



ISE 220

Engineering Economics



University of Economics

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Agenda

- Types of Strategic Eng. Econ. Decisions
- Resolving Problems
 - Basic notation, Cash flow Tables & Diagrams
- Simple versus Compound
 - Interest and Inflation
- Example, Class Work, Homework



Self test questions

Bonus for day 1 attenders

- 1s.1 Which of the following statements is incorrect?
- (a) Economic decisions are time invariant.
 - (b) Time and risk are the most important factors in any investment evaluation.
 - (c) For a large-scale engineering project, engineers must consider the impact of the project on the company's financial statements.
 - (d) One of the primary roles of engineers is to make capital expenditure decisions.
- 1s.2 When evaluating a large-scale engineering project, which of the following items is important?
- (a) Expected profitability
 - (b) Timing of cash flows
 - (c) Degree of financial risk
 - (d) All of the above



Self test questions

- 1s.3 Which of the following statements defines the discipline of engineering economics most closely?
- (a) Economic decisions made by engineers.
 - (b) Economic decisions related to financial assets.
 - (c) Economic decisions primarily for real assets and services from engineering projects.
 - (d) Any economic decision related to the time value of money.
- 1s.4 Which of the following statements is not one of the four fundamental principles of engineering economics?
- (a) Receiving a dollar today is worth more than a dollar received in the future.
 - (b) To expect a higher return on investment, you need to take a higher risk.
 - (c) Marginal revenue must exceed marginal cost to justify any production.
 - (d) When you are comparing different alternatives, you must not focus only differences in alternatives.



Types of Strategic Eng. Econ. Decisions

Invest or not to invest

- New product or product expansion
- Equipment or process selection
- Cost Reduction
- Equipment replacement
- Service or Quality Improvement

