Utility and Demand

Fei DING

HKUST ECON

Announcements

■ Assigned reading:

- Textbook, Chapter 8, 9

■ Problem set 5 will be released soon. Stay toned.

■ No lectures on Oct. 16 and 18 ☺☺☺

■ Proposed Quiz 2 time: Monday Oct. 22 9-9:30pm

Part III – households' choices

Why do we value diamonds more than water ???

Individual Choice Making

■ The choices you make as a buyer of goods and services are influenced by many factors:

● Consumption Choices/Consumption Possibilities Set: Things you can afford to buy.

● Preferences: Things you prefer (ranking).
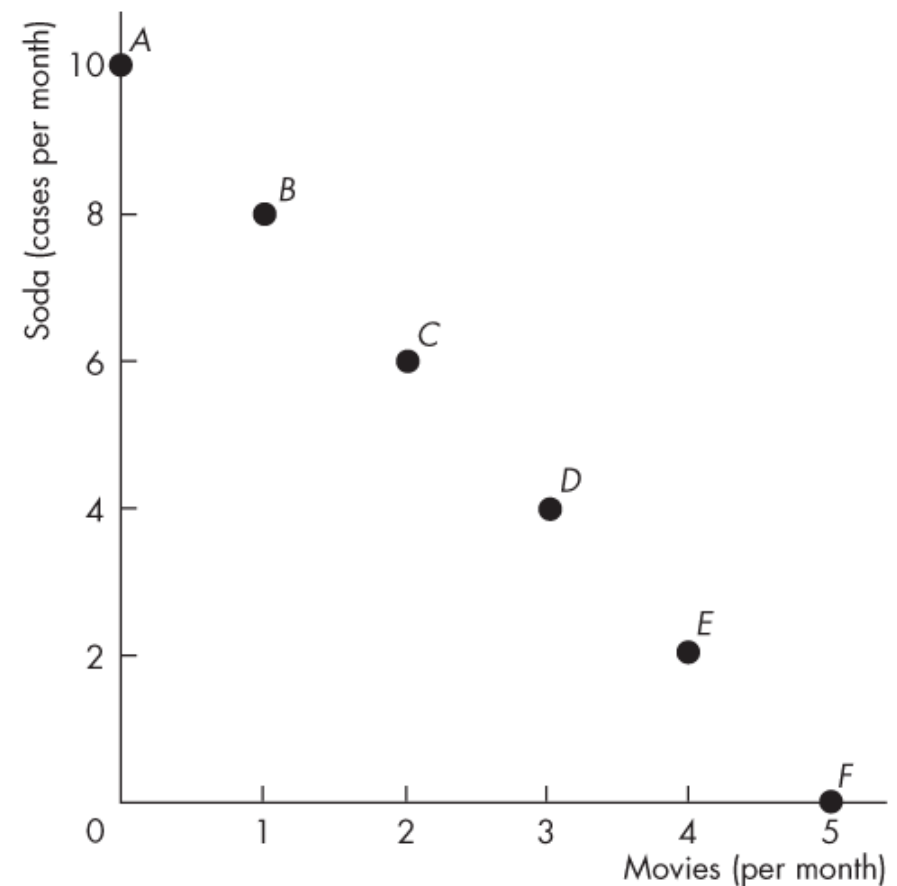
Consumption Choices – Budget Line

Textbook Example:

- Lisa buys only two goods: **movies** and **soda.**

- Consumption Choices are limited by **income**, the **price of a movie**, and the **price of soda.**

- Lisa's budget line shows the limits of her Consumption Choices.
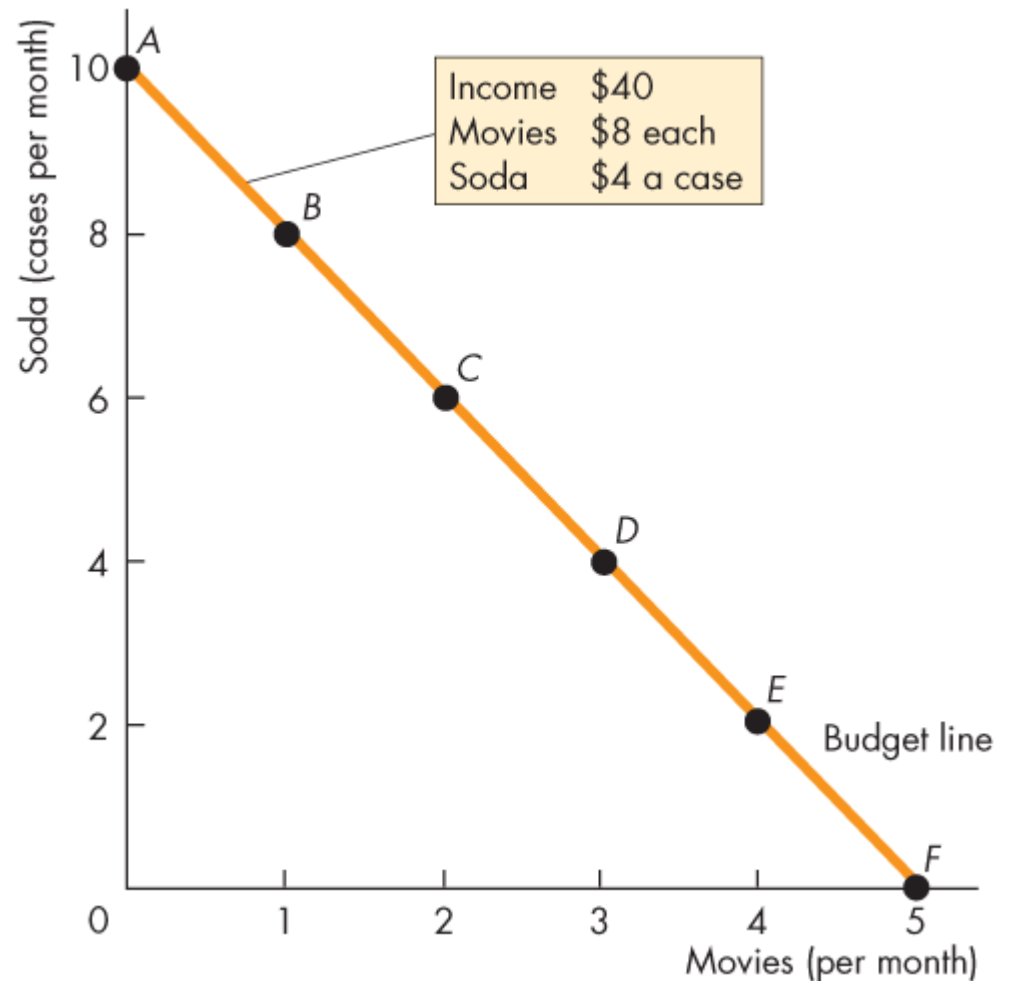
Consumption Choices – Budget Line

■ Lisa has $40 to spend, the price of a movie is $8 and the price of soda is $4 a case.

| Consumption possibility	Movies (per month)	Soda (cases per month)
A	0	10
B	1	8
C	2	6
D	3	4
E	4	2
F	5	0

Consumption Choices – Budget Line

–Lisa can afford any of the combinations at the points A to F.

