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Investment Analysis and Portfolio Management

Leonardo da Vinci programme project

**„Development and Approbation of Applied Courses
Based on the Transfer of Teaching Innovations
in Finance and Management for Further Education
of Entrepreneurs and Specialists in Latvia, Lithuania and Bulgaria"**

**Vytautas Magnus University
Kaunas, Lithuania**

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Introduction

Motivation for Developing the Course

      Research by the members of the project consortium Employers' Confederation of Latvia and Bulgarian Chamber of Commerce and Industry indicated the need for further education courses.

Innovative Content of the Course

      The course is developed to include the following innovative content:

- Key concepts of investment analysis and portfolio management which are explained from an applied perspective emphasizing the individual investors'decision making issues.
- Applied exercises and problems, which cover major topics such as quantitative methods of investment analysis and portfolio formation, stocks and bonds analysis and valuation for investment decision making, options pricing and using as investments, asset allocation, portfolio rebalancing, and portfolio performance measures.
- Summaries, Key-terms, Questions and problems are provided at the end of every chapter, which aid revision and control of knowledge acquisition during self-study;
- References for further readings and relevant websites for broadening knowledge and analyzing real investment environment are presented at the end of every chapter.

Innovative Teaching Methods of the Course

      The course is developed to utilize the following innovative teaching methods:

- Availability on the electronic platform with interactive learning and interactive evaluation methods;
- Active use of case studies and participant centered learning;
- Availability in modular form;
- Utilizing two forms of learning - self-study and tutorial consultations;
- Availability in several languages simultaneously.

Target Audience for the Course

      The target audience is: entrepreneurs, finance and management specialists from Latvia, Lithuania and Bulgaria.

The course assumes little prior applied knowledge in the area of finance.

The course is intended for 32 academic hours (2 credit points).

Course Objectives

Investment analysis and portfolio management course objective is to help entrepreneurs and practitioners to understand the investments field as it is currently understood and practiced for sound investment decisions making. Following this objective, key concepts are presented to provide an appreciation of the theory and practice of investments, focusing on investment portfolio formation and management issues. This course is designed to emphasize both theoretical and analytical aspects of investment decisions and deals with modern investment theoretical concepts and instruments. Both descriptive and quantitative materials on investing are presented.

Upon completion of this course the entrepreneurs shall be able:

- to describe and to analyze the investment environment, different types of investment vehicles;

- to understand and to explain the logic of investment process and the contents of its' each stage;

- to use the quantitative methods for investment decision making – to calculate risk and expected return of various investment tools and the investment portfolio;

- to distinguish concepts of portfolio theory and apply its' principals in the process of investment portfolio formation;

- to analyze and to evaluate relevance of stocks, bonds, options for the investments;

- to understand the psychological issues in investment decision making;

- to know active and passive investment strategies and to apply them in practice.

The structure of the course

The Course is structured in 8 chapters, covering both theoretical and analytical aspects of investment decisions:

1. Investment environment and investment process;
2. Quantitative methods of investment analysis;
3. Theory of investment portfolio formation;
4. Investment in stocks;

5. Investment in bonds;

6. Psychological aspects in investment decision making;

7. Using options as investments;

8. Portfolio management and evaluation.

Evaluation Methods

As has been mentioned before, every chapter of the course contains opportunities to test the knowledge of the audience, which are in the form of questions and more involved problems. The types of question include open ended questions as well as multiple choice questions. The problems usually involve calculations using quantitative tools of investment analysis, analysis of various types of securities, finding and discussing the alternatives for investment decision making.

Summary for the Course

The course provides the target audience with a broad knowledge on the key topics of investment analysis and management. Course emphasizes both theoretical and analytical aspects of investment decision making, analysis and evaluation of different corporate securities as investments, portfolio diversification and management. Special attention is given to the formulation of investment policy and strategy.

The course can be combined with other further professional education courses developed in the project.

1. Investment environment and investment management process

Mini-contents

1.1. Investing versus financing

The term 'investing" could be associated with the different activities, but the common target in these activities is to "employ" the money (funds) during the time period seeking to enhance the investor's wealth. Funds to be invested come from assets already owned, borrowed money and savings. By foregoing consumption today and investing their savings, investors expect to enhance their future consumption possibilities by increasing their wealth.

But it is useful to make a distinction between real and financial investments. Real investments generally involve some kind of tangible asset, such as land, machinery, factories, etc. Financial investments involve contracts in paper or electronic form such as stocks, bonds, etc. Following the objective as it presented in the introduction this course deals only with the financial investments because the key theoretical investment concepts and portfolio theory are based on these investments and allow to analyze investment process and investment management decision making in the substantially broader context

Some information presented in some chapters of this material developed for the investments course could be familiar for those who have studied other courses in finance, particularly corporate finance. Corporate finance typically covers such issues as capital structure, short-term and long-term financing, project analysis, current asset management. Capital structure addresses the question of what type of long-term financing is the best for the company under current and forecasted market conditions; project analysis is concerned with the determining whether a project should be undertaken. Current assets and current liabilities management addresses how to

manage the day-by-day cash flows of the firm. Corporate finance is also concerned with how to allocate the profit of the firm among shareholders (through the dividend payments), the government (through tax payments) and the firm itself (through retained earnings). But one of the most important questions for the company is financing. Modern firms raise money by issuing stocks and bonds. These securities are traded in the financial markets and the investors have possibility to buy or to sell securities issued by the companies. Thus, the investors and companies, searching for financing, realize their interest in the same place – in financial markets. Corporate finance area of studies and practice involves the interaction between firms and financial markets and Investments area of studies and practice involves the interaction between investors and financial markets. Investments field also differ from the corporate finance in using the relevant methods for research and decision making. Investment problems in many cases allow for a quantitative analysis and modeling approach and the qualitative methods together with quantitative methods are more often used analyzing corporate finance problems. The other very important difference is, that investment analysis for decision making can be based on the large data sets available form the financial markets, such as stock returns, thus, the mathematical statistics methods can be used.

But at the same time both Corporate Finance and Investments are built upon a common set of financial principles, such as the present value, the future value, the cost of capital). And very often investment and financing analysis for decision making use the same tools, but the interpretation of the results from this analysis for the investor and for the financier would be different. For example, when issuing the securities and selling them in the market the company perform valuation looking for the higher price and for the lower cost of capital, but the investor using valuation search for attractive securities with the lower price and the higher possible required rate of return on his/ her investments.

Together with the investment the term *speculation* is frequently used. Speculation can be described as investment too, but it is related with the short-term investment horizons and usually involves purchasing the salable securities with the hope that its price will increase rapidly, providing a quick profit. Speculators try to buy low and to sell high, their primary concern is with anticipating and profiting from market fluctuations. But as the fluctuations in the financial markets are and become

more and more unpredictable speculations are treated as the investments of highest risk. In contrast, an investment is based upon the analysis and its main goal is to promise safety of principle sum invested and to earn the satisfactory risk.

There are *two types of investors:*

> ➢   individual investors;
> ➢   Institutional investors.

Individual investors are individuals who are investing on their own. Sometimes individual investors are called *retail investors*. *Institutional investors* are entities such as investment companies, commercial banks, insurance companies, pension funds and other financial institutions. In recent years the process of institutionalization of investors can be observed. As the main reasons for this can be mentioned the fact, that institutional investors can achieve economies of scale, demographic pressure on social security, the changing role of banks.

One of important preconditions for successful investing both for individual and institutional investors is the favorable investment environment (see section 1.3).

Our focus in developing this course is on the management of individual investors' portfolios. But the basic principles of investment management are applicable both for individual and institutional investors.

1.2. Direct versus indirect investing

Investors can use direct or indirect type of investing. *Direct investing* is realized using financial markets and *indirect investing* involves financial intermediaries.

The primary difference between these two types of investing is that applying direct investing investors buy and sell financial assets and manage individual investment portfolio themselves. Consequently, investing directly through financial markets investors take all the risk and their successful investing depends on their understanding of financial markets, its fluctuations and on their abilities to analyze and to evaluate the investments and to manage their investment portfolio.

Contrary, using indirect type of investing investors are buying or selling financial instruments of financial intermediaries (financial institutions) which invest large pools of funds in the financial markets and hold portfolios. Indirect investing relieves investors from making decisions about their portfolio. As shareholders with the ownership interest in the portfolios managed by financial institutions (investment

companies, pension funds, insurance companies, commercial banks) the investors are entitled to their share of dividends, interest and capital gains generated and pay their share of the institution's expenses and portfolio management fee. The risk for investor using indirect investing is related more with the credibility of chosen institution and the professionalism of portfolio managers. In general, indirect investing is more related with the financial institutions which are primarily in the business of investing in and managing a portfolio of securities (various types of investment funds or investment companies, private pension funds). By pooling the funds of thousands of investors, those companies can offer them a variety of services, in addition to diversification, including professional management of their financial assets and liquidity.

Investors can "employ" their funds by performing direct transactions, bypassing both financial institutions and financial markets (for example, direct lending). But such transactions are very risky, if a large amount of money is transferred only to one's hands, following the well known American proverb "don't put all your eggs in one basket" (Cambridge Idioms Dictionary, 2nd ed. Cambridge University Press 2006). That turns to the necessity to diversify your investments. From the other side, direct transactions in the businesses are strictly limited by laws avoiding possibility of money laundering. All types of investing discussed above and their relationship with the alternatives of financing are presented in Table 1.1.

Table 1.1.

Types of investing and alternatives for financing

Types of investing in the economy	Alternatives for financing in the economy
Direct investing (through financial markets)	Raising equity capital or borrowing in financial markets
Indirect investing (through financial institutions)	Borrowing from financial institutions
Direct transactions	borrowing, partnership contracts

Companies can obtain necessary funds directly from the general public (those who have excess money to invest) by the use of the financial market, issuing and selling their securities. Alternatively, they can obtain funds indirectly from the general public by using financial intermediaries. And the intermediaries acquire funds by allowing the general public to maintain such investments as savings accounts, Certificates of deposit accounts and other similar vehicles.

1.3. Investment environment

Investment environment can be defined as the existing investment vehicles in the market available for investor and the places for transactions with these investment vehicles. Thus further in this subchapter the main types of investment vehicles and the types of financial markets will be presented and described.

1.3.1. Investment vehicles

As it was presented in 1.1, in this course we are focused to the financial investments that mean the object will be financial assets and the marketable securities in particular. But even if further in this course only the investments in financial assets are discussed, for deeper understanding the specifics of financial assets comparison of some important characteristics of investment in this type of assets with the investment in physical assets is presented.

Investment in financial assets differs from investment in physical assets in those important aspects:

• Financial assets are divisible, whereas most physical assets are not. An asset is *divisible* if investor can buy or sell small portion of it. In case of financial assets it means, that investor, for example, can buy or sell a small fraction of the whole company as investment object buying or selling a number of common stocks.

• *Marketability (or Liquidity)* is a characteristic of financial assets that is not shared by physical assets, which usually have low liquidity. Marketability (or liquidity) reflects the feasibility of converting of the asset into cash quickly and without affecting its price significantly. Most of financial assets are easy to buy or to sell in the financial markets.

• The planned holding period of financial assets can be much shorter than the holding period of most physical assets. *The holding period for investments is* defined as the time between signing a purchasing order for asset and selling the asset. Investors acquiring physical asset usually plan to hold it for a long period, but investing in financial assets, such as securities, even for some months or a year can be reasonable. Holding period for investing in financial assets vary in very wide interval and depends on the investor's goals and investment strategy.

- Information about financial assets is often more abundant and less costly to obtain, than information about physical assets. *Information availability* shows the real possibility of the investors to receive the necessary information which could influence their investment decisions and investment results. Since a big portion of information important for investors in such financial assets as stocks, bonds is publicly available, the impact of many disclosed factors having influence on value of these securities can be included in the analysis and the decisions made by investors.

Even if we analyze only financial investment there is a big variety of financial investment vehicles. The on going processes of globalization and integration open wider possibilities for the investors to invest into new investment vehicles which were unavailable for them some time ago because of the weak domestic financial systems and limited technologies for investment in global investment environment.

Financial innovations suggest for the investors the new choices of investment but at the same time make the investment process and investment decisions more complicated, because even if the investors have a wide range of alternatives to invest they can't forgot the key rule in investments: invest only in what you really understand. Thus the investor must understand how investment vehicles differ from each other and only then to pick those which best match his/her expectations.

The most important characteristics of investment vehicles on which bases the overall variety of investment vehicles can be assorted are the return on investment and the risk which is defined as the uncertainty about the actual return that will be earned on an investment (determination and measurement of returns on investments and risks will be examined in Chapter 2). Each type of investment vehicles could be characterized by certain level of profitability and risk because of the specifics of these financial instruments. Though all different types of investment vehicles can be compared using characteristics of risk and return and the most risky as well as less risky investment vehicles can be defined. However the risk and return on investment are close related and only using both important characteristics we can really understand the differences in investment vehicles.

The ***main types of financial investment vehicles*** are:
- Short term investment vehicles;
- Fixed-income securities;

- Common stock;
- Speculative investment vehicles;
- Other investment tools.

Short - term investment vehicles are all those which have a maturity of one year or less. Short term investment vehicles often are defined as money-market instruments, because they are traded in the money market which presents the financial market for short term (up to one year of maturity) marketable financial assets. The risk as well as the return on investments of short-term investment vehicles usually is lower than for other types of investments. The main *short term investment vehicles* are:

- Certificates of deposit;
- Treasury bills;
- Commercial paper;
- Bankers' acceptances;
- Repurchase agreements.

Certificate of deposit is debt instrument issued by bank that indicates a specified sum of money has been deposited at the issuing depository institution. Certificate of deposit bears a maturity date and specified interest rate and can be issued in any denomination. Most certificates of deposit cannot be traded and they incur penalties for early withdrawal. For large money-market investors financial institutions allow their large-denomination certificates of deposits to be traded as negotiable certificates of deposits.

Treasury bills (also called T-bills) are securities representing financial obligations of the government. Treasury bills have maturities of less than one year. They have the unique feature of being issued at a discount from their nominal value and the difference between nominal value and discount price is the only sum which is paid at the maturity for these short term securities because the interest is not paid in cash, only accrued. The other important feature of T-bills is that they are treated as risk-free securities ignoring inflation and default of a government, which was rare in developed countries, the T-bill will pay the fixed stated yield with certainty. But, of course, the yield on T-bills changes over time influenced by changes in overall macroeconomic situation. T-bills are issued on an auction basis. The issuer accepts competitive bids and allocates bills to those offering the highest prices. Non-competitive bid is an offer to purchase the bills at a price that equals the average of the

competitive bids. Bills can be traded before the maturity, while their market price is subject to change with changes in the rate of interest. But because of the early maturity dates of T-bills large interest changes are needed to move T-bills prices very far. Bills are thus regarded as high liquid assets.

Commercial paper is a name for short-term unsecured promissory notes issued by corporation. Commercial paper is a means of short-term borrowing by large corporations. Large, well-established corporations have found that borrowing directly from investors through commercial paper is cheaper than relying solely on bank loans. Commercial paper is issued either directly from the firm to the investor or through an intermediary. Commercial paper, like T-bills is issued at a discount. The most common maturity range of commercial paper is 30 to 60 days or less. Commercial paper is riskier than T-bills, because there is a larger risk that a corporation will default. Also, commercial paper is not easily bought and sold after it is issued, because the issues are relatively small compared with T-bills and hence their market is not liquid.

