MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

SIMON KUZNETS KHARKIV NATIONAL UNIVERSITY OF ECONOMICS

FINANCE

Practicum
for Bachelor's (first) degree students
of speciality 073 "Management",
educational program "Business Administration"

Kharkiv
S. Kuznets KhNUE
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  F54

Compiled by: T. Lepeyko
             O. Kanova

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Practical assignments, guidelines to them, questions for seminars, tests and a list of topics for writing essays are given to help students gain practical skills in the academic discipline.
For Bachelor's (first) degree students of speciality 073 "Management", educational program "Business Administration".

UDC 336(076.034)

Introduction

The academic discipline "Finance" studies main patterns of the financial resources circulating in the financial systems. It considers the main elements of the financial system, peculiarities of the financial markets, the money market, the capital market, the banking system, the tax and insurance systems. It describes features of the financial system of Ukraine and explains its specific characteristics comparing with the foreign systems. The academic discipline provides the ways of accumulation and distribution of financial resources at an enterprise.

The purpose of the academic discipline is to form the knowledge system in the finance theory, master patterns of financial operations on the meso-, macro- and microlevels as a theoretical basis of financial policy and development of a financial system in the country, as well as formation of an effective system of the financial management at an enterprise.

The purpose of practical studies of the academic discipline is consolidation of theoretical knowledge of the academic discipline and formation of practical skills in forming and participating in financial relations at different levels, as well as analyzing and making decisions concerning financial aspects of enterprises at different areas.

The practicum on the academic discipline is based on the formation of students' profession-oriented competences by solving practical assignments (tasks), tests, preparing reports for seminars and answers to questions, solving cases.

A significant amount of material of the academic discipline is devoted to independent work of students. Its quality is assessed based on the way the given tasks are carried out. Solving the problems helps students to improve the quality of their own training and acquire the necessary competences and skills.

The academic discipline belongs to the base educational disciplines of the professional cycle. It is studied according to the plan for Bachelor's (first) degree students of speciality 073 "Management" of the educational program "Business Administration".

The practicum covers the majority of aspects of the academic discipline and consists of 8 topics; it includes a list of references that allows students to comprehensively study the given topics.

Content module 1. Theory of finance at the macrolevel

Theme 1. The essence and purpose of finance

The purpose: to form knowledge, skills and competences in theory of finance.

The main competence: the ability to understand the nature of finance, the importance of finance in the modern economy and the main functions of finance.

Practical tasks

Task 1. Match the given functions of money with examples.

Examples
1. Last week, at the supermarket, you purchased ₴876 worth of groceries. You paid for the groceries with cash. You gave the cashier one ₴500 bill, three ₴100 bills, seven ₴10 bills, and six ₴1 bills
2. Last week, at the supermarket, you were pondering whether to buy a 1-liter milk carton for ₴26 or a 1.5-liter milk carton for ₴4
3. Last year, you sold your old textbooks to your friend for $150 in cash. You've been keeping this money in a jar. You are saving the money to buy a new laptop next month

Functions of money
a) a medium of exchange
b) a store of value
c) a unit of account

Task 2. Determine the amount of money turnover in the country and the volume of the released goods if the yearly amount of money in circulation is ₴300 billion, the velocity is 13, the average level of prices is ₴210.

Task 3. Match the given characteristics of money with examples.

Examples
1. During the American Civil War, there were not enough coins in circulation in the US. To solve this issue the US government printed fractional currency notes in denominations of 3, 5, 10, 15, 25, and 50 cents. What basic characteristic of money did these fractional notes seek to restore?
2. In 1998, Zimbabwe's inflation rate was 32 %. In 2008, hyperinflation was reported. The estimated inflation rate was nearly 250 000 000 % in July, 2008. Also in 2008, Zimbabwe issued a new $100 billion note. What basic characteristic of money is violated by the Zimbabwean dollar in this case?
3. In many countries worldwide, US dollars are preferred over the local currency. In such countries, there are significant black markets where US dollars are used instead of local currencies. What basic characteristic of money is violated by the local currency in such cases?
4. In the 17th century, tobacco was beginning to be used as currency in Virginia, one of the English colonies in North America. However, tobacco could easily be grown in these territories. That's why it did not always work well as money. What basic characteristic of money is violated by the use of tobacco as money?
5. The inhabitants of Yap, an island in Micronesia, used giant stone wheels to carry out some exchanges. Such wheels are heavy and cannot be easily used for daily transactions in a modern economy. What basic characteristic of money is violated by the use of such stone wheels as money in the modern society?
6. Ukrainian hryvnia banknotes are printed on paper made from cotton. Thanks to this high-quality material, a hryvnia banknote left in the jeans pocket can survive the washing machine. What basic characteristic of money would be violated if Ukrainian hryvnia banknotes were printed on usual paper?

Characteristics of money
a) acceptable
b) divisible
c) durable
d) portable
e) scarce
f) stable

Task 4. In the last year, the gross national product of a country was 3549.6 billion monetary units, the money supply was 916.9 billion monetary units. Determine the velocity of money.

Task 5. The following is known about money aggregates of a country:

Cash: $170 000 000.
Demand deposits: $448 000 000.
Government bonds: $300 000 000.
Large time deposits: $700 000 000.
Small time deposits: $300 000 000.

Determine M0, M1, M2, and M3. Draw a conclusion.

Task 6. The following is known about money aggregates of a country:

Amounts owed on credit cards: $279 000 000.
Bills and coins in circulation: $610 000 000.
Bills and coins in vaults of commercial banks: $37 000 000.
Credit limits available on credit cards: $514 000 000.
Demand deposits: $905 000 000.
Government bonds held by the Central Bank: $251 000 000.
Government bonds held by the public: $218 000 000.
Savings deposits: $4 000 000.
Small time deposits: $2 321 000 000.

Calculate M0, M1, M2 and M3. Some of the listed elements may not be included in any money aggregate. Draw a conclusion.

Task 7. The Bank ABC already has excess reserves of ₴600. The required reserve ratio is 20 %. If the bank lends ₴400 to Hanna, and Maria deposits ₴1000 of cash into her checking account, how much more can the Bank ABC lend?

Task 8. The Bank ABC lent all its excess reserves. The current required reserve ratio is 15 %. How much do excess reserves increase if the bank increases deposits by ₴300 000?

Task 9. The Bank ABC has €750 of excess reserves. What should the required reserve ratio be if when the bank lends all possible amount, it increases the money supply by €3000.

Guidelines to practical tasks on the topic

In economics, the money supply (or money stock) refers to the total amount of money available in an economy at a given time.

Money performs different functions such as a medium of exchange, in final settlement of a debt, and a store of value. These different functions are related with different empirical measures of the money supply. There is no single "correct" measure of the money supply: instead, there are several measures, classified between narrow and broad monetary aggregates (Fig. 1).
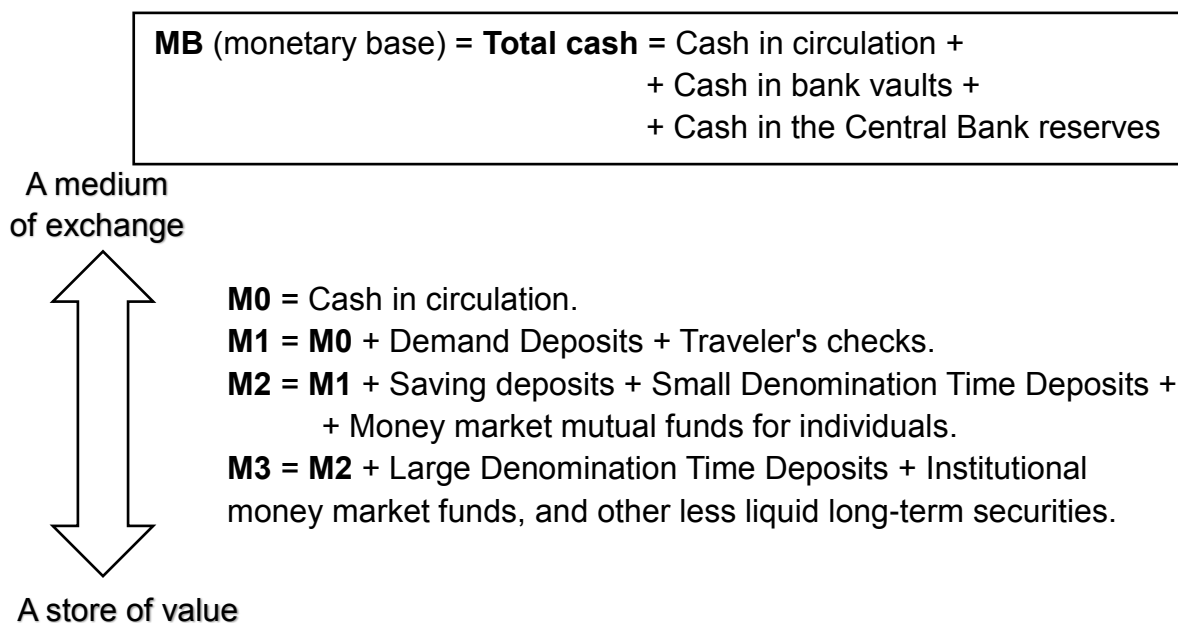
MB (monetary base) = **Total cash** = Cash in circulation +
+ Cash in bank vaults +
+ Cash in the Central Bank reserves

A medium
of exchange

M0 = Cash in circulation.
M1 = **M0** + Demand Deposits + Traveler's checks.
M2 = **M1** + Saving deposits + Small Denomination Time Deposits +
+ Money market mutual funds for individuals.
M3 = **M2** + Large Denomination Time Deposits + Institutional
money market funds, and other less liquid long-term securities.

A store of value

Fig. 1. **Monetary aggregates**

Narrow measures include only the most liquid assets, the ones most easily used to spend like currency or checkable deposits. Broader measures add less liquid types of assets like certificates of deposit, etc. (Fig. 2).
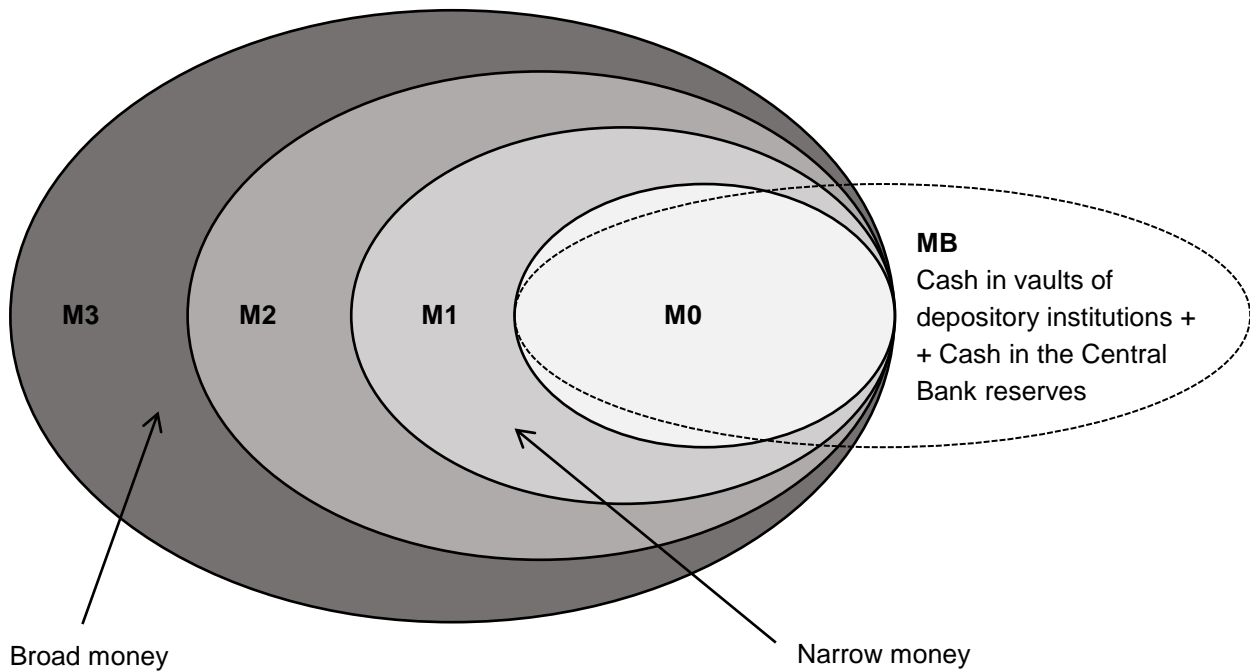
Fig. 2. **Broad and narrow money**

The money multiplier refers to the measurement of money created by commercial banks with the help of deposits after exclusion of required reserves. It shows the number of times the amount of money in circulation increases due to the changes in the deposits:

$$MM = \frac{1}{rr} = \frac{M2}{M0},\qquad(1)$$

where MM is money multiplier;

rr is the required reserve ratio.

In monetary economics, the equation of exchange is the relation:

$$M \times V = P \times Q = GDP,\qquad(2)$$

where M is the total nominal amount of money supply in circulation on average in an economy;

V is the velocity of money, that is the average frequency with which a unit of money is spent;

P is the price level;

Q is an index of real expenditures (on newly produced goods and services).

Thus, $P \times Q$ is the level of nominal expenditures.

Questions for the seminar

1. Name the main monetary policy tools used by the National Bank of Ukraine.

2. What is a price stability? Does it mean that prices do not change?

3. What are the ways in which the National Bank of Ukraine affects the exchange rates? Does it fix them? Why yes (no)?

4. Could the National Bank of Ukraine print enough money to finance all the country's needs? Why?

5. How is money issued in the country? Who regulates this process? How is the decision on the quantity of banknotes and coins made?

Tests

Determine whether the following statements are true or false. If true, explain why. If they are false, provide a counterexample.

1. Commodity money is accepted because the holder knows he can exchange it later:

a) true;

b) false.

2. Electronic money is not a type of money:

a) true;

b) false.

3. Money does not have to have any inherent value to function as a medium of exchange:

a) true;

b) false.

4. Money is not distinct from wealth or income:

a) true;

b) false.

5. Money refers to anything that is generally accepted in payment for goods or services or in the repayment of debts:

a) true;

b) false.

6. Paper claim on some amount of a commodity money is called a convertible paper:

a) true;

b) false.

7. Precious metals are an example of the fiat money:

a) true;

b) false.

8. The relative value of goods and services can't be expressed in money:

a) true;

b) false.

Choose one correct answer.

9. What kind of currency is included in M0:

a) bills and coins in bank vaults;

b) bills and coins in circulation;

c) bills and coins in the Central Bank reserves;

d) in M0, there is no currency included?