–Some goods are indivisible and must be bought in whole units at the points marked.

–Other goods are divisible goods and can be bought in any quantity.

–The line through points A to F is Lisa's budget line.

Income $40
Movies $8 each
Soda $4 a case

Soda (cases per month)

A
B
C
D
E
F

Budget line

Movies (per month)

Consumption Choices – Budget Line

–The budget line is a constraint on Lisa's consumption choices.

–Lisa can afford any point on her budget line or inside it.

–Lisa cannot afford any point outside her budget line.

–**Consumption Possibilities Set**
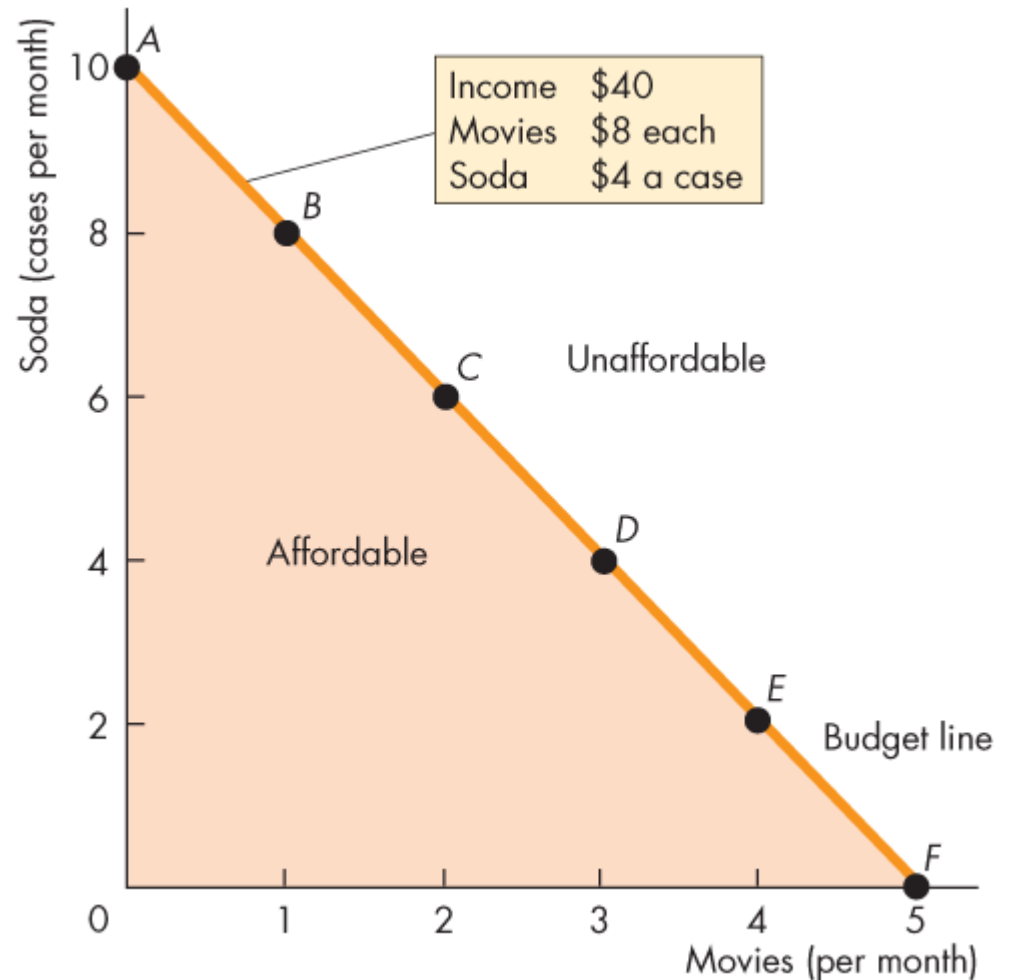
Preferences

- The choice that Lisa makes depends on her preferences—Comparison among different consumption bundles.

- Her benefit or satisfaction from consuming a good or service is called **utility.**

- **Total utility**: Total benefit a person gets from the consumption of goods. Generally, more consumption gives more total utility.

   – We all prefer more to less.

Total Utility

–Table 8.1 shows Lisa's total utility schedule.

–**Total utility** from a good increases as the quantity of the good increases.

–As Lisa sees more movies in a month, her total utility from movies increases.

TABLE 8.1 Lisa's Utility from Movies and Soda

Movies		Soda	
Quantity (per month)	Total utility	Cases (per month)	Total utility
0	0	0	0
1	50	1	75
2	90	2	123
3	122	3	159
4	150	4	183
5	176	5	205
6	200	6	225
7	222	7	238
8	242	8	248
9	259	9	255
10	275	10	260

Marginal Utility

–Table 8.1 shows how to calculate Lisa's marginal utility from her total utility.

