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Section 3
Theory of Consumer Demand: Neoclassical and Behavioral Perspective

Reference:

N. Gregory Mankiw and Mark P. Taylor (2023), "*Microeconomics*", Cengage Learning, Chapter 4, 18;

Pindyck, R.S. and Rubinfeld, D.L. (2018), "Microeconomics", 9th Edition, Prentice Hall, Chapter 19

The slides of this section are mainly based on the 6th edition of the book by Mankiw and Taylor (2023). In some slides we reproduce figures, sentences and definitions given in the book.

Introductory Video

https://www.youtube.com/watch?v=IlxfjZ8rKSg

The Economist ≡ Menu | Weekly edition | Search

Graphic detail

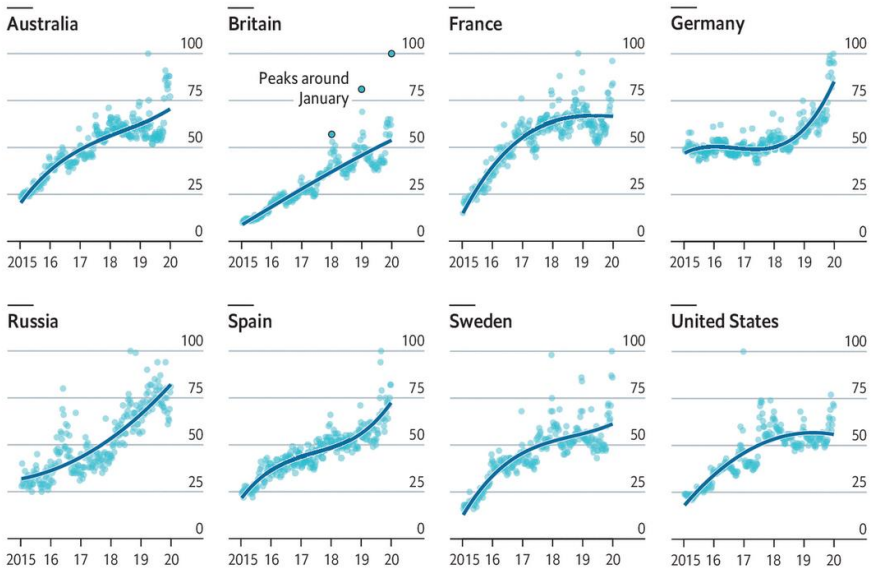
Daily chart

Interest in veganism is surging

Concerns about health and climate, rather than animal welfare, appear to be behind the trend

A chance of meatballs

Google search interest in "veganism" by country, 100=max



Source: Google Trends

The Economist

Contents

A. Introduction

Satisfaction, Utility and Willingness to Pay (WTP)

- The consumption of a certain quantity of a good or a service provides satisfaction to the consumers

- **Utility:** level of satisfaction derived from the consumption of a certain quantity of a product

  ↳In microeconomics, utility has been a controversial topic.

  ↳Can we measure the utility? Can we measure and compare the utility obtained by consuming two goods? Can we compare the utility of two individuals?

Utility: cardinal or ordinal?

- All economists agree that consumption of a certain quantity of a good or a service provides utility to a consumer

- However, economists have different views on the means to measure utility

↳ **Early neo-classical economists** (Marshall, Walrus, Meneger) believed that **utility** can be measured numerically just like weight, height, or temperature

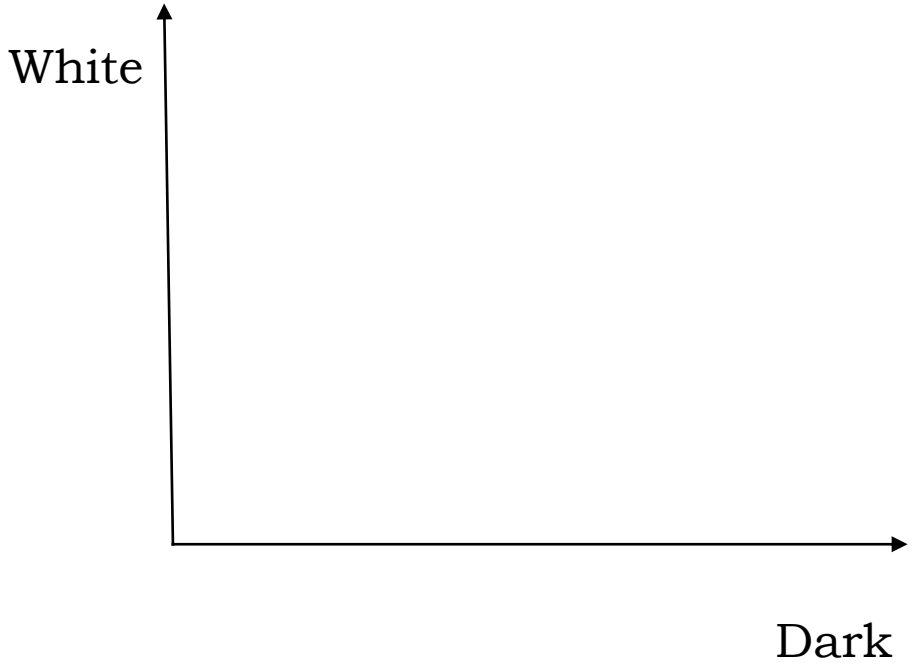
↳ **Modern consumer theory** argues that utility cannot be measured numerically because utility is a subjective phenomenon (influenced by personal feelings, preference and opinions)

↳ This difference has led to the concepts of cardinal and ordinal utility.

"Classroom" Experiment

- What is your order of preference for the two chocolate types?
  - White
  - Dark
- Some students state their preferences
- Students are asked to rank the 2 different small Toblerone in order of preference using a 10-point scale (with each point referred to as a **util, i.e.** unit that represents the amount of satisfaction a specific good)
- Students are asked to define the number of Toblerone (**white or dark**) that provide the same satisfaction (e.g. 2 white= 1 dark)

	Order of preference	Utils (1-10)
White		
Dark		



	Order of preference	Utils (1-10)
White	1	10
Dark	2	6

	Order of preference	Utils (1-10)
White	2	5
Dark	1	8

Interpretation of the result:

For instance, we could conclude that “Toblerone white” is preferred to “Toblerone Dark” (Person 1).
For instance, we could conclude that “Toblerone Dark” is preferred to “Toblerone White” (Person 2).

Person 1 ranked “Toblerone White” at 10 utils, whilst person 2 ranked the same “Toblerone white” at 5 utils. Can we say that person 1 values the “Toblerone white” twice as much as person 2 ? No, we can only say that person 1 placed it higher in his preferences.

Implications:

- The **utility values** simply define a ranking of preferences rather than an actual cardinal measurement.
- we cannot make interpersonal comparisons of utility

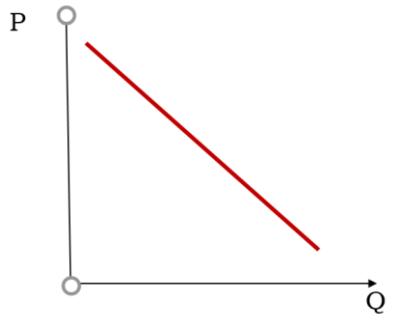
Utility and Willingness to Pay (WTP)

- One way to learn the preferences of the consumers is to consider the amount consumers are prepared to pay for a products.

- Utility can be measured in people's willingness to pay (WTP) for different goods.

- How much a consumer is willing to pay for a good is a reflection of the value that the consumer put on the good

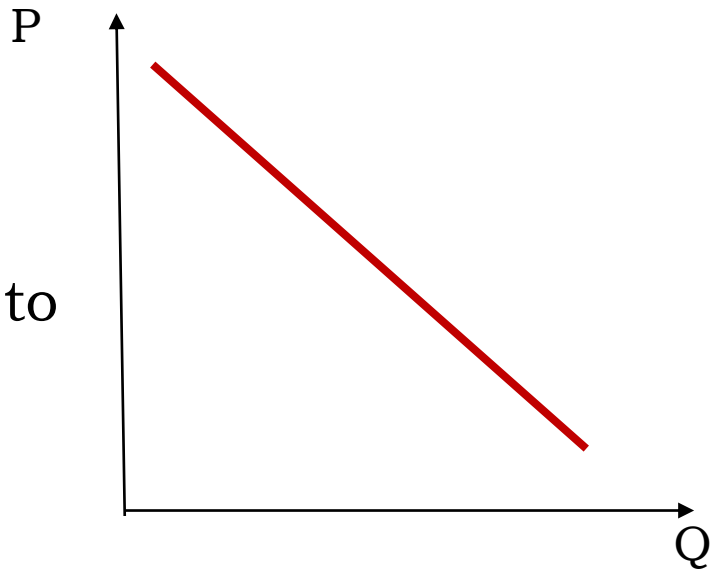
- The demand curve reflects the willingness to pay for a good



Preferences and the Demand Curve

Consumer behavior is best understood in three distinct steps:

1) We will study the **budget constraint**
   - Consumers have a limited income.
2) Then we will turn to **consumer preferences**
   - A description of why and how people prefer one good to another.
3) Finally we combine consumer preferences and budget constraint to determine the **consumer choices that maximize the level of satisfaction**.
   - ➢Derive the demand function using figures



Key Assumptions:

1. Buyers are rational (they do the best they can given their circumstances)
2. More is preferred to less
3. Buyers seek to maximize their utility
4. Consumers act in self-interests and do not consider the utility of others

B. Budget Constraint

Budget Constraints

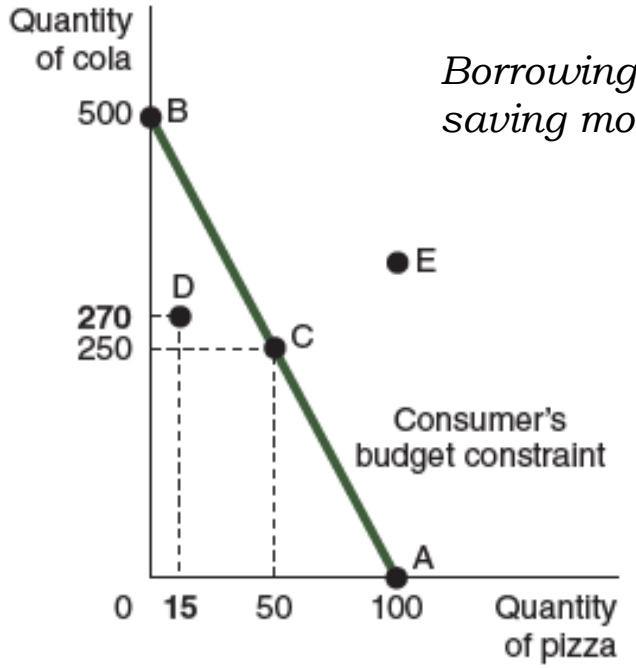
- Preferences cannot explain consumer behavior completely.

