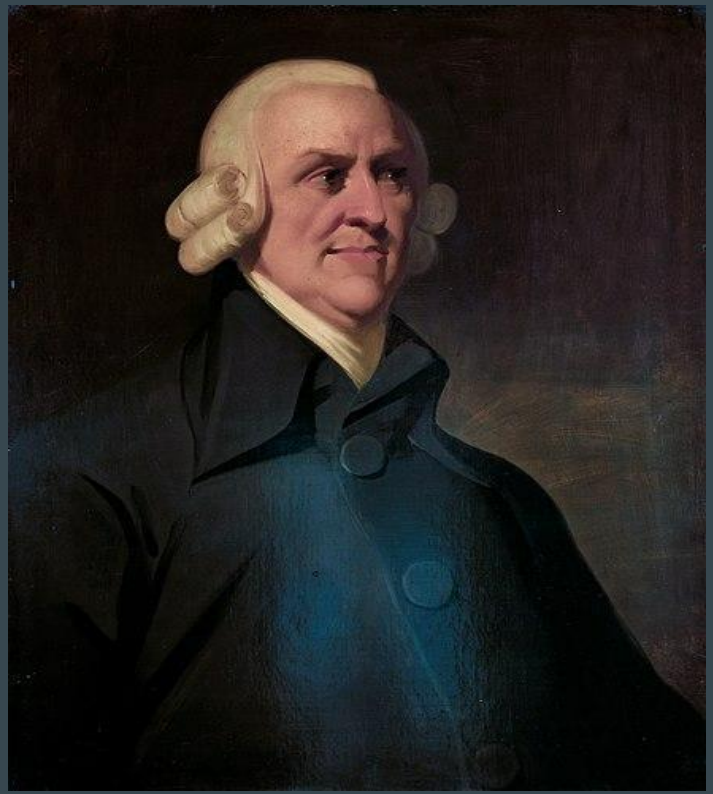
Neoclassical Economics

Introduction and an Overview

Plan for the week

- Overview of major developments in Neoclassical economics
- How economics can help a neuroeconomist?
- Some tales of caution

Where did it all start?

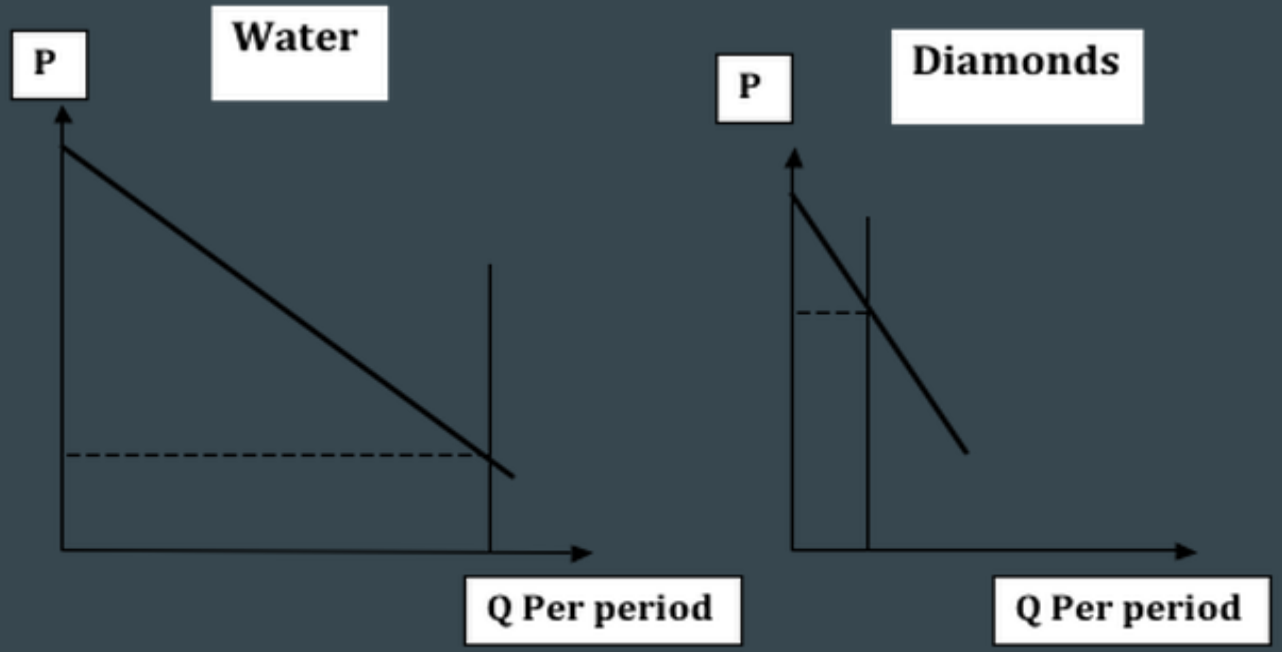


- Adam Smith (1723-1790)
- Wealth of Nations (1776)
- First Theory of Markets
- What creates value of a commodity?