10. Checking accounts held by the non-bank public in commercial banks are referred to as:

a) demand deposits;

b) saving deposits;

c) time deposits;

d) currency.

11. What is the smallest "M" including demand deposits:

a) M0;

b) M1;

c) M2;

d) M3?

12. An interest-bearing account held at a bank with no maturity date is referred to as:

a) demand deposits;

b) saving deposits;

c) time deposits;

d) currency.

13. What is the smallest "M" including saving deposits:

a) M0;

b) M1;

c) M2;

d) M3?

14. An interest-bearing bank account that has a date of maturity is referred to as:

a) demand deposits;

b) saving deposits;

c) time deposits;

d) currency.

15. What is the largest "M" including time deposits:

a) M0;

b) M1;

c) M2;

d) M3?

Theme 2. The financial system of Ukraine

The purpose: to study the internal and organizational structure of the financial system of Ukraine and define its main actors.

The main competence: the ability to identify the main peculiarities of the financial system of Ukraine.

Practical tasks

Task 1. Which of the following are included (or excluded) in the calculation of this year's GDP? Explain your answer in each case.

1. A reduction in the length of the work week by two hours per week.
2. An increase in business inventories by ₴1 billion.
3. Interest paid on a corporate bond.
4. Rent received on a one-bedroom apartment.
5. Social security payments received by a retiree.
6. The income of a dentist.
7. The money Alex received when resold his current-year-model automobile to Kim.
8. The money received by Maria when she sells her old textbooks to a fellow student.
9. The monthly allowance a student receives from parents.
10. The purchase of 53 shares of ABC company's stock.
11. The purchase of a corporate bond.
12. The purchase of an insurance policy.
13. The services of a neighbor in painting the appartment.

Task 2. Consider the following diagram (Fig. 3). Determine which letters correspond to the following items:

- factor market;
- product market;
- firms;
- households;
- government;
- flow of goods and services;
- flow of resources;
- flow of taxes from producers;
- flow of money as a cost;
- flow of money as revenue;
- flow of money as an expenditure;
- flow of money as income;
- provider of public goods and services.

Some letters may be used several times. Several letters may correspond to one element in some cases.
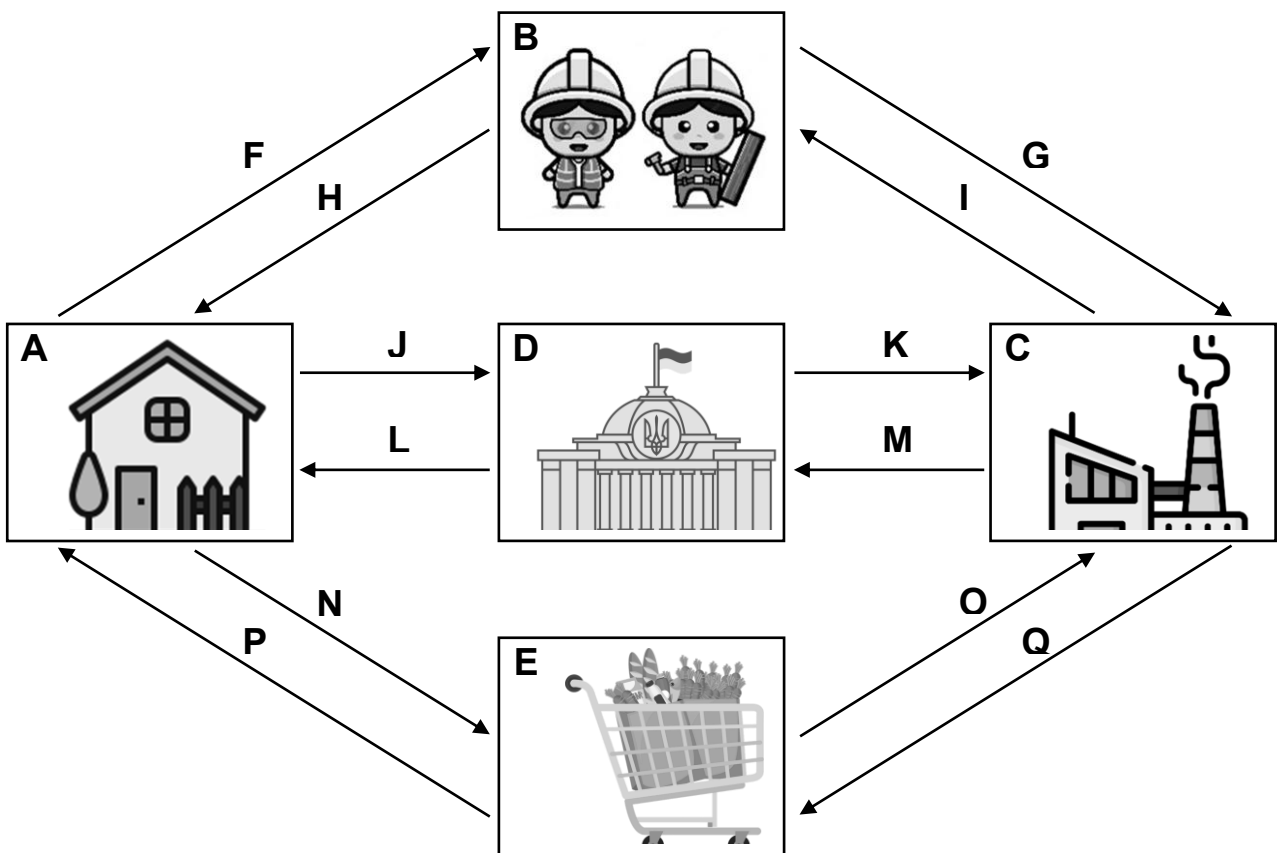
Fig. 3. **The circular flow model**

Task 3. Use the following data to calculate GDP. Which method of the GDP calculation is applicable? Draw a conclusion.

Consumption expenditures: ₴30 400 000.
Fixed investment: ₴33 000 000.
Government purchases: ₴30 350 000.
Inventory investment: ₴24 500 000.
Residential investment: ₴23 050 000.

Task 4. A small country produces orange juice and chairs. Information about the production of these goods is provided in Table 1.

Table 1

Initial data

Products	20X1		20X2	
	Quantity, pcs	Price, MU	Quantity, pcs	Price, MU
Orange juice	200	50	240	48
Chairs	140	120	200	160

Using the given data, calculate the following:
1) nominal GDP in 20X1 and 20X2; compare them;
2) real GDP in 20X1 and 20X2 if 20X1 is a base year and if 20X2 is a base year; compare;
3) GDP deflator;
4) what happens to GDP and GNP if the one third from chair producers is owned by a foreign country?
Draw conclusions.

Task 5. Calculate GDP using both the expenditure method and the income method. Draw a conclusion.

Corporate profits before taxes: $110 960.
Small business income: $79 412.
Income on investments: $52 176.
Exports: $458 204.
Imports: $412 228.

Taxes (less subsidies on products): $77 480.

Taxes (less subsidies on factors of production): $57 588.

Government expenditure on goods and services: $226 632.

Capital consumption allowance: $143 000.

Consumption expenditures: $620 344.

Gross investment: $184 184.

Wages: $557 736.

Task 6. Match financial markets with their definitions.

Definitions
1. The market where the company shares are listed and traded after the IPO
2. The market where debt securities (e. g. bonds) are traded
3. The market where financial instruments (e. g. options and futures) are traded
4. The market where natural resources or commodities are traded
5. The market where investors deal in stocks or other equity instruments
6. The market where investors buy and sell fixed claims or debt instruments (e. g. debentures or bonds)
7. The market where investors buy and sell securities that mature within a year
8. The market where investors buy and sell medium and long-term financial assets
9. The market where the trade is done by matching the highest bids for a security with the least price of that security on offer
10. The market where securities are traded in an unofficial manner

Financial markets
a) stock market
b) bond market
c) derivatives market
d) commodities market
e) equity market
f) debt market
g) money market
h) capital market
i) auction market
j) gray market

Task 7. Use the following data to calculate GDP. Which method of the GDP calculation is applicable? Draw a conclusion.

Dividends: ₴12 000 000.

Profits: ₴30 000 000.

Rental income: ₴4 010 000.

Wages: ₴1 000 000.

Task 8. In Table 2, mark which services are usually provided by the given financial intermediaries. You can expand the list of services offered.

Table 2

Typical services offered by financial intermediaries

Financial intermediaries	Taking deposits	Issuing credits	Maintaining current accounts, issuing payment cards	Transfering money	Insurance services	Brokerage services	Financial leasing	Retirement planning	Currency exchange services	Other (*Add*)
Commercial bank										
Investment bank										
Pawnshop										
Credit union										
Insurance company										
Pension fund										
Building society										
Trust company										
Mortgage loan company										
Underwriter										
Brokerage firm										

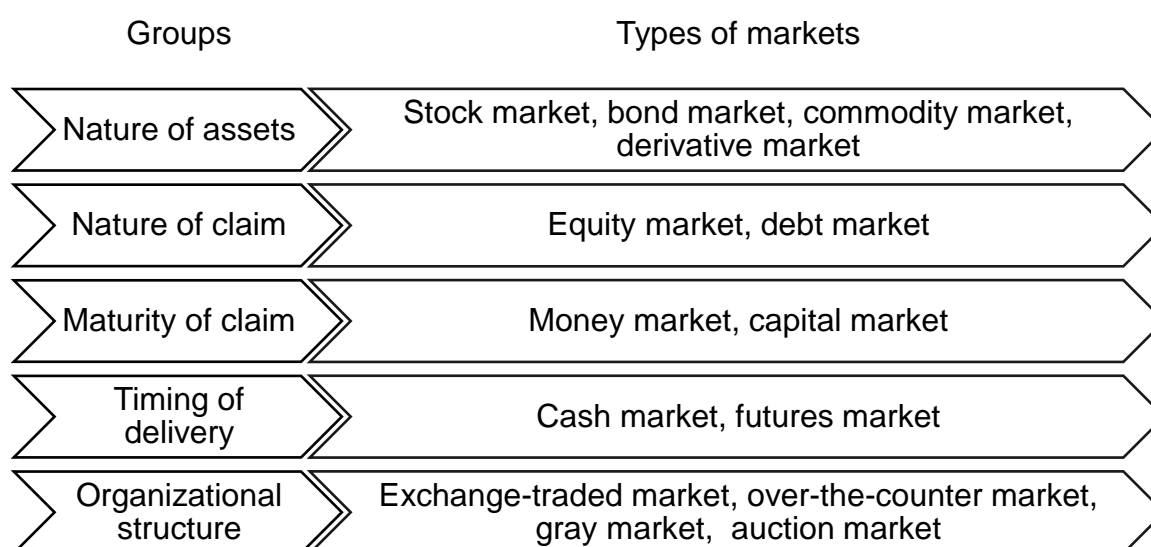**Task 9.** Choose two financial markets from one of the following groups (Fig. 4).

Groups	Types of markets
Nature of assets	Stock market, bond market, commodity market, derivative market
Nature of claim	Equity market, debt market
Maturity of claim	Money market, capital market
Timing of delivery	Cash market, futures market
Organizational structure	Exchange-traded market, over-the-counter market, gray market, auction market

Fig. 4. **Types of financial markets**

Compare them using the following criteria (Table 3).

Table 3

Comparison of financial markets

Comparison criteria	Market 1	Market 2
Definition		
Primary or secondary		
Types of instruments involved		
Maturity period		
Risk factor		
Return on investment		

Guidelines to practical tasks on the topic

Nominal GDP is the sum value of all produced goods and services at current prices:

$$GDP_{nominal} = \sum Q_{current} \times P_{current},$$
(3)

where $Q_{current}$ is the quantity of all goods and services produces at the current period;

$P_{current}$ is prices at the current period.

Real GDP is the sum value of all produced goods and services at constant prices:

$$GDP_{Real} = \sum Q_{current} \times P_{base},$$
(4)

where P_{base} is prices at the base period.

The GDP deflator shows how much of the change in the GDP from a base year is reliant on changes in the price level:

$$GDP\ deflator = \frac{GDP_{nominal}}{GDP_{real}} - 1.$$
(5)

GNP (Gross National Product) is the value of goods and services produced by citizens of a country regardless of their location.

The following methods are used to calculate GDP:

- *The expenditure approach to measuring GDP* concentrates on total expenditures on goods and services produced within the given period:

$$GDP = C + I + G + (X - M), \tag{6}$$

where C is gross private consumption expenditures;

I is gross private investment;

G is government purchases;

X is exports;

M is imports.

- *The income approach to measuring GDP* focuses on total payments to the production factors involved within the given period:

$$GDP = W + R + i + P, \tag{7}$$

where W is wages (labor incomes);

R is rental incomes;

i is interest incomes;

P is profits.

Questions for the seminar

1. Which countries are world leaders in GDP? What place does your country take? What does this say about the welfare of the society of these countries, their economic and social conditions?

2. What other methods (in addition to GDP or GNP) are used to measure and evaluate the economy of different countries?

3. Check the latest news from Ukraine or the world related to the economy. Choose three of them and analyze how they affect the circular flow.

4. How do modern technologies effect activities of financial intermediaries? Provide particular examples from the Ukrainian practice with positive and negative cases.

Tests

Determine whether the following statements are true or false. If true, explain why. If they are false, provide a counterexample:

1. A bank overdraft is a form of financing that allows the current account holders to overdraw their account up to a specified limit:
a) true;
b) false.

2. A commercial bank is a financial intermediary where most individuals do their banking, as opposed to an investment bank:
a) true;
b) false.

3. A mortgage company is a firm engaged in the business of originating and funding mortgages for residential or commercial property:
a) true;
b) false.

4. A trust company acts as an agent in the interests of a person or entity administrating and managing assets, and ultimately transferring assets to beneficiaries:
a) true;
b) false.

5. A trust company owns the assets provided by its clients for managing:
a) true;
b) false.

6. A typical type of the investment banks for Western Europe and developing countries are banks that deal exclusively with trading and placing securities:
a) true;
b) false.

7. An insurance company can specialize in one type of insurance, such as life insurance, health insurance, or auto insurance, or offer multiple types of insurance:
a) true;
b) false.

8. An underwriter is an entity that evaluates risks for others to participate in some businesses:

a) true;

b) false.

9. Brokerage firms do not need any special license for operations with securities:

a) true;

b) false.

10. In cooperative banks, their customers are their owners as well; and where the cooperative principle "one person − one vote" is followed:

a) true;

b) false.

11. Insurance is a financial compensation for the consequences of adversity, where the payment is made from the contributions accumulated from the ones done by all participated parties:

a) true;

b) false.