- **Budget constraint:** the limit on the consumption bundles that a consumer can afford.

- The **budget line** shows all combinations of goods which can be bought with a certain income, i.e. for which the total amount of money spent is equal to the income.

Budget Constraints

Litres of cola	Spending on cola (€)	Number of pizzas	Spending on pizza (€)	Total spending (€)
0	0	100	1,000	1,000
50	100	90	900	1,000
100	200	80	800	1,000
150	300	70	700	1,000
200	400	60	600	1,000
250	500	50	500	1,000
300	600	40	400	1,000
350	700	30	300	1,000
400	800	20	200	1,000
450	900	10	100	1,000
500	1,000	0	0	1,000



Borrowing (E) or saving money (D)

Source: Mankiw & Taylor (2023), "Microeconomics"

Budget Constraints

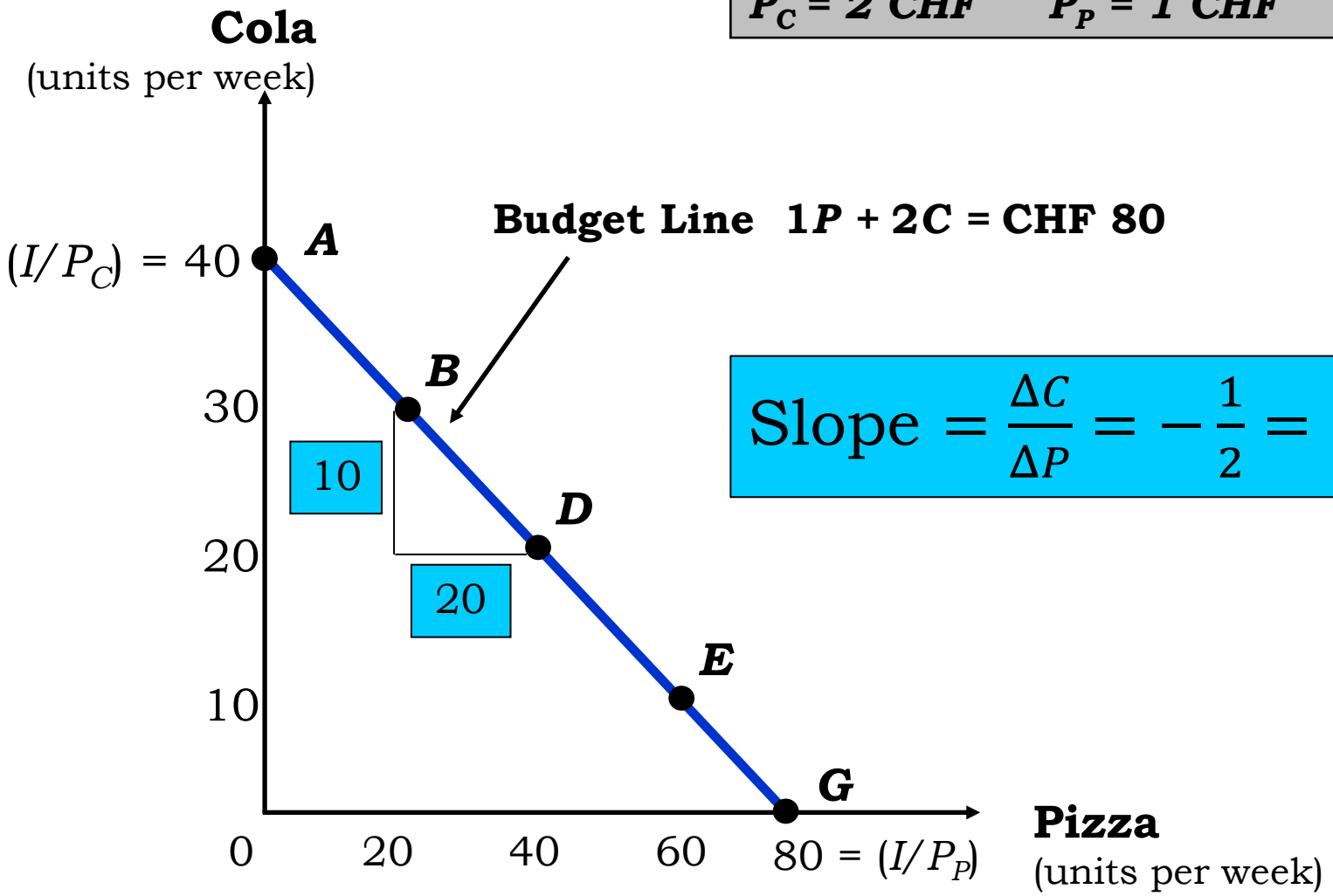
The budget line can be written as:

$$P_P P + P_C C = I$$

$$\rightarrow \quad C = \frac{I}{P_C} - \frac{P_P}{P_C} P$$

Budget Constraints

P_C = 2 CHF P_P = 1 CHF I = 80 CHF



$$\text{Slope} = \frac{\Delta C}{\Delta P} = -\frac{1}{2} = -\frac{P_P}{P_C}$$

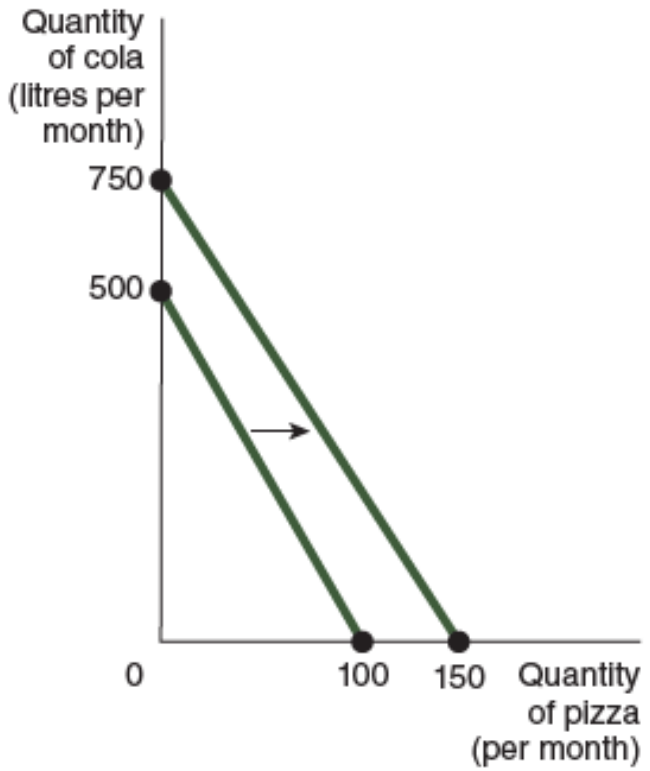
Budget Constraints

An increase in income means that the consumer can now buy more of both goods assuming that the price of the cola and pizza remain the same.

- The result is a **shift** in the budget constraint **to the right**.

If the consumer's income was to fall, then the budget constraint would shift to the left.

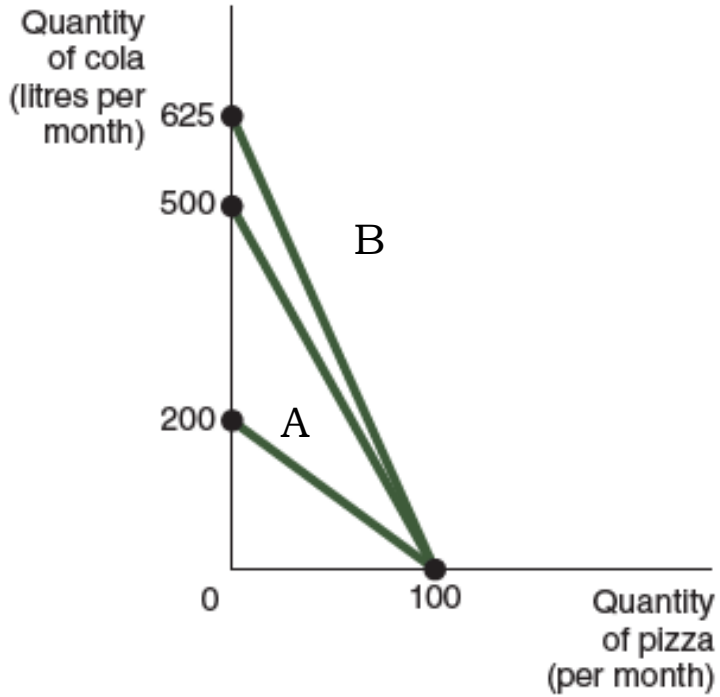
- Because the relative price of the two goods has not changed, the slope of the budget constraint remains the same.



Source: Mankiw & Taylor (2023), "Microeconomics"