Banker's acceptances are the vehicles created to facilitate commercial trade transactions. These vehicles are called bankers acceptances because a bank accepts the responsibility to repay a loan to the holder of the vehicle in case the debtor fails to perform. Banker's acceptances are short-term fixed-income securities that are created by non-financial firm whose payment is guaranteed by a bank. This short-term loan contract typically has a higher interest rate than similar short –term securities to compensate for the default risk. Since bankers' acceptances are not standardized, there is no active trading of these securities.

Repurchase agreement (often referred to as a repo) is the sale of security with a commitment by the seller to buy the security back from the purchaser at a specified price at a designated future date. Basically, a repo is a collectivized short-term loan, where collateral is a security. The collateral in a repo may be a Treasury security, other money-market security. The difference between the purchase price and the sale price is the interest cost of the loan, from which repo rate can be calculated. Because of concern about default risk, the length of maturity of repo is usually very short. If the agreement is for a loan of funds for one day, it is called overnight repo; if the term of the agreement is for more than one day, it is called a term repo. A reverse repo is the opposite of a repo. In this transaction a corporation buys the securities with an

agreement to sell them at a specified price and time. Using repos helps to increase the liquidity in the money market.

Our focus in this course further will be not investment in short-term vehicles but it is useful for investor to know that short term investment vehicles provide the possibility for temporary investing of money/ funds and investors use these instruments managing their investment portfolio.

Fixed-income securities are those which return is fixed, up to some redemption date or indefinitely. The fixed amounts may be stated in money terms or indexed to some measure of the price level. This type of financial investments is presented by two different groups of securities:

- Long-term debt securities
- Preferred stocks.

Long-term debt securities can be described as long-term debt instruments representing the issuer's contractual obligation. Long term securities have maturity longer than 1 year. The buyer (investor) of these securities is landing money to the issuer, who undertake obligation periodically to pay interest on this loan and repay the principal at a stated maturity date. Long-term debt securities are traded in the capital markets. From the investor's point of view these securities can be treated as a "safe" asset. But in reality the safety of investment in fixed –income securities is strongly related with the default risk of an issuer. The major representatives of long-term debt securities are *bonds*, but today there are a big variety of different kinds of bonds, which differ not only by the different issuers (governments, municipals, companies, agencies, etc.), but by different schemes of interest payments which is a result of bringing financial innovations to the long-term debt securities market. As demand for borrowing the funds from the capital markets is growing the long-term debt securities today are prevailing in the global markets. And it is really become the challenge for investor to pick long-term debt securities relevant to his/ her investment expectations, including the safety of investment. We examine the different kinds of long-term debt securities and their features important to understand for the investor in Chapter 5, together with the other aspects in decision making investing in bonds.

Preferred stocks are equity security, which has infinitive life and pay dividends. But preferred stock is attributed to the type of fixed-income securities, because the dividend for preferred stock is fixed in amount and known in advance.

Though, this security provides for the investor the flow of income very similar to that of the bond. The main difference between preferred stocks and bonds is that for preferred stock the flows are for ever, if the stock is not callable. The preferred stockholders are paid after the debt securities holders but before the common stock holders in terms of priorities in payments of income and in case of liquidation of the company. If the issuer fails to pay the dividend in any year, the unpaid dividends will have to be paid if the issue is cumulative. If preferred stock is issued as noncumulative, dividends for the years with losses do not have to be paid. Usually same rights to vote in general meetings for preferred stockholders are suspended. Because of having the features attributed for both equity and fixed-income securities preferred stocks is known as hybrid security. A most preferred stock is issued as noncumulative and callable. In recent years the preferred stocks with option of convertibility to common stock are proliferating.

The common stock is the other type of investment vehicles which is one of most popular among investors with long-term horizon of their investments. Common stock represents the ownership interest of corporations or the equity of the stock holders. Holders of common stock are entitled to attend and vote at a general meeting of shareholders, to receive declared dividends and to receive their share of the residual assets, if any, if the corporation is bankrupt. The issuers of the common stock are the companies which seek to receive funds in the market and though are "going public". The issuing common stocks and selling them in the market enables the company to raise additional equity capital more easily when using other alternative sources. Thus many companies are issuing their common stocks which are traded in financial markets and investors have wide possibilities for choosing this type of securities for the investment. The questions important for investors for investment in common stock decision making will be discussed in Chapter 4.

Speculative investment vehicles following the term "speculation" (see p.8) could be defined as investments with a high risk and high investment return. Using these investment vehicles speculators try to buy low and to sell high, their primary concern is with anticipating and profiting from the expected market fluctuations. The only gain from such investments is the positive difference between selling and purchasing prices. Of course, using short-term investment strategies investors can use for speculations other investment vehicles, such as common stock, but here we try to

accentuate the specific types of investments which are more risky than other investment vehicles because of their nature related with more uncertainty about the changes influencing the their price in the future.

Speculative investment vehicles could be presented by these different vehicles:

- Options;
- Futures;
- Commodities, traded on the exchange (coffee, grain metals, other commodities);

Options are the *derivative financial instruments*. An options contract gives the owner of the contract the right, but not the obligation, to buy or to sell a financial asset at a specified price from or to another party. The buyer of the contract must pay a fee (option price) for the seller. There is a big uncertainty about if the buyer of the option will take the advantage of it and what option price would be relevant, as it depends not only on demand and supply in the options market, but on the changes in the other market where the financial asset included in the option contract are traded. Though, the option is a risky financial instrument for those investors who use it for speculations instead of hedging. The main aspects of using options for investment will be discussed in Chapter 7.

Futures are the other type of derivatives. A future contract is an agreement between two parties than they agree tom transact with the respect to some financial asset at a predetermined price at a specified future date. One party agree to buy the financial asset, the other agrees to sell the financial asset. It is very important, that in futures contract case both parties are obligated to perform and neither party charges the fee.

There are two types of people who deal with options (and futures) contracts: speculators and hedgers. Speculators buy and sell futures for the sole purpose of making a profit by closing out their positions at a price that is better than the initial price. Such people neither produce nor use the asset in the ordinary course of business. In contrary, hedgers buy and sell futures to offset an otherwise risky position in the market.

Transactions using derivatives instruments are not limited to financial assets. There are derivatives, involving different commodities (coffee, grain, precious metals,

and other commodities). But in this course the target is on derivatives where underlying asset is a financial asset.

> ***Other investment tools:***
> - Various types of investment funds;
> - Investment life insurance;
> - Pension funds;
> - Hedge funds.

Investment companies/ investment funds. They receive money from investors with the common objective of pooling the funds and then investing them in securities according to a stated set of investment objectives. Two types of funds:

> - open-end funds (mutual funds) ,
> - closed-end funds (trusts).

Open-end funds have no pre-determined amount of stocks outstanding and they can buy back or issue new shares at any point. Price of the share is not determined by demand, but by an estimate of the current market value of the fund's net assets per share (NAV) and a commission.

Closed-end funds are publicly traded investment companies that have issued a specified number of shares and can only issue additional shares through a new public issue. Pricing of closed-end funds is different from the pricing of open-end funds: the market price can differ from the NAV.

Insurance Companies are in the business of assuming the risks of adverse events (such as fires, accidents, etc.) in exchange for a flow of insurance premiums. Insurance companies are investing the accumulated funds in securities (treasury bonds, corporate stocks and bonds), real estate. Three types of Insurance Companies: life insurance; non-life insurance (also known as property-casualty insurance) and re-insurance. During recent years *investment life insurance* became very popular investment alternative for individual investors, because this hybrid investment product allows to buy the life insurance policy together with possibility to invest accumulated life insurance payments or lump sum for a long time selecting investment program relevant to investor's future expectations.

Pension Funds are an asset pools that accumulates over an employee's working years and pays retirement benefits during the employee's nonworking years. Pension

funds are investing the funds according to a stated set of investment objectives in securities (treasury bonds, corporate stocks and bonds), real estate.

Hedge funds are unregulated private investment partnerships, limited to institutions and high-net-worth individuals, which seek to exploit various market opportunities and thereby to earn larger returns than are ordinarily available. They require a substantial initial investment from investors and usually have some restrictions on how quickly investor can withdraw their funds. Hedge funds take concentrated speculative positions and can be very risky. It could be noted that originally, the term "hedge" made some sense when applied to these funds. They would by combining different types of investments, including derivatives, try to hedge risk while seeking higher return. But today the word "hedge' is misapplied to these funds because they generally take an aggressive strategies investing in stock, bond and other financial markets around the world and their level of risk is high.

1.3.2. Financial markets

Financial markets are the other important component of investment environment.

Financial markets are designed to allow corporations and governments to raise new funds and to allow investors to execute their buying and selling orders. In financial markets funds are channeled from those with the surplus, who buy securities, to those, with shortage, who issue new securities or sell existing securities. A financial market can be seen as a set of arrangements that allows trading among its participants.

Financial market provides three important economic functions (Frank J. Fabozzi, 1999):

1. Financial market determines the prices of assets traded through the interactions between buyers and sellers;

2. Financial market provides a liquidity of the financial assets;

3. Financial market reduces the cost of transactions by reducing explicit costs, such as money spent to advertise the desire to buy or to sell a financial asset.

Financial markets could be classified on the bases of those characteristics:

- Sequence of transactions for selling and buying securities;
- Term of circulation of financial assets traded in the market;
- Economic nature of securities, traded in the market;

- From the perspective of a given country.

By sequence of transactions for selling and buying securities:

➢ Primary market

➢ Secondary market

All securities are first traded in the primary market, and the secondary market provides liquidity for these securities.

Primary market is where corporate and government entities can raise capital and where the first transactions with the new issued securities are performed. If a company's share is traded in the primary market for the first time this is referred to as an initial public offering (IPO).

Investment banks play an important role in the primary market:

- Usually handle issues in the primary market;

- Among other things, act as underwriter of a new issue, guaranteeing the proceeds to the issuer.

Secondary market - where previously issued securities are traded among investors. Generally, individual investors do not have access to secondary markets. They use security brokers to act as intermediaries for them. The broker delivers an orders received form investors in securities to a market place, where these orders are executed. Finally, clearing and settlement processes ensure that both sides to these transactions honor their commitment. Types of brokers:

- Discount broker, who executes only trades in the secondary market;

- Full service broker, who provides a wide range of additional services to clients (ex., advice to buy or sell);

- Online broker is a brokerage firm that allows investors to execute trades electronically using Internet.

Types of secondary market places:

- Organized security exchanges;

- Over-the-counter markets;

- Alternative trading system.

An organized security exchange provides the facility for the members to trade securities, and only exchange members may trade there. The members include brokerage firms, which offer their services to individual investors, charging commissions for executing trades on their behalf. Other exchange members by or sell

for their own account, functioning as dealers or market makers who set prices at which they are willing to buy and sell for their own account. Exchanges play very important role in the modern economies by performing the following tasks:

- Supervision of trading to ensure fairness and efficiency;
- The authorization and regulation of market participants such as brokers and market makers;
- Creation of an environment in which securities' prices are formed efficiently and without distortion. This requires not only regulation of an orders and transaction costs but also a liquid market in which there are many buyers and sellers, allowing investors to buy or to sell their securities quickly;
- Organization of the clearing and settlement of transactions;
- The regulation of he admission of companies to be listed on the exchange and the regulation of companies who are listed on the exchange;
- The dissemination of information (trading data, prices and announcements of companies listed on the exchange). Investors are more willing to trade if prompt and complete information about trades and prices in the market is available.

The over-the-counter (OTC) market is not a formal exchange. It is organized network of brokers and dealers who negotiate sales of securities. There are no membership requirements and many brokers register as dealers on the OTC. At the same time there are no listing requirements and thousands of securities are traded in the OTC market. OTC stocks are usually considered as very risky because they are the stocks that are not considered large or stable enough to trade on the major exchange.

An alternative trading system (ATS) is an electronic trading mechanism developed independently from the established market places – security exchanges – and designed to match buyers and sellers of securities on an agency basis. The brokers who use ATS are acting on behalf of their clients and do not trade on their own account. The distinct advantages of ATS in comparison with traditional markets are cost savings of transactions, the short time of execution of transactions for liquid securities, extended hours for trading and anonymity, often important for investors, trading large amounts.

By term of circulation of financial assets traded in the market:

➢ Money market;

➢ Capital market

Money market - in which only short-term financial instruments are traded.

Capital market - in which only long-term financial instruments are traded. The capital markets allow firms, governments to finance spending in excess of their current incomes.

Table 1.2.

The comparison of money market and capital market

Features	Money market	Capital market
Term of circulation of securities traded	Short-term, less than 1 year	Long-term, more than 1 year
Level of risk	Low, because of trading short-term securities which have lower level of risk and high liquidity	Long-term securities, traded in this market, is more risky
Fund suppliers	Commercial banks, non-financial business institutions with the excess funds	Banks, insurance companies, pension funds, lending the large amounts of funds for a long-term period; investment funds with big pools of funds for investing
Financial instruments	Certificates of deposit; Treasury bills; Commercial paper; Bankers' acceptances; Repurchase agreements, other short-term investment vehicles	Common stocks; Preferred stocks; Treasury bonds; Municipal bonds; Corporate bonds; other long-term investment vehicles
Aims for raising money	For financing of working capital and current needs	For financing of further business development and investment projects

By economic nature of securities, traded in the market:

➢ Equity market or stock market;

➢ Common stock market;

➢ Fixed-income market;

➢ Debt market;

➢ Derivatives market.

From the perspective of a given country financial markets are:

➢ Internal or national market;

➢ External or international market.

The internal market can be split into two fractions: domestic market and foreign market. *Domestic market* is where the securities issued by domestic issuers (companies, Government) are traded. *A country's foreign market* is where the securities issued by foreign entities are traded.

The external market also is called *the international market* includes the securities which are issued at the same time to the investors in several countries and they are issued outside the jurisdiction of any single country (for example, offshore market).

Globalization and integration processes include the integration of financial markets into an international financial market. Because of the globalization of financial markets, potential issuers and investors in any country become not limited to their domestic financial market.

1.4. Investment management process

Investment management process is the process of managing money or funds. The investment management process describes how an investor should go about making decisions.

Investment management process can be disclosed by *five-step procedure*, which includes following stages:

1. Setting of investment policy.
2. Analysis and evaluation of investment vehicles.
3. Formation of diversified investment portfolio.
4. Portfolio revision
5. Measurement and evaluation of portfolio performance.

Setting of investment policy is the first and very important step in investment management process. *Investment policy* includes setting of investment objectives. The investment policy should have the specific objectives regarding the investment return requirement and risk tolerance of the investor. For example, the investment policy may define that the target of the investment average return should be 15 % and should avoid more than 10 % losses. Identifying investor's tolerance for risk is the most important objective, because it is obvious that every investor would like to earn the highest return possible. But because there is a positive relationship between risk and return, it is not appropriate for an investor to set his/ her investment objectives as just

"to make a lot of money". Investment objectives should be stated in terms of both risk and return.

The investment policy should also state other important constrains which could influence the investment management. Constrains can include any liquidity needs for the investor, projected investment horizon, as well as other unique needs and preferences of investor. The *investment horizon* is the period of time for investments. Projected time horizon may be short, long or even indefinite.