NEVER omit thinking about IDEAL



To Invest or Not TO



- Depends on

$P, F, A_n, i, ROI, ROR, MARR > f$



Money Money Money



P Value of the Money at year 0

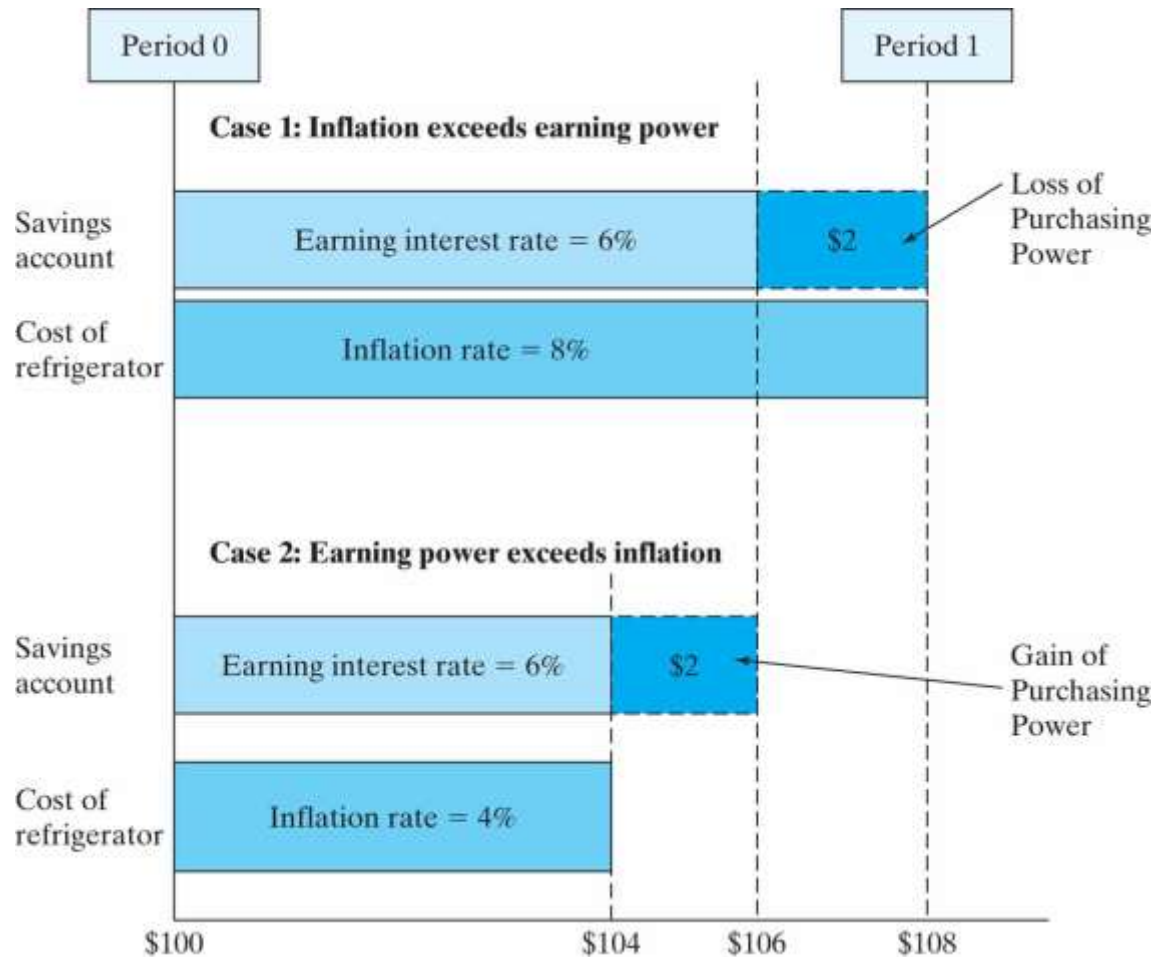
F Value of the Money at year N

Which Money is better



Which Money is Better

Money Today – Money Tomorrow





Money Today – Money Tomorrow

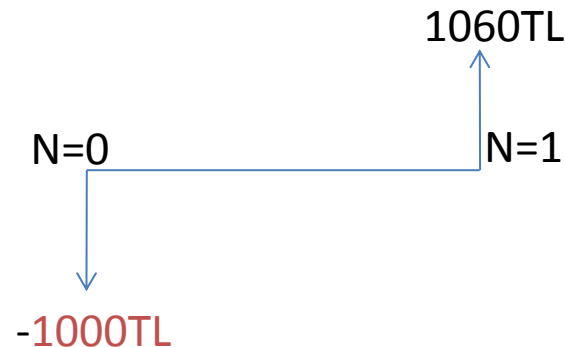
1000 TL today is (In year 0)

if $i = 6\%$ which is market interest rate

1060 TL in year 1

1060 is **Actual TL** (Inflation is reflected).

if $f = 4\%$ **Real TL** $\sim = 1020\text{TL}$





Cash Flow Diagrams & Tables

- You have received 30,000TL loan for a Toyota Yaris. Initiation fee is 300. You will pay back 7000 each year for the next 5 years.
- Analyze (Dissect the problem)
- Draw Diagram and Table



No question and solution yet



Dissect into Notation

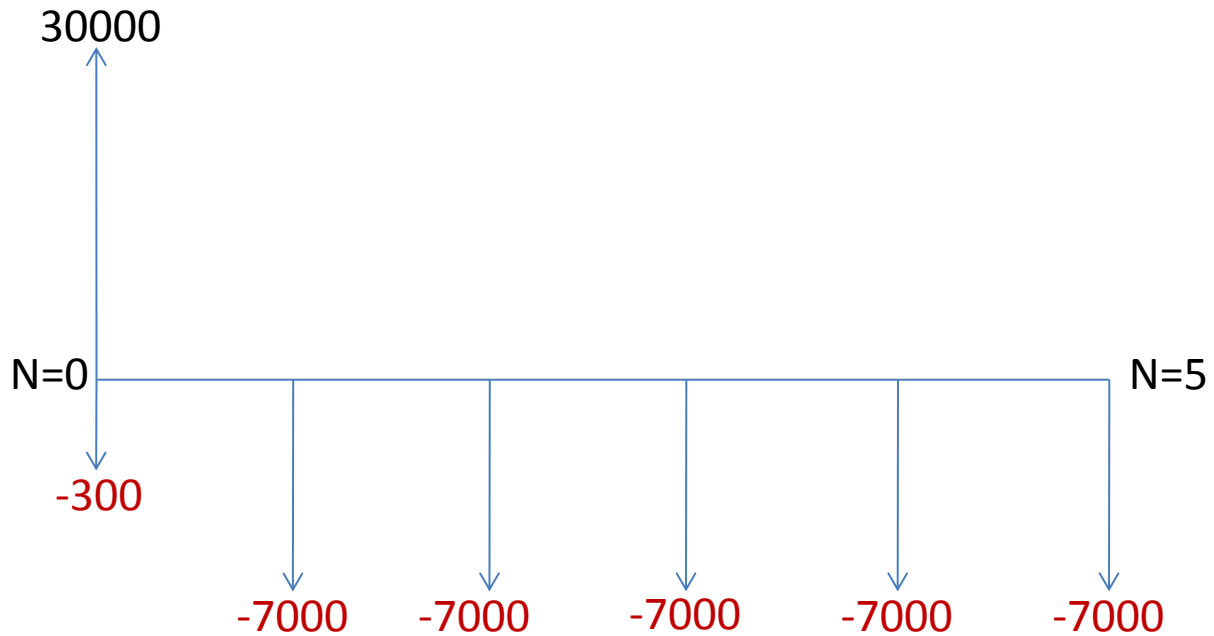
$$P = 30000 - 300 = 29700$$

$$A_n = -7000 \text{ (n= 1 to N)}$$

$$N = 5$$



Show in Diagram





Show in Table

Load [OpenOffice](#) Latest **English** version

Year (n)	Cash Flow
0	29,700.00TL
1	-7,000.00TL
2	-7,000.00TL
3	-7,000.00TL
4	-7,000.00TL
5	-7,000.00TL