Budget Constraints

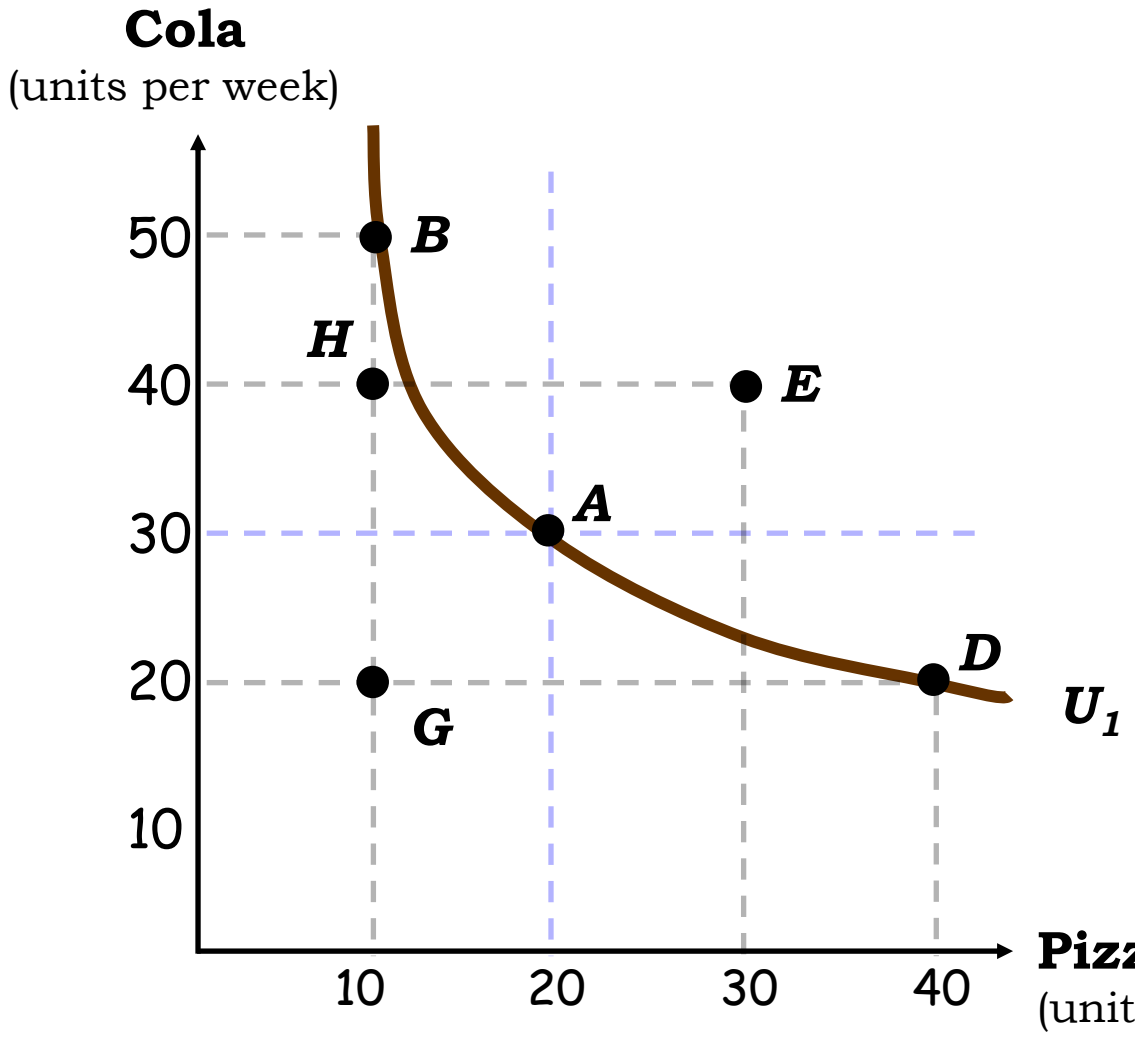
- **Case A**: an increase in price Cola causes the budget line to pivot inward.
- **Case B**: a decrease in price of Cola causes the budget constraint to pivot outward.



Source: Mankiw & Taylor (2023), "Microeconomics"

C. Consumer Preferences

Consumer Preferences



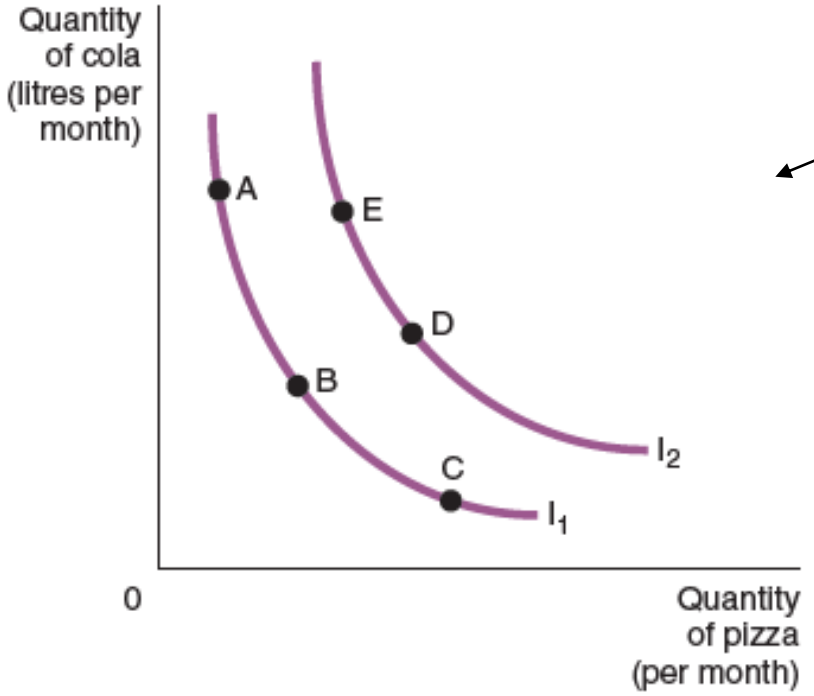
A choice set represents the possible choices for a consumer.

Indifference curve: a curve that shows consumption bundles that give the consumer the same level of satisfaction.

The combinations *B*, *A* & *D* yield the same satisfaction

- ***E*** **is preferred to** U_1
- U_1 **is preferred to *H* & *G***

Consumer Preferences



A figure with several *indifference curves* is called an ***indifference map***

Source: Mankiw & Taylor (2023), "Microeconomics"

Four Properties of Indifference Curves

1. **Higher indifference curves are preferred to lower ones.**

   - Any bundle lying above and to the right of one indifference curve is preferred to any bundle on the indifference curve. “More is always better than less.”

2. **Indifference curves slope downward from left to right.**
   - An upward sloping curve would violate the assumption that more of any commodity is preferred to less.

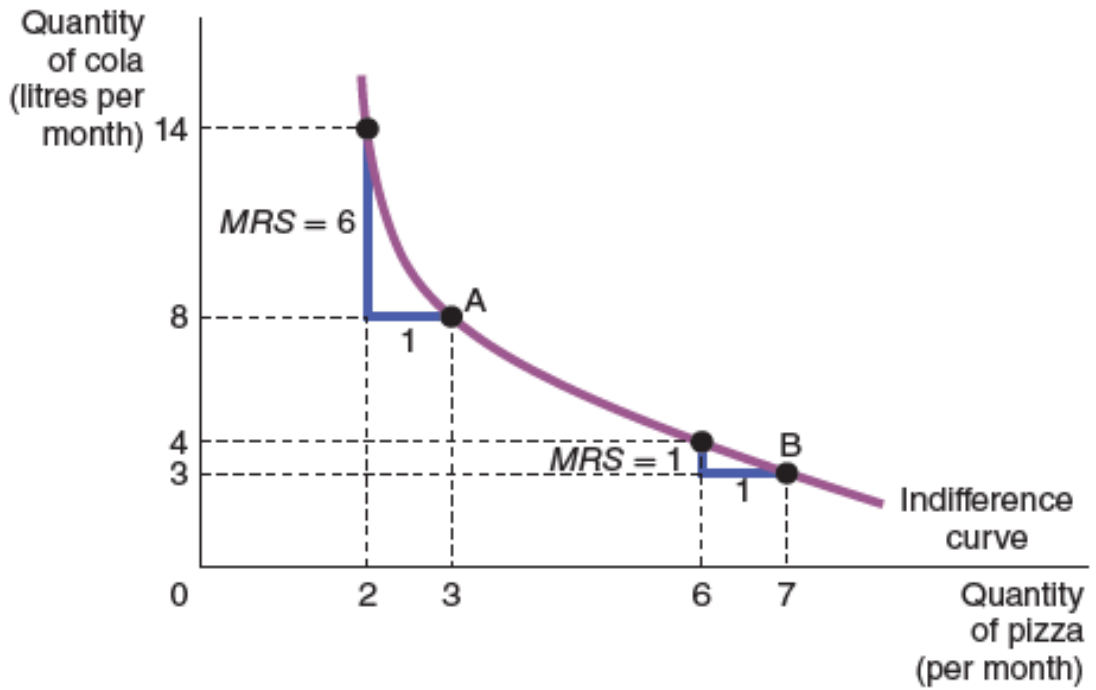
3. **Indifference curves do not cross.**

4. **Indifference curves are bowed inward**

people have consistent preferences that do not change during the period being analyzed

Four Properties of Indifference Curves

4. Indifference curves are bowed inward



At **point A**, the consumer has little pizza and much cola, so he requires a lot of extra cola (6 litres) to induce him to give up one of the pizzas.

At **point B**, the consumer has much pizza and little cola, so he requires only a little extra cola (1 litre) to induce him to give up one of the pizzas.

Source: Mankiw & Taylor (2023)

Consumer Preferences

- The **marginal rate of substitution (MRS)** the rate at which consumer is willing to trade one good for another.

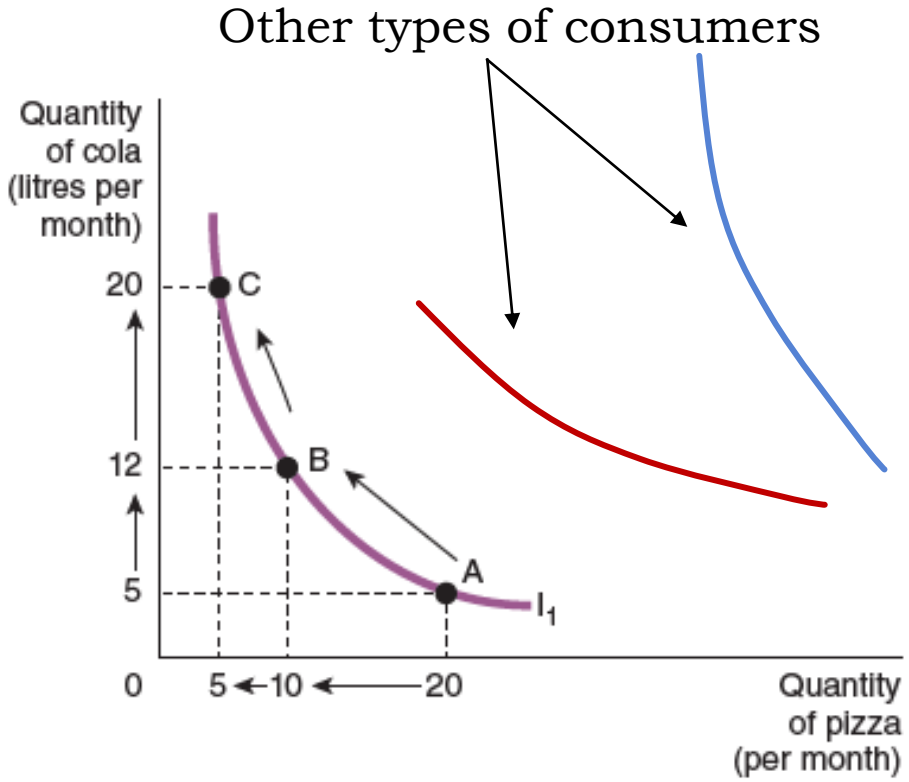
↳The MRS is equal in magnitude to the slope of the indifference curve.

↳A high MRS represents a great importance of the newly obtained good to the consumer.