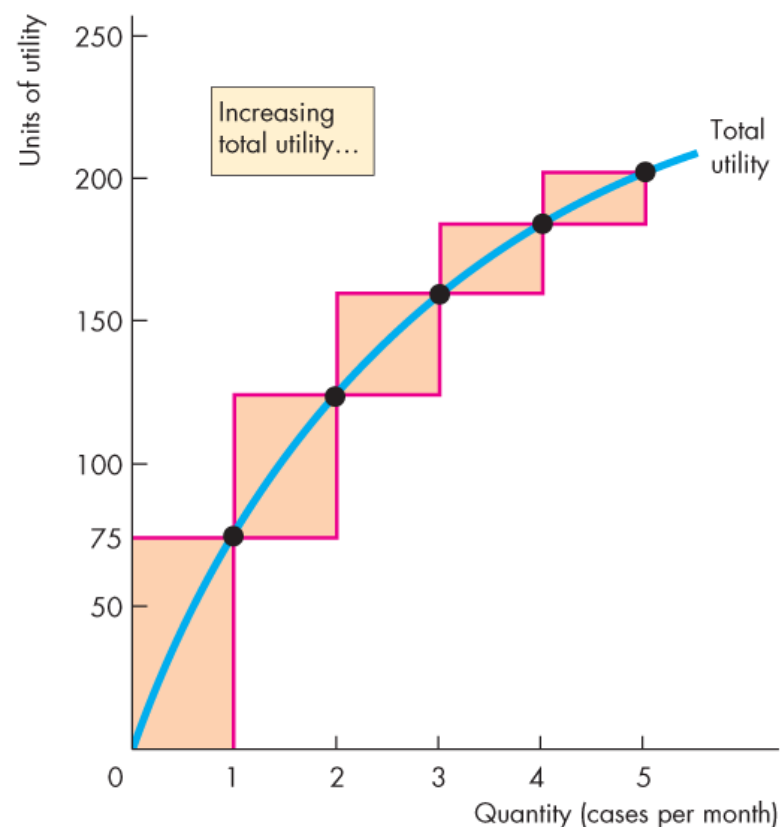–**Marginal utility** from a good decreases as the quantity of the good increases.

–As the number of movies seen in a month increases, marginal utility from movies decreases.

TABLE 8.1 Lisa's Utility from Movies and Soda

Movies			Soda		
Quantity (per month)	Total utility	Marginal utility	Cases (per month)	Total utility	Marginal utility
0	0		0	0	
		50			75
1	50		1	75	
		40			48
2	90		2	123	
		32			36
3	122		3	159	
		28			24
4	150		4	183	
		26			22
5	176		5	205	
		24			20
6	200		6	225	
		22			13
7	222		7	238	
		20			10
8	242		8	248	
		17			7
9	259		9	255	
		16			5
10	275		10	260	

Marginal Utility

–Figure 8.2(a) shows Lisa's total utility and marginal utility from soda.

–Total utility from soda increases as more soda is consumed.

–The bars along the total utility curve show the extra total utility (marginal utility) from each additional case of soda.
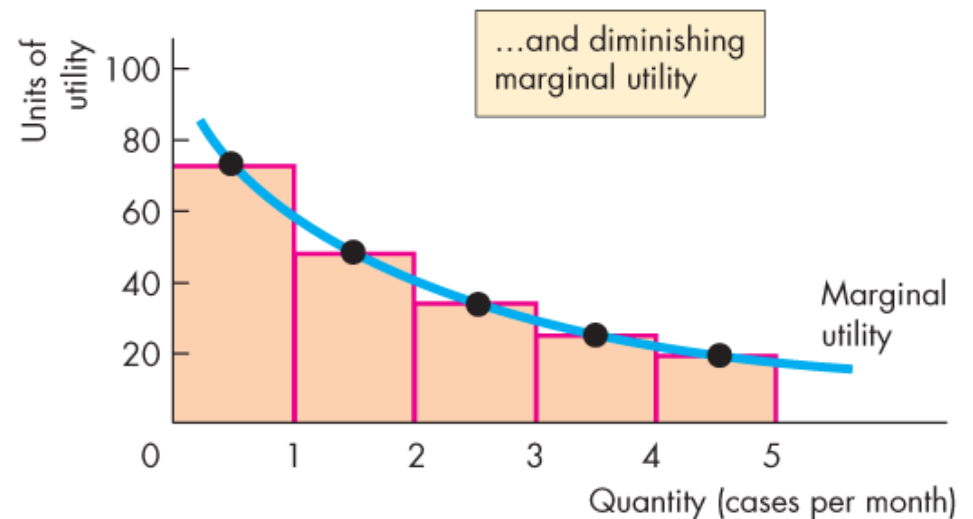

(a) Total utility

Marginal Utility

–Figure 8.2(b) illustrates diminishing marginal utility.

–As Lisa increases the quantity of soda she drinks, her marginal utility from soda diminishes.

(b) Marginal utility

Quick Check

The total utility from three skirts is

A) three times the marginal utility of the third skirt.

B) three times the price of a skirt.

C) three skirts divided by total income.

D) the sum of the marginal utility of the first skirt plus the marginal utility of the second skirt plus the marginal utility of the third skirt.

E) none of the above

Quick Check

Utility-Maximizing Choice

- Under rationality assumption, individual or household chooses the consumption possibility bundle that maximizes total utility.

- How to find the utility maximizing consumption bundle?

- Solution 1: Spreadsheet!!!

Utility-Maximizing Choice

Find Just-Affordable Combinations

–Lisa has $40 a month to spend on movies and soda.

–The price of a movie is $8 and the price of soda is $4 a case.

–Each row of Table 8.2 shows a combination of movies and soda that exhausts Lisa's $40.

TABLE 8.2 Lisa's Utility-Maximizing Choice

	Movies $8	Soda $4
	Quantity (per month)	Cases (per month)
A	0	10
B	1	8
C	2	6
D	3	4
E	4	2
F	5	0

Utility-Maximizing Choice

Find the Total Utility for Each Just-Affordable Combination

–When Lisa sees 1 movie and drinks 8 cases of soda a month,

–She gets 50 units of utility from the 1 movie and 248 units of utility from the 8 cases of soda.

–Her total utility is 298 units.

TABLE 8.2   Lisa's Utility-Maximizing Choice

	Movies $8		Total utility from movies and soda	Soda $4	
	Quantity (per month)	Total utility		Total utility	Cases (per month)
A	0	0	260	260	10
B	1	50	298	248	8
C	2	90	315	225	6
D	3	122	305	183	4
E	4	150	273	123	2
F	5	176	176	0	0

Utility-Maximizing Choice

Consumer Equilibrium

–Lisa chooses the combination that gives her the highest total utility.

–Lisa maximizes her total utility when she sees 2 movies and drinks 6 cases of soda a month.

–Lisa gets 90 units of utility from the 2 movies and 225 units of utility from the 6 cases of soda.

TABLE 8.2 Lisa's Utility-Maximizing Choice

	Movies $8		Total utility from movies and soda	Soda $4	
	Quantity (per month)	Total utility		Total utility	Cases (per month)
A	0	0	260	260	10
B	1	50	298	248	8
C	2	90	315	225	6
D	3	122	305	183	4
E	4	150	273	123	2
F	5	176	176	0	0

Utility-Maximizing Choice

Consumer equilibrium

–is the situation in which Lisa has allocated all of her available income in the way that maximizes her total utility, given the prices of movies and soda.