Setting of investment objectives for individual investors is based on the assessment of their current and future financial objectives. The required rate of return for investment depends on what sum today can be invested and how much investor needs to have at the end of the investment horizon. Wishing to earn higher income on his / her investments investor must assess the level of risk he /she should take and to decide if it is relevant for him or not. The investment policy can include the tax status of the investor. This stage of investment management concludes with the identification of the potential categories of financial assets for inclusion in the investment portfolio. The identification of the potential categories is based on the investment objectives, amount of investable funds, investment horizon and tax status of the investor. From the section 1.3.1 we could see that various financial assets by nature may be more or less risky and in general their ability to earn returns differs from one type to the other. As an example, for the investor with low tolerance of risk common stock will be not appropriate type of investment.

Analysis and evaluation of investment vehicles. When the investment policy is set up, investor's objectives defined and the potential categories of financial assets for inclusion in the investment portfolio identified, the available investment types can be analyzed. This step involves examining several relevant types of investment vehicles and the individual vehicles inside these groups. For example, if the common stock was identified as investment vehicle relevant for investor, the analysis will be concentrated to the common stock as an investment. The one purpose of such analysis and evaluation is to identify those investment vehicles that currently appear to be mispriced. There are many different approaches how to make such analysis. Most frequently two forms of analysis are used: technical analysis and fundamental analysis.

Technical analysis involves the analysis of market prices in an attempt to predict future price movements for the particular financial asset traded on the market.

This analysis examines the trends of historical prices and is based on the assumption that these trends or patterns repeat themselves in the future. Fundamental analysis in its simplest form is focused on the evaluation of intrinsic value of the financial asset. This valuation is based on the assumption that intrinsic value is the present value of future flows from particular investment. By comparison of the intrinsic value and market value of the financial assets those which are under priced or overpriced can be identified. Fundamental analysis will be examined in Chapter 4.

This step involves identifying those specific financial assets in which to invest and determining the proportions of these financial assets in the investment portfolio.

Formation of diversified investment portfolio is the next step in investment management process. *Investment portfolio* is the set of investment vehicles, formed by the investor seeking to realize its' defined investment objectives. In the stage of portfolio formation the issues of selectivity, timing and diversification need to be addressed by the investor. *Selectivity* refers to micro forecasting and focuses on forecasting price movements of individual assets. *Timing* involves macro forecasting of price movements of particular type of financial asset relative to fixed-income securities in general. *Diversification* involves forming the investor's portfolio for decreasing or limiting risk of investment. 2 techniques of diversification:

- *random diversification,* when several available financial assets are put to the portfolio at random;
- *objective diversification* when financial assets are selected to the portfolio following investment objectives and using appropriate techniques for analysis and evaluation of each financial asset.

Investment management theory is focused on issues of objective portfolio diversification and professional investors follow settled investment objectives then constructing and managing their portfolios.

Portfolio revision. This step of the investment management process concerns the periodic revision of the three previous stages. This is necessary, because over time investor with long-term investment horizon may change his / her investment objectives and this, in turn means that currently held investor's portfolio may no longer be optimal and even contradict with the new settled investment objectives. Investor should form the new portfolio by selling some assets in his portfolio and buying the

others that are not currently held. It could be the other reasons for revising a given portfolio: over time the prices of the assets change, meaning that some assets that were attractive at one time may be no longer be so. Thus investor should sell one asset ant buy the other more attractive in this time according to his/ her evaluation. The decisions to perform changes in revising portfolio depend, upon other things, in the transaction costs incurred in making these changes. For institutional investors portfolio revision is continuing and very important part of their activity. But individual investor managing portfolio must perform portfolio revision periodically as well. Periodic re-evaluation of the investment objectives and portfolios based on them is necessary, because financial markets change, tax laws and security regulations change, and other events alter stated investment goals.

Measurement and evaluation of portfolio performance. This the last step in investment management process involves determining periodically how the portfolio performed, in terms of not only the return earned, but also the risk of the portfolio. For evaluation of portfolio performance appropriate measures of return and risk and benchmarks are needed. *A benchmark* is the performance of predetermined set of assets, obtained for comparison purposes. The benchmark may be a popular index of appropriate assets – stock index, bond index. The benchmarks are widely used by institutional investors evaluating the performance of their portfolios.

It is important to point out that investment management process is continuing process influenced by changes in investment environment and changes in investor's attitudes as well. Market globalization offers investors new possibilities, but at the same time investment management become more and more complicated with growing uncertainty.

Summary

1. The common target of investment activities is to "employ" the money (funds) during the time period seeking to enhance the investor's wealth. By foregoing consumption today and investing their savings, investors expect to enhance their future consumption possibilities by increasing their wealth.

2. Corporate finance area of studies and practice involves the interaction between firms and financial markets and Investments area of studies and practice involves the interaction between investors and financial markets. Both Corporate Finance and Investments are built upon a common set of financial principles, such as the

present value, the future value, the cost of capital). And very often investment and financing analysis for decision making use the same tools, but the interpretation of the results from this analysis for the investor and for the financier would be different.

3. Direct investing is realized using financial markets and *indirect investing* involves financial intermediaries. The primary difference between these two types of investing is that applying direct investing investors buy and sell financial assets and manage individual investment portfolio themselves; contrary, using indirect type of investing investors are buying or selling financial instruments of financial intermediaries (financial institutions) which invest large pools of funds in the financial markets and hold portfolios. Indirect investing relieves investors from making decisions about their portfolio.

4. Investment environment can be defined as the existing investment vehicles in the market available for investor and the places for transactions with these investment vehicles.

5. The most important characteristics of investment vehicles on which bases the overall variety of investment vehicles can be assorted are the return on investment and the risk which is defined as the uncertainty about the actual return that will be earned on an investment. Each type of investment vehicles could be characterized by certain level of profitability and risk because of the specifics of these financial instruments. The main types of financial investment vehicles are: short- term investment vehicles; fixed-income securities; common stock; speculative investment vehicles; other investment tools.

6. Financial markets are designed to allow corporations and governments to raise new funds and to allow investors to execute their buying and selling orders. In financial markets funds are channeled from those with the surplus, who buy securities, to those, with shortage, who issue new securities or sell existing securities.

7. All securities are first traded in the primary market, and the secondary market provides liquidity for these securities. Primary market is where corporate and government entities can raise capital and where the first transactions with the new issued securities are performed. Secondary market - where previously issued securities are traded among investors. Generally, individual investors do not have

access to secondary markets. They use security brokers to act as intermediaries for them.

8. Financial market, in which only short-term financial instruments are traded, is Money market, and financial market in which only long-term financial instruments are traded is Capital market.

9. The investment management process describes how an investor should go about making decisions. Investment management process can be disclosed by five-step procedure, which includes following stages: (1) setting of investment policy; (2) analysis and evaluation of investment vehicles; (3) formation of diversified investment portfolio; (4) portfolio revision; (5) measurement and evaluation of portfolio performance.

10. Investment policy includes setting of investment objectives regarding the investment return requirement and risk tolerance of the investor. The other constrains which investment policy should include and which could influence the investment management are any liquidity needs, projected investment horizon and preferences of the investor.

11. Investment portfolio is the set of investment vehicles, formed by the investor seeking to realize its' defined investment objectives. Selectivity, timing and diversification are the most important issues in the investment portfolio formation. Selectivity refers to micro forecasting and focuses on forecasting price movements of individual assets. Timing involves macro forecasting of price movements of particular type of financial asset relative to fixed-income securities in general. Diversification involves forming the investor's portfolio for decreasing or limiting risk of investment.

Key-terms

- Alternative trading system (ATS)
- Broker
- Capital market
- Closed-end funds
- Common stock
- Debt securities
- Derivatives

- Direct investing
- Diversification
- Financial institutions
- Financial intermediaries
- Financial investments
- Financial markets
- Indirect investing
- Institutional investors

- Investment
- Investment environment
- Investment vehicles
- Investment management process
- Investment policy
- Investment horizon
- Investment management
- Investment funds
- Investment portfolio
- Investment life insurance
- Hedge funds
- Investment portfolio
- Long-term investments

- Money market
- Open-end funds
- Organized security exchange
- Over-the-counter (OTC) market
- Pension funds
- Primary market
- Preferred stock
- Real investments
- Secondary market
- Short-term investments
- Speculation
- Speculative investment

Questions and problems

1. Distinguish investment and speculation.
2. Explain the difference between direct and indirect investing.
3. How could you describe the investment environment?
4. Classify the following types of financial assets as long-term and short term:
    a) Repurchase agreements
    b) Treasury Bond
    c) Common stock
    d) Commercial paper
    e) Preferred Stock
    f) Certificate of Deposit
5. Comment the differences between investment in financial and physical assets using following characteristics:
    a) Divisibility
    b) Liquidity
    c) Holding period
    d) Information ability
6. Why preferred stock is called hybrid financial security?
7. Why Treasury bills considered being a risk free investment?

8. Describe how investment funds, pension funds and life insurance companies each act as financial intermediaries.

9. Distinguish closed-end funds and open-end funds.

10. How do you understand why word "hedge' currently is misapplied to hedge funds?

11. Explain the differences between

    a) Money market and capital market;

    b) Primary market and secondary market.

12. Why the role of the organized stock exchanges is important in the modern economies?

13. What factors might an individual investor take into account in determining his/ her investment policy?

14. Define the objective and the content of a five-step procedure.

15. What are the differences between technical and fundamental analysis?

16. Explain why the issues of selectivity, timing and diversification are important when forming the investment portfolio.

17. Think about your investment possibilities for 3 years holding period in real investment environment.

    a) What could be your investment objectives?

    b) What amount of funds you could invest for 3 years period?

    c) What investment vehicles could you use for investment? (What types of investment vehicles are available in your investment environment?)

    d) What type(-es) of investment vehicles would be relevant to you? Why?

    e) What factors would be critical for your investment decision making in this particular investment environment?

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Relevant websites

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- www.euronext.com   Euronext
- www.nasdaqomx.com   NASDAQ OMX
- www.world-exchanges.org   World Federation of Exchange
- www.hedgefund.net   Hedge Fund
- www.liffeinvestor.com   Information and learning tools from LIFFE to
                                  help the private investor
- www.amfi.com   Association of Mutual Funds Investors
- www.standardpoors.com   Standard &Poors Funds
- www.bloomberg.com/markets   Bloomberg

2. Quantitative methods of investment analysis

Mini-contents

3 basic questions for the investor in decision making:

1. How to compare different assets in investment selection process? What are the quantitative characteristics of the assets and how to measure them?

2. How does one asset in the same portfolio influence the other one in the same portfolio? And what could be the influence of this relationship to the investor's portfolio?

3. What is relationship between the returns on an asset and returns in the whole market (market portfolio)?

The answers of these questions need quantitative methods of analysis, based on the statistical concepts and they will be examined in this chapter.

2.1. Investment income and risk

A return is the ultimate objective for any investor. But a relationship between return and risk is a key concept in finance. As finance and investments areas are built upon a common set of financial principles, the main characteristics of any investment are investment return and risk. However to compare various alternatives of investments the precise quantitative measures for both of these characteristics are needed.

2.1.1. Return on investment and expected rate of return

General definition of return is the benefit associated with an investment. In most cases the investor can estimate his/ her historical return precisely.

Many investments have two components of their measurable return:

> ➢   a capital gain or loss;
>
> ➢   some form of income.

The rate of return is the percentage increase in returns associated with the holding period:

Rate of return = Income + Capital gains / Purchase price (%)   **(2.1)**

For example, rate of return of the share (r) will be estimated:

$$R = \frac{D + (P_{me} - P_{mb})}{P_{mb}} \ (\%) \tag{2.2}$$

Here   D -   dividends;

     P_{mb} - market price of stock at the beginning of holding period;

     P_{me} - market price of stock at the end of the holding period.

The rate of return, calculated in formulas 2.2 and 2.3 is called **holding period return,** because its calculation is independent of the passages of the time. All the investor knows is that there is a beginning of the investment period and an end. The percent calculated using this formula might have been earned over one month or other the year. Investor must be very careful with the interpretation of holding period returns in investment analysis. Investor can't compare the alternative investments using holding period returns, if their holding periods (investment periods) are different. Statistical data which can be used for the investment analysis and portfolio formation deals with a series of holding period returns. For example, investor knows monthly returns for a year of two stocks. How he/ she can compare these series of returns? In these cases **arithmetic average return** or **sample mean of the returns (ř)** can be used:

$$ř = \frac{\sum_{i=1}^{n} r_i}{n}, \tag{2.3}$$

here r_i - rate of return in period i;

     n - number of observations.

But both holding period returns and sample mean of returns are calculated using historical data. However what happened in the past for the investor is not as important as what happens in the future, because all the investors'decisions are focused to the future, or to expected results from the investments. Of course, no one investor knows the future, but he/ she can use past information and the historical data as well as to use his knowledge and practical experience to make some estimates about it. Analyzing each particular investment vehicle possibilities to earn income in the future investor must think about several „scenarios" of probable changes in macro economy, industry and company which could influence asset prices ant rate of return. Theoretically it could be a series of discrete possible rates of return in the future for the same asset with the different probabilities of earning the particular rate of return. But for the same asset the sum of all probabilities of these rates of returns must be equal to 1 or 100 %. In mathematical statistics it is called **simple probability distribution.**

The expected rate of return E(r) of investment is the statistical measure of return, which is the sum of all possible rates of returns for the same investment weighted by probabilities:

$$E(r) = \sum_{i=1}^{n} h_i \times r_i,$$ (2.4)

Here h_i - probability of rate of return;

   r_i - rate of return.

In all cases than investor has enough information for modeling of future scenarios of changes in rate of return for investment, the decisions should be based on estimated expected rate of return. But sometimes sample mean of return (arithmetic average return) are a useful proxy for the concept of expected rate of return. Sample mean can give an unbiased estimate of the expected value, but obviously it's not perfectly accurate, because based on the assumption that the returns in the future will be the same as in the past. But this is the only one scenario in estimating expected rate of return. It could be expected, that the accuracy of sample mean will increase, as the size of the sample becomes longer (if n will be increased). However, the assumption, that the underlying probability distribution does not change its shape for the longer period becomes more and more unrealistic. In general, the sample mean of returns should be taken for as long time, as investor is confident there has not been significant change in the shape of historical rate of return probability distribution.

2.1.2. Investment risk

Risk can be defined as a chance that the actual outcome from an investment will differ from the expected outcome. Obvious, that most investors are concerned that the actual outcome will be less than the expected outcome. The more variable the possible outcomes that can occur, the greater the risk. Risk is associated with the dispersion in the likely outcome. And dispersion refers to variability. So, the total risk of investments can be measured with such common absolute measures used in statistics as

- variance;
- standard deviation.

Variance can be calculated as a potential deviation of each possible investment rate of return from the expected rate of return:

$$\delta^2(r) = \sum_{i=1}^{n} h_i \times [\, r_i - E_{(r)} \,]^2 \qquad\qquad (2.5)$$

To compute the variance in formula 2.5 all the rates of returns which were observed in estimating expected rate of return (r_i) have to be taken together with their probabilities of appearance (h_i).