Price Theory

- Supply-demand determines price
- Exchange-value (price at the market) depends on use-value (to the consumer) and cost of production (for the production)
- Higher use value → higher price
- Higher cost of production → higher price

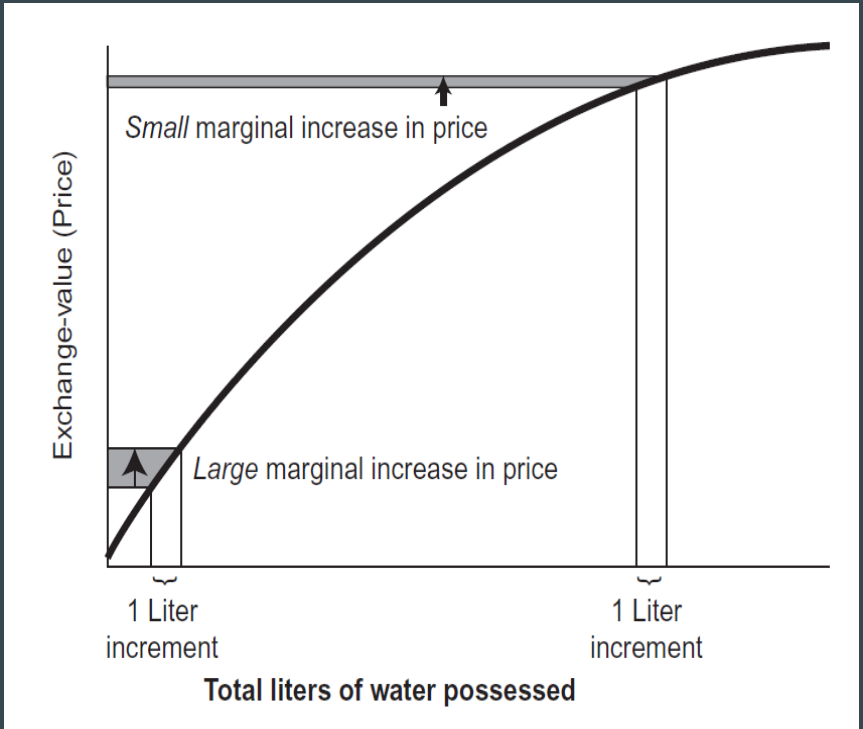
Diamond- Water paradox



Ricardo's Solution

- David Ricardo (1772-1823)
- Labor theory of value
- Diamond expensive : it's difficult to cut and polish diamonds
- What if I take an ordinary rock and do the same?
- Would it be as costly as diamonds?

Marginal Revolution



- Middle-late nineteenth century
- Exchange value depends on the existing quantity
- Not the average, but the marginal increase determines value
- But why?
- Value depends on the level of satisfaction (utility) obtained

Theory of Rational Choice

1. Decision-makers maximize utility/satisfaction by choosing action

2. Decision-makers obtain utility by owning or consuming goods
3. The amount of utility they experienced per unit of most goods was a function “diminishing at the margin.”

First Neuroeconomists?

- Measuring utility in utils
- Needed tools to infer value from physical signals, through a “hedonimeter”
- Notable economists: Ramsey, Edgeworth, Fisher
- Keynes: theory of animal spirit

A parallel development!

- Blaise Pascal (1623-1662)
- Exploring how people gamble
- Should I buy a lottery ticket that yields a 50% chance of winning $200 at a price of $45
- His answer: expected value
- Expected value of lottery:

  .5*200=100
- Definitely buy the ticket

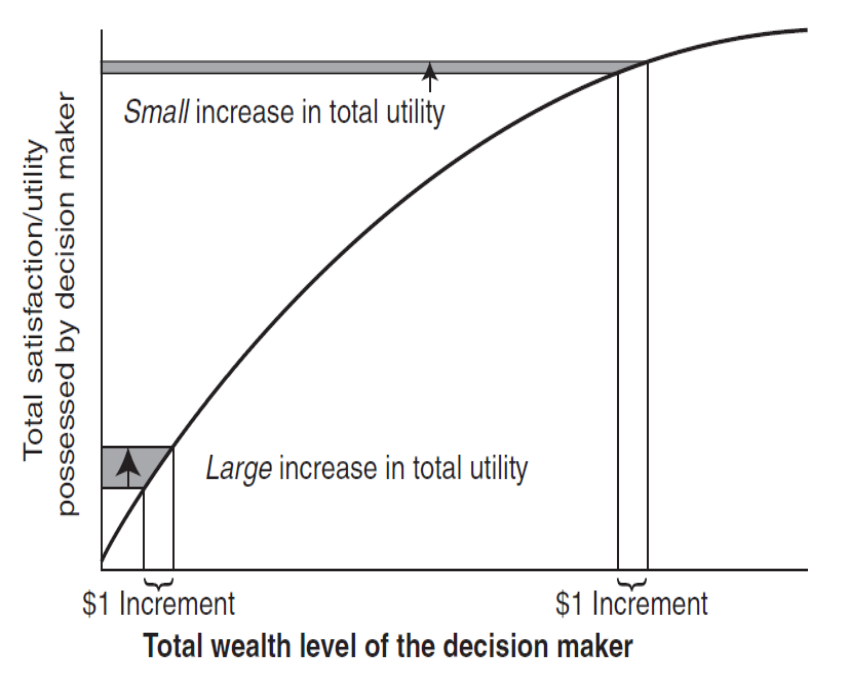
Bernoulli's Lottery

- Tossing a coin infinitely many times
- If "T" comes in first draw get $2
- If "T" comes in second draw get $4
- If "T" comes in n^{th} draw get $\$2^n$
- How much will you pay for the lottery?

From Expected value to Expected Utility

- Daniel Bernoulli (1700-1782)
- Most people pay less than $10 for Bernoulli's lottery
- But the expected value is infinity!
- Bernoulli's solution use expected utility
- Utility: logarithmic function of value

Expected Utility



- As wealth increases additional utility falls
- Expected value can go to infinity but expected utility does not
- Logarithmic function are commonly observed in many decision-making context

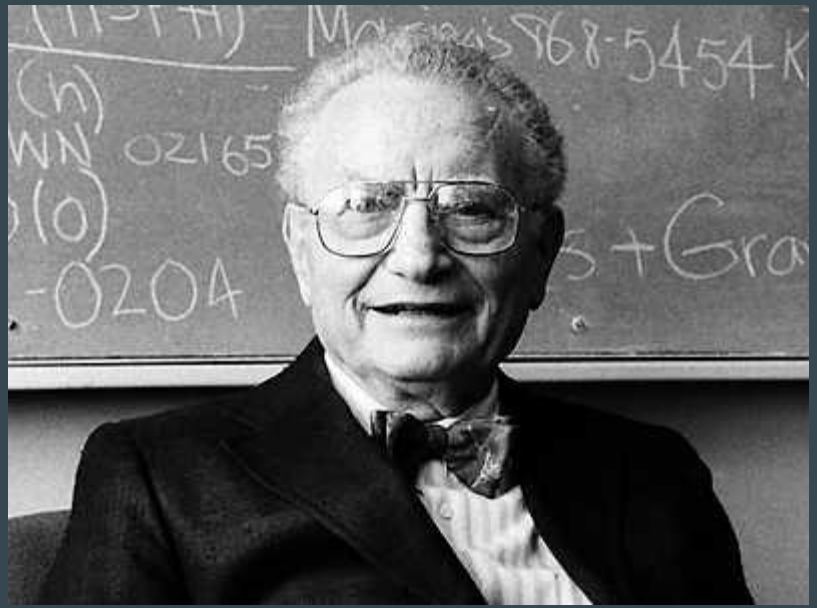
Ordinal Revolution

- Vilfredo Pareto (1848-1923)
- Utility numbers are not important
- Only the ranking matters
- Apple = 12 utils, Orange = 5 utils same as Apple = 15 utils, Orange = 8
- Theory of ordinal ranking

Why Ordinal Ranking?

- Economists can’t measure utility
- Precise functional form does not matter
- But we can measure prices and choices
- Ordinal theory based on choice data

Samuelson's Critique



- Paul Samuelson (1915-2009)
- Ordinal preferences are still not measurable
- Only measurable quantities: price and choice
- Need a theory based on observed choices