–Lisa's consumer equilibrium is 2 movies and 6 cases of soda a month.

TABLE 8.2 Lisa's Utility-Maximizing Choice

	Movies $8		Total utility from movies and soda	Soda $4	
	Quantity (per month)	Total utility		Total utility	Cases (per month)
A	0	0	260	260	10
B	1	50	298	248	8
C	2	90	315	225	6
D	3	122	305	183	4
E	4	150	273	123	2
F	5	176	176	0	0

Utility-Maximizing Choice

- Solution 2: Use the idea **Choosing at the Margin**!!!

The idea is simple: <u>How to spend a dollar?</u>

- Spending a dollar more or a dollar less on a good brings more total utility?

- The **marginal utility per dollar** is the marginal utility from a good that results from spending one more dollar on it.

Utility-Maximizing Choice

- The marginal utility per dollar equals the marginal utility from a good divided by its price.

- Call the marginal utility from movies MU_M and the price of a movie P_M, then the marginal utility per dollar from movies is MU_M/P_M .

- Call the marginal utility of soda MU_S and the price of soda P_S, then the marginal utility per dollar from soda is MU_S/P_S .

Utility-Maximizing Choice

- By comparing MU_M/P_M and MU_S/P_S, we can determine whether Lisa has allocated her budget in the way that maximizes her total utility.

- Utility-Maximizing Rule – A consumer's total utility is maximized by following the rule:

  - Equalize the marginal utility per dollar for all goods: $MU_M/P_M = MU_S/P_S$.

  - Spend all available income: $P_M M + P_S S = I$, where "I" stands for income.

Utility-Maximizing Choice

Lisa's Marginal Calculation

■ Figure 8.3 shows why the utility-maximizing rule works.

■ Each row of the table (on the next slide) shows a just-affordable combination.

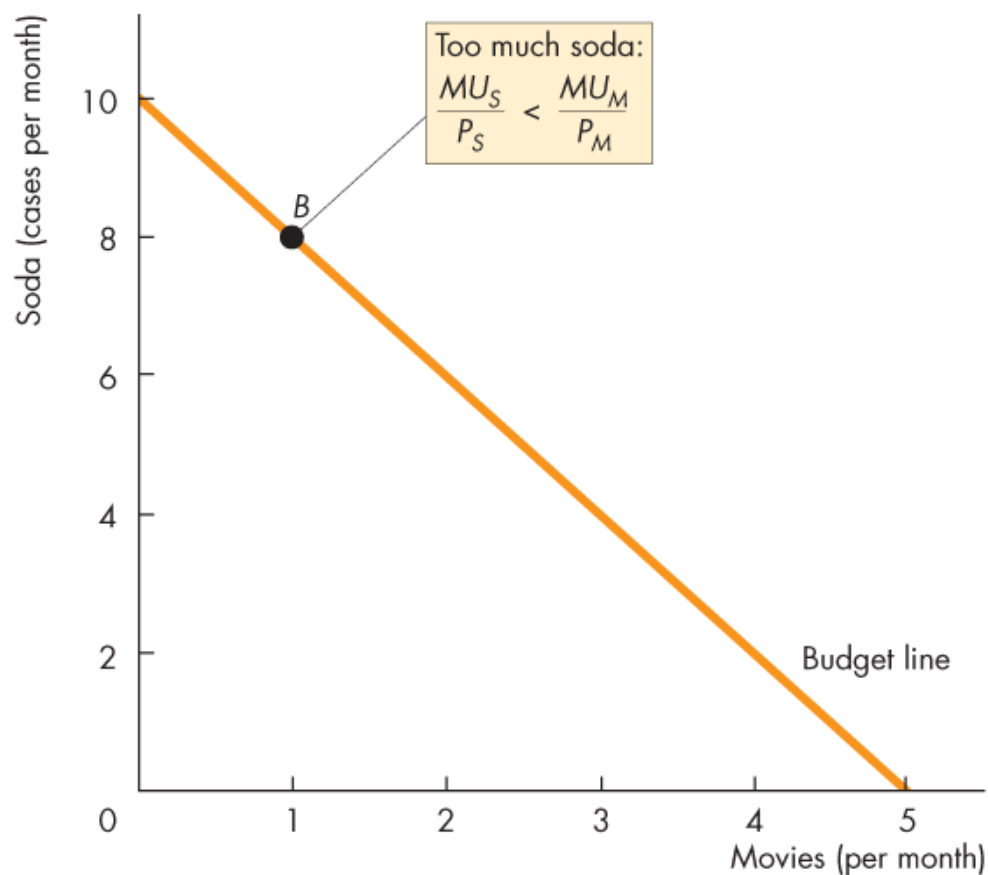■ Start by choosing a row—a point on the budget line.

Utility-Maximizing Choice

In row *B*,

$MU_S/P_S < MU_M/P_M$

Lisa spends too much on soda and too little on movies.

	Movies ($8 each)			Soda ($4 per case)		
Quantity	Marginal utility	Marginal utility per dollar	Cases	Marginal utility	Marginal utility per dollar	
B	1	50	6.25	8	10	2.50