Marginal Rate of Substitution

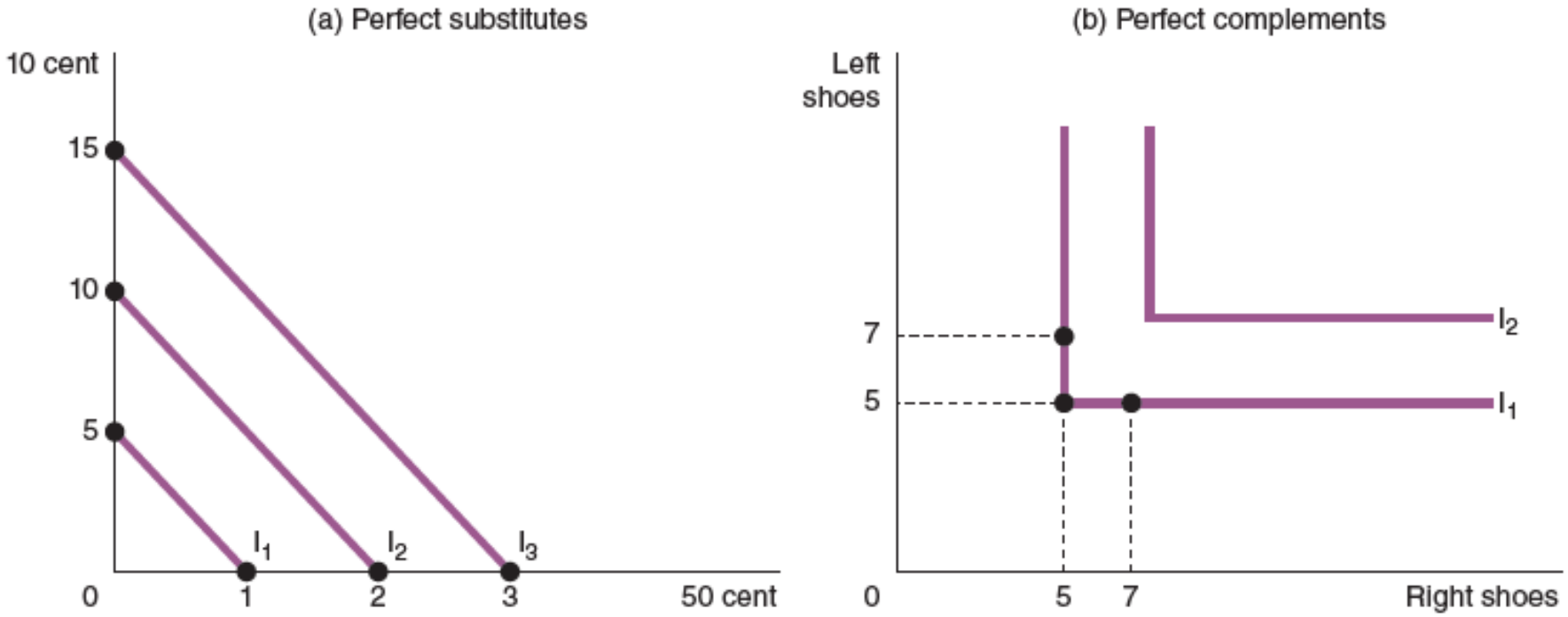
MRS_{CP} = 7/10 (absolute value);
Starting at point A, the individual is willing to give up 10 units of pizza for 7 additional units of cola and reach point B

MRS_{CP} = 8/5 (absolute value); Starting at point B, the individual is willing to give up 5 units of pizza for 8 additional units of cola and reach point C



Source: Mankiw & Taylor (2023), "Microeconomics"

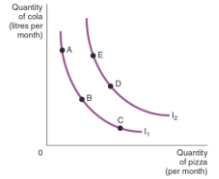
Perfect substitutes and Perfect Complements



Source: Mankiw & Taylor (2023), "Microeconomics"

Consumer Preferences represented with a function

- **Total utility**: the satisfaction gained from the consumption of a good or a bundle of goods.



↳ A utility function U(c,p) is a way to represent a preference order (U(c,p) = cp)

↳A utility function assigns a number to each bundle of goods so that more preferred bundles get higher numbers.

↳ Numbers have no intrinsic meaning (**ordinal approach**)

↳E.g. if $U(c_2,p_2) = 6$ and $U(c_1,p_1) = 2$ then bundle (c_2,p_2) is preferred to bundle (c_1,p_1). But (c_2,p_2) is not preferred three times as much as (c_1,p_1).

- **Marginal utility:** the additional level of satisfaction obtained from the consumption of an extra unit of a good.
- **Diminishing marginal utility:** decreasing marginal utility

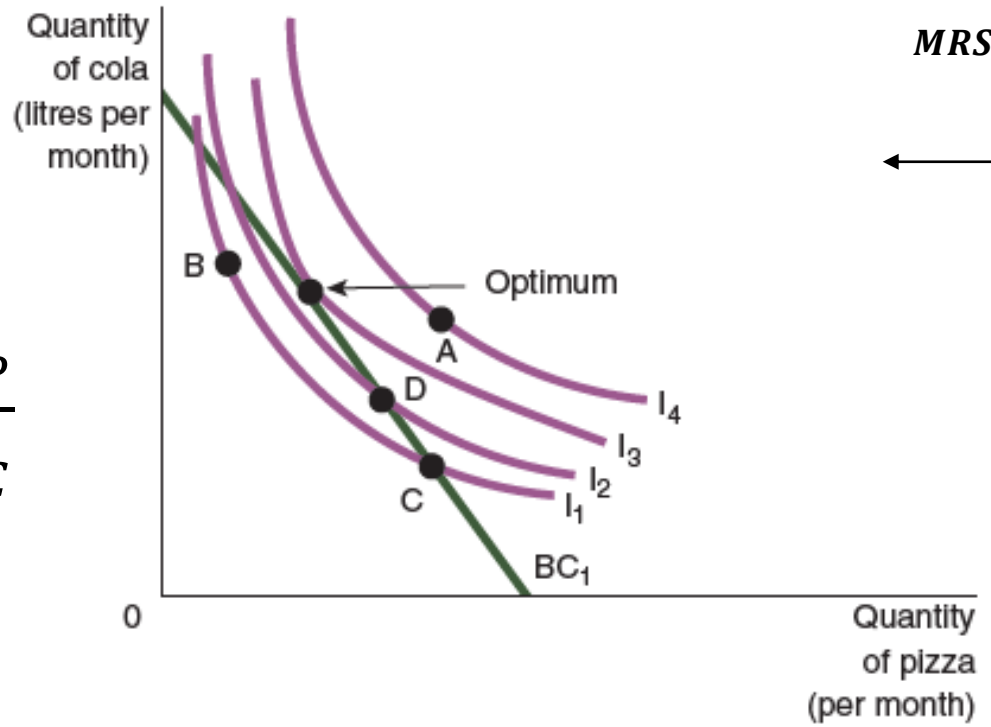
D. Consumer Choice

The Consumer's Optimum

Rational Consumer

$$MRS = \frac{P_P}{P_C}$$

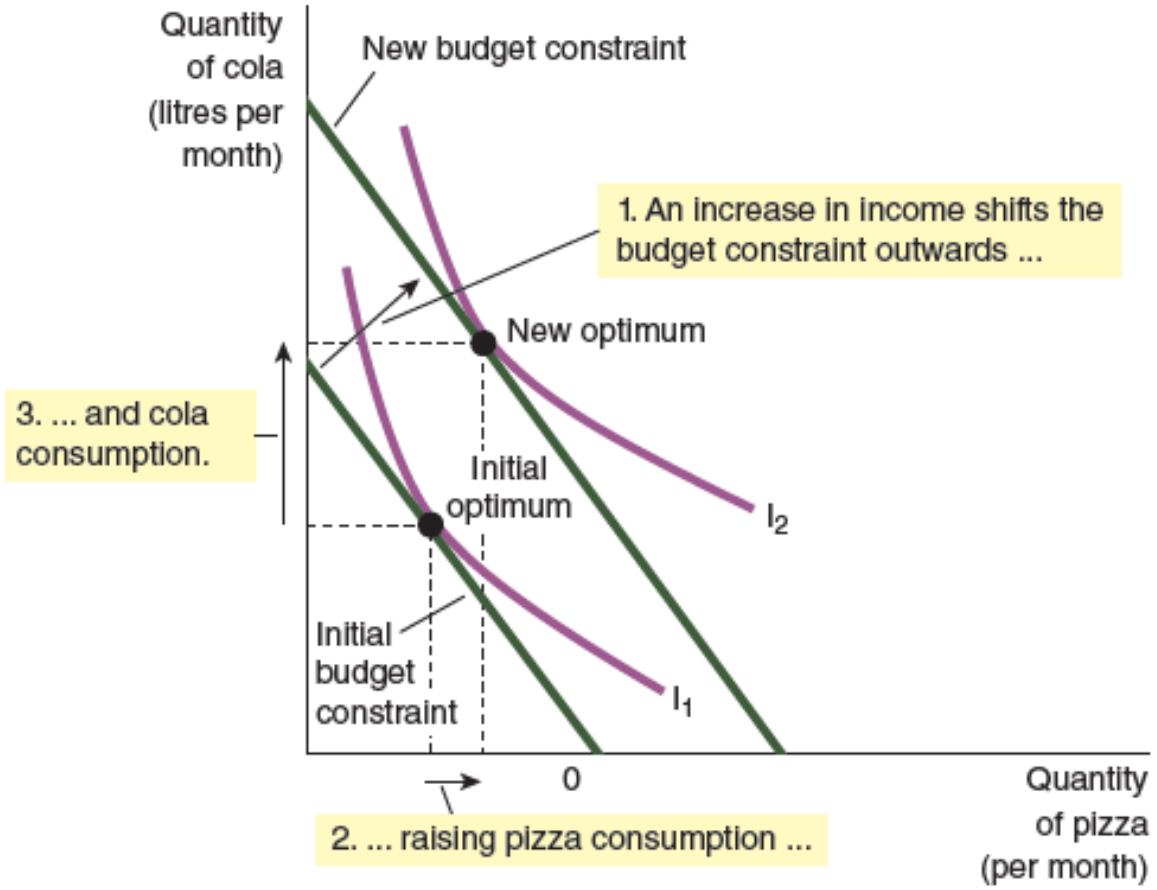
$$\frac{\Delta C}{\Delta P} = MRS_{CP} = \frac{P_P}{P_C}$$



Source: Mankiw & Taylor (2023), "Microeconomics"