12. A mortgage bank is a bank that specializes in originating and/or servicing mortgage loans:

a) true;

b) false.

13. Closed pension funds are those where only a limited group of employees keep their pension plans. Open funds have no restrictions on membership:

a) true;

b) false.

14. Pawnbroking is one of the oldest forms of money lending:

a) true;

b) false.

15. Pawnshops generally lend money to the customer against some articles put in place of equal or higher value:

a) true;

b) false.

16. Political shifts always increase financial risks when you deal with offshore banks:

a) true;

b) false.

17. Robo-advisors with their high-touch services are the most expensive brokerage companies:

a) true;

b) false.

18. The majority of investment banks' clients are individuals who are looking for the best deposit option:

a) true;

b) false.

19. Executing trades for an investor to buy stock or for a seller to sell it is one of the main functions for brokers:

a) true;

b) false.

20. The specific of the state pension fund is that when you achieve the age of 60 you automatically get the pension:

a) true;

b) false.

21. There are two possible sources of a pawnshop income: interest on loan agreements; and selling items that were not redeemed by their owners:

a) true;

b) false.

22. Underwriting is the process of selling bonds or stocks to investors on behalf of a company to raise funds:

a) true;

b) false.

23. When members of the pension fund reach retirement age, they are provided with either an annuity or a capital paid by the fund:

a) true;

b) false.

Theme 3. The essence of credit. The banking system

The purpose: to study the specifics of the economic category "credit", the peculiarities of the financial intermediaries acting in the financial market, particularly the banking system.

The main competence: the ability to understand the specifics of credit relations in the society and know the main principles of the banking system functioning.

Practical tasks

Task 1. Find the simple interest on a loan of $2 500 at a rate of 6 % p. a. over 4 years.

Task 2. Which loan for ₴100 000 is cheaper overall: a) 8.3 % simple interest for 5 years; or b) 7.9 % simple interest for 5.5 years?

Task 3. A loan at a simple interest rate of 6 % p. a. results in an interest charge of $900 after 4 years. How much money was borrowed?

Task 4. What simple interest rate should be charged on a loan of $900 in order to earn $70 interest after 6 months?

Task 5. Peter has ₴90 000 in the bank. If his account pays interest at a flat rate of 9.25 % p. a., how long will it take to earn ₴20 000 in interest?

Task 6. For a loan of $5 000 at 10.3 % p. a. flat rate of return, what are the monthly repayments if the loan should be paid back in 3 years?

Task 7. You've obtained a loan of $8 000 and have to repay $690 each quarter in the next 3.5 years. What will the future value be if the rate is 5.5 % of simple interest?

Task 8. Calculate the future value of a compound interest investment of: $4500 after 3 years at 7 % p. a. with interest calculated annually.

Task 9. Find the total interest earned on the investment of $950 after 10 years at 6.6 % p. a. compound interest with interest calculated annually.

Task 10. What will the value at your account be in 4 years if now you have 15 000 euro there. The account pays 6 % p.a. compounded annually. How much total interest is earned during the period?

Task 11. Maria places $8500 in a deposit account that pays interest at the rate of 6.5 % p. a. compounded semi-yearly. How much will she have in her account in 4 years?

Task 12. You have ₴35 500 that you can leave for the next 3 years in an account where the interest may be:
a) 8.5 % p. a. simple interest calculated annually;
b) 6.5 % p. a. compound interest calculated annually;
c) 6.3 % p. a. compound interest calculated monthly;
d) 5.8 % p. a. compound interest calculated quarterly.
Which option will be more profitable for you?

Task 13. When Alex was born his parents deposited 2000 euro in a bank account that pays 5 % p. a. compounded semi-annually. How much will he receive on his18th birthday?

Task 14. You are planning your next year vacation that costs $10 340. Now you have $7 500. If you deposit this sum for 1 year what should be the lowest interest rate you accept if the rate is compounded quarterly?

Task 15. Your grandparents give you $8000 to buy a car but the car you want costs $9200. You deposit the $8000 into an account that pays 5.5 % p. a. compounded monthly. How long will it take to accumulate enough money to buy the car you want?

Task 16. Suppose you receive $500 at the end of each year in the next 4 years. If the interest rate is 7 % p. a., what is the present value of these cash flows? What is the future value in 4 years?

Task 17. You made an investment in one startup. You will be paid $10 000 at the end of this year, $20 000 at the end of the following year, and $30 000 at the end of the year after that. The interest rate is 4.5 % p. a. How much did you invest? What is the future value in 3 years?

Task 18. Consider the following cash flows (Table 4).

Table 4

Cash flows

Year	Investment A, $	Investment B, $
1	2	3
0	0	0
1	100	0

Table 4 (the end)

1	2	3
2	500	0
3	650	1 200

If the compound interest rate is 5.6 %, which option is better to invest?

Task 19. You are offered an investment on January 1, 2024 with the following promised cash flows (Table 5).

Table 5

Cash flows

Date promised	Amount, MU
June 30, 2024	25
December 31, 2024	25
June 30, 2025	25
December 31, 2025	1 025

If you require a 6 % p. a. compound rate on your investments, what is the most you will be willing to pay for this offer?

Task 20. Suppose that you want to subscribe to a streaming service for the next 3 years. There are 4 options available:
a) a 3-year subscription of $54 paid immediately;
b) three 1-year subscriptions of $22 each paid at the beginning of each year;
c) a 2-year subscription of $38 paid immediately, followed by a 1-year subscription of $22 paid at the beginning of the third year;
d) a 1-year subscription of $22 paid immediately, followed by a 2-year subscription of $38 paid at the beginning of the second year.
If the opportunity cost of funds is 7 %, which subscription option offers you the lowest cost?

Task 21. For a 5-year annuity with annual payments of $200, evaluated at 15 % p. a. interest rate, what is the future value if this is a) ordinary annuity? b) annuity due?

Task 22. For a 5-year annuity with monthly payments of $200, evaluated at 15 % p. a. interest rate, what is the present value if this is a) ordinary annuity? b) annuity due?

Task 23. Ben refuses to retire until the balance in his retirement account is at least $200 000. He is not going to make any further deposits into this account. The balance at the account is $160 000 and pays 6 % p. a. compounded half-yearly. How long will it take Ben to retire?

Task 24. A bank offers your family a mortgage of $90 000 at an interest rate of 4.5 % p. a. Under the terms you are supposed to make regular monthly payments over 15 years. How much should each payment be in order to pay off the debt?

Task 25. Maria wants to save money to provide for her retirement. Beginning one year from now, she will be depositing the same fixed amount each year for the next 30 years into a retirement savings account.

Starting one year after making the final payment, she wants to start withdrawing $100 000 annually for each of the following 25 years.

Her retirement fund earns 12 % annually over both the periods (when she is depositing money and when withdrawing). How much should she deposit annually in order to have enough funds in her account to fund the retirement?

Task 26. Consider the given investment opportunities (Table 6).

Table 6

Investment opportunities

Opportunity	Interest rate, % p. a.	Frequency of compounding
A	10 %	Quarterly
B	10 %	Monthly
C	10.3 %	Annually
D	11 %	Semi-annually
E	8 %	Daily

Which of them has the highest effective annual rate of return?

Task 27. Search the web and build your own rating of any 3 banks operating in your country. The rating is based on a 5-point scale: from 1 point (poor performance, low ratings, etc.) to 5 points (good performance, high ratings, etc.). Total rating score is the sum of points for each of the positions, respectively. The maximum score of the total rating will be 30 points.

The following criteria should be studied:

1. *License.* It is advisable to check on the NBU website when the bank was granted a license and what types of services are included (for example, whether it can work with bank metals, if you plan to place your gold bar on deposit in it).

2. *Liquidity of the bank's assets.* This information can be found on the NBU website or in the bank's financial statements, which should be published on its website. The high level of liquidity of assets indicates that the bank will have enough funds for timely settlement of its liabilities (for example, timely return of the deposit).

3. *Quality of the bank's loan portfolio.* This information can also be found on the NBU website or in the bank's financial statements. A significant proportion of overdue loans issued by the bank (i.e., those that are not repaid by borrowers) increases the risk that the bank will not be able to pay its debts.

4. *Profitability.* On the NBU website or in the bank's financial statements it is advisable to check whether the bank is profitable or unprofitable in the last few quarters.

5. *Bank rating.* There are rating agencies that assess the reliability of banks, assigning them ratings. For example, a deposit reliability rating is an assessment of a bank's ability to meet its obligations to depositors in a timely and complete manner. Information on ratings can be found on the website of the bank and the rating agency.

6. *Bank owner.* It may be useful to know who owns the bank, whether the bank's owners depend on the political or economic situation in Ukraine or abroad, etc. Information on the bank's ownership structure can be found on the NBU website or on the bank's website.

7. *News about the bank and "people's rating".* If the media has a lot of negative news about the bank, in particular about claims against it by the financial regulator, – this is cause for concern. A significant number of negative feedbacks from the bank's customers should also be a precaution.

Summarize your rating in Table 7.

Table 7

Banks' rating

Criteria	Bank 1	Bank 2	Bank 3
Availability of a license			
Liquidity of the bank's assets			
Quality of the bank's loan portfolio			
Profitability			
Bank rating in official ratings			
Bank owner			
"People's rating"			
Total score			

Provide brief explanations and references to the sources.

Guidelines to practical tasks on the topic

The time value of money (TVM) is a basic concept of financial mathematics comparing two or more monetary amounts from different points in time. A timeline illustrating the basic terms of the TVM concept is provided in Fig. 5.
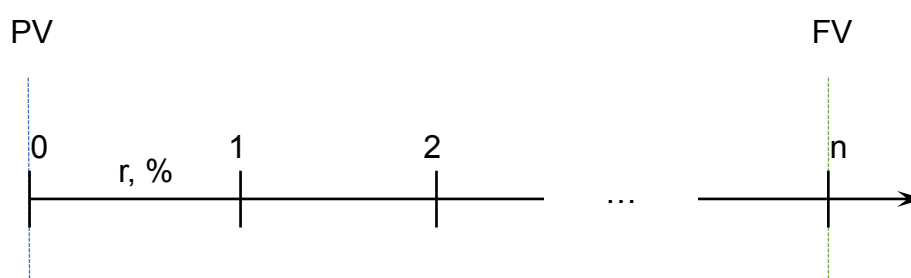
Fig. 5. **The TVM timeline**

Legend: *PV* is the present value (current value of a future sum of money or stream of cash flows based on an assumed rate of growth);

FV is the future value (the value of a current asset at a future date based on an assumed rate of growth);

Pmt is the fixed payment or cash flow per period;

I is the interest earned (or paid) – the difference between future value and present value;

n is the number of periods (in years);

r is the rate of return or interest rate (% per annum);

m is the frequency of compounding during the year.

- *Simple interest* is a practice of charging an interest rate only to the initial sum (and not on any interest already owed).

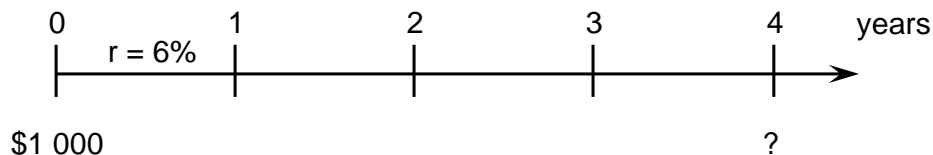$$FV_{simple\ rate} = PV \times \left(1 + n \times \frac{r}{100\ \%}\right). \tag{8}$$

Example 1. Future value of a lump sum with simple interest.

Problem:

How much should you return in 4 years if you borrowed $1 000 at 6 % p. a. simple interest? What will the interest charge paid over the loan be?

Solution:

The timeline of the given loan looks as follows:

First, let's find the future value of this loan:

$$FV = 1000 \times \left(1 + 4 \times \frac{6\ \%}{100\ \%}\right) = \$1240.$$

So, in 4 years $1 240 should be returned.

The interest charged can be found as a difference between present and future value of the loan:

$$I = 1240 - 1000 = \$240.$$

So, $240 will be paid over for the loan.

- *Compound interest* is a practice of charging an interest rate to the initial sum and to all previously accumulated interest not withdrawn.

$$FV_{compound\ rate} = PV \times \left(1 + \frac{r}{100\ \%}\right)^n. \tag{9}$$
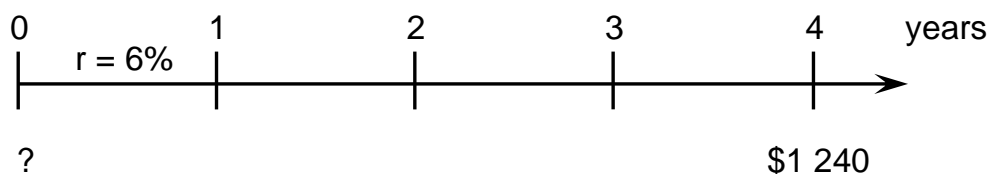
Example 2. Present value of a lump sum with compound interest.

Problem:
How much did you borrow 4 years ago if now you should return $1 240? The rate is 6 % p. a. compound interest.

Solution:
The timeline of a given loan looks as follows:

Find the present value of this loan:

$$PV = \frac{1240}{\left(1 + \frac{6\ \%}{100\ \%}\right)^4} = \$982.2.$$

So, you borrowed $982.2 4 years ago.

An interest rate can be compounded more frequently than annually. In such case, make sure that both the interest rate and the number of periods used correspond to the specific time interval.

$$FV_{compound\ rate} = PV \times \left(1 + \frac{r/m}{100\ \%}\right)^{n \times m}. \tag{10}$$

Example 3. Future value of a lump sum with compound interest and intra-year compounding.

Problem:

An investor deposits $12 500 in an account that pays 5 % interest compounded monthly. How much will he have in the account in 2 years?

Solution:

The future value will be:

$$FV = 12\,500 \times \left(1 + \frac{5\,\%/12}{100\,\%}\right)^{2 \times 12} = \$13\,811.77.$$

So, in 2 years he will have $13 811.77.
So, you borrowed $982.2 4 years ago.

Many investment opportunities have multiple cash flows that occur at different points in time. Consider a stream of cash flows: Pmt_0 at date *0*, Pmt_1 at date *1*, and so on, up to Pmt_n at date *n*.