Too much soda: $\dfrac{MU_S}{P_S} < \dfrac{MU_M}{P_M}$

Budget line
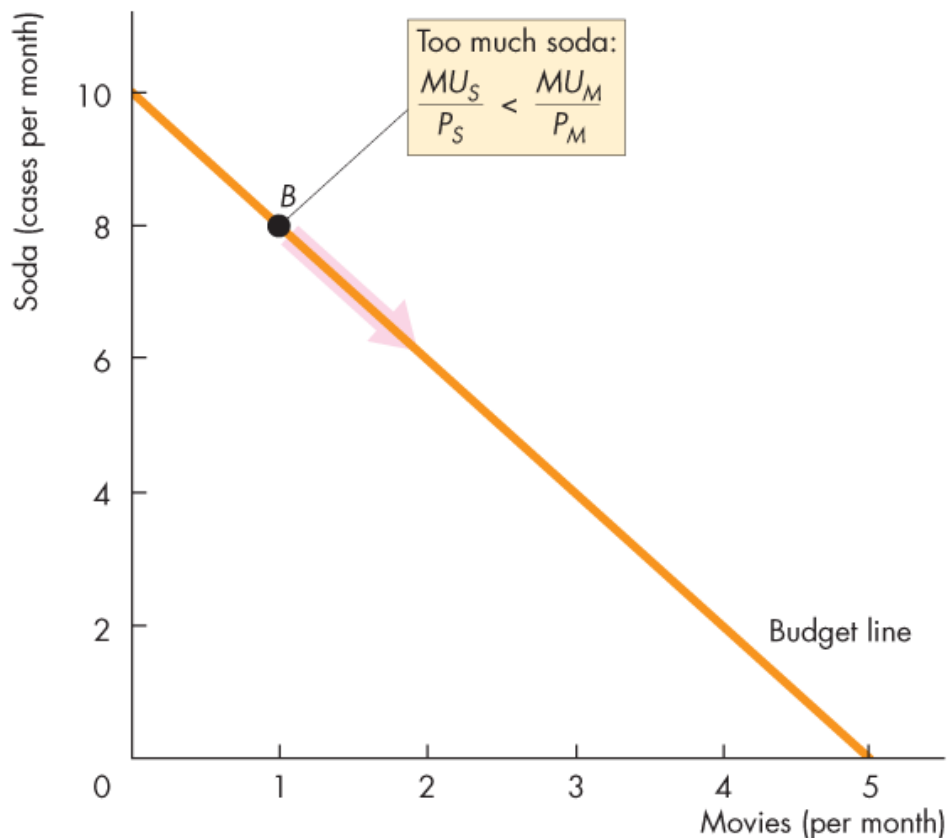
Utility-Maximizing Choice

If Lisa spends less on soda and more on movies, …

MU_S increases and MU_M decreases.

	Quantity	Movies ($8 each)		Cases	Soda ($4 per case)	
		Marginal utility	Marginal utility per dollar		Marginal utility	Marginal utility per dollar
B	1	50	6.25	8	10	2.50

Too much soda:
$$\frac{MU_S}{P_S} < \frac{MU_M}{P_M}$$

Soda (cases per month)
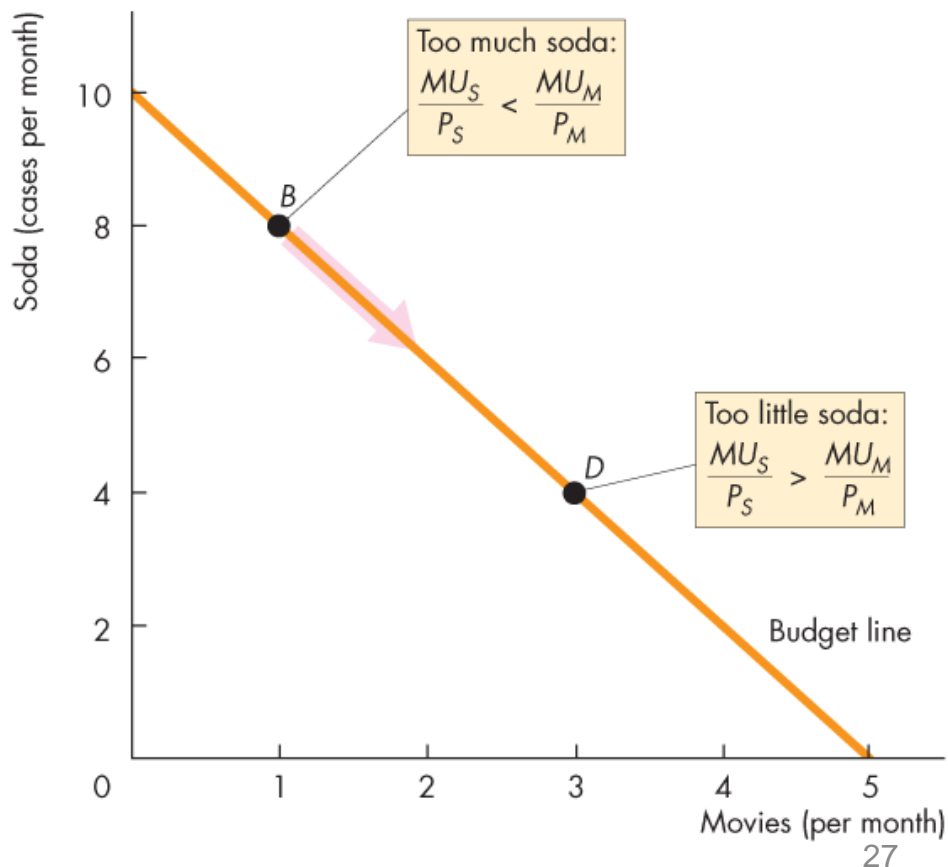
Movies (per month)

Budget line

B

Utility-Maximizing Choice

In row *D*,

$MU_S/P_S > MU_M/P_M$

Lisa spends too little on soda and too much on movies.

	Movies ($8 each)			Soda ($4 per case)		
Quantity	Marginal utility	Marginal utility per dollar	Cases	Marginal utility	Marginal utility per dollar
B	1	50	6.25	8	10	2.50
D	3	32	4.00	4	24	6.00