The other an equivalent to variance measure of the total risk is **standard deviation** which is calculated as the square root of the variance:

$$\delta(r) = \sqrt{\sum h_i \times [r_i - E_{(r)}]^2} \qquad\qquad (2.6)$$

In the cases than the arithmetic average return or sample mean of the returns (ř) is used instead of expected rate of return, *sample variance* ($\delta^2{}_r$) can be calculated:

$$\delta^2{}_r = \frac{\sum_{t=1}^{n} (r_t - \check{r})^2}{n-1} \qquad\qquad (2.7)$$

Sample standard deviation (δ_r) consequently can be calculated as the square root of the sample variance:

$$\delta_r = \sqrt{\delta^2{}_r} \qquad\qquad (2.8)$$

Variance and the standard deviation are similar measures of risk and can be used for the same purposes in investment analysis; however, standard deviation in practice is used more often.

Variance and standard deviation are used when investor is focused on estimating total risk that could be expected in the defined period in the future. Sample variance and sample standard deviation are more often used when investor evaluates total risk of his /her investments during historical period – this is important in investment portfolio management.

2.2. Relationship between risk and return

The expected rate of return and the variance or standard deviation provide investor with information about the nature of the probability distribution associated with a single asset. However all these numbers are only the characteristics of return and risk of the particular asset. But how does one asset having some specific trade-off between return and risk influence the other one with the different characteristics of return and risk in the same portfolio? And what could be the influence of this relationship to the investor's portfolio? The answers to these questions are of great importance for the investor when forming his/ her diversified portfolio. The statistics that can provide the investor with the information to answer these questions are covariance and correlation coefficient. Covariance and correlation are related and they generally measure the same phenomenon – the relationship between two variables. Both concepts are best understood by looking at the math behind them.

2.2.1. Covariance

Two methods of covariance estimation can be used: the sample covariance and the population covariance.

The sample covariance is estimated than the investor hasn't enough information about the underlying probability distributions for the returns of two assets and then the sample of historical returns is used.

Sample covariance between two assets - A and B is defined in the next formula (2.9):

n

$$Cov\ (\acute{r}_A,\ \acute{r}_B) = \frac{\sum\limits_{t=1}[(\ r_{A,t}\ -\ \acute{r}_A\ )\times(\ r_{B,t}\ -\ \acute{r}_B)]}{n-1},\qquad (2.9)$$

here $r_{A,t}$, $r_{B,t}$ - consequently, rate of return for assets A and B in the time period t, when t varies from 1 to n;

$\acute{r}_A$, $\acute{r}_B$ - sample mean of rate of returns for assets A and B consequently.

As can be understood from the formula, a number of sample covariance can range from "–" to "+" infinity. Though, the covariance number doesn't tell the investor much about the relationship between the returns on the two assets if only this pair of assets in the portfolio is analysed. It is difficult to conclud if the relationship between returns of two assets (A and B) is strong or weak, taking into account the absolute number of the sample variance. However, what is very important using the covariance for measuring relationship between two assets – the identification of the direction of this relationship. Positive number of covariance shows that rates of return of two assets are moving to the same direction: when return on asset A is above its mean of return (positive), the other asset B is tend to be the same (positive) and vice versa: when the rate of return of asset A is negative or bellow its mean of return, the returns of other asset tend to be negative too. Negative number of covariance shows that rates of return of two assets are moving in the contrariwise directions: when return on asset A is above its mean of return (positive), the returns of the other asset - B is tend to be the negative and vice versa. Though, in analyzing relationship between the assets in the same portfolio using covariance for portfolio formation it is important to identify which of the three possible outcomes exists:

➢ positive covariance ("+"),

➢ negative covariance ("-") or

➢ zero covariance ("0").

If the positive covariance between two assets is identified the common recommendation for the investor would be not to put both of these assets to the same portfolio, because their returns move in the same direction and the risk in portfolio will be not diversified.

If the negative covariance between the pair of assets is identified the common recommendation for the investor would be to include both of these assets to the

portfolio, because their returns move in the contrariwise directions and the risk in portfolio could be diversified or decreased.

If the zero covariance between two assets is identified it means that there is no relationship between the rates of return of two assets. The assets could be included in the same portfolio, but it is rare case in practice and usually covariance tends to be positive or negative.

For the investors using the sample covariance as one of the initial steps in analyzing potential assets to put in the portfolio the graphical method instead of analytical one (using formula 2.9) could be a good alternative. In figures 2.1, 2.2 and 2.3 the identification of positive, negative and zero covariances is demonstrated in graphical way. In all these figures the horizontal axis shows the rates of return on asset A and vertical axis shows the rates of return on asset B. When the sample mean of return for both assets is calculated from historical data given, the all area of possible historical rates of return can be divided into four sections (I, II, III and IV) on the basis of the mean returns of two assets ($\acute{r}_A$, $\acute{r}_B$ consequently). In I section both asset A and asset B have the positive rates of returns above their means of return; in section II the results are negative for asset A and positive for asset B; in section III the results of both assets are negative – below their meansof return and in section IV the results are positive for asset A and negative for asset B.

When the historical rates of return of two assets known for the investor are marked in the area formed by axes $\acute{r}_A$, $\acute{r}_B$, it is very easy to identify what kind of relationship between two assets exists simply by calculating the number of observations in each:

> ➢ if the number of observations in sections I and III prevails over the number of observations in sections II and IV, the covariance between two assets is positive ("+");

> ➢ if the number of observations in sections II and IV prevails over the number of observations in sections I and III, the covariance between two assets is negative("-");

> ➢ if the number of observations in sections I and III equals the number of observations in sections II and IV, there is the zero covariance between two assets ("0").
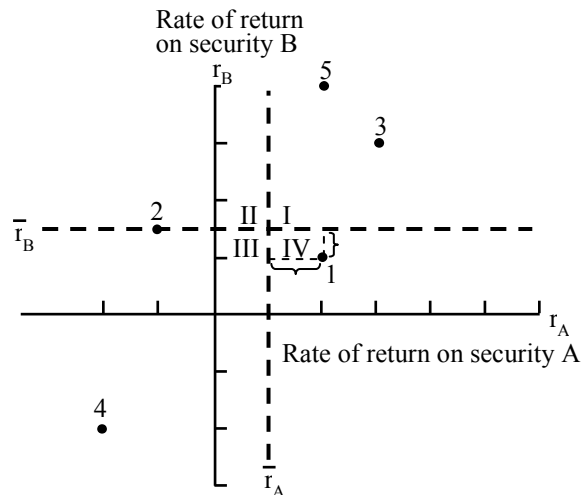
Figure 2.1. Relationship between two assets: positive covariance.
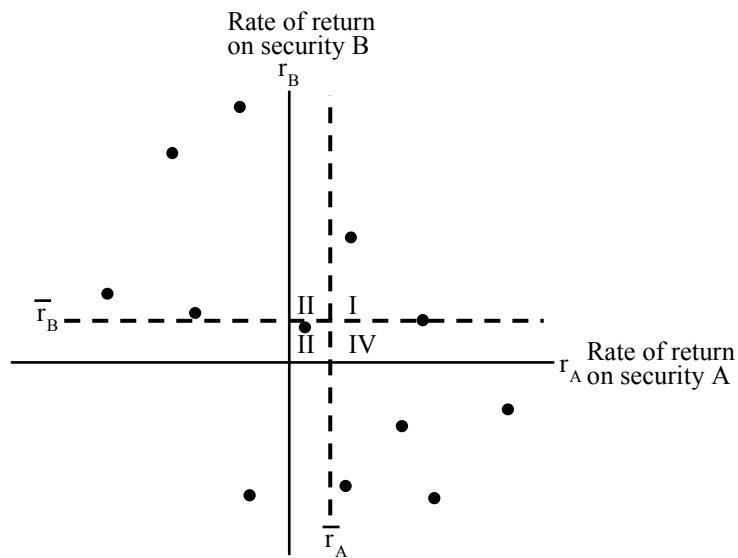
Figure 2.2. Relationship between two assets: negative covariance.
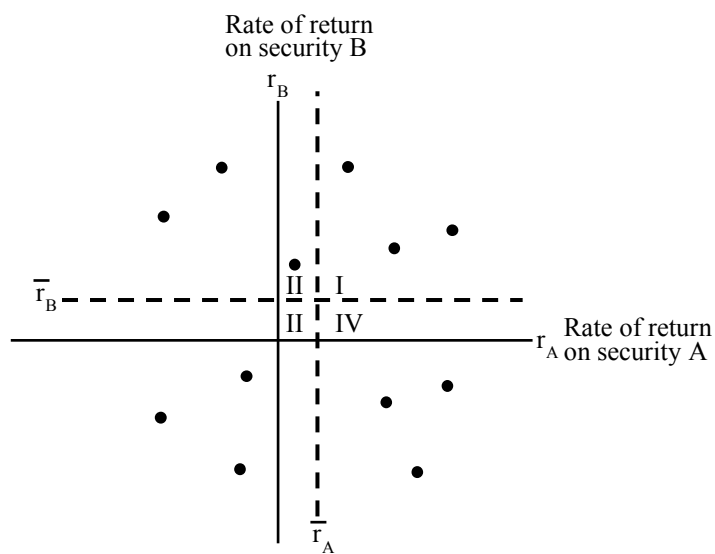
Figure 2.3. Relationship between two assets: zero covariance.

The population covariance is estimated when the investor has enough information about the underlying probability distributions for the returns of two assets and can identify the actual probabilities of various pairs of the returns for two assets at the same time.

The population covariance between stocks A and B:

$$Cov\ (r_A, r_B)\ =\ \sum_{i=1}^{m} h_i \times [r_{A,i} - E(r_A)\ ] \times [r_{B,i} - E(r_B)] \qquad (2.10)$$

Similar to using the sample covariance, in the population covariance case the graphical method can be used for the identification of the direction of the relationship between two assets. But the graphical presentation of data in this case is more complicated because three dimensions must be used (including the probability). Despite of it, if investor observes that more pairs of returns are in the sections I and III than in II and IV, the population covariance will be positive, if the pairs of return in II and IV prevails over I and III, the population covariance is negative.

2.2.2. Correlation and Coefficient of determination.

Correlation is the degree of relationship between two variables.

The correlation coefficient between two assets is closely related to their covariance. **The correlation coefficient between two assets A and B (k_{AB})** can be calculated using the next formula:

$$k_{A,B} = \frac{Cov(r_A, r_B)}{\delta\ (r_A) \times \delta(r_B)}, \qquad (2.11)$$

here $\delta\ (r_A)$ and $\delta(r_B)$ are standard deviation for asset A and B consequently.

Very important, that instead of covariance when the calculated number is unbounded, the correlation coefficient can range only from -1,0 to +1,0. The more close the absolute meaning of the correlation coefficient to 1,0, the stronger the relationship between the returns of two assets. Two variables are perfectly positively correlated if correlation coefficient is +1,0, that means that the returns of two assets have a perfect positive linear relationship to each other (see Fig. 2.4), and perfectly negatively correlated if correlation coefficient is -1,0, that means the asset returns have a perfect inverse linear relationship to each other (see Fig. 2.5). But most often correlation between assets returns is imperfect (see Fig. 2.6). When correlation coefficient equals 0, there is no linear relationship between the returns on the two

assets (see Fig. 2.7). Combining two assets with zero correlation with each other reduces the risk of the portfolio. While a zero correlation   between two assets returns is better than positive correlation, it does not provide the risk reduction results of a negative correlation coefficient.
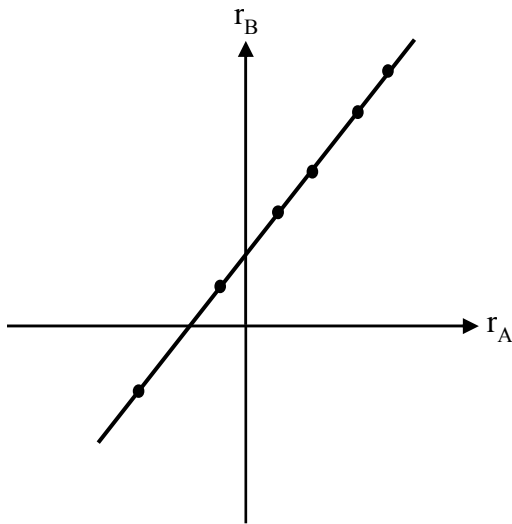
Fig. 2.4. Perfect positive correlation between returns of two   assets.
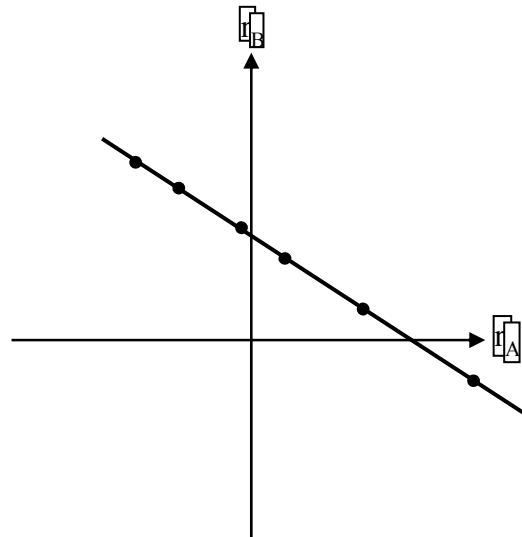
Fig. 2.5. Perfect negative correlation between returns of two assets.

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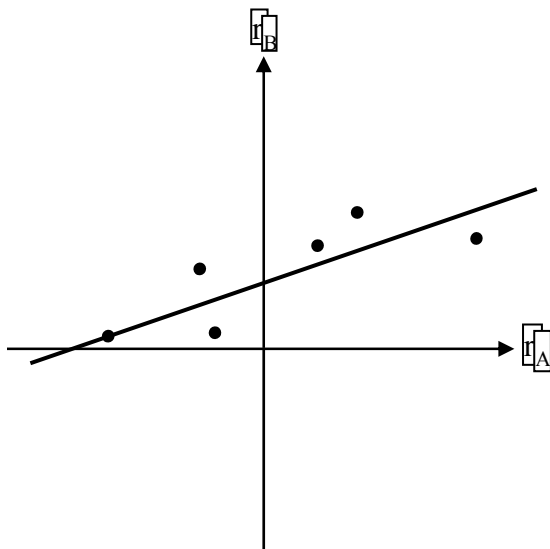
Fig. 2.6. Imperfect positive correlation between returns on two assets.
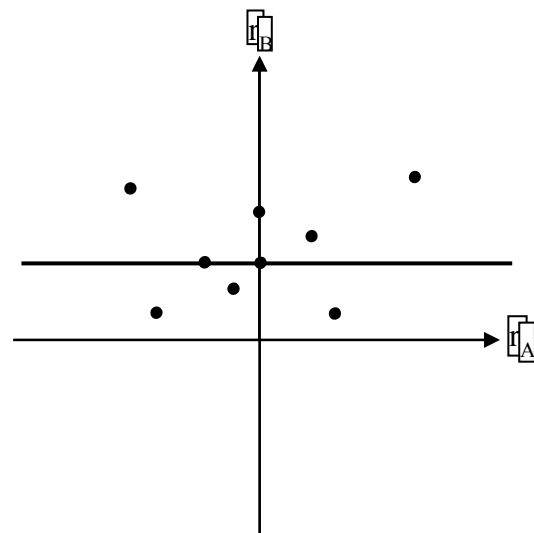
Fig. 2.7. Zero correlation between returns on two assets.