Changes in Income

An Increase in Income: **Normal Goods**

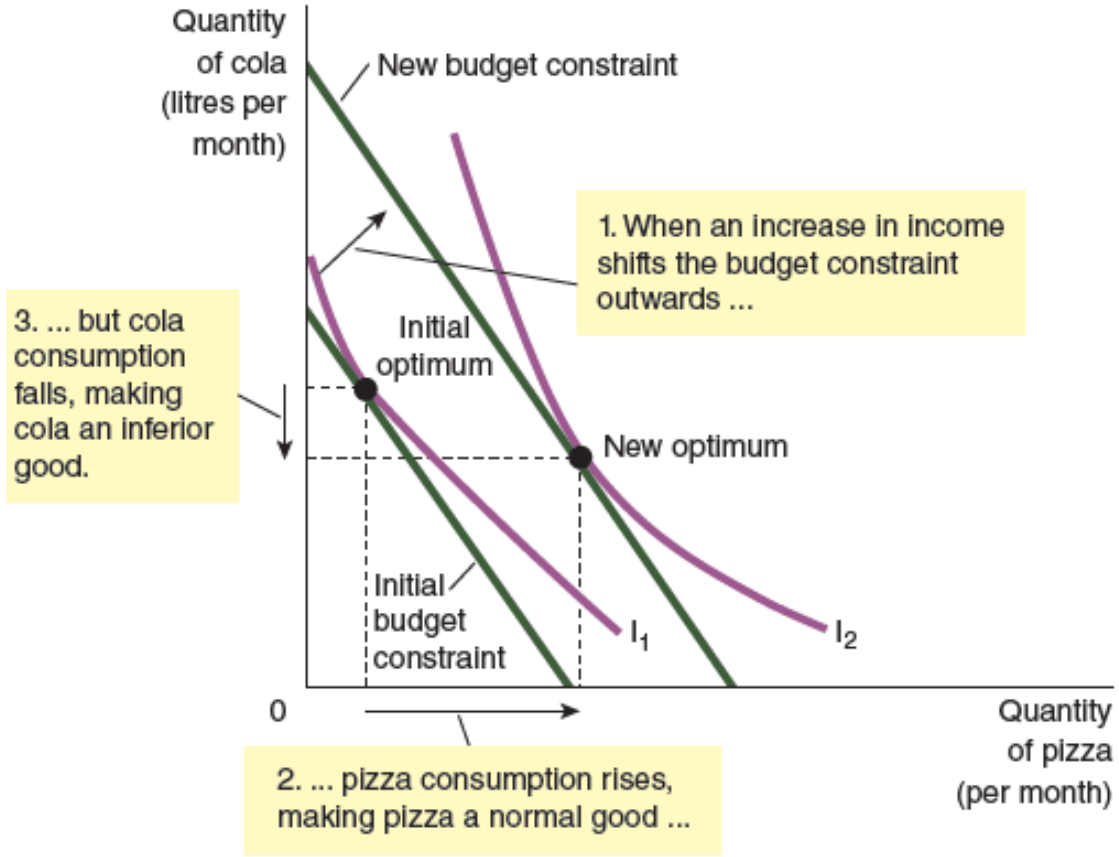


Source: Mankiw & Taylor (2023), "Microeconomics"

When the consumer's **income rises**, the budget constraint shifts out. If both goods are **normal goods**, the consumer responds to the increase in income by **buying more** of both of them.

Changes in Income

An Increase in Income: **Inferior Goods**



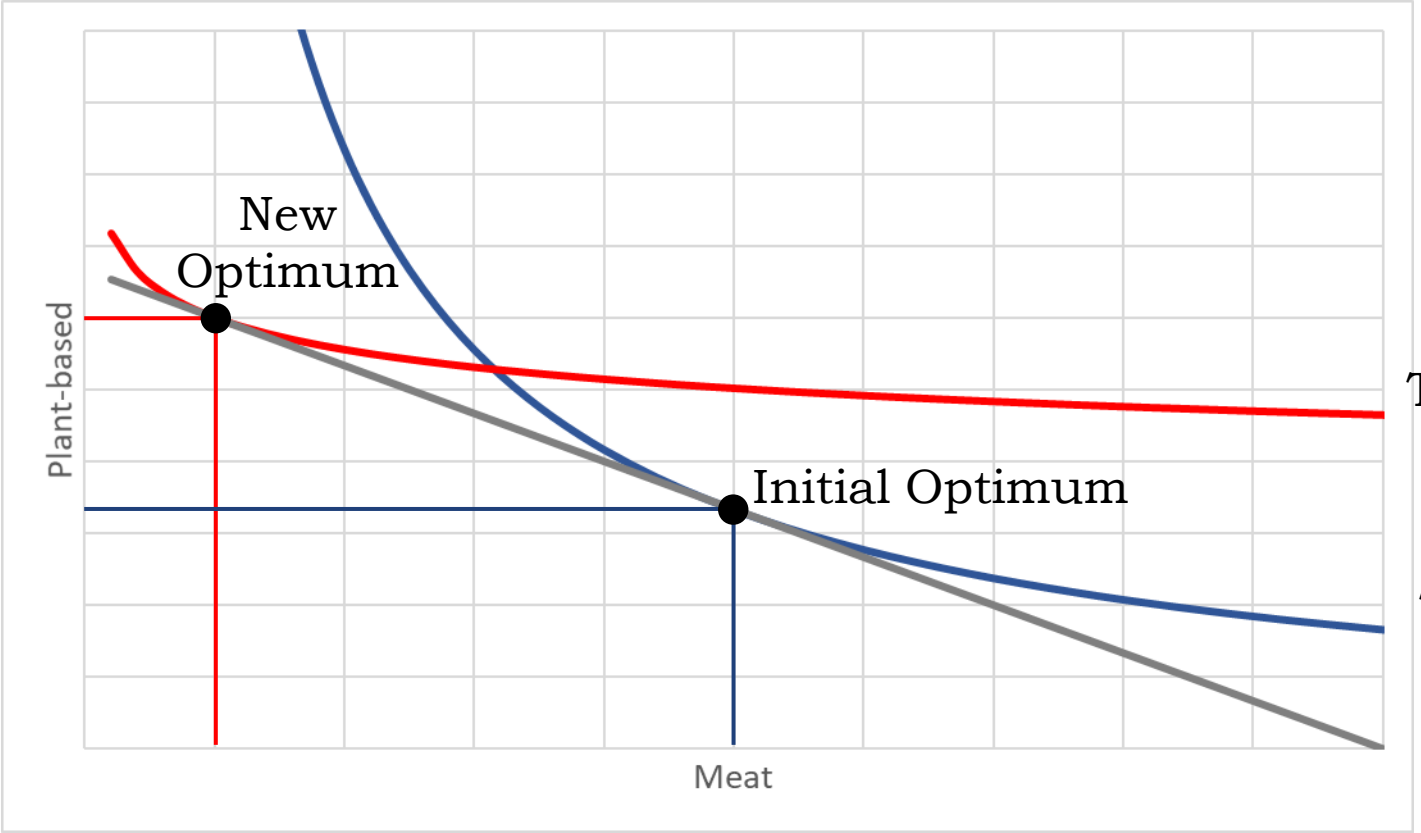
A good is an **inferior** good if the consumer **buys less** of it when his **income rises**. Here cola is an inferior good: when the consumer's income increases and the budget constraint shifts outward, the consumer buys more pizza but less cola.

Source: Mankiw & Taylor (2023), "Microeconomics"

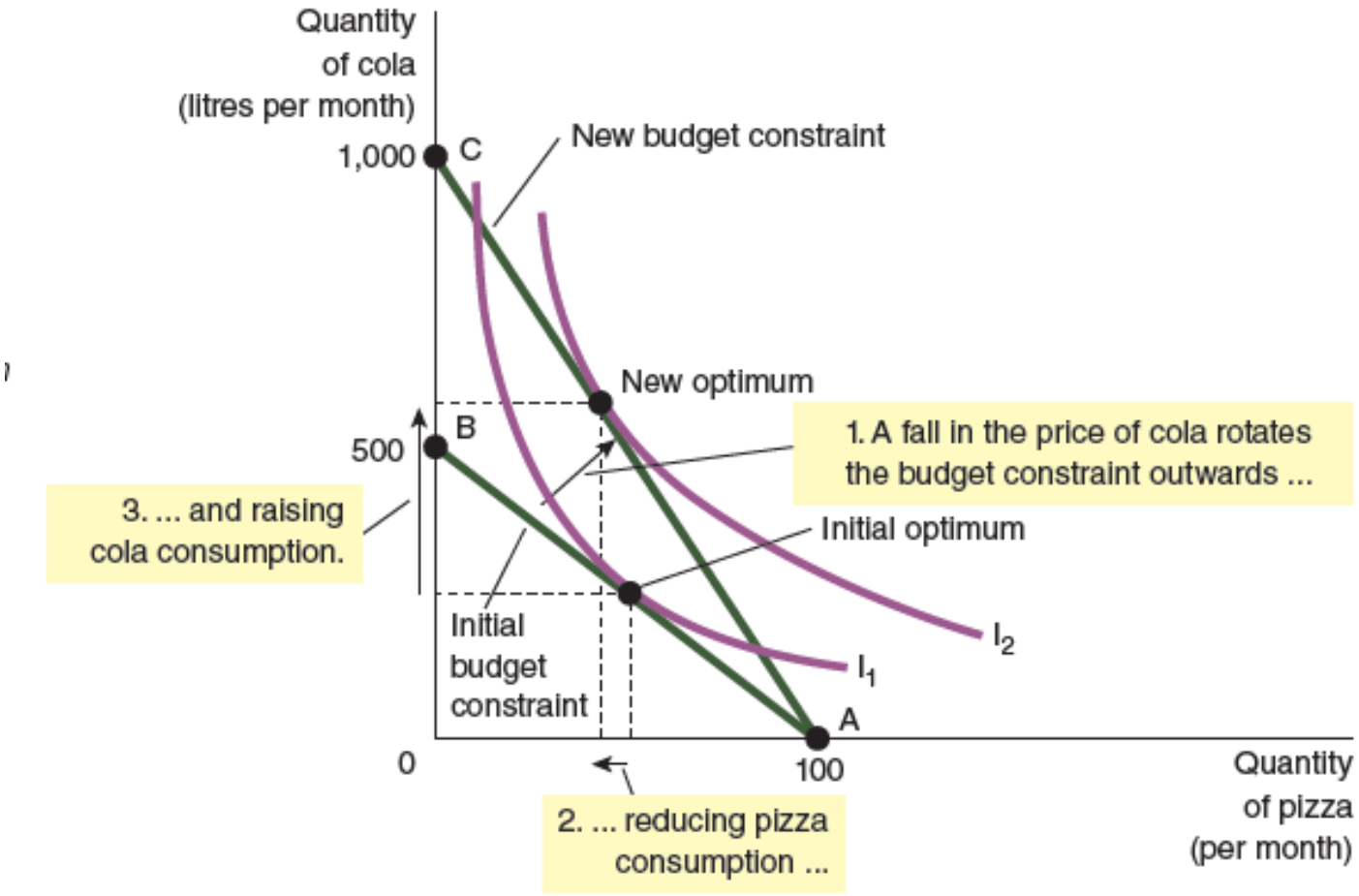
People change tastes , more plant-based products and less meat (Change of Indifference Curves)

- Change in taste over time towards more plant-based food

↳ The shape of the indifference curves in time 0 is different from the shape in time 1