Too much soda:
$$\frac{MU_S}{P_S} < \frac{MU_M}{P_M}$$

Too little soda:
$$\frac{MU_S}{P_S} > \frac{MU_M}{P_M}$$
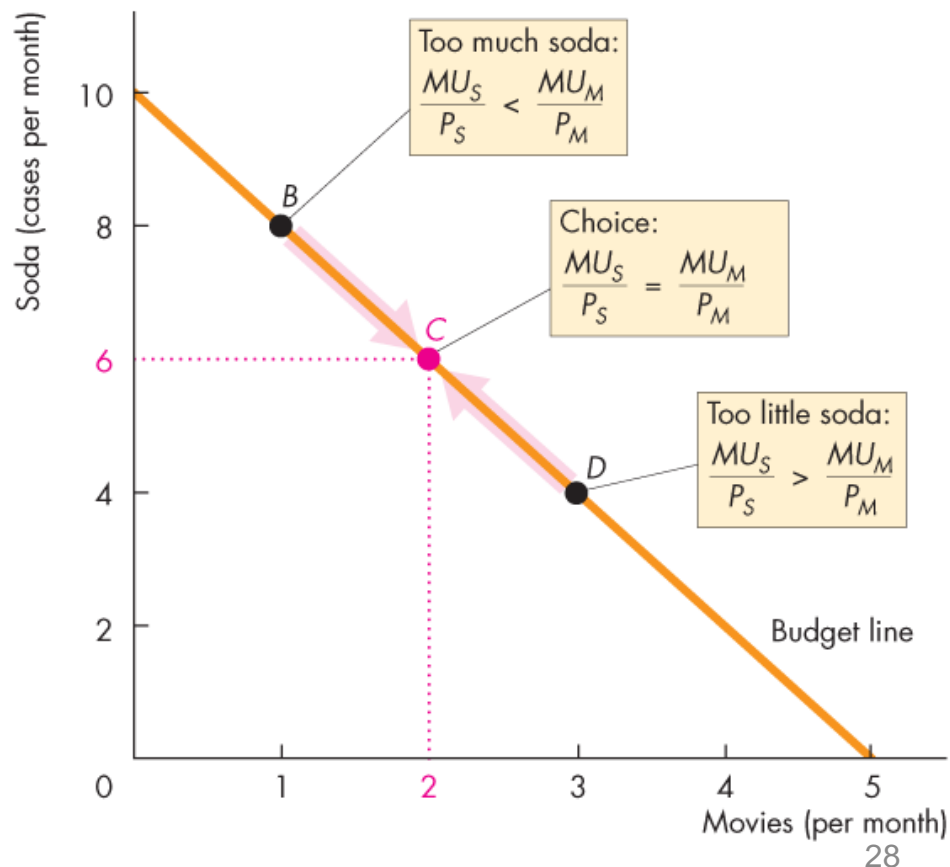
Budget line

Soda (cases per month)

Movies (per month)

27

Utility-Maximizing Choice

In row C,

$$MU_S/P_S = MU_M/P_M$$

Lisa is maximizing utility.

		Movies ($8 each)			Soda ($4 per case)	
	Quantity	Marginal utility	Marginal utility per dollar	Cases	Marginal utility	Marginal utility per dollar
B	1	50	6.25	8	10	2.50
C	2	40	**5.00**	6	20	**5.00**
D	3	32	4.00	4	24	6.00

Soda (cases per month)

Too much soda:
$$\frac{MU_S}{P_S} < \frac{MU_M}{P_M}$$

Choice:
$$\frac{MU_S}{P_S} = \frac{MU_M}{P_M}$$

Too little soda:
$$\frac{MU_S}{P_S} > \frac{MU_M}{P_M}$$

Budget line

Movies (per month)

Predictions of Marginal Utility Theory

A Fall in the Price of a Movie

Predictions of Marginal Utility Theory

A change in the price of one good changes the demand for another good. (What is this?)

Predictions of Marginal Utility Theory

–Table 8.3 shows Lisa's just-affordable combinations when the price of a movie is $4 (decreases from $8).

–Before Lisa changes what she buys

$MU_M/P_M > MU_S/P_S$

–To maximize total utility, Lisa sees **more** movies and drinks **less** soda even when P_S does not change!!!

**TABLE 8.3** How a Change in the Price of Movies Affects Lisa's Choices

		Movies ($4 each)			Soda ($4 per case)	
	Quantity	Marginal utility	Marginal utility per dollar	Cases	Marginal utility	Marginal utility per dollar
	0	0		10	5	1.25
	1	50	12.50	9	7	1.75
A	2	40	10.00	8	10	2.50
	3	32	8.00	7	13	3.25
B	4	28	7.00	6	20	5.00
	5	26	6.50	5	22	5.50
C	6	24	6.00	4	24	6.00
	7	22	5.50	3	36	9.00
	8	20	5.00	2	48	12.00
	9	17	4.25	1	75	18.75
	10	16	4.00	0	0	

Predictions of Margi

–Figure 8.4 illustrates these predictions.

–A fall in the price of a movie increases the quantity of movies demanded—a movement along the demand curve for movies,

–and decreases the demand for soda—a shift of the demand curve for soda.
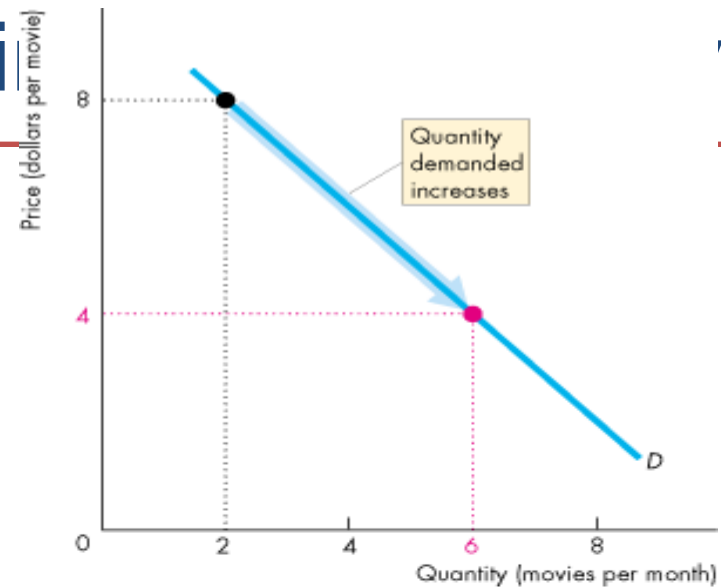
(a) Demand for movies
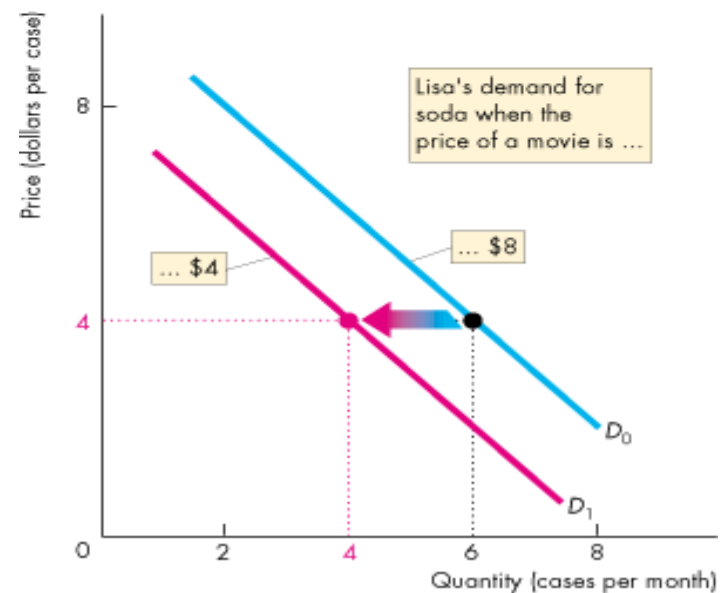
(b) Demand for soda

Predictions of Marginal Utility Theory

A Rise in the Price of Soda

Predictions of Marginal Utility Theory

–Table 8.4 shows Lisa's just-affordable combinations when the price of soda is $8 and the price of a movie is $4.