It can be useful to note, that when investor knows correlation coefficient, the covariance between stocks A and B can be estimated, because standard deviations of the assets' rates of return will already are available:

$$\mathbf{Cov(r_A, r_B)} \; = \; \mathbf{k_{A,B}} \; \times \delta(r_A) \times \delta(r_B) \qquad\qquad (2.12)$$

Therefore, as it was pointed out earlier, the covariance primarily provides information to the investor about whether the relationship between asset returns is positive, negative or zero, because simply observing the number itself without any context with which to compare the number, is not very useful. When the covariance is positive, the correlation coefficient will be also positive, when the covariance is negative, the correlation coefficient will be also negative. But using correlation coefficients instead of covariance investor can immediately asses the degree of relationship between assets returns.

The coefficient of determination **(Det.AB)** is calculated as the square of correlation coefficient:

$$\mathbf{Det._{A,\,B}} \; = \mathbf{k^2_{A,B}} \qquad\qquad (2.13)$$

The coefficient of determination shows how much variability in the returns of one asset can be associated with variability in the returns of the other. For example, if correlation coefficient between returns of two assets is estimated + 0,80, the coefficient of determination will be 0,64. The interpretation of this number for the investor is that approximately 64 percent of the variability in the returns of one asset can be explained by the returns of the other asset. If the returns on two assets are perfect correlated, the coefficient of determination will be equal to 100 %, and this means that in such a case if investor knows what will be the changes in returns of one asset he / she could predict exactly the return of the other asset.

2.3. Relationship between the returns on stock and market portfolio

When picking the relevant assets to the investment portfolio on the basis of their risk and return characteristics and the assessment of the relationship of their returns investor must consider to the fact that these assets are traded in the market. How could the changes in the market influence the returns of the assets in the investor's portfolio? What is the relationship between the returns on an asset and returns in the whole market (market portfolio)? These questions need to be answered

when investing in any investment environment. The statistics can be explored to answer these questions as well.

2.3.1. The characteristic line and the Beta factor

Before examining the relationship between a specific asset and the market portfolio the concept of "market portfolio" needs to be defined. Theoretical interpretation of the ***market portfolio*** is that it involves every single risky asset in the global economic system, and contains each asset in proportion to the total market value of that asset relative to the total value of all other assets (value weighted portfolio). But going from conceptual to practical approach - how to measure the return of the market portfolio in such a broad its understanding - the market index for this purpose can be used. Investors can think of the market portfolio as the ultimate market index. And if the investor following his/her investment policy makes the decision to invest, for example, only in stocks, the market portfolio practically can be presented by one of the available representative indexes in particular stock exchange.

The most often the relationship between the asset return and market portfolio return is demonstrated and examined using the common stocks as assets, but the same concept can be used analyzing bonds, or any other assets. With the given historical data about the returns on the particular common stock (r_J) and market index return (r_M) in the same periods of time investor can draw the stock's ***characteristic line*** (see Fig. 2.8.).
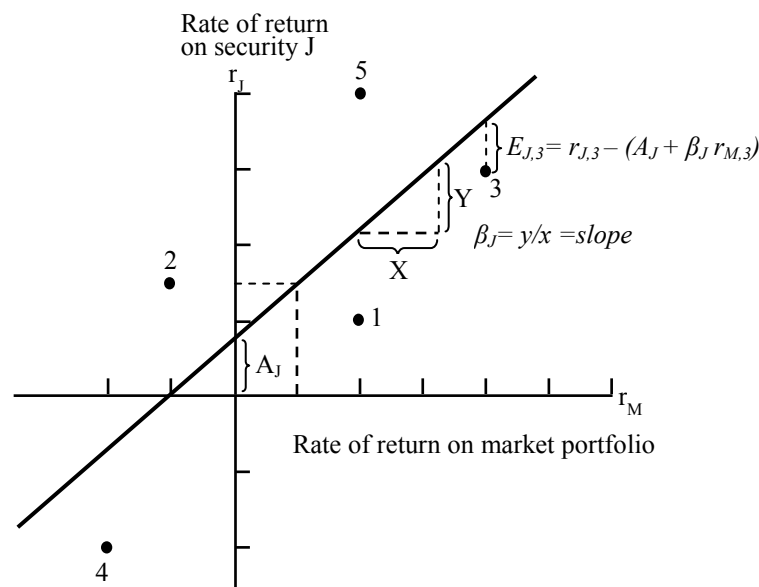
Figure 2.8. Stock's J characteristic line.

Stock's characteristic line:

> ➢ describes the relationship between the stock and the market;
>
> ➢ shows the return investor expect the stock to produce, given that a particular rate of return appears for the market;
>
> ➢ helps to assess the risk characteristics of one stock relative to the market.

Stock's characteristic line as a straight line can be described by its slope and by point in which it crosses the vertical axis - intercept (point A in Fig. 2.8.).

The slope of the characteristic line is called the ***Beta factor.*** Beta factor for the stock J and can be calculated using following formula:

$$\beta_J = \frac{Cov\,(r_J, r_M)}{\delta^2(r_M)}, \qquad\qquad (2.14)$$

here: $Cov(r_J, r_M)$ – covariance between returns of stock J and the market portfolio;

$\delta^2(r_M)$ - variance of returns on market portfolio.

The Beta factor of the stock is an indicator of the degree to which the stock reacts to the changes in the returns of the market portfolio. The Beta gives the answer to the investor how much the stock return will change when the market return will change by 1 percent. Further in Chapter 3 the use of Beta factor in developing capital asset pricing model will be discussed.

Intercept A_J (the point where characteristic line passes through the vertical axis) can be calculated using following formula:

$$A_J = r_J - \beta_J \times r_M, \qquad\qquad (2.15)$$

here: r_J - rate of return of stock J;

β_J - Beta factor for the stock J;

r_M - rate of return of the market.

The intercept technically is a convenient point for drawing a characteristic line. The interpretation of the intercept from the investor's point of view is that it shows what would be the rate of return of the stock, if the rate of return in the market is zero.

2.3.2. Residual variance

The characteristic line is a line-of-best-fit through some data points. A characteristic line is what in statistics is called as time-series regression line. But in

reality the stock produce returns that deviate from the characteristic line (see Fig. 2.8). In statistics this propensity is called the **residual variance.**

Residual variance is the variance in the stock's residuals and for the stock J can be calculated using formula:

$$\delta^2 \varepsilon,t = \frac{\sum_{t=1}^{n} \varepsilon^2_{J,t}}{n-2} \, , \qquad (2.15)$$

here $\varepsilon_{J,t}$ - residual of the stock J in period t;

      n - number of periods observed.

To calculate residual variance the residual in every period of observations must be identified. *Residual* is the vertical distance between the point which reflect the pair of returns (stock J and market) and the characteristic line of stock J. The **residual of the stock J** can be calculated:

$$\varepsilon_{J,t} = r_{J,t} - (A_J + \beta_J \times r_{M,t}) \qquad (2.16)$$
$$\qquad\quad c.1 \qquad\quad c.2$$

It is useful for the interpretation of residual to investor to accentuate two components in formula of residual (see 2.16):

- *Component 1* reflects the return actually generated by the stock J during period t;
- *Component 2* (in the bracket) represents investor's expectations for the stock's return, given its characteristic line and market's returns.

Note the difference *between the variance and the residual variance:*

➢ The variance describes the deviation of the asset returns from its expected value ;

➢ The residual variance describes the deviation of the asset returns from its characteristic line.

Summary

1. The main characteristics of any investment are investment return and risk. However to compare various alternatives of investments the precise quantitative measures for both of these characteristics are needed.

2. General definition of return is the benefit associated with an investment. Many investments have two components of their measurable return: (1) a capital gain or

loss; (2) some form of income. The holding period return is the percentage increase in returns associated with the holding period.

3. Investor can't compare the alternative investments using holding period returns, if their holding periods (investment periods) are different. In these cases arithmetic average return or sample mean of the returns can be used.

4. Both holding period returns and sample mean of returns are calculated using historical data. However all the investors' decisions are focused to the future, or to expected results from the investments. The expected rate of return of investment is the statistical measure of return, which is the sum of all possible rates of returns for the same investment weighted by probabilities.

5. Risk can be defined as a chance that the actual outcome from an investment will differ from the expected outcome. The total risk of investments can be measured with such common absolute measures used in statistics as variance and standard deviation. Variance can be calculated as a potential deviation of each possible investment rate of return from the expected rate of return. Standard deviation is calculated as the square root of the variance. The more variable the possible outcomes that can occur, the greater the risk.

6. In the cases than the arithmetic average return or sample mean of the returns is used instead of expected rate of return, sample variance and sample standard deviation is calculated.

7. Covariance and correlation coefficient are used to answer the question, what is the relationship between the returns on different assets. Covariance and correlation coefficient are related and they generally measure the same phenomenon – the relationship between two variables.

8. The sample covariance is estimated than the investor hasn't enough information about the underlying probability distributions for the returns of two assets and then the sample of historical returns is used. The population covariance is estimated when the investor has enough information about the underlying probability distributions for the returns of two assets and can identify the actual probabilities of various pairs of the returns for two assets at the same time.

9. Analyzing relationship between the assets in the same portfolio using covariance for portfolio formation it is important to identify which of the three possible outcomes exists: positive covariance, negative covariance or zero covariance. If the

positive covariance between two assets is identified the common recommendation for the investor would be not to put both of these assets to the same portfolio, because their returns move in the same direction and the risk in portfolio will be not diversified; if the negative - the common recommendation for the investor would be to include both of these assets to the portfolio, because their returns move in the contrariwise directions and the risk in portfolio could be diversified; if the zero covariance - it means that there is no relationship between the rates of return of two assets.

10. The correlation coefficient between two assets is closely related to their covariance. But instead of covariance when the calculated number is unbounded, the correlation coefficient can range only from -1,0 to +1,0. The more close the absolute meaning of the correlation coefficient to 1,0, the stronger the relationship between the returns of two assets. Using correlation coefficients instead of covariance investor can immediately asses the degree of relationship between assets returns.

11. The coefficient of determination is calculated as the square of correlation coefficient and shows how much variability in the returns of one asset can be associated with variability in the returns of the other.

12. Theoretical interpretation of the market portfolio is that it involves every single risky asset in the global economic system, and contains each asset in proportion to the total market value of that asset relative to the total value of all other assets (value weighted portfolio). Investors can think of the market portfolio as the ultimate market index.

13. Stock's characteristic line describes the relationship between the stock and the market, shows the return investor expect the stock to produce, given that a particular rate of return appears for the market and helps to assess the risk characteristics of one stock relative to the market.

14. The slope of the characteristic line is called the Beta factor. The Beta factor of the stock is an indicator of the degree to which the stock reacts to the changes in the returns of the market portfolio.

15. The intercept is the point where characteristic line passes through the vertical axis. The interpretation of the intercept from the investor's point of view is that it shows

what would be the rate of return of the stock, if the rate of return in the market is zero.

16. The residual variance describes the deviation of the asset returns from its characteristic line.

Key-terms

- Beta factor
- Characteristic line
- Coefficient of correlation
- Coefficient of determination
- Correlation
- Covariance
- Expected rate of return
- Holding period return
- Intercept
- Investment risk
- Market portfolio
- Population covariance

- Probability
- Residual
- Residual variance
- Return on investment
- Sample mean of return
- Sample standard deviation
- Sample covariance
- Sample variance
- Simple probability distribution
- Standard deviation
- Variance

Questions and problems

1. Comment why methods and tools of the statistics are so important in investment decision making.

2. Distinguish between historical returns and expected returns.

3. Define the components of holding period return. Can any of these components be negative?

4. When should the sample mean of return be used instead of expected rate of return?

5. What does a probability distribution describe?

6. What does covariance measure? If two assets are said to have positive covariance, what does it mean?

7. Explain, why doesn't an estimated absolute covariance number tell the investor much about the relationship between the returns on the two assets?

8. How do you understand an investment risk and what statistic tools can be used to measure it?

9. What is the interpretation of the coefficient of determination for the investor? If the coefficient of correlation for two securities is 0,7, what is the coefficient of determination?

10. Describe the Beta factor.

11. What does the characteristic line tells to investor? Why stock characteristic lines are different for the securities traded in the same market?

12. With which of stock's characteristic line definitions presented below you disagree?

   a) Stock's characteristic line describes the relationship between the stock and the market;

   b) Stock's characteristic line shows the return investor expect the stock to produce, given that a particular rate of return appears for the market;

   c) Stock's characteristic line describes the relationship between rate of return of any two different stocks in the market;

   d) I agree with all definitions presented above.

13. Refer to the following information on joint stock returns for stock 1, 2, and 3 in the table

Probability	Return for stock		
	Stock 1	Stock 2	Stock 3
0.20	0.20	0.25	0.10
0.30	-0.05	0.10	0.05
0.25	0.10	0.05	0
0.25	0	-0.10	-0.05

   If you must choose only two stocks to your investment portfolio, what would be your choise?

   a) stocks 1 and 2; b) stocks 1 and 3; c) stocks 2 and 3; d) other decision.

   Present your arguments and calculations, to explain your decision.

14. Refer to the following observations for stock A and the market portfolio in the table:

Month	Rate of return	
	Stock A	Market portfolio
1	0,30	0,12
2	0.24	0,08
3	-0,04	-0,10
4	0,10	-0,02
5	0,06	0,08
6	0,10	0,07

a) Calculate the main statistic measures to explain the relationship between stock A and the market portfolio:

- The sample covariance between rate of return for the stock A and the market;
- The sample Beta factor of stock A;
- The sample correlation coefficient between the rates of return of the stock A and the market;
- The sample coefficient of determination associated with the stock A and the market.

b) Draw in the characteristic line of the stock A and give the interpretation - what does it show for the investor?

c) Calculate the sample residual variance associated with stock's A characteristic line and explain how the investor would interpret the number of this statistic.

d) Do you recommend this stock for the investor with the lower tolerance of risk?

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3. Theory for investment portfolio formation

Mini-contents

3.1. Portfolio theory

3.1.1. Markowitz portfolio theory

The author of the modern portfolio theory is Harry Markowitz who introduced the analysis of the portfolios of investments in his article "Portfolio Selection" published in the Journal of Finance in 1952. The new approach presented in this article included portfolio formation by considering the expected rate of return and risk of individual stocks and, crucially, their interrelationship as measured by correlation. Prior to this investors would examine investments individually, build up portfolios of attractive stocks, and not consider how they related to each other. Markowitz showed how it might be possible to better of these simplistic portfolios by taking into account the correlation between the returns on these stocks.

The diversification plays a very important role in the modern portfolio theory. Markowitz approach is viewed as a single period approach: at the beginning of the period the investor must make a decision in what particular securities to invest and hold these securities until the end of the period. Because a portfolio is a collection of securities, this decision is equivalent to selecting an optimal portfolio from a set of possible portfolios. Essentiality of the *Markowitz portfolio theory is the problem of optimal portfolio selection.*

The method that should be used in selecting the most desirable portfolio involves the use of *indifference curves.* Indifference curves represent an investor's preferences for risk and return. These curves should be drawn, putting the investment return on the vertical axis and the risk on the horizontal axis. Following Markowitz approach, the

measure for investment return is expected rate of return and a measure of risk is standard deviation (these statistic measures we discussed in previous chapter, section 2.1). The exemplified map of indifference curves for the individual risk-averse investor is presented in Fig.3.1. Each indifference curve here (I_1, I_2, I3) represents the most desirable investment or investment portfolio for an individual investor. That means, that any of investments (or portfolios) ploted on the indiference curves (A,B,C or D) are equally desirable to the investor.