To calculate *the present value of the cash flow stream*, first, compute the present value of each individual cash flow and then, combine them (Fig. 6).
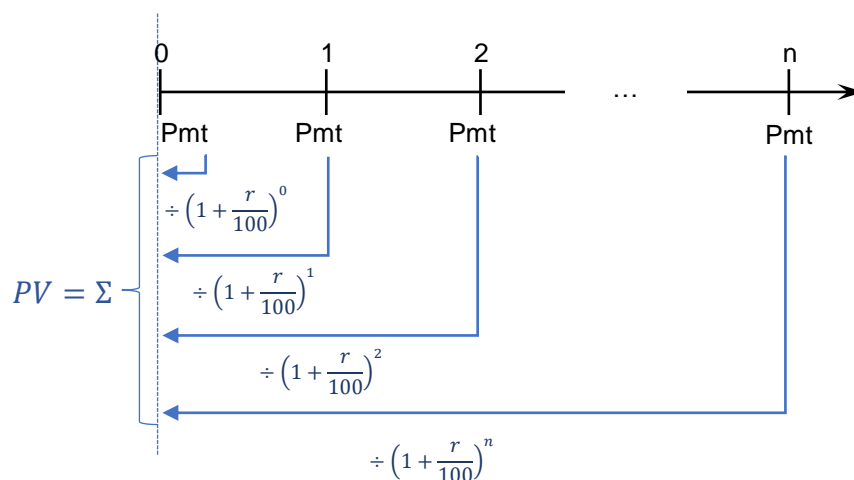

Fig. 6. **Present value of a cash flow**

That is, the present value of the cash flow stream is the sum of the present values of each cash flow:

$$PV = Pmt_0 + \frac{Pmt_1}{\left(1 + {r}/{100}\right)^1} + \frac{Pmt_2}{\left(1 + {r}/{100}\right)^2} + \cdots + \frac{Pmt_n}{\left(1 + {r}/{100}\right)^n} =$$
$$= \sum_{t=1}^{n} \frac{Pmt_t}{\left(1 + {r}/{100}\right)^t}. \tag{11}$$

Example 4. Present value of a stream of cash flows.

Problem:
You have just graduated and need money to buy a new car. Your rich Uncle Henry will lend you the money so long as you agree to pay him back within four years, and you offer to pay him the rate of interest that he would otherwise get by putting his money in a savings account. Based on your earnings and living expenses, you think you will be able to pay him $5000 in one year, and then $8000 each year for the next three years. If Uncle Henry would otherwise earn 6 % per year on his savings, how much can you borrow from him?

Solution:
The cash flows you can promise Uncle Henry are as follows:
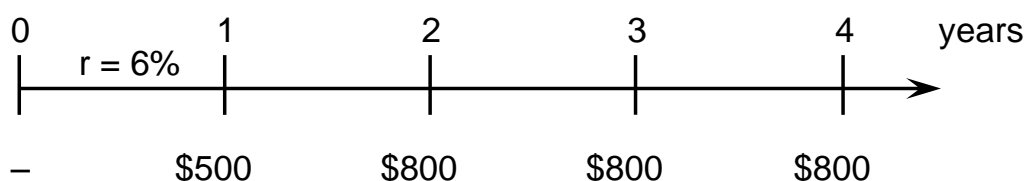
How much money should Uncle Henry be willing to give you today in return for your promise of these payments?

This is the amount of money that it would take him to produce these same cash flows, which we calculate as follows:

$$PV = \frac{\$5000}{(1.06)^1} + \frac{\$8000}{(1.06)^2} + \frac{\$8000}{(1.06)^3} + \frac{\$8000}{(1.06)^4} = \$24\,890.65.$$

As far as $\left(1 + \frac{6}{100}\right) = 1.06.$

30

Thus, Uncle Henry should be willing to lend you $24 890.65 in exchange for your promised payments. This amount is less than the total you will pay him, $5000 + $8000 + $8000 + $8000 = $29 000, due to the time value of money.

To find *the future value of a stream of cash flows*, first compute the future value of each individual cash flow and then sum them up (Fig. 7).
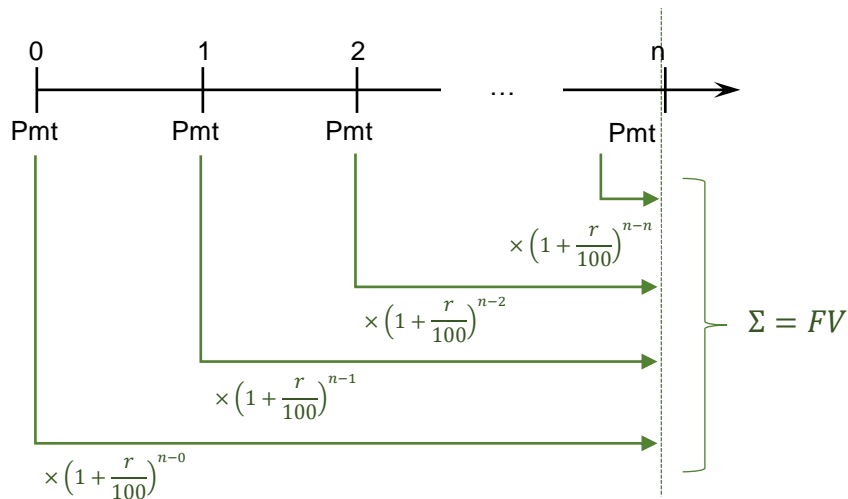

Fig. 7. **Future value of a cash flow**

That is, the future value in year *n* of the cash flow stream is the sum of the future values of each cash flow.

$$
\begin{aligned}
FV &= Pmt_0 \times \left(1 + \frac{r}{100}\right)^{n-0} + Pmt_1 \times \left(1 + \frac{r}{100}\right)^{n-1} + \\
&+ Pmt_2 \times \left(1 + \frac{r}{100}\right)^{n-2} + \cdots + Pmt_n \times \left(1 + \frac{r}{100}\right)^{n-n} = \\
&= \sum_{t=1}^{n} Pmt_t \times \left(1 + \frac{r}{100}\right)^{n-t}.
\end{aligned}
\tag{12}
$$

Example 5. Future value of a stream of cash flows.

Problem:
Considering the problem given in the previous example, suppose that Uncle Henry gives you the money, and then deposits your payments to him in the bank each year. How much will he have four years from now?

Solution:

We generate the same cash flow as we have in the previous example.

As we've already computed the present value of the given cash flow, we can simply move it to the future:

$$FV = \$24\,890.65 \times (1.06)^4 = \$31\,423.87 \text{ in 4 years.}$$

Or we can apply the direct computation:

$$FV = \$5000 \times (1.06)^{4-1} + \$8000 \times (1.06)^{4-2} + \$8000 \times (1.06)^{4-3} + \$8000 \times$$
$$\times (1.06)^{4-4} = \$31\,423.87 \text{ in 4 years.}$$

We get the same answer both ways.

Thus, Uncle Henry will have $31 423.87 in 4 years in case if he deposits payments to him in the bank.

An annuity is a stream of *n* equal cash flows paid over constant time intervals. Most car loans, mortgages, and some bonds are annuities.

The key difference of an annuity from any other streams of cash flows is:

1. All payments are equal *(Pmt$_1$ = Pmt$_2$ = Pmt$_n$)*.

2. Payments arise in equal time intervals (unlike other streams cash flows must arise each time interval, i. e. annually or monthly, etc.).

3. An annuity ends after some fixed number of payments.

Annuities break down into two basic types: ordinary annuities and annuities due.

- *An ordinary annuity* makes payments at the end of each period. We represent the cash flows of an ordinary annuity on a timeline as follows (Fig. 8).
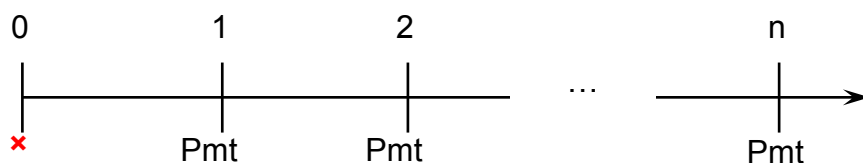

Fig. 8. **Timeline of an ordinary annuity**

Note that the first payment takes place at date 1, one period from today. The present value of an *n*-period ordinary annuity with payment *Pmt* and interest rate *r* is:

$$PV = Pmt \times \frac{100}{r} \times \left(1 - \frac{1}{\left(1 + {}^{r}/_{100}\right)^{n}}\right). \tag{13}$$

The future value of an *n*-period ordinary annuity with payment *Pmt* and interest rate *r* is:

$$FV = Pmt \times \frac{100}{r} \times \left(\left(1 + {}^{r}/_{100}\right)^{n} - 1\right). \tag{14}$$

**Example 6.** Valuing an ordinary annuity.

Problem:
Ellen just turned 35 years old, and she has decided it is time to plan seriously for her retirement. On each birthday, beginning in one year and ending when she turns 65, she will save $10 000 in a savings account. If the account earns 10 % per year, how much will Ellen have saved at age 65?
What is the today value of her future savings?

Solution:
In this case, it is helpful to keep track of both the dates and Ellen's age:

Age:	35	36	37		65
Date:	0	1	2	...	30
		$10 000	$10 000		$10 000
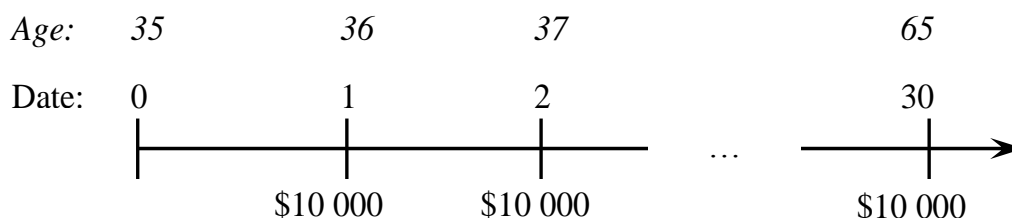
Ellen's account looks like an annuity of $10 000 per year for 30 years.
(Hint: It is easy to become confused when you just look at age, rather than at both dates and age. A common error is to think there are only 65 − − 36 = 29 payments. Writing down both dates and age avoids this problem.)

To determine the amount Ellen will have in the RRSP at age 65, we compute the future value of this annuity:

$$FV = 10\,000 \times \frac{1}{0.1} \times ((1 + 0.1)^{30} - 1) = \$1\,644\,940.23 \text{ at age 65.}$$

To find the current value of the annuity we calculate its present value:

$$PV = 10\,000 \times \frac{1}{0.1} \times \left(1 - \frac{1}{(1 + 0.1)^{30}}\right) = \$94\,269.14.$$

Now, her future savings worth \$94 269.14.

- With an *annuity due* payments come at the beginning of each period. We represent the cash flows of an annuity due on a timeline as follows (Fig. 9).
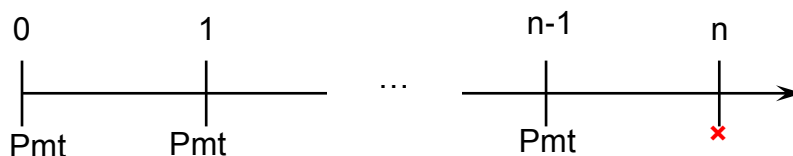

Fig. 9. **Timeline of an annuity due**

Note that the first payment occurs immediately at date *0* and the last payment occurs in 1 period before the last date (date *n − 1*).

The present value of an *n*-period annuity due with payment *Pmt* and interest rate *r* is:

$$PV = Pmt \times \frac{100}{r} \times \left(1 - \frac{1}{(1 + {}^{r}/_{100})^{n}}\right) \times \left(1 + \frac{r}{100}\right) =$$

$$= Pmt \times \frac{100}{r} \times \left(1 - \frac{1}{(1 + {}^{r}/_{100})^{n-1}}\right) + Pmt. \tag{15}$$

The future value of an *n*-period annuity due with payment *Pmt* and interest rate *r* is:

$$FV = Pmt \times \frac{100}{r} \times \left(\left(1 + {}^{r}/_{100}\right)^{n} - 1\right) \times \left(1 + \frac{r}{100}\right) =$$

$$= Pmt \times \frac{100}{r} \times \left(\left(1 + {}^{r}/_{100}\right)^{n+1} - 1\right) - Pmt. \tag{16}$$

**Example 7.** Valuing an annuity due with intra-year time intervals.

Problem:

A four-year lease agreement requires payments of $1 000 at the beginning of every month. If the interest rate is 6 % p. a., what is the present value of the lease?

Solution:

In this case, we apply an intra-year compounding. Therefore, we have 4 years × 12 month = 48 monthly periods. Interest rate is 6 % p. a. ÷ 12 = = 0.5 % per month.

The cash flows are as follows:
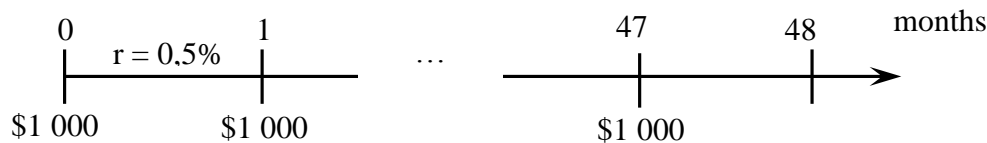
The present value is:

$$PV = 1\,000 \times \frac{1}{0.005} \times \left(1 - \frac{1}{(1 + 0.005)^{48}}\right) \times (1 + 0.005) = \$42\,793.22.$$

The present value of the lease agreement is $42 793.22.

- *A perpetuity* is a stream of equal cash flows that occur at constant time intervals and last forever. Here is the timeline for a perpetuity (Fig. 10).

Fig. 10. **Timeline of a perpetuity**

Note that the first cash flow does not occur immediately; it arrives at the end of the first period.

Present value of a perpetuity with discount rate r and constant cash flows Pmt starting in one period (date 1) is:

$$PV = \frac{Pmt \times 100}{r}.$$ (17)

As far as there is no final date it is not possible to find the future value of the perpetuity.

Example 8. Endowing a perpetuity.

Problem:

You want to endow an annual graduation party at your university. You want the event to be a memorable one, so you budget $30 000 per year forever for the party. If the university earns 8 % per year on its investments, and if the first party is in one year's time, how much will you need to donate to endow the party?

Solution:

This is a standard perpetuity of $30 000 per year. The funding you would need to give the university in perpetuity is the present value of this cash flow stream. From the formula:

$$PV = \frac{30\ 000}{0.08} = \$375\ 000\ today.$$

If you donate $375 000 today, and if the university invests it at 8 % per year forever, then the graduates will have $30 000 every year for their party.

- *The effective annual interest rate* (EAR) is the real return on a savings account or any interest-paying investment when the effects of compounding over time are taken into account. It also reveals the real percentage rate owed in interest on a loan, a credit card, or any other debt.

$$EAR = \left(1 + \frac{r/100}{m}\right)^{m} - 1. \tag{18}$$

The more frequent the compounding periods, the greater the return.