–Before Lisa changes what she buys, row A tells us that

$$MU_M/P_M > MU_S/P_S$$

–To maximize her total utility, Lisa drinks less soda.

–However, for this case, the consumption on movie stays at 6.

TABLE 8.4 How a Change in the Price of Soda Affects Lisa's Choices

	Movies ($4 each)			Soda ($8 per case)		
	Quantity	Marginal utility	Marginal utility per dollar	Cases	Marginal utility	Marginal utility per dollar
	0	0		5	22	2.75
A	2	40	10.00	4	24	3.00
	4	28	7.00	3	36	4.50
B	6	24	6.00	2	48	6.00
	8	20	5.00	1	75	9.38
	10	16	4.00	0	0	

Predictions of Marginal Utility Theory

–Figure 8.5 illustrates these predictions

–A rise in the price of soda decreases the quantity of soda demanded—a movement along the demand curve for soda.
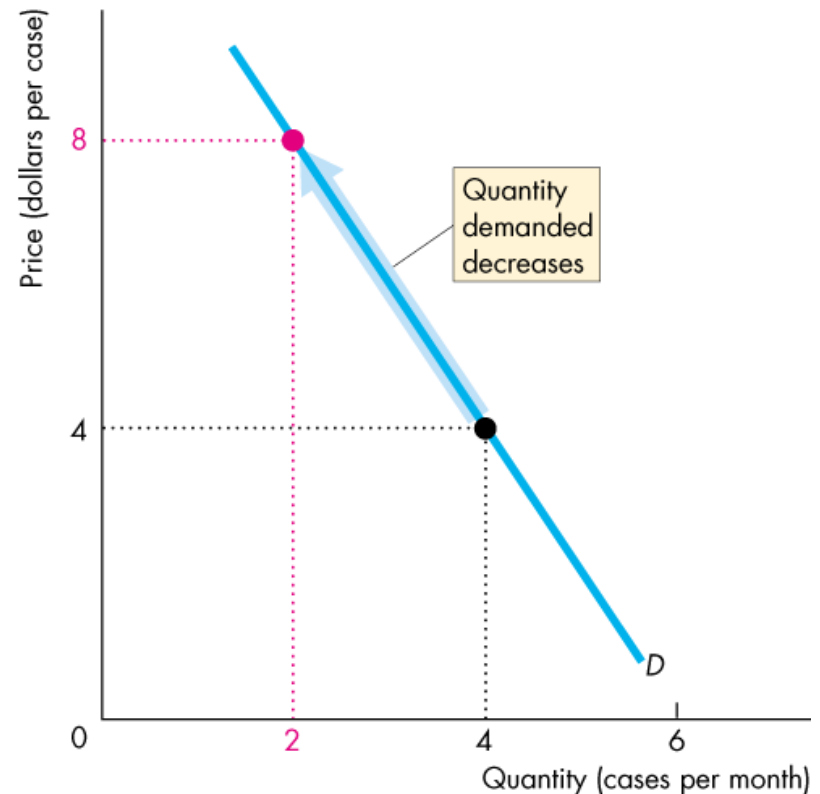
Predictions of Marginal Utility Theory

A Rise in Income

- When income increases, the demand for a normal good increases. (*Are soda and movie normal goods?*)

- Given the prices of movies and soda, when Lisa's income increases from $40 to $56 a month, she buys more movies and more soda???

Predictions of Marginal Utility Theory

– Table 8.5 shows Lisa's just-affordable combinations when she has $56 to spend.

– With $40 to spend, Lisa sees 6 movies and drinks 4 cases of soda a month.

– With $56 to spend, Lisa spends the extra $16, so she buys more of both goods.

– She sees 8 movies and drinks 6 cases of soda a month.

**TABLE 8.5** Lisa's Choices with an Income of $56 a Month

	Movies ($4 each)			Soda ($4 per case)		
	Quantity	Marginal utility	Marginal utility per dollar	Cases	Marginal utility	Marginal utility per dollar
	4	28	7.00	10	5	1.25
	5	26	6.50	9	7	1.75
A	6	24	6.00	8	10	2.50
	7	22	5.50	7	13	3.25
B	8	20	5.00	6	20	5.00
	9	17	4.25	5	22	5.50
C	10	16	4.00	4	24	6.00