Features of indifference curves:

➢ All portfolios that lie on a given indifference curve are equally desirable to the investor. An implication of this feature: indifference curves cannot intersect.

➢ An investor has an infinitive number of indifference curves. Every investor can represent several indifference curves (for different investment tools). Every investor has a map of the indifference curves representing his or her preferences for expected returns and risk (standard deviations) for each potential portfolio.
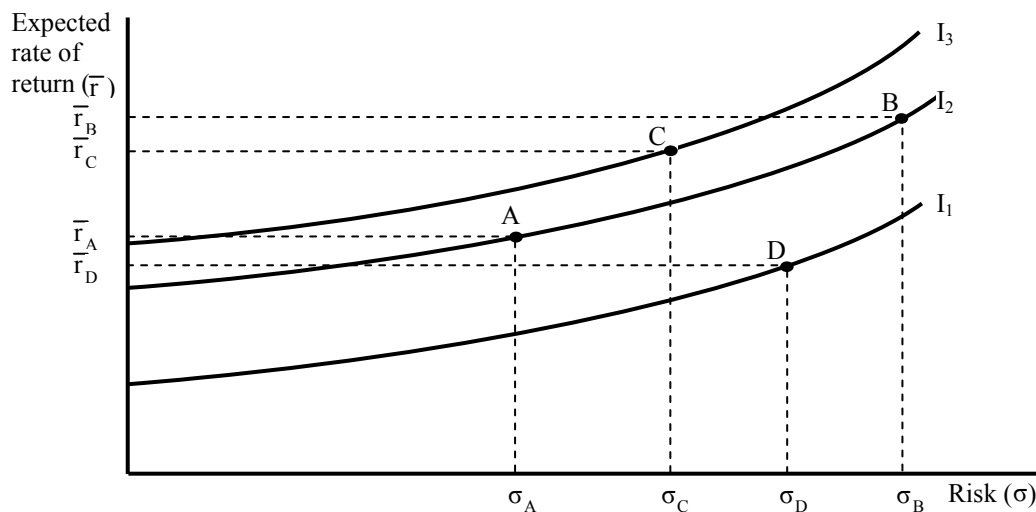
Fig. 3.1. Map of Indifference Curves for a Risk-Averse Investor

Two important fundamental assumptions than examining indifference curves and applying them to Markowitz portfolio theory:

1. The investors are assumed to prefer higher levels of return to lower levels of return, because the higher levels of return allow the investor to spend more on consumption at the end of the investment period. Thus, given two portfolios with the same standard deviation, the investor will choose the

portfolio with the higher expected return. This is called an ***assumption of nonsatiation.***

2. Investors are risk averse. It means that the investor when given the choise, will choose the investment or investment portfolio with the smaller risk. This is called ***assumption of risk aversion.***
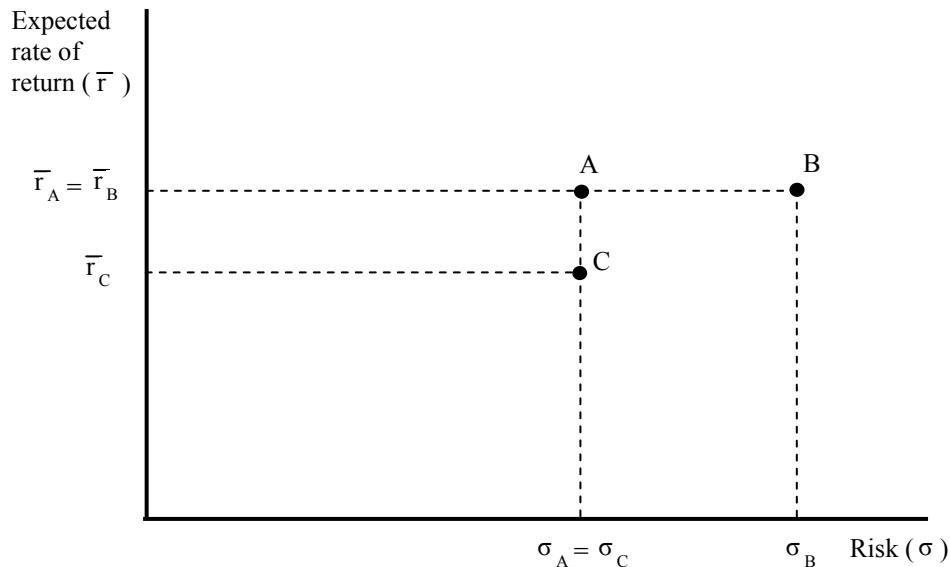
Fig. 3.2. Portfolio choise using the assumptions of nonsatiation and risk aversion

Fig. 3.2. gives an example how the investor chooses between 3 investments – A,B and C. Following the assumption of nonsatiation, investor will choose A or B which have the higher level of expected return than C. Following the assumption of risk aversion investor will choose A, despite of the same level of expected returns for investment A and B, because the risk (standard deviation) for investment A is lower than for investment B. In this choise the investor follows so called „furthest northwest" rule.

In reality there are an infinitive number of portfolios available for the investment. Is it means that the investor needs to evaluate all these portfolios on return and risk basis? Markowitz portfolio theory answers this question using ***efficient set theorem:*** *an investor will choose his/ her optimal portfolio from the set of the portfolios that (1) offer maximum expected return for varying level of risk, and (2) offer minimum risk for varying levels of expected return.*

Efficient set of portfolios involves the portfolios that the investor will find optimal ones. These portfolios are lying on the "northwest boundary" of the feasible set and is called an ***efficient frontier.*** The efficient frontier can be described by the

curve in the risk-return space with the highest expected rates of return for each level of risk.

Feasible set is opportunity set, from which the efficient set of portfolio can be identified. The feasibility set represents all portfolios that could be formed from the number of securities and lie either or or within the boundary of the feasible set.

In Fig.3.3 feasible and efficient sets of portfolios are presented. Considering the assumptions of nonsiation and risk aversion discussed earlier in this section, only those portfolios lying between points A and B on the boundary of feasibility set investor will find the optimal ones. All the other portfolios in the feasible set are are inefficient portfolios. Furthermore, if a risk-free investment is introduced into the universe of assets, the efficient frontier becomes the tagental line shown in Fig. 3.3 this line is called the *Capital Market Line (CML)* and the portfolio at the point at which it is tangential (point M) is called the *Market Portolio.*
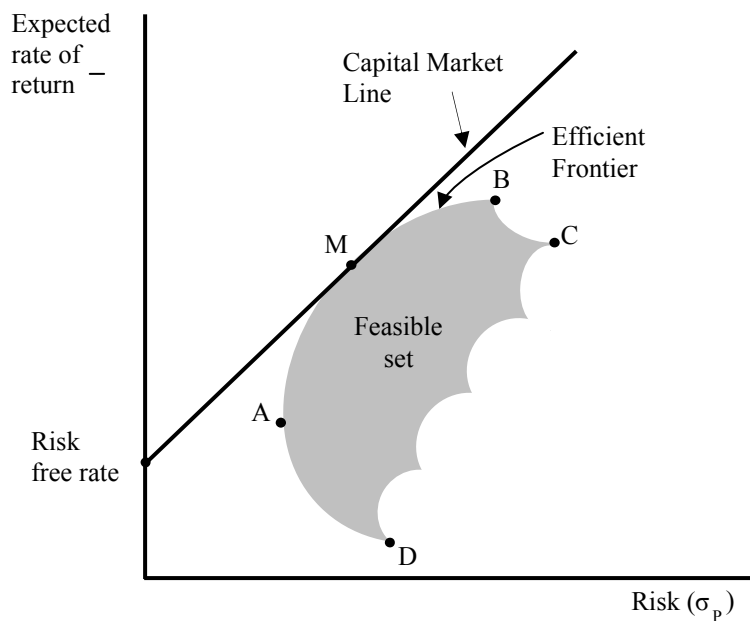
Fig.3.3. Feasible Set and   Efficient Set of Portfolios (Efficient Frontier)

3.1.2. The Expected Rate of Return and Risk of Portfolio

Following Markowitz efficient set portfolios approach an investor should evaluate alternative portfolios inside feasibility set on the basis of their expected returns and standard deviations using indifference curves. Thus, the methods for calculating expected rate of return and standard deviation of the portfolio must be discussed.

The expected rate of return of the portfolio can be calculated in some alternative ways. The Markowitz focus was on the end-of-period wealth (terminal value) and using these expected end-of-period values for each security in the portfolio the expected end-of-period return for the whole portfolio can be calculated. But the portfolio really is the set of the securities thus the expected rate of return of a portfolio should depend on the expected rates of return of each security included in the portfolio (as was presented in Chapter 2, formula 2.4). This alternative method for calculating **the expected rate of return on the portfolio ($E_{(r)p}$)** is the weighted average of the expected returns on its component securities:

$$E_{(r)p} = \sum_{i=1}^{n} w_i * E_i(r) = E_1(r) + w_2 * E_2(r) + \ldots + w_n * E_n(r), \qquad (3.1)$$

here w_i - the proportion of the portfolio's initial value invested in security i;

$E_i(r)$ - the expected rate of return of security I;

n   -   the number of securities in the portfolio.

Because a portfolio's expected return is a weighted average of the expected returns of its securities, the contribution of each security to the portfolio's expected rate of return depends on its expected return and its proportional share from the initial portfolio's market value (weight). Nothing else is relevant. The conclusion here could be that the investor who simply wants the highest posible expected rate of return must keep only one security in his portfolio which has a highest expected rate of return. But why the majority of investors don't do so and keep several different securities in their portfolios? Because they try to diversify their portfolios aiming to reduce the investment portfolio risk.

Risk of the portfolio. As we know from chapter 2, the most often used measure for the risk of investment is standard deviation, which shows the volatility of the securities actual return from their expected return. If a portfolio's expected rate of return is a weighted average of the expected rates of return of its securities, the calculation of standard deviation for the portfolio can't simply use the same approach. The reason is that the relationship between the securities in the same portfolio must be taken into account. As it was discussed in section 2.2, the relationship between the assets can be estimated using the covariance and coefficient of correlation. As covariance can range from "−" to "+" infinity, it is more useful for identification of the direction of relationship (positive or negative), coefficients of correlation always

lies between -1 and +1 and is the convenient measure of intensity and direction of the relationship between the assets.

Risk of the portfolio, which consists of 2 securities (A ir B):

$$\delta_P = \left(w^2_A \times \delta^2_A + w^2_B \times \delta^2_B + 2\, w_A \times w_B \times k_{AB} \times \delta_A \times \delta_B\right)^{1/2}, \qquad (3.2)$$

here: w_A ir w_B - the proportion of the portfolio's initial value invested in security A

and B ($wA + wB = 1$);

δ_A ir δ_B -   standard deviation of security A and B;

k_{AB} - coefficient of coreliation between the returns of security A and B.

Standard deviation of the portfolio consisting n securities:

$$\delta = \left(\sum_{i=1}^{n}\sum_{j=1}^{n} w_i\, w_j\, k_{ij}\, \delta_i\, \delta_j\right)^{1/2}, \qquad (3.3)$$

here: w_i ir w_j - the proportion of the portfolio's initial value invested in security i

and j ($wi + wj = 1$);

δ_i ir δ_j -   standard deviation of security i and j;

k_{ij} -   coefficient of coreliation between the returns of security i and j.

3.2. Capital Asset Pricing Model (CAPM)

CAPM was developed by W. F. Sharpe. CAPM simplified Markowitz's Modern Portfolio theory, made it more practical. Markowitz showed that for a given level of expected return and for a given feasible set of securities, finding the optimal portfolio with the lowest total risk, measured as variance or standard deviation of portfolio returns, requires knowledge of the covariance or correlation between all possible security combinations (see formula 3.3). When forming the diversified portfolios consisting large number of securities investors found the calculation of the portfolio risk using standard deviation technically complicated.

Measuring Risk in CAPM is based on the identification of two key components of total risk (as measured by variance or standard deviation of return):

➢   *Systematic risk*

➢   *Unsystematic risk*

Systematic risk *is that associated with the market (purchasing power risk, interest rate risk, liquidity risk, etc.)*

Unsystematic risk is unique to an individual asset (business risk, financial risk, other risks, related to investment into particular asset).

Unsystematic risk can be diversified away by holding many different assets in the portfolio, however systematic risk can't be diversified (see Fig 3.4). In CAPM investors are compensated for taking only systematic risk. Though, CAPM only links investments via the market as a whole.
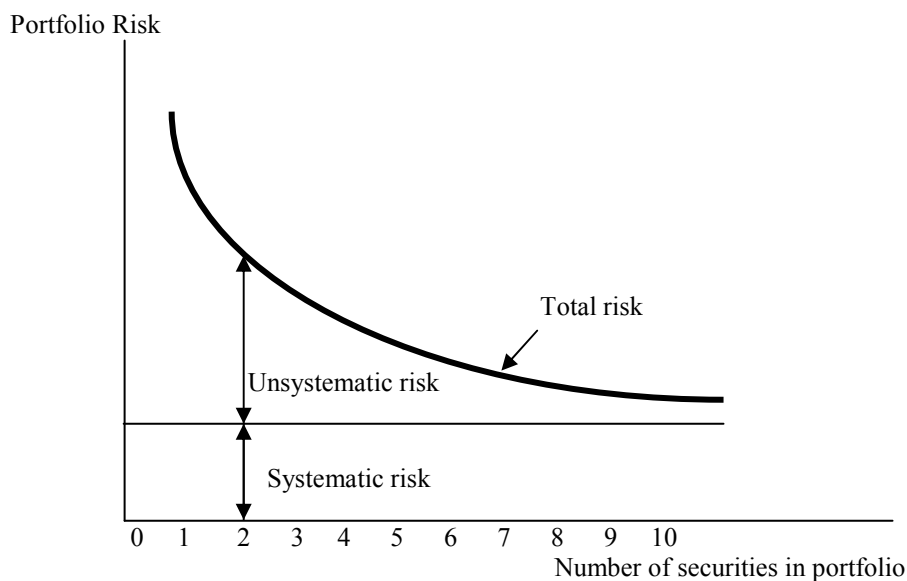
Fig.3.4. Portfolio risk and the level of diversification

The essence of the CAPM: the more systematic risk the investor carry, the greater is his / her expected return.

The CAPM being theoretical model is based on some important assumptions:

• All investors look only one-period expectations about the future;

• Investors are price takers and they cant influence the market individually;

• There is risk free rate at which an investors may either lend (invest) or borrow money.

• Investors are risk-averse,

• Taxes and transaction costs are irrelevant.

• Information is freely and instantly available to all investors.