You can compare various offers accurately only if you know the effective annual interest rates of each.

Example 9. Effective annual interest rate.

Problem:

Consider these two offers: Investment A pays 10 % interest, compounded monthly. Investment B pays 10.1 % compounded semi-annually. Which is the better offer?

Solution:

In both cases, the advertised interest rate is the nominal interest rate. For investment A, this would be:

$$EAR = \left(1 + \frac{10/100}{12}\right)^{12} - 1 = 0.1047 \times 100\,\% = 10.47\,\%.$$

And for investment B, it would be:

$$EAR = \left(1 + \frac{10.1/100}{2}\right)^{2} - 1 = 0.1036 \times 100\,\% = 10.36\,\%.$$

Investment B has a higher stated nominal interest rate, but the effective annual interest rate is lower than the effective rate for investment A. This is because Investment B compounds fewer times over the course of the year.

If an investor were to put, say, $5 000 000 into one of these investments, the wrong decision would cost more than $5 800 per year.

Questions for the seminar

1. Have you ever dealt with a credit? If yes, how did you decide on a possible lender? What information about you was required when giving a loan? If not, imagine that you needed a loan, how would you answer the above question?

2. Discuss main advantages and disadvantages of dealing with banks over other depository financial institutions.

3. State the conditions under which the nationalization of commercial banks is appropriate, give an example. And what about privatization?

Tests

Determine whether the following statements are true or false. If true, explain why. If they are false, provide a counterexample.

1. The reason money has a time value is that people decline something particular now to gain what is uncertain tomorrow:
a) true;
b) false.

2. The uncertainty factor increases with time because as further the cash flows is, the greater the uncertainty:
a) true;
b) false.

3. As shorter the compounding period is, the higher the effective interest rate:
a) true;
b) false.

4. Higher inflation rates tend to increase the interest rates:
a) true;
b) false.

5. The reason for the time value of money is that people prefer future consumption to present spending:
a) true;
b) false.

6. The nominal interest rates are always equal to the effective interest rates when interest is compounded annually:

a) true;

b) false.

7. Financial analysis should obviously consider the time value of money. This is because utmost financial issues at corporate and individual level involve streams of cash flows that occur at different time moments:

a) true;

b) false.

8. A regular annuity is one where equal amounts of cash occur periodically at the beginning of each period:

a) true;

b) false.

9. The frequency of compounding does not change the interest earned:

a) true;

b) false.

10. It is more preferable when investing to choose the option with higher frequency of compounding:

a) true;

b) false.

11. The effective annual rate of interest is greater with longer compounding period:

a) true;

b) false.

12. The interest charged is the same for each year in case of simple interest:

a) true;

b) false.

13. Continuous compounding yields the greatest future value for a given interest rate and time period:

a) true;

b) false.

14. A perpetuity is a type of annuities that continues for one hundred years:

a) true;

b) false.

15. A perpetuity means that the capital remains intact:

a) true;

b) false.

16. Continuous compounding occurs when interest is compounded on a daily basis:

a) true;

b) false.

17. An annuity due is a periodic cash flow where equal amounts occur at the beginning of each period:

a) true;

b) false.

18. If an annuity due is compounded over the same period, it usually has a higher future value compared to an ordinary annuity:

a) true;

b) false.

19. Generally, annuities refer to cash flows with constant payments and occurring at regular intervals:

a) true;

b) false.

20. A perpetuity is a type of an annuity that lasts forever (there is no maturity date):

a) true;

b) false.

Theme 4. State budget

The purpose: to study the specifics of the budgetary system of the state, the definition of the peculiarities of the budget revenues and expenditures, as well as the main methods of balancing the system.

The main competence: the ability to identify the specifics of the budgetary system of the state and understand the relations between its components.

Practical tasks

Task 1. Determine whether the following elements refer to the state budget revenues or expenditures:

a) defense; b) education; c) social security; d) environmental protection; e) excise tax;   f) funds from foreign countries and international organizations; g) health care;   h) housing and utility management;   i) income from capital transactions; j) income from property; k) income tax; l) rent; m) trust funds; n) VAT tax.

State budget revenues:

State budget expenditures:

Task 2. Analyze the structure of the state budget expenditures of Ukraine in 2021 and 2022 (Table 8).

Table 8

Analysis of the state budget expenditures of Ukraine

Items	2021		2022	
	Value, UAH million	Share, %	Value, UAH million	Share, %
General state functions	206 643.1		201 999.1	
Defense	127 527.3		1 142 872.4	
Public order, security, judiciary	174 409.6		443 323.2	
Economic activity	180 989.9		95 368.4	
Environmental protection	8 200.2		4 714.1	
Housing and utility management	164.1		528.6	
Health care	170 505.2		184 267.8	
Spiritual and physical development	15 970.3		11 051.3	
Education	63 837.1		58 508.1	
Social protection and social security	339 278.9		425 987.0	
Inter-budget transfers	202 733.3		136 803.3	
Total				

What are the main changes you can note? What do they relate to? What positive/negative consequences do you see in these changes?

Task 3. Analyze the structure of the state budget revenues of Ukraine in 2021 and 2022 (Table 9).

Analysis of the state budget revenues of Ukraine

Items	2021		2022	
	Value, UAH million	Share, %	Value, UAH million	Share, %
Tax revenues:				
Individual income tax	137 555.2		148 427.3	
Corporate income tax	147 751.7		117 049.9	
Rent and fees for the use of other natural resources	80 749.4		85 365	
Excise tax on excise goods manufactured in Ukraine	82 858.4		60 699.1	
Excise tax on excise goods imported into Ukraine	79 592.8		41 653.8	
Value added tax on domestic goods	155 774.8		213 948	
Value added tax on imported goods	380 714.4		253 053	
Taxes on international trade and foreign operations	38 177.2		26 246	
Other taxes and fees	3 916.5		3 322.4	
Non-tax revenues:				
Income from property and entrepreneurial activity	56 021.9		87 172.4	
Other non-tax revenues	17 994.9		16 147	
Administrative fees and payments, income from non-commercial activities	12 975.5		8 166.1	
Own revenues of budgetary institutions	88 365.7		234 842.3	
Income from capital transactions	328.7		611	
Funds from foreign countries and international organizations	1 289.9		481 090.7	
Trust funds	209.4		136.2	
Official transfers	12 576.1		9 465.6	
Total				

What are the main changes you can note? What do they relate to? What positive/negative consequences do you see in these changes?

Task 4. Characterize the changes in the balance of payments of Ukraine for the given period (Table 10).

**The main aggregates of the balance of payments of Ukraine
for the four months of 2021 and 2022, million USD**

Items	January – April 2021	January – April 2022
Current account balance	−446	3 185
Balance of goods	−1 936	−1 292
Balance of services	1 333	−349
Balance of wages and salaries	4 498	4 166
Interest and dividend payments	−5 777	−2 700
Current transfers	2 106	4 090
Financial account balance	273	−7 313
Direct investment (net)	2 143	99
Portfolio investments (net)	1 326	−1 040
Foreign loans, liabilities	−418	2 188
Trade loans, assets	−488	−5 232
Currency outside banks	−1 544	−3 582
Consolidated balance	−166	−4 123

Task 5. Calculate a consolidated balance of the state's financial resources and determine its total income, expenditures and the excess of income over expenses or vice versa. Initial data is provided in Table 11.

Initial data

Item	Amount, million UAH
1	2
Expenditures of budget funds	443 841.4
Expenditures of state extrabudgetary funds	136 009.4
Revenues of budget funds	4 433 841.4
Revenues of state extrabudgetary funds	136 098.2
Incomes of state-owned enterprises	203 941.2
Expenses of state-owned enterprises	203 941.2

Table 11 (the end)

1	2
Expenditures for the implementation of national economic development programs at the expense of long-term loans of national banks	60 600
Funds of foreign investors	60 000
Expenses of foreign investors for the development of the economy	60 000
Repayment of the principal amount of external debt	11 473.3
Long-term loans for the development of the economy, provided by commercial banks	60 600
The Pension Fund's own income	117 177.8

Task 6. Adjust the budget expenditures, determine the share of the approved budget fulfillment according to expenditures (Table 12). Actual budget receipts make 4 650 MU.

<div align="right">Table 12</div>

<div align="center">

Initial data

</div>

Budget expenditures	Expenditures according to the approved budget, MU	Critical required minimum of financing, MU
Financing services of general purpose	1 526	1 000
Financing services of social purpose	1 997	1 800
Financing services of economic activity	1 004	510
Other expenditures	823	400
Total		

<div align="center">

Guidelines to practical tasks on the topic

</div>

A *consolidated balance of financial resources* reflects the amount of financial resources of the state and directions they are used for financing national needs. The essence of the balance method of planning and forecasting is coordination of needs and resources on the scale of the entire

society. The balance consists of two parts: one part characterizes the state resources as to the sources of income and it is equal to the other part, which refers to the use of resources in all areas of expenditures.

A *budget is adjusted* when there a deviation between the current and planned amounts of its revenues.

The distribution of expenditures exceeding the amount of "protected" items is carried out in proportion to the structure of expenditures of the approved budget.

Questions for the seminar

1. How do you think should citizens and public officials make decisions about where to allocate money when developing a state budget?

2. Explain the top-down and bottom-up budgeting methods. What is the difference between them? Which method is more widely accepted and why?

Tests

Choose one correct answer.

1. What term is used to specify the annual level of income below which people are considered living in poverty:

a) income line;

b) consumption line;

c) savings line;

d) poverty line?

2. In 2022, more than half of state revenues in the state budget of Ukraine came from:

a) tax revenues;

b) non-tax revenues;

c) income from capital transactions;

d) funds from foreign countries and international organizations.

3. In 2022, the major of the state budget expenditures of Ukraine was directed at:

a) defense;

b) public order, security, judiciary;

c) social protection and security;

d) health care.

4. The personal income tax rate in Ukraine is:

a) 5 %;

b) 15 %;

c) 18 %;

d) 20 %.

5. The corporate income tax rate in Ukraine is:

a) 5 %;

b) 15 %;

c) 18 %;

d) 20 %.

6. The value added tax rate in Ukraine is:

a) 5 %;

b) 15 %;

c) 18 %;

d) 20 %.

7. The excise tax rate in Ukraine is:

a) 5 %;

b) 15 %;

c) 18 %;

d) 20 %.

8. Possible reasons for the state budget deficit may include:

a) overspending in the development of the national economy;

b) negative consequences of unforeseen events such as wars, natural disasters, pandemics;

c) economic crises;

d) all of the above.

9. Which of the following funds is not a state trust fund in Ukraine:

a) Children's Protection Fund;

b) Pension Fund of Ukraine;

c) Social Insurance Fund in Case of Unemployment;

d) Social Insurance Fund for Temporary Disability?

10. How many levels are in the budget system of Ukraine:

a) one level;

b) two levels;

c) three levels;

d) five levels?

Content module 2. The basics of finance of an enterprise

Theme 5. Finance of an enterprise

The purpose: to form knowledge of the basis of enterprise's finance and understanding of the corporate finance sources.

The main competence: the ability to understand the essence of the corporate finance, its specific functions and main sources for forming the capital of an enterprise.

Practical tasks

Task 1. You own a building company. You've recently got a contract to build a municipal office building. Construction will take one year and requires $1 million invested today and $0.5 million a year from now. Up on completion, the municipal government will pay you $2 million. Assume that the cash flow and the timing of the payments are certain. The risk-free interest rate is 10 %. What is the net present value of this opportunity?

Task 2. The company has received three potential investment projects. The cash flows of the offered projects are provided in Table 13.

Table 13

Initial data

Project	Cash flow (MU)	
	Today	In 1 year
A	−10	20
B	5	5
C	20	−10

Suppose the risk-free interest rate is 10 %; all cash flows are certain.

Calculate the net present value of each project. If the company could only choose one of these projects, which one should it be? What if the company could choose two projects, which should it choose?

Task 3. Consider the investment opportunity that costs $5 000 today and will pay $6 000 in two years. Calculate its internal rate of return.

Task 4. Consider the following cash flow of the investment opportunity (Table 14). The required return is 8.5 %.

Table 14

Initial data

Year	Cash flows (MU)
0	21 400
1	7 000
2	9 800
3	0
4	8 800

What is its profitability index?

Task 5. A used coffee cart costs $2 400. You expect that sales will be about $1 400 per year. The remaining useful life of the cart is three years. What is the payback period of this purchase?

Task 6. You are considering an opportunity to expand your business through adding several new items to the store. The estimated inventory cost will be $4 300. Renovation cost will be $1 500. The forecasted sales will generate net cash inflows of $1 000, $1 200, $1 630, and $1 850, respectively, over the next four years. Assuming a 3-year payback period for the project, should it be accepted?

Task 7. Consider the following mutually exclusive projects (Table 15).

Table 15

Initial data

Year	Cash flows (MU)	
	Project A	Project B
1	2	3
0	−240 000	−198 100
1	0	110 000

Table 15 (the end)

1	2	3
2	0	83 000
3	340 000	45 000

The required rate of return is 8 %.

Calculate the net present value, discounted payback period and profitability index in order to choose a better option.

Will your choice changes if the required rate of return is 11 %.

Task 8. Classify each of the following transactions according to the types of activities.

Types of activities:

1. Operating activity.
2. Investing activity.
3. Financing activity.

Transactions:

a) cash dividends paid to shareholders;

b) cash payments for equipment;

c) cash receipts from issuance of bonds;

d) cash payments to employees;

e) cash receipts from sales of goods;

f) cash receipts from sale of common stock;

g) cash payments for purchases of merchandise;

h) cash payments to lenders for interest on loans;

i) cash receipts from collection of interest on loans made to other entities;

j) cash receipts from collection of the principal for loans made to other entities.

To make a decision on investment opportunities the following financial metrics are used:

- *Net Present Value (NPV).*

In order to find the current value of some future costs of benefits, their present value (PV) is computed. Similarly, we define the net present value

(NPV) of an investment opportunity or some project as the difference bet-ween the present value of its future benefits and costs:

$$NPV = PV\ of\ benefits - PV\ of\ cost = PV\ of\ all\ project\ cash\ flows. \qquad (19)$$

That is, the NPV is the total of the present values of all project cash flows.

As NPV is expressed in terms of cash today, it makes decision making simpler. The *NPV decision rule:*

Take the alternative with the highest NPV. Choosing this alternative is like receiving its NPV in cash today:

Accept those projects with positive present value ($NPV > 0$) because accepting them is equivalent to receiving their NPV in cash today.

Reject those projects with negative present value ($NPV \leq 0$); accepting them would reduce the wealth of investors.