Change in Price



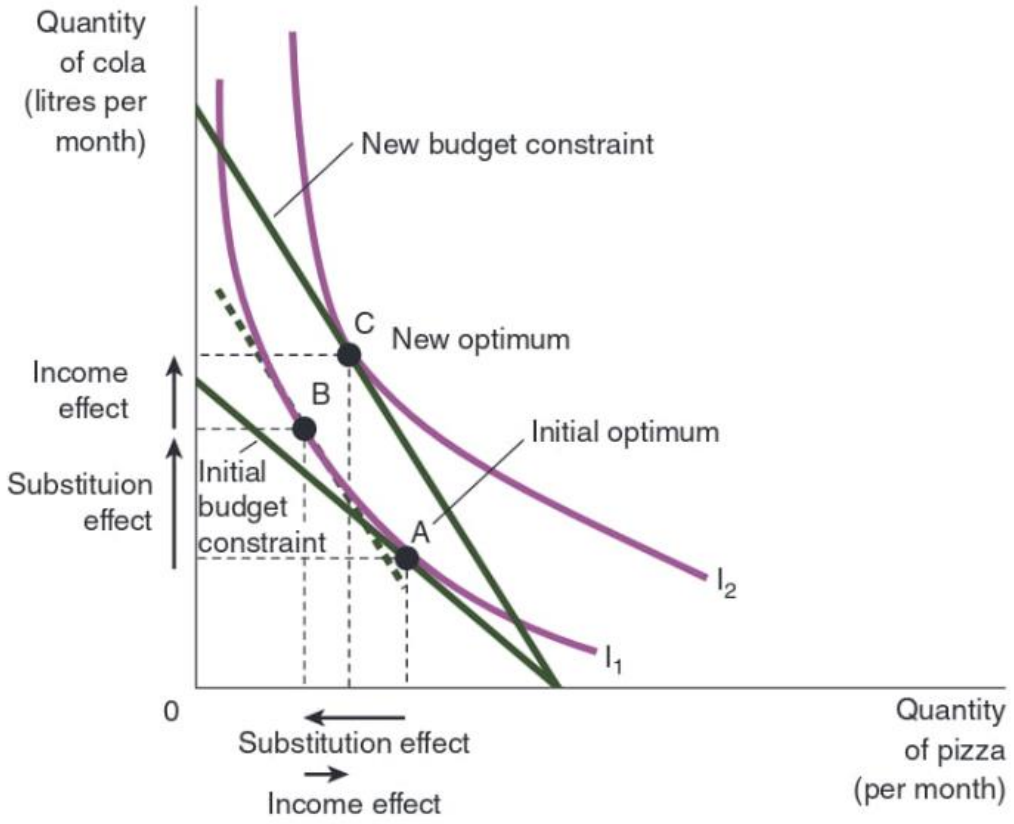
Source: Mankiw & Taylor (2023), "Microeconomics"

Income and Substitution Effects

- The **income effect** is the change in consumption that results when a price change moves the consumer to a *higher or lower indifference curve*.

- The **substitution effect** is the change in consumption that results when a price change moves the consumer *along an indifference curve* to a point with a different marginal rate of substitution.

Income and Substitution Effects



The effect of a change in price can be broken down into an income effect and a **substitution effect** – the movement along an indifference curve to a point with a different marginal rate of substitution – is shown here as the change from point A to point B along the indifference curve I_1. The **income effect** – the shift to a higher indifference curve – is shown here as the change from point B on indifference curve I_1 to point C on indifference curve I_2.

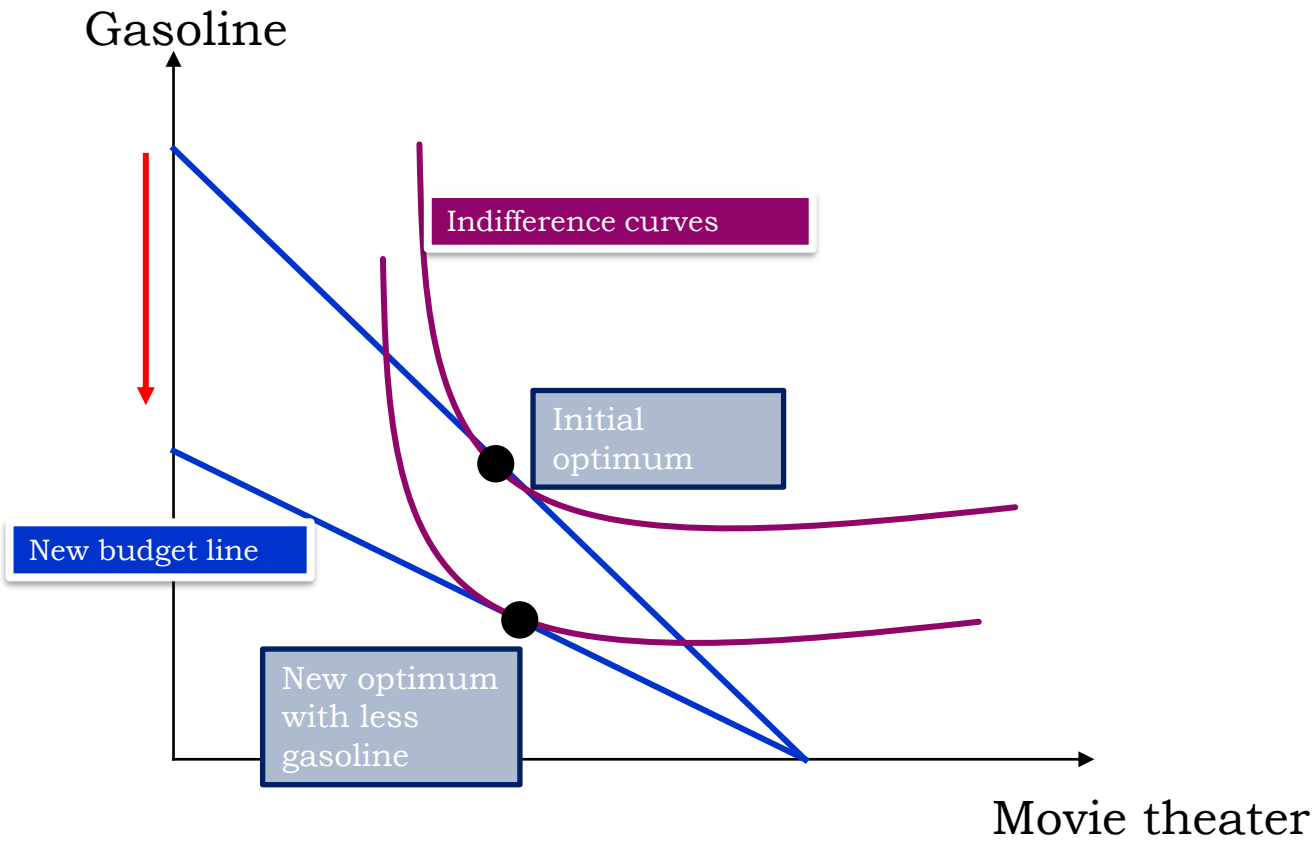
Source: Mankiw & Taylor (2023), "Microeconomics"

Income and Substitution Effects

Good	Income effect	Substitution effect	Total effect
Cola	Consumer is richer, so he buys more cola.	Cola is relatively cheaper, so consumer buys more cola.	Income and substitution effects act in same direction, so consumer buys more cola.
Pizza	Consumer is richer, so he buys more pizza.	Pizza is relatively more expensive, so consumer buys less pizza.	Income and substitution effects act in opposite directions, so the total effect on pizza consumption is ambiguous.

Source: Mankiw & Taylor (2023), "Microeconomics"

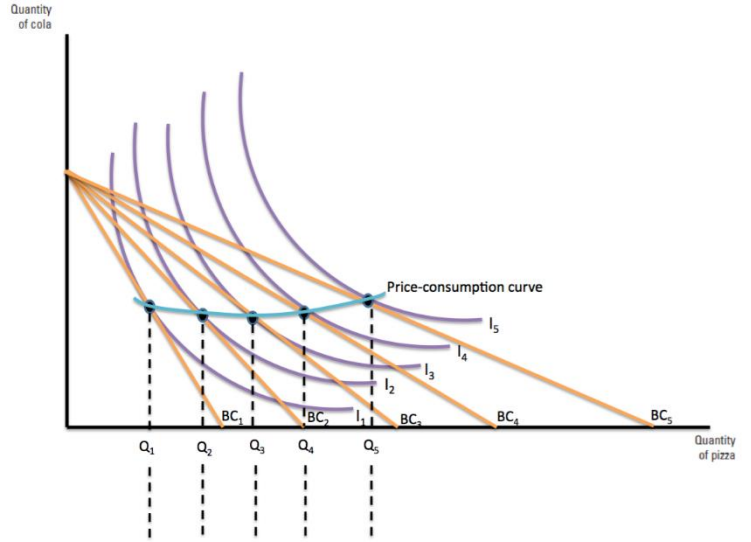
Due to a **CO_2 tax**, there is an **increase** in the gasoline price . This causes the **budget line to pivot inward**



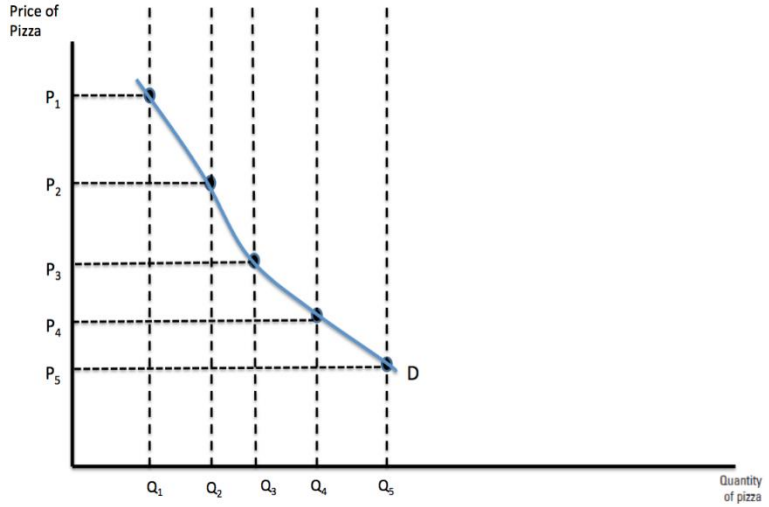
E. Demand Function

Price-consumption curve

The upper graph shows that a decrease in price leads to a change in the consumer's optimum. These changes are showed as the **price-consumption curve.**