Or you may simply download the document and open in <http://docs.google.com>



Simple Interest

$$i = 8\%$$

$$P = 100$$

$$N = 5$$

$$I_1 = 8$$

$$I_2 = 8$$

$$I_3 = 8$$

	A	B	C	D
1	Simple Interest Calculation Sample			
2	P=	100 TL		
3	i=	0.08	8.00%	
4	N=	5 Years		
5				
6	TABLE ISE220-1-2 Simple Interest Calculation			
7	Year (n)	Cash Flow	Interest	Balance
8	0	100.00TL		100.00TL
9	1		8.00TL	108.00TL
10	2		8.00TL	116.00TL
11	3		8.00TL	124.00TL
12	4		8.00TL	132.00TL
13	5		8.00TL	140.00TL

$$F = - P(1+i N)$$

Compound Interest (Real world)



$$i = 8\%$$

$$P = 100$$

$$N = 5$$

$$n=1 \quad F = P(1+i)$$

$$n=2 \quad F = P(1+i) + i(P(1+i))$$

$$F = P(1+i)^2$$

$$n=3 \quad F = P(1+i)^3$$

	A	B	C	D
1	Compound Interest Calculation Sample			
2	P=	100 TL		
3	i=	0.08	8.00%	
4	N=	5 Years		
5				
6	TABLE ISE220-1-3 Compound Int. Calc.			
7	Year (n)	Cash Flow	Interest	Balance
8	0	100.00TL		100.00TL
9	1		8.00TL	108.00TL
10	2		8.64TL	116.64TL
11	3		9.33TL	125.97TL
12	4		10.08TL	136.05TL
13	5	-146.93TL	10.88TL	0.00TL

$$F = - P (1+i)^N$$



Basic Formula

$$F = P(1+i)^N$$

All Other [Formulas](#) Are Drived From This



Exercise 1 – Simple interest

Assume that you have lend 4000TL to your friend with simple interest rate of 1% for 3 months.

How much is the pay back value at the end of month 3?

1. Dissect (P, i, n)
2. Draw diagram
3. Show in table
4. Calculate F



Exercise 2 – Compound interest

Assume that you have received 5000TL from a bank with interest rate of 1% for 6 months.

How much should you pay back at the end of month 6.

1. Dissect (P, i, N)
2. Draw diagram
3. Show in table
4. Calculate F



Exercise 3

You are considering investing \$1,000 at an interest rate of 6.5% compounded annually for five years or investing the \$1,000 at 6.8% per year simple interest for five years. Which option is better?

1. Dissect (P, F, A, i, N, ..)
2. Draw diagram
3. Show in table
4. Calculate

(Solve in Spreadsheet and send by e-mail)



Exercise 4

Suppose you have the alternative of receiving either \$5,000 at the end of five years or P dollars today. Currently, you have no need for the money, so you could deposit the P dollars into a bank account that pays 7% interest compounded annually. What value of P would make you indifferent in your choice between P dollars today and the promise of \$5,000 at the end of five years?

1. Dissect (P , F , A , i , N , ..)
2. Draw diagram
3. Show in table
4. Calculate

(Solve in Spreadsheet and send by e-mail)



Exercise 5

2.9 Which of the following alternatives would you choose, assuming an interest rate of 10% compounded annually?

Alternative 1: Receive \$100 today.

Alternative 2: Receive \$120 two years from now.

Alternative 3: Receive \$170 five years from now.



Exercise 6

2.6 You are about to borrow \$10,000 from a bank at an interest rate of 9% compounded annually. You are required to make five equal annual repayments in the amount of \$2,570.92 per year, with the first repayment occurring at the end of year 1. For each year, show the interest payment and principal payment.

1. Dissect (P, F, A, i, N, ..)
2. Draw diagram
3. Show in table
4. Calculate

(Solve in Spreadsheet and send by e-mail)



For Next week

- Have ***Open Office*** version ***4.0.0 or newer, English*** version loaded
 - ✓ Load it from openoffice.org.
- Show exercises 3, 4, 5, 6 in spreadsheet and send by e-mail
(E-mail address is on the next slide)
 - I suggest having an original book
 - I suggest having a note-net-ultra book



Questions

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