If the NPV is exactly *zero*, you will neither gain nor lose by accepting the project rather than rejecting it. It is not a bad project as it does not reduce firm value, but it does not increase value either.

Example 1. NPV.

Problem:

Your firm needs to buy a new $9500 copier. As part of a promotion, the manufacturer has offered to let you pay $10 000 in one year, rather than pay cash today. Suppose the risk-free interest rate is 7 % per year. Is this offer a good deal? Show that its NPV represents cash in your pocket.

Solution:

If you take the offer, the benefit is that you won't have to pay $9 500 today, which is already in PV terms. The cost, however, is $10 000 in one year. We therefore convert the cost to a present value at the risk-free interest rate (using the formula for PV of lump-sum with compound interest):

$$PV\ of\ Cost = (\$10\ 000\ in\ one\ year) \div (1.07^1) = \$9\ 345.79\ today.$$

The NPV of the promotional offer is the difference between the benefits and the costs:

$$NPV = \$9500 - 9345.79 = \$154.21 \; today.$$

The NPV is positive, so the investment is a good deal. It is equivalent to getting a cash discount today of $154.21, and only paying $9345.79 today for the copier. To confirm our calculation, suppose you take the offer and invest $9345.79 in a bank paying 7 % interest. With interest, this amount will grow to $9345.79 × 1.07 = $10,000 in one year, which you can use to pay for the copier.

- *Internal Rate of Return (IRR).*

Sometimes, the present value of the option is known as well as its cash flows. But the interest rate equating them is not defined. This interest rate called the internal rate of return (IRR) defines the interest rate that sets the net present value of the cash flows equal to zero:

$$NPV = 0;$$
$$PV \; of \; benefits = PV \; of \; cost. \tag{20}$$

When there are just two cash flows, consider the general case in which you invest an amount *PV* today, and receive *FV* in *n* years. Then the IRR satisfies the equation $FV = PV \times (1 + IRR)^n$, which implies IRR with two cash flows:

$$IRR = \sqrt[n]{\frac{FV}{PV}} - 1. \tag{21}$$

When dealing with multiple cash flows, you can use Excel function or a financial calculator to find the IRR. The IRR function is = *IRR (values; guess).*

This function accounts for the inflows and the outflows, including the initial investment at time 0.

The IRR Decision Rule:

Accept the project if the IRR is greater than the required rate of return (discount rate). Otherwise, reject the project.

Accept those projects with $IRR > r$.

Reject those projects with $IRR < r$.

The higher the IRR on a particular project, and the greater the amount by which it exceeds the cost of capital, the higher the net cash flows to the company. However, a company may not rigidly follow the rule if the project has other, less tangible, benefits.

Example 2. IRR.

Problem:

Assume that you started a business with an initial investment of $10 000 and received the following income for the next five years: t1 = $2 000; t2 = = $3 000; t3 = $4 000; t4 = $5 000; t5 = $1 000. What is IRR of the project?

Solution:

What interest rate, r, would you need so that the NPV of this investment is zero?

$$NPV = -\frac{\$10\ 000}{\left(1 + \frac{IRR}{100}\right)^0} + \frac{\$2\ 000}{\left(1 + \frac{IRR}{100}\right)^1} + \frac{\$3\ 000}{\left(1 + \frac{IRR}{100}\right)^2} + \frac{\$4\ 000}{\left(1 + \frac{IRR}{100}\right)^3} + \frac{\$5\ 000}{\left(1 + \frac{IRR}{100}\right)^4} +$$

$$+ \frac{\$1\ 000}{\left(1 + \frac{IRR}{100}\right)^5} = 0.$$

In Excel:

	C14	▼	=	=IRR(C5:C10)	
	A	B	C	D	
1					
2			.		
3					
4		Period	Cash flow		
5		0	-10,000		
6		1	2000		
7		2	3000		
8		3	4000		
9		4	5000		
10		5	1000		
11					
12					
13					
14		IRR	14.974%		
15					
16					

The IRR of 14.974 % means that at this rate the net present value will be zero.

- *Payback period.*

The payback period for an investment opportunity is the number of years required to cover all the costs of the project.

The payback period decision rule:

Accept the project if the payback period is less than a pre-specified number of years.

Example 3. Payback period.

Problem:

Assume that a company invests $5,000 in a project, which generates the following cash flow in the next 5 years.

Year	Cash flow
0	−$5000
1	$2000
2	$2000
3	$2000
4	$1000
5	$1000

What is a payback period? If the company requires all projects to have a payback period of 3 years or less, would it undertake the project?

Solution:

The payback period will be equal to the time period when the firm has generated back its $5,000 investment.

In year 1, the firm generates $2000.

In year 2, it generates $2,000. By the end of year 2, the cumulative cash inflow is $4,000.

In year 3, it generates $2,000. At the end of year 3, the cumulative cash flow is $6,000, which is more than our initial investment. That means the payback period is somewhere between year 2 and year 3.

By the end of year 2, we have recovered $4,000. The unrecovered amount is $1,000. In year 3, the total cash flow is $2,000.

With this information, the payback period can be calculated as follows.

Payback period = 2 years + $1,000 / $2000 = 2.5 years.

Applying the payback investment rule, the company can invest in the project as its payback period is less than 3 years.

- *Discounted payback period.*

The discounted payback period for an investment opportunity shows the length of time until the accumulated discounted cash flows from the investment equal or exceed the original costs.

The discounted payback period decision rule:

Accept the project if the discounted payback period is less than a pre-specified number of years.

Example 4. Discounted payback period.

Problem:

Assume that a company invests $5,000 in a project, which generates the following cash flow in the next 5 years, assuming that the firm has a cost of capital of 10 %.

Year	Cash flow
0	−$5000
1	$2000
2	$2000
3	$2000
4	$1000
5	$1000

What is a discounted payback period? If the company requires all projects to have a payback period of 3 years or less, would it undertake the project?

Solution:

Let's construct the following table:

Year	Cash flow (CF)	Discount factor $(DF = 1 + r/100)^n$	Discounted cash flow (CF/DF)	Accumulated cash flow
1	2	3	4	5
0	−$5000	$(1.1)^0$	−5000	−5000

1	2	3	4	5
1	$2000	$(1.1)^1$	1818.18	= −5000 + 1818.18 = = −3181.82
2	$2000	$(1.1)^2$	1652.89	= −3181.82 + + 1652.89 = −1528.96
3	$2000	$(1.1)^3$	1502.63	**−26.30**
4	$1000	$(1.1)^4$	**683.01**	**656.72**
5	$1000	$(1.1)^5$	620.92	1277.64

As you can see, the project generates a total of $4973.70 (1818.18 + + 1652.89 + 1502.63) in 3 years. By the end of four years, the total cash inflow is $5656.72. This means that the discounted payback period is between 3 and 4 years.

You can come to the same conclusion by looking at the accumulated cash flows. It becomes positive in year 4.

The discounted payback period can be calculated as follows:

Discounted payback period = 3 + (5000 − 4973.70) / 683.01 = 3.04 years;

or, Discounted payback period = 3 + (−(−26.30)) / 683.01 = 3.04 years;

or, Discounted payback period = 4 − (656.72 / 683.01) = 3.04 years.

So, the company will cover initial investments in 3.04 years. Applying the rule, the company should not invest in the project as its discounted payback period is more than 3 years.

- *Profitability index (PI).*

A profitability index measures the benefit per unit cost, based on the time value of money (A profitability index of 1.1 means that for every ₴1 invested, we create an additional ₴0.10 in value):

$$PI = \frac{Value\ created}{Resource\ consumed} = \frac{PV\ of\ benefits}{PV\ of\ cost} = 1 + \frac{NPV}{Initial\ investment}. \quad (22)$$

The PI decision rule.

When making an investment decision, take the alternative with the highest PI.

Accept those projects with $PI > 1$ because the invested money creates an additional value.

Reject those projects with $PI < 1$ because investments are not covered in the project.

Example 5. Profitability index.

Problem:

Assume that a company invests $5,000 in a project, which generates the following cash flow in the next 5 years, assuming that the firm has a cost of capital of 10 %.

Year	Cash flow
0	−$5 000
1	$2 000
2	$2 000
3	$2 000
4	$1 000
5	$1 000

What is a profitability index?

Solution:

The present value of all future inflows is:

$$PV \ of \ benefits = \frac{2\ 000}{1.1^1} + \frac{2\ 000}{1.1^2} + \frac{2\ 000}{1.1^3} + \frac{1\ 000}{1.1^4} + \frac{1\ 000}{1.1^5} = \$6\ 277.64.$$

$$NPV = 6\ 277.64 - 5\ 000 = \$1\ 277.64.$$

The profitability index:

$$PI = \frac{6\ 277.64}{5\ 000} = 1.25 \quad or \quad PI = 1 + \frac{1\ 277.64}{5\ 000} = 1.25.$$

Since PI > 1, the project can be accepted. From every $1 invested in the project, the company creates an additional $0.25 in value.

Questions for the seminar

1. What options for an asset financing do you know? Discuss them in terms of appropriate goals, assets' amount, interest, payment obligation and ownership rights.

2. What sources of financing are available for small business innovative startups in your regions? Compare their terms. How to make a better choice among them?

Tests

Choose one correct answer.

1. A financial statement that describes assets and liabilities of a firm and gives a snapshot of its financial position at a point in time is:
a) a balance sheet;
b) an income statement;
c) a statement of cash flows;
d) none of the above.

2. A financial statement that provides a firm's revenues and expenses, and calculates its net income over a given time period is:
a) a balance sheet;
b) an income statement;
c) a statement of cash flows;
d) none of the above.

3. A financial statement that indicates a company's sources of cash and use of cash during a particular time period is:
a) a balance sheet;
b) an income statement;
c) a statement of cash flows;
d) none of the above.

4. What are the cash activities associated with a firm's net income:
a) operating activities;
b) investing activities;
c) financing activities;
d) none of the above?

5. What are cash activities associated with a firm's non-current assets:
a) operating activities;
b) investing activities;
c) financing activities;
d) none of the above?

6. What are cash activities associated with a firm's non-current liabilities and owners' equity:

a) operating activities;

b) investing activities;

c) financing activities;

d) none of the above?

7. What is a general term describing a company's cash, inventory, property, plant, and equipment, and other investments made:

a) assets;

b) liabilities;

c) shareholder's equity;

d) none of the above?

8. What do the firm's obligations to creditors represent:

a) assets;

b) liabilities;

c) shareholder's equity;

d) none of the above?

9. An accounting measure of the firm's net worth that represent a difference between its assets and liabilities:

a) assets;

b) liabilities;

c) shareholder's equity;

d) none of the above.

10. Cash or assets that can be converted into cash within a year:

a) current assets;

b) current liabilities;

c) long-term liabilities;

d) fixed assets.

11. Liabilities that should be satisfied within a year:

a) current assets;

b) current liabilities;

c) long-term liabilities;

d) fixed assets.

12. The difference between current assets and current liabilities that refers to capital available in the short term to operate a business is:

a) gross profit;

b) net profit;

c) net working capital;

d) sales revenue.

13. Liabilities due more than one year in the future are:

a) current assets;

b) current liabilities;

c) long-term liabilities;

d) fixed assets.

14. The difference between sales revenues and costs is:

a) gross profit;

b) net profit;

c) net working capital;

d) operating income.

15. Firm's sales revenues less its cost of goods sold and operating expenses are:

a) gross profit;

b) net profit;

c) net working capital;

d) operating income.

Theme 6. The fundamentals of finance at an enterprise

The purpose: to form the knowledge of the money moving business model and skills in the formation and distribution of assets at an enterprise.

The main competence**:** the ability to identify the ways of the formation and distribution of current and fixed assets at an enterprise.

Practical tasks

Task 1. Evaluate how different activities effect the cash flow of the company (Table 16).

Table 16

Effect of business activities on the cash flow

Activities	Effects of the cash flow
1	2
1. Inventories were purchased on credit (trade payables were created)	

Table 16 (the end)

1	2
2. Inventories were sold on credit (trade payables were created)	
3. Trade payables need to be paid; the cash is collected from the trade receivables	

Task 2. Complete the comparison of working capital character for enterprises in different industries (Table 17).

Table 17

Comparison of working capital for different industries

Items	Manufacturing	Retail trade	Service
Inventories	High volume (due to WIP and finished goods)		
Trade payables		Very high levels (due to large purchases of inventories	
Trade receivables			Low levels (as usually services are paid immediately)

Task 3. The following extract from financial statements is available about the trade company on June 30, 20X1 (Table 18).

Table 18

Initial data

Balance items	Amount, MU
Sales revenue	2 400
Cost of goods sold	1 400
Inventories	360
Trade receivables	290
Trade payables	190
Cash and cash equivalents	95

Calculate the duration of the company's working capital cycle on June 30, 20X1.

Task 4. The following data is available about the company ABC (Table 19).

Table 19

Initial data

Balance items	Amount, MU
Inventories	50 000
Trade receivables	70 000
Trade payables	88 000
Cash and cash equivalents	10 000
Interest payable	7 000

Calculate the company's quick ratio.

Task 5. The following extract from financial statements is available about the company A on December 31, 20X1 and 20X2 (Tables 20, 21).

Table 20

A balance sheet extract (on December, 31)

Items	Amount, thousand MU	
	20X1	20X2
Current assets		
Inventory	84	74
Trade receivables	58	46
Bank	6	10
Current liabilities		
Trade payables	72	82
Taxation	20	20

Table 21

An income statement extract (for the year ended December, 31)

Items	Amount, thousand MU	
	20X1	20X2
Turnover	418	392
Opening inventory	74	58
Purchases	324	318
Closing inventory	−84	−74
Gross profit	104	90

Calculate the working capital ratios of the company A, particularly, current ratio and quick ratio, inventory days, trade payable and trade receivable days, and the working capital cycle.

Draw conclusions.

Guidelines to practical tasks on the topic

Working capital refers to the amount of capital available for running day-to-day business operations and is computed as follows:

$$Working\ capital = Current\ assets - Current\ liabilities. \qquad (23)$$

Some working capital ratios include the following:
- *Current ratio or working capital ratio:*

$$Current\ ratio = \frac{Current\ assets}{Current\ liabilities}. \qquad (24)$$

It measures the short-term liquidity of the company and shows the extent to which the claims of short-term creditors are covered by current assets.

The normal value of the ratio varies within industries and usually is about 2 : 1. Low value refers to insolvency of the company. High value may reflect losing opportunities by not maximizing return on working capital.