Following these assumptions, the ***CAPM predicts what an expected rate of return for the investor should be, given other statistics about the expected rate of return in the market and market risk (systematic risk):***

$$E(r_j) = R_f + \beta_{(j)} * (E(r_M) - R_f), \tag{3.4}$$

here: $E(r_j)$ -   expected return on stock j;

       R_f -   risk free rate of return;

       $E(r_M)$ -   expected rate of return on the market

       $\beta_{(j)}$ -   coefficient Beta, measuring undiversified risk of security j.

Several of the assumptions of CAPM seem unrealistic. Investors really are concerned about taxes and are paying the commisions to the broker when bying or selling their securities. And the investors usually do look ahead more than one period. Large institutional investors managing their portfolios sometimes can influence market by bying or selling big ammounts of the securities. All things considered, the assumptions of the CAPM constitute only a modest gap between the thory and reality. But the empirical studies and especially wide use of the CAPM by practitioners show that it is useful instrument for investment analysis and decision making in reality.

As can be seen in Fig.3.5, Equation in formula 3.4 represents the straight line having an intercept of R_f and slope of $\beta_{(j)} * (E(r_M) - R_f)$. This relationship between the expected return and Beta is known as Security Market Line (SML). Each security can be described by its specific security market line, they differ because their Betas are different and reflect different levels of market risk for these securities.
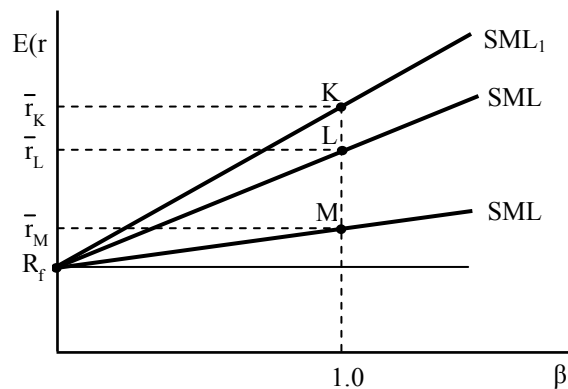
Fig.3.5. Security Market Line (SML)

Coefficient Beta (β). Each security has it's individual systematic - undiversified risk, measured using coefficient Beta. Coefficient Beta (β) indicates how the price of security/ return on security depends upon the market forces (note: CAPM uses the statistic measures which we examined in section 2.3, including Beta factor). Thus, coefficient Beta for any security can be calculated using formula 2.14:

$$\beta_J = \frac{Cov(r_J, r_M)}{\delta^2(r_M)}$$

Table 3.1

Interpretation of coefficient Beta (β)

Beta	Direction of changes in security's return in comparison to the changes in market's return	Interpretation of β meaning
2,0	The same as market	Risk of security is twice higher than market risk
1,0	The same as market	Security's risk is equal to market risk
0,5	The same as market	Security's risk twice lower than market risk
0	There is no relationship	Security's risk are not influenced by market risk
Minus 0,5	The opposite from the market	Security's risk twice lower than market risk, but in opposite direction
Minus 1,0	The opposite from the market	Security's risk is equal to market risk but in opposite direction
Minus 2,0	The opposite from the market	Risk of security is twice higher than market risk, but in opposite direction

One very important feature of Beta to the investor is that the Beta of portfolio is simply a weighted average of the Betas of its component securities, where the proportions invested in the securities are the respective weights. Thus, ***Portfolio Beta*** can be calculated using formula:

$$\beta_P = w_1\beta_1 + w_2\beta_2 + ...+ w_n\beta_n = \sum_{i=1}^{n} w_i * \beta_i, \qquad (3.5)$$

here w_i - the proportion of the portfolio's initial value invested in security i;

β_i - coefficient Beta for security i.

Earlier it was shown that the expected return on the portfolio is a weighted average of the expected returns of its components securities, where the proportions invested in the securities are the weights. This meas that because every security plots o the SML, so will every portfolio. That means, that not only every security, but also every portfolio must plot on an upward sloping straight line in a diagram (3.5) with the expected return on the vertical axis and Beta on the horizontal axis.

3.3.Arbitrage Pricing Theory (APT)

APT was propsed ed by Stephen S.Rose and presented in his article „The arbitrage theory of Capital Asset Pricing", published in Journal of Economic Theory in

1976. Still there is a potential for it and it may sometimes displace the CAPM. In the CAPM returns on individual assets are related to returns on the market as a whole. The key point behind APT is the rational statement that the market return is determined by a number of different factors. These factors can be fundamental factors or statistical. If these factors are essential, there to be no arbitrage opportunities there must be restrictions on the investment process. Here **arbitrage** we understand as *the earning of riskless profit by taking advantage of differential pricing for the same assets or security.* Arbitrage is is widely applied investment tactic.

APT states, that the expected rate of return of security J is the linear function from the complex economic factors common to all securities and can be estimated using formula:

$$E(r_J) = E(\acute{r}_J) + \beta_{1J} I_{1J} + \beta_{2J} I_{2J} + ... + \beta_{nJ} I_{nJ} + \varepsilon_J , \qquad (3.6)$$

here: $E(r_J)$ - expected return on stock J;

$E(\acute{r}_J)$ - expected rate of return for security J, if the influence of all factors is 0;

I_{iJ} - the change in the rate of return for security J, influenced by economic factor i (i = 1, ..., n);

β_{iJ} - coefficient Beta, showing sensitivity of security's J rate of return upon the factor i (this influence could be both positive or negative);

ε_J - error of rounding for the security J (expected value – 0).

It is important to note that the arbitrage in the APT is only approximate, relating diversified portfolios, on assumption that the asset unsystematic (specific) risks are negligable compared with the factor risks.

There could presumably be an infinitive number of factors, although the empirical research done by S.Ross together with R. Roll (1984) identified four factors – economic variables, to which assets having even the same CAPM Beta, are differently sensitive:

- inflation;
- industrial production;
- risk premiums;
- slope of the term structure in interst rates.

In practice an investor can choose the macroeconomic factors which seems important and related with the expected returns of the particular asset. The examples of possible macroeconomic factors which could be included in using APT model :

- GDP growth;

- an interest rate;

- an exchange rate;

- a defaul spread on corporate bonds, etc.

Including more factors in APT model seems logical. The institutional investors and analysts closely watch macroeconomic statistics such as the money supply, inflation, interest rates, unemployment, changes in GDP, political events and many others. Reason for this might be their belief that new information about the changes in these macroeconomic indicators will influence future asset price movements. But it is important to point out that not all investors or analysts are concerned with the same set of economic information and they differently assess the importance of various macroeconomic factors to the assets they have invested already or are going to invest. At the same time the large number of the factors in the APT model would be impractical, because the models seldom are 100 percent accurate and the asset prices are function of both macroeconomic factors and noise. The noise is coming from minor factors, with a little influence to the result – expected rate of return.

The APT does not require identification of the market portfolio, but it does reguire the specification of the relevant macroeconomic factors. Much of the current empirical APT research are focused on identification of these factors and the determination of the factors' Betas. And this problem is still unsolved. Although more than two decades have passed since S. Ross introduced APT model, it has yet to reach the practical application stage.

The CAPM and APT are not really essentially different, because they are developed for determing an expected rate of return based on one factor (market portfolio – CAPM) or a number of macroeconomic factors (APT). But both models predict how the return on asset will result from factor sensitivities and this is of great importance to the investor.

3.4. Market efficiency theory

The concept of market efficiency was proposed by Eugene Fama in 1965, when his article "Random Walks in Stock Prices" was published in Financial Analyst Journal.

Market efficiency means that the price which investor is paying for financial asset (stock, bond, other security) fully reflects fair or true information about the intrinsic value of this specific asset or fairly describe the value of the company – the issuer of this security. The key term in the concept of the market efficiency is the information available for investors trading in the market. It is stated that the market price of stock reflects:

1. *All known information, including:*

> ➢ Past information, e.g., last   year's or last quarter's, month's earnings;

> ➢ Current information as well as events, that have been announced but are still forthcoming, e.g. shareholders' meeting.

   2. *Information that can reasonably be inferred*, for example, if many investors believe that ECB will increase interest rate in the nearest future or the government deficit increases, prices will reflect this belief before the actual event occurs.

Capital market is efficient, *if the prices of securities which are traded in the market, react to the changes of situation immediately, fully and credibly reflect all the important information about the security's future income and risk related with generating this income.*

What is *the important information for the investor*? From economic point of view the important information is defined as such information which has direct influence to the investor's decisions seeking for his defined financial goals. Example, the essential events in the joint stock company, published in the newspaper, etc.

Market efficiency requires thet the adjustment to new information occurs very quikly as the information becomes known. Obvious, that Internet has made the markets more efficient in the sense of how widely and quickly information is disseminated.

There are 3 forms of market efficiency under efficient market hypothesis:
- Weak form of efficiency;
- Semi- strong form of efficiency;
- Strong form of the efficiency.

Under ***the weak form of efficiency*** stock prices are assumed to reflect any information that may be contained in the past history of the stock prices. So, if the market is characterized by weak form of efficiency, no one investor or any group of investors should be able to earn over the defined period of time abnormal rates of return by using information about historical prices available for them and by using technical analysis. Prices will respond to news, but if this news is random then price changes will also be random.

Under ***the semi-strong form of efficiency*** all publicly available information is presumed to be reflected in stocks' prices. This information includes information in the stock price series as well as information in the firm's financial reports, the reports of competing firms, announced information relating to the state of the economy and any other publicly available information, relevant to the valuation of the firm. Note that the market with a semi strong form of efficiency encompasies the weak form of the hypothesis because the historical market data are part of the larger set of all publicly available information. If the market is characterized by semi-strong form of efficiency, no one investor or any group of investors should be able to earn over the defined period of time abnormal rates of return by using information about historical prices and publicly available fundamental information(such as financial statemants) and fundamental analysis.

The strong form of efficiency which asserts that stock prices fully reflect all information, including private or inside information, as well as that which is publicly available. This form takes the notion of market efficiency to the ultimate extreme. Under this form of market efficiency securities' prices quickly adjust to reflect both the inside and public information. If the market is characterized by strong form of efficiency, no one investor or any group of investors should be able to earn over the defined period of time abnormal rates of return by using all information available for them.

The validity of the market efficiency hypothesis whichever form is of great importance to the investors because it determines whether anyone can outperform the market, or whether the successful investing is all about luck. Efficient market hypothesis does not require to behave rationally, only that in response to information there will be a sufficiently large random reaction that an excess profit cannot be made.

The concept of the market efficiency now is criticezed by some market analysts and participants by stating that no one market can be fully efficient as some irrational behavior of investors in the market occurs which is more based on their emotions and other psychological factors than on the information available (the psychological aspects of investment decision making will be disscussed further, in chapter 6). But, at the same time, it can be shown that the efficient market can exist, if in the real markets following events occur:

- ➤ A large number of rational, profit maximizing investors exist who are actively and continuously analyzing valuing and trading securities;
- ➤ Information is widely available to market participants at the same time and without or very small cost;
- ➤ Information is generated in a random walk manner and can be treated as independent;
- ➤ Investors react to the new information quickly and fully, though causing market prices to adjust accordingly.

Summary

1. Essentiality of the Markowitz portfolio theory is the problem of optimal portfolio selection. The Markowitz approach included portfolio formation by considering the expected rate of return and risk of individual stocks measured as standard deviation, and their interrelationship as measured by correlation. The diversification plays a key role in the modern portfolio theory.

2. Indifference curves represent an investor's preferences for risk and return. These curves should be drawn, putting the investment return on the vertical axis and the risk on the horizontal axis.

3. Two important fundamental assumptions than applying indifference curves to Markowitz portfolio theory. An assumption of nonsatiation assumes that the investors prefer higher levels of return to lower levels of return, because the higher levels of return allow the investor to spend more on consumption at the end of the investment period. An assumption of risk aversion assumes that the investor when given the choise, will choose the investment or investment portfolio with the smaller risk, i.e. the investors are risk averse.

4. Efficient set theorem states that an investor will choose his/ her optimal portfolio from the set of the portfolios that (1) offer maximum expected return for varying level of risk, and (2) offer minimum risk for varying levels of expected return.

5. Efficient set of portfolios involves the portfolios that the investor will find optimal ones. These portfolios are lying on the "northwest boundary" of the feasible set and is called an efficient frontier. The efficient frontier can be described by the curve in the risk-return space with the highest expected rates of return for each level of risk. Feasible set is opportunity set, from which the efficient set of portfolio can be identified. The feasibility set represents all portfolios that could be formed from the number of securities and lie either or or within the boundary of the feasible set.

6. Capital Market Line (CML) shows the trade off-between expected rate of return and risk for the efficient portfolios under determined risk free return.

7. The expected rate of return on the portfolio is the weighted average of the expected returns on its component securities.

8. The calculation of standard deviation for the portfolio can't simply use the weighted average approach. The reason is that the relationship between the securities in the same portfolio measured by coefficient of correlation must be taken into account. When forming the diversified portfolios consisting large number of securities investors found the calculation of the portfolio risk using standard deviation technically complicated.

9. Measuring Risk in Capital asset Pricing Model (CAPM) is based on the identification of two key components of total risk: systematic risk and unsystematic risk. Systematic risk is that associated with the market. Unsystematic risk is unique to an individual asset and can be diversified away by holding many different assets in the portfolio. In CAPM investors are compensated for taking only systematic risk.

10. The essence of the CAPM: CAPM predicts what an expected rate of return for the investor should be, given other statistics about the expected rate of return in the market, risk free rate of return and market risk (systematic risk).

11. Each security has it's individual systematic - undiversified risk, measured using coefficient Beta. Coefficient Beta (β) indicates how the price of security/ return on security depends upon the market forces. The Beta of the portfolio is simply a

weighted average of the Betas of its component securities, where the proportions invested in the securities are the respective weights.

12. Security Market Line (SML) demonstrates the relationship between the expected return and Beta. Each security can be described by its specific security market line, they differ because their Betas are different and reflect different levels of market risk for these securities.

13. Arbitrage Pricing Theory (APT) states, that the expected rate of return of security is the linear function from the complex economic factors common to all securities. There could presumably be an infinitive number of factors. The examples of possible macroeconomic factors which could be included in using APT model are GDP growth; an interest rate; an exchange rate; a defaul spread on corporate bonds, etc.

14. Market efficiency means that the price which investor is paying for financial asset (stock, bond, other security) fully reflects fair or true information about the intrinsic value of this specific asset or fairly describe the value of the company – the issuer of this security. The key term in the concept of the market efficiency is the information available for investors trading in the market.

15. There are 3 forms of market efficiency under efficient market hypothesis: weak form of efficiency; semi- strong form of efficiency; strong form of the efficiency.Under the weak form of efficiency stock prices are assumed to reflect any information that may be contained in the past history of the stock prices.Under the semi-strong form of efficiency all publicly available information is presumed to be reflected in stocks' prices.The strong form of efficiency which asserts that stock prices fully reflect all information, including private or inside information, as well as that which is publicly available.