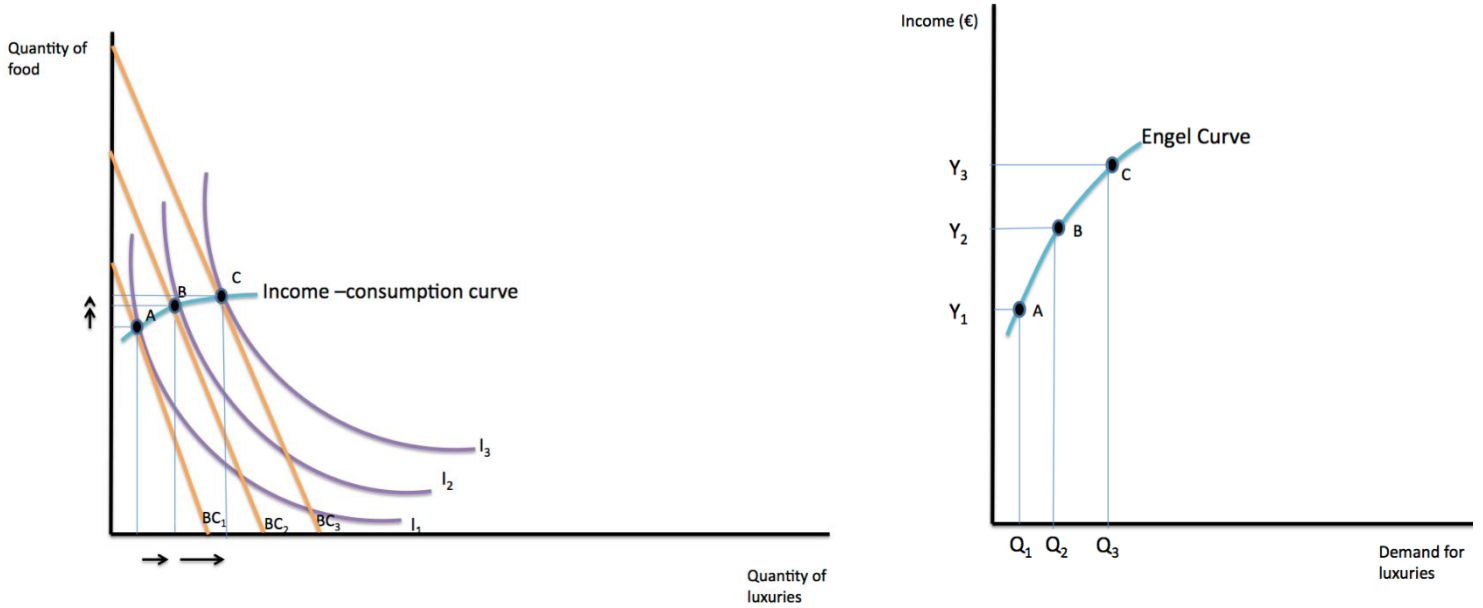
The lower graph represents the relationship between the change in price of pizza and the quantity demanded. The demand curve is derived from the price-consumption curve.



Source: Mankiw & Taylor (2023), "Microeconomics"

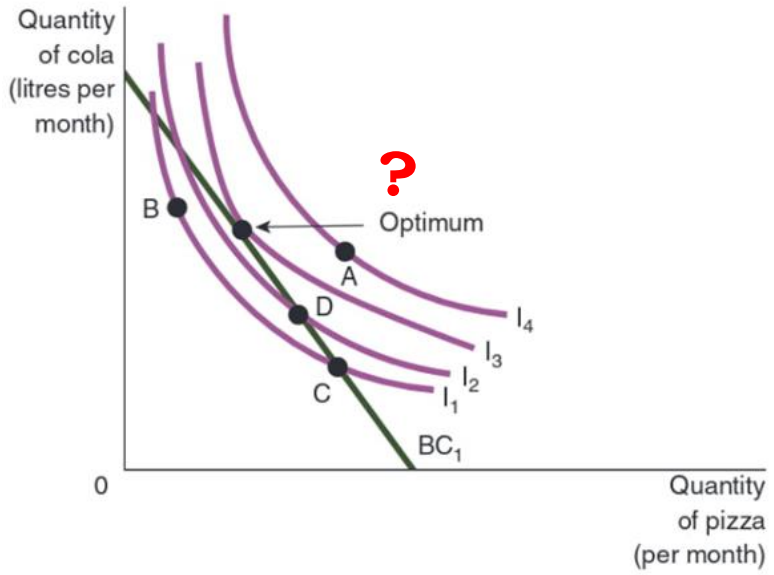
Engel Curve

- Ernst Engel observed that as income rises, the proportion of income spent on food decreases whereas the proportion of income devoted to other goods such as leisure, increases.
- **Engel curve** is a *line showing the relationship between demand and levels of income.*



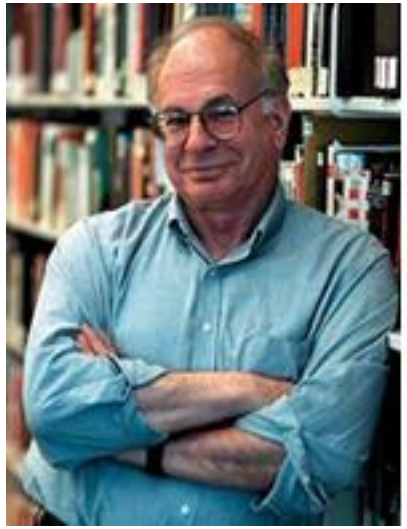
Source: Mankiw & Taylor (2023), "Microeconomics"

F. Behavioral Economics



Three notable Nobel Prizes in the study of Behavioral Economics

Herbert Simon – 1978 – Bounded Rationality



Daniel Kahneman and Amos Tversky – 2002 – Prospect Theory and cognitive bias

Richard Thaler – 2017 – Predictable Irrationality, Nudge Theory

Behavioral Economics

Thaler & Mullainathan (2008)

«The standard economic model of human behavior includes three unrealistic traits – unbounded rationality, unbounded willpower, and unbounded selfishness»

In «Behavioral economics» in *The Concise Encyclopeida of Economics*, (2008) http://www.econlib.org/library/Enc/BehavioralEconomics.html

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A Behavioral Approach to Law and Economics

Christine Jolls
Yale Law School

Cass R. Sunstein
csunstei@law.harvard.edu

Richard Thaler
richard.thaler@chicagobooth.edu

Source: http://digitalcommons.law.yale.edu/cgi/viewcontent.cgi?article=2797&context=fss_papers

Behavioral Anomalies

Behavioral Economics

Neoclassical economics assumes that:

- Individuals always behave rationally, they have access to all information
- Individuals maximize utility
- Managers maximize profits
- Given constraints that they face, individuals make decisions by rationally weigthing all costs and benefits
- **But in reality consumer choices are not always utility-maximizing**

Most important behavioral anomalies affecting economic decisions

Behavioral anomalies: systematic deviations from the assumptions of the rationally self-interested model of man

Bounded rationality	*"Bounded rationality, an idea first introduced by Herbert Simon, refers to the obvious fact that human cognitive abilities are not infinite. We have limited computational skills and seriously flawed memories." p. 1479* People make decisions using limited information and with cognitive constraints in processing information.
Bounded willpower (self-control)	*"In addition to bounded rationality, people often display bounded willpower. This term refers to the fact that human beings often take actions that they know to be in conflict with their own long-term" p. 1479*
Bounded selfishness	*"…the term bounded self-interest to refer to an important fact about the utility function of most people: They care, or act as if they care, about others, even strangers, in some circumstances." , p. 1479*

Source: Jolls C., Sunstein C., Thaler R (1998). A behavioral approach to law and economics. Stanf Law Rev 50:1471–1550

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	Factors that determine behavioral anomalies
Bounded rationality	**Cognitive limitations in evaluating complex tasks** **Loss aversion (**tendency to prefer avoiding losses to acquiring equivalent gains) ↳ Status quo bias (strong tendency to remain at the status quo) ↳ Endowment effect (humans assign greater value to specific goods that they own than to identical goods they do not own) **Framing (**when our decisions are influenced by the way information is presented) **Limited use of information** ↳ Limited attention (ability to pay **attention** to several things at once is much more **limited** than we might think) ↳ Limited salience of relevant information (attention is differentially directed to one portion of the environment rather than to others) ↳ Wrong priors/beliefs about which information is relevant
Bounded willpower (self-control)	**Cognitive dissonance** (inconsistencies between individual beliefs and behaviors) ↳ ***Attitude-behaviour gap***, a mismatch between beliefs and concrete behaviors. Possible reaction: alignment of their beliefs to their behavior instead of the opposite **Myopia in intertemporal choices**: cognitive myopia/present bias (near future rewards are valued higher than more distant rewards because of varying discount rate; disproportionate weight on immediate costs and benefits relatively to long-term one; impatience or immediate gratification in decision-making)
Bounded selfishness	**Altruism, Fairness, Social norms**

Bounded rationality: *Cognitive constraints in evaluating complex tasks*

- Consumers make decisions based on **limited information** and with **cognitive constraints** in handling information.
- Many decisions are complex, so people can resort to mental shortcuts and rules inspired by common sense, which introduce distortions in decision-making processes.
- Consumers do not always make calculations, perform an investment analysis, take an economic decision considering the result of an optimization problem,,...

↳ They make choices that are not completely rational → choices that are “good enough" using simple heuristics/rule of thumb.

↳ e.g., purchasing a new energy-consuming durable without considering the lifetime cost and just considering initial price or label, or...; ignoring shipping costs for goods purchased over internet;..

Empower the Consumer! Energy-related Financial Literacy and its Implications for Economic Decision Making

Julia Blasch, *Nina Boogen*, *Claudio Daminato*, *Massimo Filippini*

Open Access Article

Abstract:
Untapped energy savings potential in the residential sector might lead to substantial welfare losses. While several studies have focused on the role of behavioral biases in explaining the lack of adoption of energy-efficient durable goods, little is known about the role of limited energy-specific knowledge and financial literacy. In this paper, we propose an integrated concept of 'energy-related financial literacy', which combines both energy cost-specific knowledge and skills needed to process this information. Using data from a large household survey in three European countries, we explore the determinants of different measures of literacy and, most importantly, we provide empirical evidence on the association between limited knowledge and skills to perform an intertemporal optimization and the adoption of energy-efficient light bulbs. Our findings support the promotion of energy-specific financial education programs and tools to increase the adoption of energy-efficient durable goods.

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Executive Summary: View

Published in Volume 10, Number 2 of The Quarterly Journal of the IAEE's Energy Economics Education Foundation.

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Energy-related financial literacy

Energy-related financial literacy:

the *combination of* ***energy-related knowledge*** *and* ***cognitive abilities*** *that is needed in order to take decisions with respect to* ***investments for the production of energy services and their consumption.***

(Blasch, Boogen, Daminato and Filippini (2018))

Lifetime cost calculation: Suppose you own your home, your fridge breaks down and you need to replace it. As a replacement, you can choose between two alternatives that are identical in terms of design, capacity and quality of the cooling system. Fridge A sells for 400 CHF and consumes electricity for the amount of 300 kWh per year. Fridge B has a retail price of 500 CHF and consumes electricity for the amount of 280 kWh per year.