Predictions of Marginal Utility Theory

– Figure 8.6 illustrates these predictions.
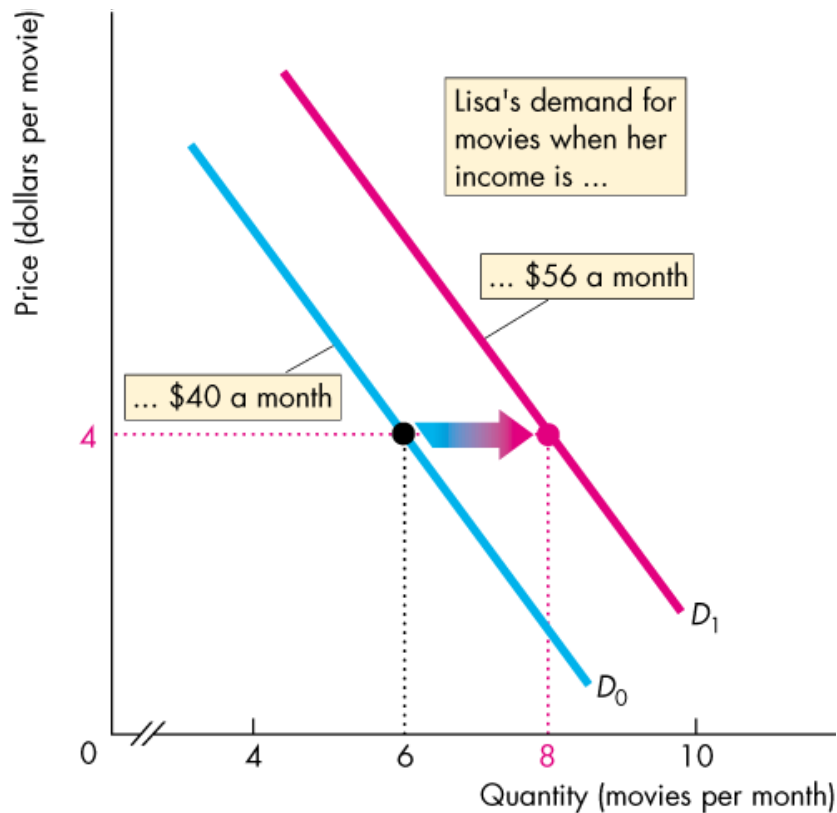
(a) Demand for movies
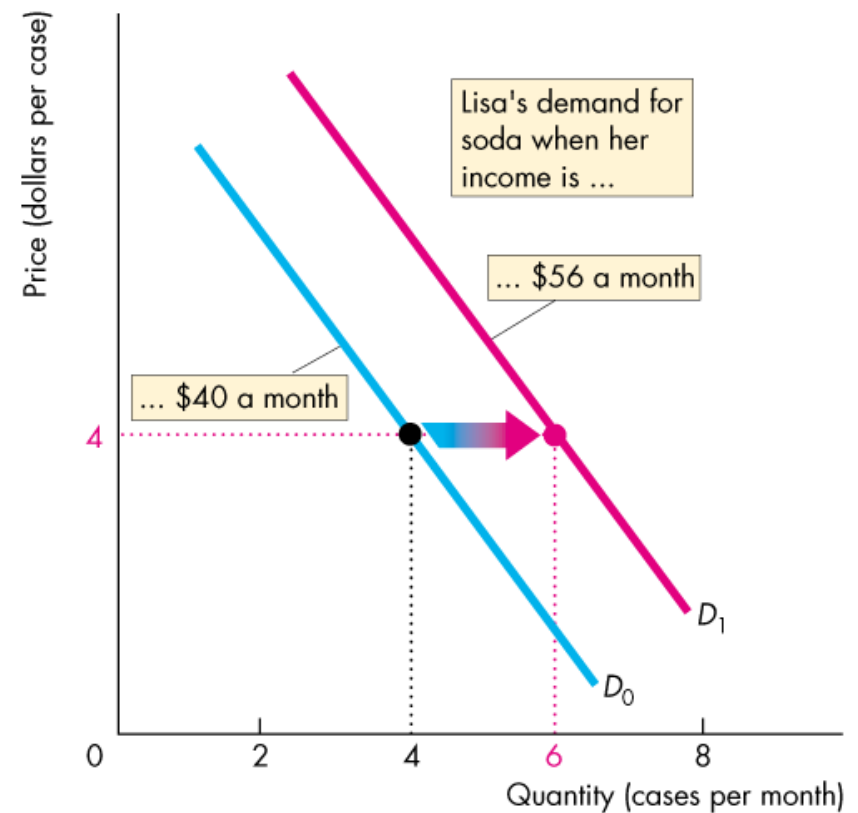
(b) Demand for soda

Quick Check

Bobby consumes only chocolate ice cream and vanilla ice cream. He is spending all of his income. His marginal utility of chocolate is 100 and his marginal utility of vanilla is 200, and the price of chocolate is $1.00 per scoop and the price of vanilla is $2.00 per scoop. To maximize his utility, Bobby should

A) buy more chocolate ice cream and less vanilla ice cream.

B) buy more vanilla ice cream and less chocolate ice cream.

C) not change his purchases between chocolate ice cream and vanilla ice cream.

D) buy no chocolate ice cream.

Quick Check

Predictions of Marginal Utility Theory

The Paradox of Value: Water, which is essential to life, is far cheaper than diamonds, which are not essential.

Predictions of Marginal Utility Theory

Predictions of Marginal Utility Theory

Value and Consumer Surplus

Putting a price on human life

Researchers at Stanford and the University of Pennsylvania estimated that a healthy human life is worth about $129,000. Using Medicare records on treatment costs for kidney dialysis as a benchmark, the authors tried to pinpoint the threshold beyond which ensuring another "quality" year of life was no longer financially worthwhile. The study comes amid debate over whether Medicare should start rationing health care on the basis of cost effectiveness.

Source: *Time*, June 9, 2008

Putting a price on human life

■ Why might Medicare ration health care according to treatment that is "financially worthwhile" as opposed to providing as much treatment as is needed by a patient, regardless of costs?

Putting a price on human life

- What conflict might exist between a person's valuation of his or her own life and the rest of society's valuation of that person's life?

Putting a price on human life

- How does the potential conflict between self-interest and the social interest complicate setting a financial threshold for Medicare treatments?

What is Utility? Temperature: An Analogy

- Utility is similar to temperature. Both are abstract concepts, and both have units of measurement that are arbitrary.

- The concept of utility helps us make predictions about consumption choices in much the same way that the concept of temperature enables us to predict when water will turn to ice or steam.

Behavioral Economics

■ Behavioral economics studies the ways in which limits on the <u>human brain's ability to compute and implement rational decisions</u> influence economic behavior—both the decisions that people make and the consequences of those decisions for the way markets work.

● Bounded rationality

● Bounded willpower

● Bounded self-interest

Behavior Economics

- **Bounded rationality** is rationality that is bounded by the computing power of the human brain.

- Faced with uncertainty and incomplete information, consumers cannot rationally make choices and instead rely on other decision-making methods such as rules of thumb, listening to the views of others, or gut instinct.

  - Example: Herding behavior in the stock market

Behavior Economics

- **Bounded will-power** is the less-than-perfect willpower that prevents us from making a decision that we know, at the time of implementing the decision, we will later regret.

  - Example: Submit problem sets on time (no delay) vs. procrastination; On diet, but finish all snacks bought.

Neuroeconomics

- Neuroeconomics is the study of the activity of the human brain when a person makes an economic decision.

- Different decisions appear to activate different areas of the brain. Some decisions are made (experiments).

- Brain hormone increases in response to pleasurable events (way to objectively measure utility level).

Economics, where to go?

- Should economics focus on explaining the decisions we observe or should it focus on what goes on inside people's heads?

- This is the controversy.

- For most economists, the goal of economics is to explain the decisions that we observe people make, and not to explain what goes on inside people's heads.

Thank you very much
End for today ☺

See you next time !