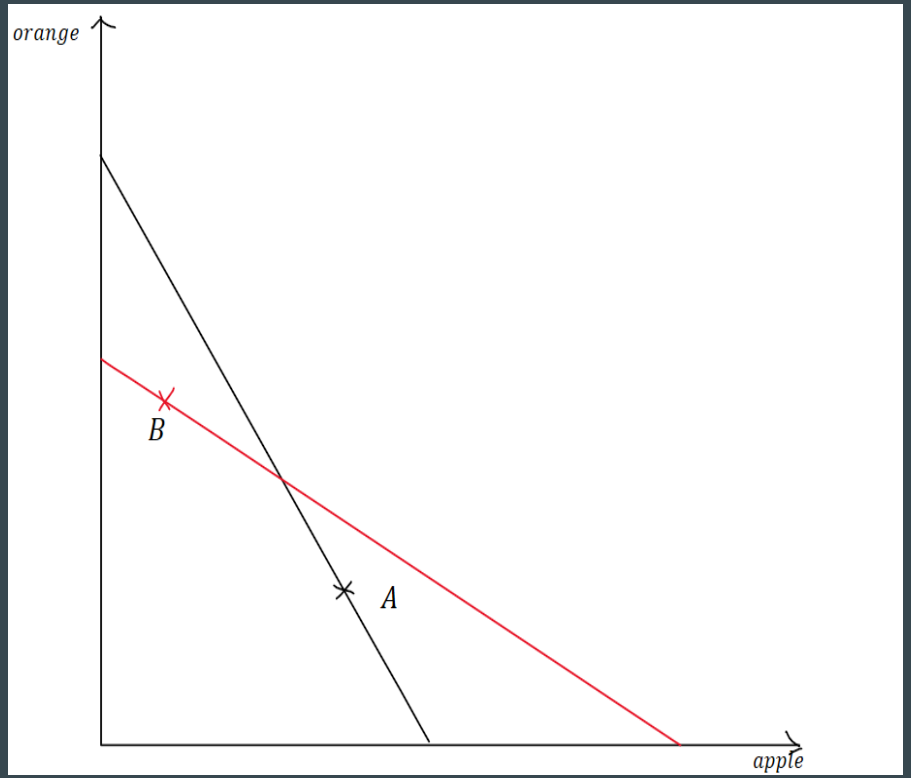
Idea of Revealed Preference

- Ordinal preference theory started with a ranking
  - Apple $\succ$ Oranges

- Revealed preference theory started with choices
  - Price of apple = 10, price of orange = 8
  - 1 apple and no oranges are bought
  - Apple $\succ$ Oranges

- Reveal Preference from choices

WARP (Weak Axiom of Revealed Preference)



- When A was chosen B was strictly inside the black set
- $A \succ B$
- But when B was chosen A was strictly inside the red set
- $B \succ A$
- WARP implies both can't true together

Why WARP?

- If WARP holds true then the choice can be presented by a utility function
- Actually there are infinitely many utility functions
- Functional form is irrelevant
- Do not need a theory of satisfaction

Is WARP enough?

- What if..
  - A is chosen when B is available but C is not available
  - B is chosen when C is available but A is not available
  - C is chosen when A is available but B is not available
- Forms a cycle of preferences
- Does not violate WARP

Money pump

- S prefers
  - Vanilla $\succ$ Chocolate
  - Chocolate $\succ$ Strawberry
  - Strawberry $\succ$ Vanilla
- If S has Vanilla, offer her Strawberry for 1 rupee
- If S has Strawberry, offer Chocolate for 1 rupee
- If S has Chocolate, offer her Vanilla for 1 rupee
- We created a money pump out of S!

GARP (Generalized Axiom of Revealed Preference)

- Excludes cycles
- If $A \succcurlyeq B$ and $B \succcurlyeq C$ then $A \succcurlyeq C$
- Rational theory of choice ≣ no money pump

Problems with Axiomatic Approach

- Since Pareto Economics taken axiomatic approach
- We do not need to know how people choose something but what they chose
- No need to rely on psychological models
- Many relevant behavior remains unexplained
- Serious implications for policy making

From Micro to Macro

- Arrow-Debrue Model
- Model of markets with individual preferences
- General Equilibrium: explains all transactions in an economy

Lucas Critique

- If policy makers do not understand preference then policies can fire back
- Macro welcomed *micro foundation*
- Most recent macro models are based on GE framework
- Recent developments include stochasticity and heterogeneity

Expected Utility

- Stochasticity is crucial for many markets
- Von- Neuman and Morgenstern: brought EU back
- More general utility function capturing risk attitude
- Independence: axiom when an irrelevant alternative is added to all options, choices do not change
- Without independence EU fails

Allais Paradox

Experiment 1				Experiment 2			
Gamble 1A		Gamble 1B		Gamble 2A		Gamble 2B	
Winnings	Chance	Winnings	Chance	Winnings	Chance	Winnings	Chance
$1 million	100%	$1 million	89%	Nothing	89%	Nothing	90%
		Nothing	1%	$1 million	11%		
		$5 million	10%			$5 million	10%

- Most people choose Gamble 1A and 2B
- Violates Independence

Enter Behavioral Economics

- First generation of BE: criticism of EU
- Kahneman and Tversky
- Multiple experiments show independence fails
- Especially problematic
  - when probability are very small or very large
  - Zero is involved
  - Loss is involved

Recent models of Decision-making

- Agents face various cognitive and other psychological constraints
- Preferences are not always *rational*
- Choice reversal are common empirical phenomenon
- Many choices are too complex
- People often do not understand implications of complex choices
- Theory of *constrained* rationality of choice

Thank You!

- Neuroeconomics: decision making and the Brain by Glimcher and Fehr
- My email id: srijita.ghosh@ashoka.edu.in