- *Quick ratio or acid test:*

$$Quick\ ratio = \frac{Current\ assets - Inventories}{Current\ liabilities}. \qquad (25)$$

It measures the immediate liquidity of the company as it removes inventories out of the calculation (as it is an item least representing cash as it needs to be sold).

The normal value is about 1 : 1. It also varies within industries.

- *Trade payables turnover (days):*

$$Trade\ payables\ turnover = \frac{Year\ end\ trade\ payables}{Credit\ purchase} \times 365\ days. \qquad (26)$$

As credit purchase is not always reflected in the financial statements, cost of sales may be used instead.

It shows the number of days required to pay the suppliers. High value may be preferable as it represents free credit. However, if it is too high, there is a risk of losing a goodwill in the future and so not extending the credit. Also high values may indicate problems with solvency as the company may not have available cash to pay.

- *Trade receivable turnover (days):*

$$Trade\ receivable\ turnover = \\ = \frac{Year\ end\ trade\ receivables}{Credit\ sales} \times 365\ days. \qquad (27)$$

It shows an average number of days taken by customers to pay. Normally, it is about up to 30 days. The longer period means potential cash flow problems due to the poor credit control of the company.

- *Inventory days:*

$$Inventory\ days = \frac{Average\ inventory}{Cost\ of\ sales} \times 365\ days. \qquad (28)$$

Average inventory is computed as $(Opening\ inventory - Closing\ inventory)/2$. It shows the number of days it takes to sell the inventory. The lower the value is, the more efficient the company's trade.

Questions for the seminar

1. Discuss conservative, moderate and aggressive policies used by companies when financing short-term and long-term assets. Which policy ensures minimum levels of inventories in order to minimize costs? Which one is applicable more when the company holds huge levels of inventories? Which one is typically riskier?

2. Explain the common signs of overtrading. What actions may be taken by the company to relieve the problem?

3. Explain the ways how a manufacturing company controls its working capital levels. How such measures effect its activity? Are these measures different for a service company or a retail company?

Tests

Determine whether the following statements are true or false. If true, explain why. If they are false, provide a counterexample.

1. Acquisition cost refers to the all-in cost to purchase an asset:
a) true;
b) false.

2. In the assets valuation, expenditures are wrapped in as operating costs rather than capital investments:
a) true;
b) false.

3. Costs incurred to maintain, repair or restore the asset to its original condition are added to its original cost:
a) true;
b) false.

4. Depreciation is the systematic expensing the asset cost over the time period while a company is benefiting from its usage:
a) true;
b) false.

5. Expensing fixed assets means finding out correct value of the assets on a particular date:
a) true;
b) false.

6. Fixed assets refer to short-term resources that are likely to be converted into cash within one year:

a) true;

b) false.

7. Functional depreciation happens due to the physical deterioration of an asset:

a) true;

b) false.

8. Improvements made after the purchase of fixed assets are added to its original cost:

a) true;

b) false.

9. Intangible assets don't physically exist, yet they have a monetary value since they represent potential revenue:

a) true;

b) false.

Choose one correct answer.

10. In a conservative policy of the firm's working capital financing, short-term funds are used to finance:

a) all fluctuating current assets and no permanent current assets;

b) all fluctuating current assets and a part of permanent current assets;

c) a part of fluctuating current assets and a part of permanent current assets;

d) a part of fluctuating current assets and no permanent current assets.

11. What policy of the firm's working capital financing is used when in order to finance all fluctuating current assets and some of the permanent current assets short-term funds are raised:

a) conservative policy;

b) moderate policy;

c) aggressive policy;

d) none of the above?

12. A company's current assets are less than its current liabilities. What happens to its working capital and its current ratio if the company issues new shares:

a) working capital increases; current ratio increases;

b) working capital remains constant; current ratio increases;

c) working capital remains constant; current ratio decreases;

d) working capital decreases; current ratio decreases?

Theme 7. Financial recourses (capital) of an enterprise

The purpose: to identify the essence, the principles of formation and the main features of the owner's and borrowed capital of an enterprise.

The main competence: the ability to form the financial capital structure of an enterprise.

Practical tasks

Task 1. Match possible sources of an enterprise's capital formation with their types. Some types may be presented with several sources of capital.

Sources
1. Account payables
2. Depreciation
3. Issue of bonds
4. Issue of shares
5. Long-term loan
6. Profit
7. Short-term loan
8. Statutory fund

Type
a) own (internal)
b) own (external)
c) borrowed

Task 2. Use the given data:
Cost of goods sold: $900 mln.
Interest expenses: $300 mln.
Net sales: $2 000 mln.
Operating expenses: $400 mln.
Taxes: $250 mln.
Calculate the following indicators for the company: gross, operating and net profits; gross profit, operating profit and net profit margins. Draw conclusions.

Task 3. Fixed costs of a company for the year are $10 000. Variable costs are $150 per unit. Price of 1 unit is $200.
1. Find the break-even point using the equation approach.
2. Find the break-even point using the contribution-margin approach (in units and sales $).
3. What is a safety margin (in units and sales $) if the company sells 500 units per year?
4. Draw a chart.

Task 4. A company produces a single article:

Unit price: ₴40.

Marginal cost per unit: ₴24.

Fixed cost per year: ₴16 000.

Calculate the contribution margin ratio and break-even sales. Find the sales volumes required to earn ₴2 000 of profit. What is the profit with sales of ₴60 000?

Calculate new break-even sales if price is decreased by 10 %.

Task 5. A company has a machine that can produce either product A or B. The cost data relating to machine A and B are as follows (Table 22).

Table 22

Initial data

Indicators	Product A	Product B
Selling price, ₴	20.00	30.00
Variable expenses, ₴ per unit	14.00	18.00

The capacity of the machine is 1 000 hours. In one hour, the machine can produce 3 units of A or 1 unit of B.

Which product should be produced?

Task 6. A company sells 10 000 product units at an average price of $50. The variable cost per unit is $12, while the total fixed costs are $100 000.

Determine its current operating leverage.

What happens to profit if the company increases its sales by 5 %?

How much should the company increase its sales to get a 10 % profit increase?

Task 7. A company produces and sells three product articles (A, B and C) (Table 23).

The company sells 5 units of C for every unit of A and 2 units of B for every unit of A. The company's fixed costs are $120 000 total.

Table 23

Initial data

Indicators	Product A	Product B	Product C
Selling price, $	100	120	50
Variable cost, $ per unit	60	90	40
Contribution margin, $ per unit	40	30	10
Contribution margin ratio, %	40	25	20

Find the multi-product break-even point in units and in dollars.

Task 8. A company sells 500 000 units of products per year. Each unit produced has a variable cost of $0.25 and sells for $0.45. Fixed operating costs of the company are $50 000.

The company has current interest charges of $6 000 and preferred dividends of $2 400. The corporate tax rate is 40 %.

Calculate the operating, financial and total leverages of the company.

What changes if it sells 750 000 units of products during a year.

Task 9. The company ABC is a manufacturing company. Now it has the following capital structure (Table 24). Its current stock is currently traded on a stock exchange at a market price of $27 per share. The company is subject to a tax rate of 40 %.

Table 24

Current capital of the company ABC

Indicators	Value, mln $
Long-term debt (8 %)	2.5
Common stock ($1 par)	0.1
Paid-in capital on common stock	0.4
Retained earnings	2

The company ABC is considering a new expansion strategy that includes building a new large factory in addition to the existing one and so increasing production volumes. This new factory will be highly automated, that's why it will require less workers than the current factory of similar capacity. This project requires $5 mln in new funds; the expected return on the new assets is 12 % p. a. before taxes.

There are two alternatives proposed to attract needed funds:

1) private placement of long-term debt at 10 % interest rate;

2) issuance of new common stock at $25 per share.

Calculate the anticipated rate of return on shareholders' equity if the project is financed by each of the alternatives.

How can these additional sources of finance change the capital structure of the company?

Task 10. The following extract from financial statements is available about the company A on the December 31, 20X1 (Tables 25, 26).

Table 25

A balance sheet extract (on December 31)

Item	Value, $
Assets	
Current	65 000
Plant and equipment	135 000
Total assets	200 000
Equities	
Debt 5 %	40 000
Common stock	100 000
Retained earnings	60 000
Total equities	200 000

Table 26

An income statement extract (for the year ended December 31)

Item	Value, $
Sales	600 000
Operating costs	538 000
Operating income	62 000
Interest charges	2 000
Net income before taxes	60 000
Income taxes	30 000
Net income	30 000

The company is deciding on launching a new product line. In order to do so it requires increased plant and equipment by 50 % from the present asset level. Two options are offered to raise $100 000 for the asset expansion financing:

1) issuing ten-year bonds at the rate of 12 %;

2) issuing new common stocks.

The investment bankers believe that the choice of the first option will change the capital structure of the company from one with 20 % debt to one with almost 50 % debt. Also, the estimated price-to-earnings ratio will be reduced from 12:1 to 10:1.

In case if the second option is chosen, the forecasts are as follows. The stock can be issued to yield $33,3. The estimated price-to-earnings ratio will remain 12:1. The present market price is $36.

Calculate the earnings per share and the market value of the stock for the two options assuming total sales (including the new product line) of: a) $400 000; b) $600 000; and c) $800 000. Costs exclusive of interest and taxes are about 90 % of sales.

Which option is better? Explain the criteria used to judge the options.

Would your answer change if a sales level of $1 200 000 or more could be achieved?

Guidelines to practical tasks in the topic

Leverage refers to a portion of the fixed costs which embodies a risk to the company.

Operating leverage measures an operating risk of the company and refers to the fixed operating costs reported in the income statement.

Financial leverage measures a financial risk and refers to financing a portion of the firm's assets at the expense of fixed financing charges with the purpose to improve returns on its shares. The higher the financial leverage, the higher the financial risk, and the higher the cost of capital.

The cost of capital rises as it values more to raise finance for risky projects.

A discussion of Break-Even Analysis or Cost-Volume-Profit Analysis is important to understand the operating leverage.

The *Break-Even Point* (BEP) shows the sales levels at which a company has no profit or loss. When calculating the BEP, costs are divided by:

- *variable costs (*directly changes regarding increase or decrease in the production volumes);
- *fixed costs (*constant regardless production volumes).

$$BEP\ is\ sales\ units = \frac{FC}{P - VC}, \tag{29}$$

where FC is fixed operating costs;

P is unit selling price;

VC is unit variable cost.

Operating leverage measures a company's operating risks and appears from its fixed operating costs. It indicates the effect of change in sales on earnings of the company.

$$Operating\ leverage\ at\ a\ given\ level\ of\ sales\ (X) =$$
$$= \frac{\%\ change\ in\ EBIT}{\%\ change\ in\ sales} = \frac{(P - VC) \times X}{(P - VC) \times X - FC}, \tag{30}$$

where X is a given level of sales in units.

Financial leverage measures a company's financial risks and appears from its fixed financial costs. It shows how earnings per share (EPS) are affected by a change in EBIT or operating income.

$$Financial\ leverage\ at\ a\ given\ level\ of\ sales\ (X) =$$
$$= \frac{\%\ change\ in\ EPS}{\%\ change\ in\ EBIT} = \frac{(P - VC) \times X - FC}{(P - VC) \times X - FC - IC}, \tag{31}$$

where IC is fixed finance charge (preferred stock dividends or interest expense).

Total leverage measures total risks of the company. It shows how earnings per share (EPS) are affected by a change in the company's sales.

$$Total\ leverage\ at\ a\ given\ level\ of\ sales\ (X) = \frac{\%\ change\ in\ EPS}{\%\ change\ in\ sales} =$$
$$= operating\ leverage \times financial\ leverage. \tag{32}$$

Questions for the seminar

1. Discuss the important factors that should be considered when making decisions on the capital structure.

2. Do you believe that profit-maximizing strategies always lead to wealth maximization? Discuss different points of view. How can this consideration affect the choice of the capital structure?

3. What are business and financial risks? How does each of them affect the capital structure decisions?

Test

Choose one correct answer.

1. Revenue received from the business's main activities is:

a) operating income;

b) non-operating income;

c) average income;

d) gross profit.

2. Money earned from a side activity that is unrelated to the business's day-to-day operations is:

a) operating income;

b) non-operating income;

c) average income;

d) gross profit.

3. Revenue per unit of output sold in the market is:

a) operating income;

b) non-operating income;

c) average income;

d) gross profit.

4. The sources from which a business generates money when selling goods or providing services are:

a) revenue model;

b) revenue streams;

c) business activities;

d) cost structure.

5. The profit remained with the company after reducing all direct costs like material, labor, overhead from sales revenue is:

a) gross profit;

b) net profit;

c) operating profit;

d) profit margin.

6. The ratio of net profits to revenues for an entity is:

a) net profit;

b) net profit margin;

c) contribution margin ratio;

d) safety margin.

7. The point in the volume of activity where the organization's revenues and expenses are equal is:

a) a break-even point;

b) net profit margin;

c) contribution margin ratio;

d) safety margin.

8. The difference between a company's sales and variable costs, expressed as a percentage is:

a) a break-even point;

b) net profit margin;

c) contribution margin ratio;

d) safety margin.

9. The difference between budgeted sales revenue and break-even sales revenue is:

a) a break-even point;

b) net profit margin;

c) contribution margin ratio;

d) safety margin.

10. The relationship between the company's sales revenue and its earnings before interest and taxes is:

a) operating leverage;

b) financial leverage;

c) total leverage;

d) capital leverage.

11. The relationship between the firm's earnings before interest and taxes and its common stock earnings per share is:

a) operating leverage;

b) financial leverage;

c) total leverage;

d) capital leverage.

12. The relationship between the firm's sales revenue and its common stock earnings per share is:

a) operating leverage;

b) financial leverage;

c) total leverage;

d) capital leverage.

Theme 8. Financial analysis and planning of an enterprise's activity

The purpose: to get knowledge and skills in analyzing the financial statements of the enterprise and draw conclusions.

The main competence: the ability to identify the main financial opportunities of the enterprise and threats to its activity for the future financial planning.

Practical tasks

Task 1. Match the following definitions with the respective financial ratios.