Assume the average cost of energy is 0.20 CHF per kWh, the two models have both a lifespan of 15 years and that you would get a return of 0 percent from any alternative investment of your money. Which choice of purchase minimizes the total costs of the fridge over its lifespan?

- Fridge A
- Fridge B
- Fridge A and B are equivalent in terms of total costs
- Don't know

- Answer: Fridge A

Results students

Results for a sample of 4600 European households

Penny project, EU

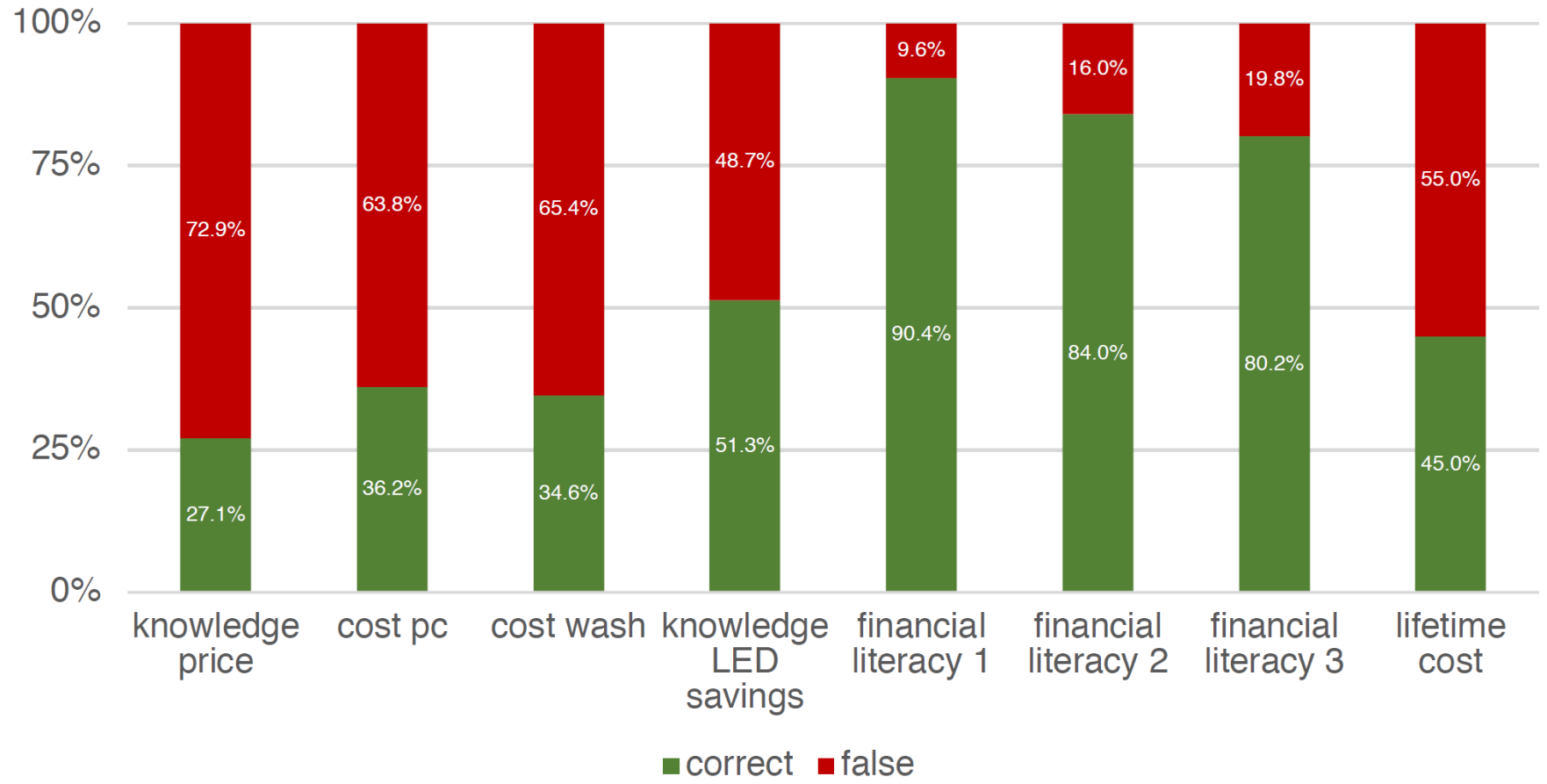

Figure 1: Results of survey questions on energy-related financial literacy. Source: Blasch et. Al. (2018)

Contents lists available at ScienceDirect

Resource and Energy Economics

journal homepage: www.elsevier.com/locate/ree

Boundedly rational consumers, energy and investment literacy, and the display of information on household appliances☆

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ARTICLE INFO

Article history:
Received 13 October 2016
Received in revised form 10 April 2017
Accepted 6 June 2017
Available online xxx

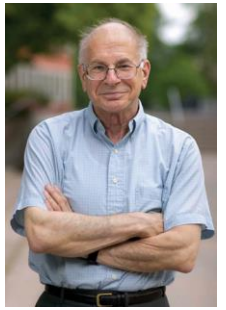
JEL classification:
D12
D80
Q41
Q48

Keywords:
Energy-efficiency
Bounded rationality
Energy-using durables
Energy label
Energy literacy
Online randomized controlled trial

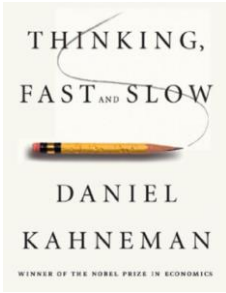
ABSTRACT

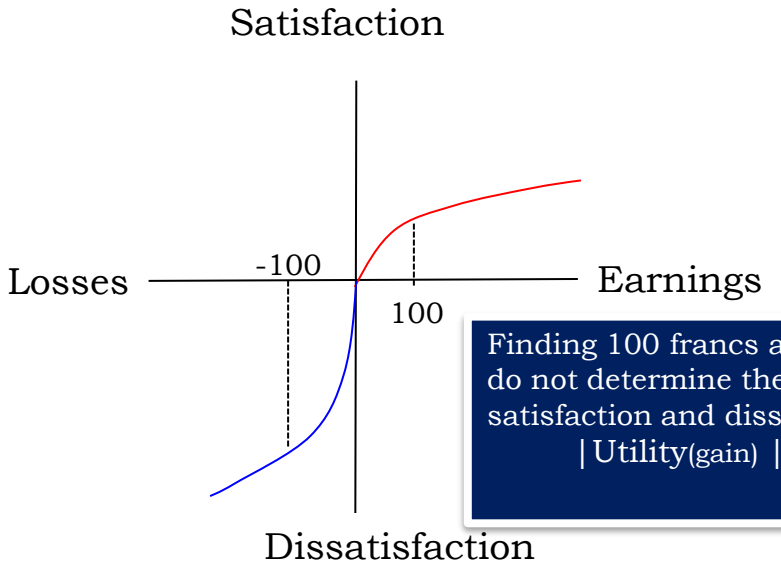
It is an ongoing debate how to increase the adoption of energy-efficient light bulbs and household appliances in the presence of the so-called 'energy efficiency gap'. One measure to support consumers' decision-making towards the purchase of more efficient appliances is the display of energy-related information in the form of energy-efficiency labels on electric consumer products. Another measure is to educate consumers in order to increase their level of energy and investment literacy. Thus, two questions arise when it comes to the display of energy-related information on appliances: (1) What kind of information should be displayed to enable consumers to make rational and efficient choices? (2) What abilities and prior knowledge do consumers need to possess to be able to process this information? In this paper, using a series of (recursive) bivariate probit models and three samples of 583, 877 and 1375 households from three major Swiss urban areas, we show how displaying information on the future energy consumption of electrical appliances in monetary terms (CHF), rather than in physical units (kWh), increases the probability that an individual makes a calculation and identifies the appliance with the lowest lifetime cost. In addition, our econometric results suggest that individuals with a higher level of energy and, in particular, investment literacy are more likely to perform an optimization rather than relying on a decision-making heuristic. These individuals are also more likely to identify the most (cost-)efficient appliance.

Bounded rationality : *Loss aversion*



- People are more interested in avoiding a loss than making a gain (Kahneman and Tversky, 1979)
- Preferences towards choices that avoid losses compared to the acquisition of gains.
- This type of preference favours stability and disfavours change.





Finding 100 francs and losing 100 francs do not determine the same level of satisfaction and dissatisfaction

$|Utility(gain)| < |Utility(loss)|$

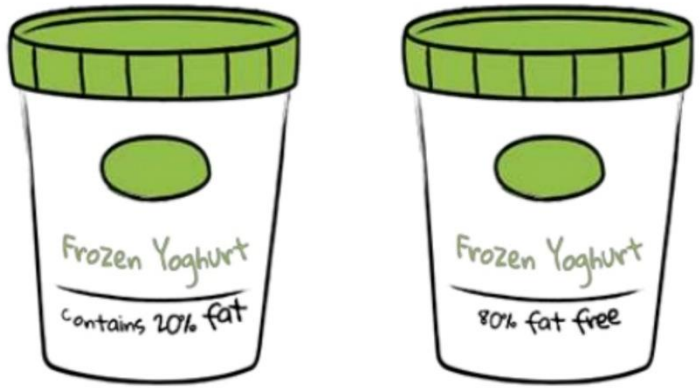
- **Endowment effect :**valuing an item more when you own it than when you do not
- **Status quo bias:** preference for familiarity. Tendency to resist change and prefer the current state of affairs

Source: Ch.19, Pindyck and Rubinfeld (2018), Microeconomics, 9ed

Bounded rationality : *Framing*

Framing

- The way information is "*framed*," when people are taking a choice, *can influence the decision*
- Consumers tend to value options that are framed positively
- A consumer is presented two or more options of a product; the product is the same
- Options are worded differently (framed) so that they appeal to our biases
- Example: a yogurt that claims "**contains 20% fat**" or one that "**80% fat free**"



The framing effect: 80% fat free seems like to be the healthier option, therefore consumers tend to choose the second option

Source: Ch.19, Pindyck and Rubinfeld (2018), Microeconomics, 9ed

Conclusions

- In the real world we find economic agents (consumers but also companies) that are very rational and consumers that are a little less, we find economic agents that for certain decisions are rational, adopt a process of optimization, collect all the information and compare benefits and costs, while for others are less rational.

- Neoclassical microeconomics theory is valid in explaining several real life decisions for all or only one part of the consumers.

- Behavioral economics attempts to provide an explanation for those decisions that standard consumer model can not fully explain.