public goods – gain**
   Paying taxes means that everyone benefits from important public services such as the NHS, roads, and schools.
5. **Public goods – loss**
   Not paying taxes means that everyone loses out on important public services such as the NHS, roads, and schools.

What did they find?

All five messages increased tax compliance relative to the standard reminder.

Treatment	**Effect on payment**
Basic social norm	+1.3 pp
Country social norm	+2.1 pp
Minority social norm	**+5.1 pp**
Public goods – gain	+1.6 pp
Public goods – loss	+1.6 pp

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The strongest treatment

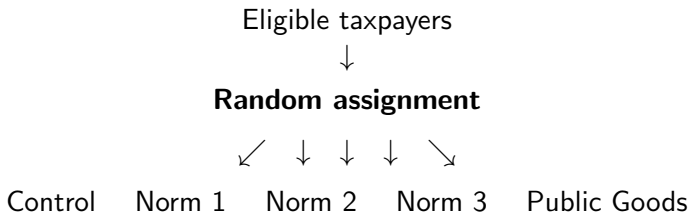
Telling taxpayers that they were part of a **small minority who had not yet paid** had the largest effect.

This treatment generated approximately **£2.37 million** in additional tax payments within 23 days.

How did they find out?

The researchers partnered with the UK tax authority (HMRC).

Around 100,000 taxpayers who had declared their tax liability but had not yet paid were assigned to different letters.



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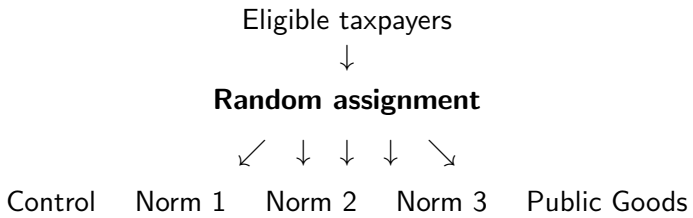

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They then observed actual administrative data

Hallsworth, M., List, J.A., Metcalfe, R.D. & Vlaev, I. (2017). *The Behavioralist as Tax Collector: Using Natural Field Experiments to Enhance Tax Compliance*. Journal of Public Economics, 148, 14–31.

Experimental vs. (and) Behavioral Economics

Behavioral Economics Behavioral theory; empirical research using naturally occurring data.

Experimental Economics Methodological papers; empirical neoclassical economics using lab and field experiments.

Overlap Empirical behavioral economics using lab and field experiments.

Behavioral Economics

Behavioral economics is the study of economic decision-making by individuals and institutions, assuming that individuals are influenced by social, cognitive, and emotional factors.

Experimental Economics

Experimental economics is the application of experimental methods to study economic questions.

Experimental Economics

Experimental economics is an empirical tool that allows the study of how individuals' decisions and behavior are affected by various testable factors in a controlled environment.

The empirical method: the importance of control

Control is central to the empirical method.

The empirical method: the importance of control

Direct observations from the real world—naturally occurring field data—may suffer from:

- Selection
- Endogeneity
- Attrition

The empirical method: the importance of control

To establish whether an **independent variable** influences the **dependent variable** (outcome):

1. Identify the treatment effect.
2. Establish the counterfactual.

Brief History

Individual choice experiments

- Daniel Bernoulli (1738) – St. Petersburg paradox
- Thurstone (1931) – ordinal utility theory
- Maurice Allais (1953) – Allais paradox

St. Petersburg paradox

A game of chance for a single player in which a fair coin is tossed at each stage.

- The initial stake starts at 2 euros and is doubled every time heads appears.
- The game ends the first time tails appears.
- The player wins whatever is in the pot:
  - 2 euros if tails appears on the first toss;
  - 4 euros if heads appears first and tails second;
  - 8 euros if heads appears on the first two tosses and tails on the third;
  - ...
  - 2^k euros, where k is the number of tosses.

What would be a fair price to pay the casino for entering the game?