Definition
a) indicates how many times inventory is sold and restocked in a given period
b) indicates how many times receivables are collected in a given period
c) indicates how much net income was generated from each dollar in average assets invested
d) indicates how much net income was generated from each dollar of common shareholders' equity
e) indicates the amount of debt incurred for each dollar that owners provide
f) indicates the gross margin generated for each dollar in net sales
g) indicates the percentage of assets funded by creditors
h) indicates the profit generated for each dollar in net sales
i) indicates whether a company has sufficient current assets to cover current liabilities
j) indicates whether a company has sufficient quick assets to cover current liabilities

Financial ratio
1. Current ratio
2. Debt-to-asset ratio
3. Debt-to-equity ratio
4. Gross margin ratio
5. Inventory turnover ratio
6. Profit margin ratio
7. Quick ratio
8. Receivables turnover ratio
9. Return on assets
10. Return on equity

Task 2. Using financial statements of the company ABC (Tables 27, 28), conduct its analysis:

1. Fill in empty cells.
2. Prepare a horizontal (trend) analysis for its balance sheet.
3. Prepare a horizontal (trend) analysis for its income statement.
4. Prepare a vertical (common-size) analysis for the company's balance sheet.
5. Prepare a vertical (common-size) analysis for the company's income statemen.
6. Describe any significant changes from 20X1 to 20X2 identified in parts 2 – 5.
7. Calculate the following ratios:

- gross margin ratio;
- profit margin ratio;
- return on assets;
- return on common shareholders' equity;
- current ratio;
- quick ratio;
- receivables turnover ratio and average collection period;
- inventory turnover ratio and average sales period;
- debt-to-assets ratio;
- debt-to-equity ratio.

8. Describe the meaning of the obtained ratios (from question 7) for the company.

Table 27

Income statement of the company ABC
(for the year ended December 31)

Items	Amount, million UAH	
	20X2	20X1
1	2	3
Net sales	57 838	43 232
Cost of goods sold	26 575	
Gross margin		23 133
Selling and administrative expenses	22 814	15 026
Other operating expenses	117	
Operating income		8 044

Table 27 (the end)

1	2	3
Interest expense	903	
Other income (expense; net)	785	399
Income before taxes		8 046
Income tax expense	1 894	
Net income		5 946

Table 28

Income Statement of the company ABC (on December 31)

Items	Amount, million UAH	
	20X2	20X1
1	2	3
Assets		
Current assets		
Cash and cash equivalents	5 943	3 943
Marketable securities	426	192
Accounts receivable (net)	6 323	4 624
Merchandise inventory	3 372	2 618
Other current assets	1 505	1 194
Total current assets		
Noncurrent assets		
Property, plant and equipment (net)	19 058	12 671
Intangible assets	28 469	9 157
Other assets	3 057	5 449
Total noncurrent assets		
Total assets		
Liabilities and shareholders' equity		
Current liabilities		
Short-term obligations	4 898	464
Accounts payable and other liabilities	10 923	8 127
Income taxes payable	71	165
Total current liabilities		
Noncurrent liabilities		
Long-term debt	19 999	7 400
Other liabilities and deferred taxes	10 786	6 250
Total noncurrent liabilities		

Table 28 (the end)

1	2	3
Shareholders' equity		
Preferred stock	(109)	(104)
Common stock	4 558	280
Retained earnings	37 402	34 443
Accumulated income (loss)	(3 630)	(3 794)
Treasury stock	(16 745)	(13 383)
Total shareholders' equity		
Total liabilities and shareholders' equity		

Draw general conclusions about the financial positions of the company ABC.

Guidelines to practical tasks on the topic

Financial analysis is an evaluation of the company's financial performance and its prospects for the future. Typically, it involves an analysis of the financial statements of the company.

The financial statements of an enterprise cover the summarized data of its assets, liabilities, and equities (the balance sheet) and its revenues and expenses (the income statement).

The following instruments are typically applied to conduct financial analysis and develop plans: horizontal, vertical, and ratio analyses.

• *Horizontal (trend) analysis of financial statements* evaluates financial data over a period of time. The main purpose of this analysis is to identify changes.

Absolute changes in monetary units are calculated as follows:

$$Amount\ of\ change = Current\ year\ amount - Base\ year\ amount. \qquad (33)$$

Relative changes in percentage are calculated as follows:

$$Percent\ change = \frac{(Current\ year\ amount - Base\ year\ amount)}{Base\ year\ amount}. \qquad (34)$$

- *Vertical (common size) analysis of financial statements* converts each line of the financial statement data to an easily comparable, or common-size, amount measured as percent. The main purposes of this analysis are to compare information from one period to the next within a company and to evaluate a company relative to its competitors.

Common size amount for the income statement is calculated by the following formula:

$$Common\ size\ amount = \frac{Item\ amount}{Net\ sales}. \qquad (35)$$

Common size amount for the balance sheet is calculated as:

$$Common\ size\ amount = \\ = \frac{Item\ amount}{Total\ assets\ (or\ total\ liabilities\ and\ shareholders'\ equity)}. \qquad (36)$$

- *Ratio analysis of financial statements* provides deeper measurements of the company's profitability, short-term liquidity and long-term solvency.

Common financial ratios are summarized in Table 29.

Table 29

Financial ratios

Ratio	Description	Normative value	Interpretation
1	2	3	4
Profitability measures			
1 $$Gross\ margin\ ratio = \frac{Gross\ margin}{Net\ sales} = \\ = \frac{Net\ sales - Cost\ of\ goods\ sold}{Net\ sales}$$	Indicates how much profit a company retains after paying off its cost of goods sold	Higher – better; stable	Generally, the higher the ratio the better. A higher ratio indicates a higher level of financial funds available for current or future business needs
2 $$Profit\ margin\ ratio = \frac{Net\ income}{Net\ sales}$$	Indicates how much profit a company generated from its net sales	Higher – better	Generally, the higher the ratio the better. It depends on the industry and it's evaluated in dynamics or comparing with competitors. An increase compared to the previous period indicates an improvement in both operational efficiency and profitability. A margin higher than competitors' one or the industry average shows better performance of the particular business during the period. A decrease means a decline in performance and profitability levels. A lower margin compared to other refer to a lower performance level. A margin that stays the same means there is no improvement or decline in performance level
3 $$Return\ on\ assets\ (ROA) = \frac{Net\ income}{Average\ total\ assets}$$	Indicates how much net income was generated from each monetary unit invested in average assets	> 0 Higher – better	A higher ratio is more favorable to investors as it indicates more effective management of the company's assets to produce greater amounts of net income. A positive ratio usually indicates an upward profit trend as well
4 $$Return\ on\ common\ shareholders'\ equity\ (ROE) = \\ = \frac{Net\ income - Preferred\ dividends}{Average\ common\ shareholders'\ equity}$$	Indicates how much net income was generated from each monetary unit invested in common shareholders' equity	> 0 ROE > ROA	Higher return is more preferable to investors as it indicates that the company uses its investors' funds effectively. Higher ratios are almost always better than lower ratios
Short-term liquidity measures			
5 $$Current\ ratio = \frac{Current\ assets}{Current\ liabilities}$$	Indicates whether a company has sufficient funds to cover its short-term obligations	> 1	A higher ratio is always more favorable as it proves that the company can easier cover current debts. If CR $\geq$ 1, the company has adequate current assets to settle its current liabilities. If CR $\leq$ 1, the company has insufficient current assets to settle its current liabilities. However, if a current ratio is too high (> 2), it might indicate that the company is missing out on more beneficial opportunities. Instead of keeping current assets (which are idle), the company could have invested in more productive ones like long-term investments and fixed assets

Table 29 (the end)

	1	2	3	4
6	$$Quick\ ratio\ = \\ = \frac{Cash\ +\ Marketable\ securities\ +\ Short\text{-}term\ receivables}{Current\ liabilities}$$	Indicates whether a company can quickly convert liquid assets into cash to pay for its short-term obligations	> 0	A higher ratio is more favorable because it shows that there are more quick (more liquid) assets than current liabilities. If QR ≥ 1, the company could pay off its current liabilities without selling any long-term assets. If QR equals 2, the company has twice as many quick assets than current liabilities. An increasing ratio indicates the improving liquidity of the company
7	$$Receivables\ turnover\ ratio = \frac{Credit\ sales}{Average\ accounts\ receivable}$$	Indicates how many times receivables are collected in a given period	Dynamics stable or increased	A higher ratio is preferable as it indicates the company's efficiency to collect its receivables. A higher ratio means the company is collecting cash more frequently and/or has a good quality of debtors, which means the company has a better cash position (it can pay off its obligations sooner). At the same time, a high turnover ratio may also mean that the company transacts mainly in cash or has a strict credit policy. A lower ratio may indicate that either the company is less efficient in collecting, the creditor has a lenient credit policy or has a poor quality of debtors. Important to analyze in dynamics
8	$$Inventory\ turnover\ ratio = \frac{Cost\ of\ goods\ sold}{Average\ inventory}$$	Indicates how many times inventory is sold and restocked in a given period	Dynamics stable or increased	If it is very high, the company manages its inventory well, there are lesser holding costs and fewer chances of obsolescence. If it is lower, the company does not manage the inventory well. A risk of obsolescence. Important to analyze in dynamics and compare with competitors
Long-term solvency measures				
9	$$Debt\ to\ assets = \frac{Total\ liabilities}{Total\ assets}$$	Indicates the percentage of a business owned (funded) by creditors compared to its own shareholders	> 0.5 and < 1	If debt-to-assets > 0.5, the company is leveraged. If debt-to-assets equals 1, the company has the same amount of liabilities as it has assets. This company is highly leveraged. If debt-to-assets >1. the company has more liabilities than assets. This company is extremely leveraged and highly risky to invest in or lend to. If debt-to-assets ≤1. The company has more assets than liabilities and could pay off its obligations by selling its assets if needed. This is the least risky option
10	$$Debt\ to\ equity = \frac{Total\ liabilities}{Total\ shareholders'\ equity}$$	Indicates how much debt incurred compared to funds provided by owners	< 0.7	If debt-to-equity equals 0.5, there are half as many liabilities as there is equity. The assets are funded 2 : 1 by investors to creditors. If debt-to-equity equals 1, investors and creditors have an equal stake in the assets. A lower ratio usually means a more financially stable business. A higher ratio usually refers to companies more risky to creditors and investors

Questions for the seminar

1. What are firm's market value, book value and enterprise value? How and why are they different? Which (if any) is more accurate? Provide examples.

2. Explain the reasons why a net income of the company does not correspond to cash generated.

Test

1. What is a current ratio:
a) current assets divided by current liabilities;
b) current assets minus current liabilities;
c) the most recently computed ratio;
d) current liabilities divided by current assets?

2. If a company has total assets of 125 000 MU and total liabilities of 130 000 MU, what is its net worth:
a) the company has no net worth;
b) a net worth of 5 000 MU;
c) a net worth of −5 000 MU;
d) there is insufficient information?

3. Which of the following will not improve the current ratio:
a) borrowing short-term in order to finance additional fixed assets;
b) selling common stock to decrease current liabilities;
c) selling fixed assets in order to decrease accounts payable;
d) issuing long-term debt to purchase inventory?

4. Which of the following will not improve the current ratio:
a) borrowing short-term in order to finance additional fixed assets;
b) selling common stock to decrease current liabilities;
c) selling fixed assets in order to decrease accounts payable;
d) issuing long-term debt to purchase inventory?

5. When could the net profit margin decrease while gross profit margin is the same:
a) cost of goods sold increased compared to sales;
b) the government increased the tax rate;
c) sales increased compared to expenses;
d) dividends were decreased?

6. What does it mean for the company if its debt to equity ratio is 1.6 (while the industry average is 1.4):

a) there will be no difficulty with its creditors;

b) it has greater financial risk compared to other firms in the industry;

c) it will be considered as highly creditworthy;

d) it has less liquidity than other firms in the industry?

7. Which of the following can improve (decrease) the debt to assets ratio:

a) borrow more;

b) sell the stock;

c) shift short-term to long-term debt;

d) shift long-term to short-term debt?

8. For a profitable company, total sources of funds will always _____ total uses of funds:

a) be equal to;

b) be greater than;

c) be less that;

d) have no relationship to.

9. Generally, the _____ the gross profit margin the better:

a) higher;

b) lower;

c) more stable;

d) the answer depends on the industry.

10. A company can be called highly leveraged if its debt-to-assets ratio:

a) is more than 50 %;

b) equals 1;

c) is greater than 1;

d) is less than 1.

11. Which debt-to-equity ratio implies a more financially stable business:

a) 0.5;

b) 1;

c) lower;

d) higher?

Topics for essays

1. The Portfolio Theory in finance: the essence, the main representative(s), the importance.

2. The Capital Asset Pricing Model (CAPM) in finance: the essence, the main representative(s), the importance.

3. The Efficient Market Hypothesis in finance: the essence, the main representative(s), the importance.

4. The Option Pricing Theory (Black-Scholes Option Pricing Model) in finance: the essence, the main representative(s), the importance.

5. The Market Microstructure Theory in finance: the essence, the main representative(s), the importance.

6. The Saving and Investment Theory in finance: the essence, the main representative(s), the importance.

7. Corporate Finance Theory: the essence, the main representative(s), the importance.

8. Financial Intermediation Theory in finance: the essence, the main representative(s), the importance.

9. Management Information System Theory in finance: the essence, the main representative(s), the importance.

10. Representation of the circular flow model in a particular case (any modern issues).

11. The composition of the financial system of Ukraine: main participants, their roles and interactions, regulations.

12. Main financial policies and application of these policies.

13. Main financial tools and application of these tools.

14. Naturalistic Theory of Credit: the essence, the main representative(s), the importance.

15. Capital-based Theory of Credit: the essence, the main representative(s), the importance.

16. Depository institutions as financial intermediaries.

17. Contractual savings institutions as financial intermediaries.

18. Investment intermediaries.

19. Centralization and decentralization of the budgetary system.

20. Dealing with the budget deficit.

21. Methods of forming the company's capital.

22. Approaches to solving problems related to the enterprise's liquidity.

23. Approaches to solving problems related to the enterprise's solvency.

Recommended literature

Main

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4. Alexander J. Financial Planning & Analysis and Performance Management / Jack Alexander. – Hoboken, New Jersey : Wiley, 2018. – 640 p.

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9. SMIDA [Electronic resource]. – Access mode : https://www.smida.gov.ua.

Contents

ФІНАНСИ

Практикум
для студентів спеціальності 073 "Менеджмент"
освітньої програми "Бізнес-адміністрування"
першого (бакалаврського) рівня
(англ. мовою)

Самостійне електронне текстове мережеве видання

Укладачі: **Лепейко** Тетяна Іванівна
Канова Олександра Андріївна

Відповідальний за видання *Т. І. Лепейко*

Редактор *З. В. Зобова*

Коректор *З. В. Зобова*

Наведено практичні завдання, методичні рекомендації до них, питання для семінарських занять, тести та перелік тем для написання есе, які сприяють набуттю студентами практичних навичок із навчальної дисципліни.

Рекомендовано для студентів спеціальності 073 "Менеджмент" освітньої програми "Бізнес-адміністрування" першого (бакалаврського) рівня.