St. Petersburg paradox

The average payout is the expected value:

$$E = \frac{1}{2} \cdot 2 + \frac{1}{4} \cdot 4 + \frac{1}{8} \cdot 8 + \frac{1}{16} \cdot 16 + \cdots = \infty.$$

- The expected win for repeated play is an infinite amount of money.
- One should therefore play the game at any price.
- Yet, in published descriptions of the game, many people expressed disbelief in the result, and few would pay 25 euros.

St. Petersburg paradox

The classical resolution involved:

- a utility function;
- an expected utility hypothesis;
- diminishing marginal utility of money.

In Daniel Bernoulli's own words:

> *"The determination of the value of an item must not be based on the price, but rather on the utility it yields. There is no doubt that a gain of one thousand ducats is more significant to the pauper than to a rich man though both gain the same amount."*

The Allais Paradox

Decision situation 1
- Lottery S: 3000 with probability 1.
- Lottery R: 4000 with probability 0.8; 0 with probability 0.2.

Decision situation 2
- Lottery S: 3000 with probability 0.25; 0 with probability 0.75.
- Lottery R: 4000 with probability 0.2; 0 with probability 0.8.

Results: The Allais Paradox

If in Treatment 1,

$$U(3000) > 0.8U(4000) + 0.2U(0),$$

then:

$$0.25U(3000) > 0.25[0.8U(4000) + 0.2U(0)]$$
$$0.25U(3000) > 0.2U(4000) + 0.05U(0).$$

Adding $0.75U(0)$ to both sides gives

$$0.25U(3000) + 0.75U(0) > 0.2U(4000) + 0.8U(0).$$

Brief History

Market experiments

- Decentralized markets
- Chamberlin (1948) – competitive equilibrium using induced values
- Vernon Smith (1962, 1964) – double auction

Brief History

Game experiments

- Prisoners' dilemma in the 1950s – originally by psychologists/sociologists
- Reinhard Selten (1959) introduced oligopoly games

Brief History (Davis and Holt, ch. 1)

- Yet, until 1980 not much was published...

Brief History (Davis and Holt, ch. 1)

- The field grew rapidly after the 1980s, in large part based on experiments that challenged the motivation attributed to theoretical agents.
- Since 1990, experimental economics methods have taken place on almost equal footing with more traditional econometric methods.

`link.springer.com/journal/10683`
`journals.elsevier.com/journal-of-behavioral-and-experimental-economics`

Experimental Economics

Experimental economics is applied across many fields:

- Industrial Economics
- Law Economics
- Gender Economics
- Information Economics
- Public Economics
- Game Theory
- Macro Economics
- ...

The purpose of experiments

Test theory

- Efficiency wage theory (Akerlof)
- Expected Utility – Allais paradox

The purpose of experiments

Equilibrium selection

- Observe behavior in cases where theory makes unclear predictions.
- Game Theory: in games with multiple solutions, what solution is chosen?

The purpose of experiments

Find empirical regularities

- Search and establish "stylized facts" as a basis for new theory.
- Subjects do not use backward induction in some games.
  - This motivates development of the theory of cognitive hierarchy.
- Observe behavior in cases where theory makes no predictions.
- Do emotions matter?

The purpose of experiments

Stress testing (test effect sizes)

- Contributions to a public good are around 30% above the Nash prediction in many experiments using groups of four subjects.
- Stress test: do contributions converge to the equilibrium if group size increases?

The purpose of experiments

Accurate measurement of variables of interest

- Use experiments to measure risk and time preferences.
- Test whether these measures explain saving decisions in the field.

The purpose of experiments

Orient/advice policy makers
Use experiments to study the effect of different forces in complex situations where theory is impractical or nonexistent.

- Test performance of different auctions in order to sell spectrum rights.
- Test ways to regulate a privatized electricity market.
- Test the effects on worker motivation of various compensation schemes.

The purpose of experiments

Replication of previous work

- Replication is important to check internal and external validity.

The purpose of experiments

Teaching economics

- Interactive experiments get the whole class involved and push students to think actively rather than passively.
- Help to learn some economic concepts better.

Information about the course

Syllabus