Key-terms

- Arbitrage
- Arbitrage Pricing Theory
- (APT)
- Coefficient Beta (β)
- Capital Market Line (CML)
- Capital Asset Pricing Model
- (CAPM)

- Efficient frontier
- Efficient set of portfolios
- Expected rate of return of the portfolio
- Feasible set
- Indifference curves
- Map of Indiference Curves

- Market efficiency
- Markowitz Portfolio Theory
- Market Portfolio
- Nonsatiation
- Portfolio Beta
- Risk aversion
- Risk free rate of return
- Risk of the portfolio
- Security Market Line (SML)
- Systematic risk

- Standard deviation of the
- portfolio
- Semi- strong form of market
- efficiency
- Strong form of market
- efficiency
- Total risk
- Unsystematic (specific) risk
- Weak form of market
  efficiency

Questions and problems

1. Explain why most investors prefer to hold a diversified portfolio of securities as opposed to placing all of their wealth in a single asset.

2. In terms of the Markowitz portfolio model, explain, how an investor identify his / her optimal portfolio. What specific information does an investor need to identify optimal portfolio?

3. How many portfolios are on an efficient frontier? How is an investor's risk aversion indicated in an indiference curve?

4. Describe the key assumptions underlying CAPM.

5. Many of underlyong assumptions of the CAPM are violated in some degree in "real world". Does that fact invalidate model's calculations? Explain.

6. If the risk-free rate of return is 6% and the return on the market portfolio is 10%, what is the expected return on an asset having a Beta of 1,4, according to the CAPM?

7. Under the CAPM, at what common point do the security market lines of individual stocks intersect?

8. Given the following information:

- Expected return for stock A = 18%
- Expected return for stock B = 25%
- Standartd deviation of stock A = 12%
- Standard deviation of stock B   = 20%
- Correlation coefficient = 1,0.

Choose the investment below that represents the minimum risk portfolio:

a)   100% invest in stock A;

b)   100% invest in stock B;

c)   50% in stock A and 50% in stock B;

d)   20% invest in stock A and 80% in stock B

e)   60% invest in stock A and 40% in stock B.

9. The following investment portfolios are evaluated by investor:

Portfolio	Expected rate of return, %	Standard deviation
A	12	15
B	10	8
C	10	9

Using Markowitz portfolio theory explain the choise for investor between portfolios A,B and C.

10. Investor owns the portfolio composed of three stocks.The Betas of these stocks and their proportions in portfolio are shown in the table. What is the Beta of the investor's portfolio?

Stock	Beta	Proportion in portfolio, %
A	0,8	30
B	1,2	40
C	-0,9	30

11. How does the CAPM differs from the APT model?

12. Comment on the risk of the stocks presented below. Which of them are more /less risky and why?

Stock	Beta
A	0,92
B	2,20
C	0,97
D	-1.12
E	1.18
F	0,51

13. What is meant by an efficient market? What are the benefits to the economy from an efficient market?

14. If the efficient market hypothesis is true, what are the implications for the investors?

15. What are the conditions for an efficient market? Discuss if are they met in the reality.

16. If stock's prices are assumed to reflect any information that may be contained in the past history of the stock price itself, this is

    a)   Strong form of efficiency;

    b)   Semi-strong form of efficiency;

    c)   Weak form of efficiency;

    d)   Not enough information to determine form of efficiency.

17. Investor ownes a portfolio of four securities. The characteristics of the securities and their proportions in the portfolio are presented in the table.

Security	Coefficient Beta	Proportion, %	Expected rate of return, %
A	1,40	30	13
B	0,90	30	18
C	1,00	20	10
D	-1,30	20	12

    a)   What is the expected rate of return of this portfolio?

    b)   What is the risk of the portfolio?

    c)   If the investor wants to reduce risk in his portfolio how he could restructure his portfolio?

18. The following table presents the three-stock portfolio.

Stocks	Portfolio Weight	Coefficient Beta	Expected return	Standard deviation
A	0,25	0,50	0,40	0,07
B	0,25	0,50	0,25	0,05
C	0,50	1,00	0,21	0,07

Variance of the market returns is 0,06.

    a)   What is the Beta coefficient of the portfolio?

    b)   What is the expected rate of return on the portfolio?

    c)   What is an actual variance of the portfolio, if the following actual covariance between the stock's returns is given:

$$Cov (r_A, r_B) = 0,020$$

$$Cov (r_A, r_C) = 0,035$$

$$Cov (r_B, r_C) = 0,035$$

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4. Investment in Stocks

Mini-contents

4.1. Stock as specific investment

Stock represents part ownership in a firm.

2 main types of stock (see Chapter 1)

- Common stock

- Preferred stock

In this chapter we focus only on the investment in common stocks.

Common stock = Common share = Equity

The main features of the common stock:

- Typically each common stock owned entitles an investor to one vote in corporate shareholders' meeting.

- Investor receives benefits in the form of dividends, capital gains or both. But:

    - ✓ dividends are paid to shareholders only after other liabilities such as interest payments have been settled;

    - ✓ typically the firm does not pay all its earnings in cash dividends;

    - ✓ special form of dividend is stock dividend, in which the corporation pays in stocks rather than cash.

- Common stock has no stated maturity. Common stock does not have a date on which the corporation must buy it back. But: some corporations pay cash to their shareholders by purchasing their own shares. These are known as share buybacks.

- Common stocks on the whole historically have provided a higher return, but they also have higher risk. An investor earns capital gains (the difference between the purchase price and selling price) when he / she sell at a higher price than the purchase price.

Main advantages of common stock as investment:

- the investment income is usually higher;
- the investor can receive operating income in cash dividends;
- common stock has a very high liquidity and can easily be moved from one investor to the other;
- the costs of transaction with common stocks involved are relatively low;
- the nominal price of common stock is lower in comparison with the other securities.

Main disadvantages of common stock as investment:

- common stock is more risky in comparison with many other types of securities;
- the selection of these securities is complicated: high supply and difficult to evaluate;
- the operating income is relatively low (the main income is received from the capital gain – change in stock price).

4.2.Stock analysis for investment decision making

In this section the focus is on the fundamental analysis of common stocks. Although technical analysis is used by many investors, fundamental analysis is far more prevalent. By performing fundamental analysis investor forecasts among other things, the future changes in GDP, changes sales, other performance indicators for a number of   industries and, in particular, future sales, earnings for a number of the firms. The main objective of this analysis for investor is to identify the attractive potential investments in stocks.

Analysts and investors use two alternative approaches for fundamental analysis:

- "Top-down" forecasting approach;
- "Bottom-up" forecasting approach.

Using *"top-down" forecasting approach* the investors are first involved in making the analysis and forecast of the economy, then for industries, and finally for

companies. The industry forecasts are based on the forecasts for the economy and a company's forecasts are based on the forecasts for both its industry and the economy.

Using *"bottom-up"forecasting approach*, the investors start with the analysis and forecast for companies, then made analysis and forecasts for industries and for the economy.

In practice "top down" approach prevail in analysis and forecasting because logically for forecasting of the companies performance the changes in macroeconomic environment must be analyzed first otherwise the inconsistent assumptions could be drawn. The combination of two approaches is used by analysts too. For example, analysis and forecasts are made for the economy using "top-down" approach and then using "bottom-up" approach continuing with the forecasts for individual companies. But despite of the different approaches to the sequence of the analysis the content of it is based on the E-I-C analysis.

4.2.1. E-I-C analysis

E-I-C analysis includes:

➢ **E - Economic (macroeconomic) analysis (**describes the macroeconomic situation in the particular country and its potential influence on the profitability of stocks).

➢ **I - Industry analysis** (evaluates the situation in the particular industry/ economic sector and its potential influence on the profitability of stocks).

➢ **C - Company analysis** (the financial analysis of the individual companies from the shareholder approach)

The contents of Macroeconomic analysis:

• The behavior of economics in the context of economic cycle (at what point of this cycle is the economy now: growth stage? peak? decline stage? recession stage?);

• Fiscal policy of the government (financial stability, budget deficit, public debt, etc.)

• Monetary policy (the stability of national currency against other foreign currencies; the ability of authorities (Central Bank) to use the money market instruments on time, etc.);

- the other economic factors:
  - ✓ inflation/deflation;
  - ✓ the level of unemployment;
  - ✓ the level of consumption;
  - ✓ investments into businesses;
  - ✓ the possibilities to use different types of energy, their prices;
  - ✓ foreign trade and the exchange rate of the foreign currency against national currency (devaluation? revaluation?)

The contents of Industry analysis could be disclosed answering following questions:

- What is the nature of the industry? Is it monopolistic or competitive?
- What is the level of regulation and administration inside this industry?
- What is the situation with the self-organization of the human resources in this industry? Is where any unions other organized structures?
- How important and how complex is the technology for this industry?
- What are the key factors which influence this industry?
- What conditions in production and financial activity are important in this industry?
- (production resources, the perspectives for raising capital, competition form the other countries, etc.)
- What is the stage of the industry's development cycle? (Introductory? Growth? Maturity? Decline?)

The other way for the development of Industry's analysis by focusing it into four important areas:

I. Demand:

- Could this sector/ industry be described as growing, mature or cyclical?
- How are this sector/ industry influenced by changes in GDP or interest rates?
- If the industry is cyclical, what is the key driver of it demand/ profit: business (capital expenditures) or consumption cycle?
- How precisely the demand for capital expenditures is defined?

- Are the goods in this industry expensive? luxury goods? cheap? For day-to-day consumption?

II. Pricing:

- How consolidated (concentrated) is this industry?
- What are the barriers for entrance to this industry? Are they high?
- How powerful and demanding are the consumers in this industry?
- Is where in the market of industry's goods the surplus, how strong is the fight   for market share?
- Is where in this industry a high competition in the international environment?

III. Costs:

- How is the industry supplied with the implements of production?
- Are the tendencies of the prices for raw materials used in this industry substantially influencing the profit?
- Are the labor costs the main component?
- Is the question of qualification for the human resources in this industry?

IV. The influence of the whole economics and financial market to the industry:

- Is this industry defensive or growing? How it could function in period of economic recession?
- How is this industry influenced by interest rates?
- Are severe stocks dominated in this industry?
- Is this sector global?
- How the fluctuations in currency exchange rate are influencing the sector? Are these fluctuations of currency exchange rate influencing the amount of profit received from abroad or the competitiveness of the sector?
- Is it possibility that political and/ or regulation risk could influence the sector?

4.2.2. Fundamental analysis

The base for the company analysis is fundamental analyses are the publicly **disclosed and audited financial statements of the company**:

- Balance Sheet
- Profit/ loss Statement
- Cash Flow Statement
- Statement of Profit Distribution

Analysis could use the period not less than 3 years.

Ratio analysis is useful when converting raw financial statement information into a form that makes easy to compare firms of different sizes. *The analysis includes the examination of **the main financial ratios:***

1. ***Profitability ratios,*** which measure the earning power of the firm.
2. ***Liquidity ratios,*** which measure the ability of the firm to pay its immediate liabilities.
3. ***Debt ratios,*** which measure the firm's ability to pay the debt obligations over the time.
4. ***Asset – utilization ratios,*** which measure the firm's ability to use its assets efficiently.
5. ***Market value ratios*** are an additional group of ratios which reflect the market value of the stock and the firm.

Table 4.1

Financial ratios by category

Ratio	Equation
Profitability ratios	
Gross profit margin	Gross profit/ Sales
Operating profit margin	Operating profit / Sales
Net profit margin	Net income/ Sales
Return on assets (ROA)	Net income / Total assets
Return on equity (ROE)	Net income / Stockholders' equity
Liquidity ratios	
Current ratio	Current assets / Current liabilities
Quick ratio	(Current assets – Inventory) / Current liabilities
Net working capital	Current assets - Current liabilities
Debt ratios	
Debt to assets	Total liabilities / Total assets
Debt to equity	Total Debt / Equity
Times interest earned	Income before interest and taxes / Interest

Asset utilization ratios	
Inventory turnover	Cost of goods sold / Inventory
Receivables turnover	Sales (credit) / Receivables
Fixed asset turnover	Sales/ Fixed assets
Total assets turnover	Sales/ Total assets
Market Value Ratios	
Capitalization	Number of common stock * Market price of the common stock
Earnings per share (EPS)	(Net Income – Cash Dividends of Preferred stock) / Number of Common Stocks
Price/Earnings ratio (PER)	Market price of the stock/ Earnings per share
Book value of the stock	(Equity–Preferred stock- Preferred stock dividends) / Number of Common Stock
Market price to Book value	Market price of the stock / Book value of the stock
Dividends per share	(Dividends - Preferred stock dividends)/ Number of Common Stock
Payout Ratio	Dividends per share / Earnings per share

Market value ratios provide an investor with a shortest way to understand how attractive the stock in the market is. But looking for long-term investment decisions investor must analyze not only the current market results but to assess the potential of the firm to generate earnings in the future. Thus, only using the other groups of financial ratios investor can receive "a full picture" of the financial condition of the firm and when continue with stock valuation.

After calculating the ratios, the investor must compare the ratios of the firm with the ratios of a relevant benchmark. The selection of the appropriate benchmark is a difficult decision. For this reason firms are frequently benchmarked against other firms with similar size and in the same home country and industry. However, such comparisons do not always reveal whether the company is buy-worthy, because the whole size category, country or industry may under perform. When using these ratios for analysis of the firm investors compare them also with industry average.

4.3. Decision making of investment in stocks. Stock valuation

Valuation theory is grounded on the assumption that investors are rational, wealth maximizing individuals and that stock market prices reflect the fundamental value. The distinction between ***fundamental and speculative value*** of stock is very important one. Fundamental value here we understand the value of an equity

investment that is held over the long term, as opposed to the value that can be realized by short term, speculative trading.

Stock valuation process:

1. Forecasting of future cash flows for the stock.

2. Forecasting of the stock price.

3. Calculation of Present value of these cash flows. This result is ***intrinsic (investment) value*** of stock.

4. Comparison of intrinsic value of stock and current market price of the stock and decision making: to buy or to sell the stock.

Valuation methods:

1. Method of income capitalization.

2. Discounted dividend models.

3. Valuation using multiples.

Method of income capitalization

This method is based on the use of Present and Future value concept well known in finance. The value of any investment could be estimated as present value of future cash flows generated by this investment, using formula:

$$V = CF_1 / (1 + k) + CF_2 / (1 + k)^2 + \ldots + CF_n / (1 + k)^n =$$
$$= \Sigma CF_t / (1 + k)^t \qquad \qquad (4.1)$$

here   CF -   expected cash flows from the investment during period t;

   k -   discount rate (capitalization rate or required rate of return for the investor, which include the expected level of risk).

Discounted dividend models

The **discounted dividends models (DDM)** is based on the method of income capitalization and considers the stock price as the discounted value of future dividends, at the risk adjusted required return of equity, for dividend paying firms.

   Important assumption behind the DDM: the only way a corporation can transfer wealth to its stockholders is through the payment of dividend, because dividends are the only source of cash payment to a common stock investor.

Common stock value using DDM:

$$V = D_1 / (1 + k) + D_2 / (1 + k)^2 + \ldots + D_n / (1 + k)^n = \Sigma D_t / (1 + k)^t, \qquad (4.2)$$

here $D_{1,2\ldots,t}$ is stock dividend for the period t.

The forecasted dividends during long-term valuation period of dividends are the key factor influencing the stock value. Expected growth rate in dividends (g) is calculated by formula:

$$g = (D_t - D_{t-1})/D_{t-1} \qquad\qquad (4.3)$$

Various types of DDM, depending upon the assumptions about the expected growth rate in dividends (g):

➢ "Zero" growth DDM

➢ Constant growth DDM

➢ Multistage growth DDM

"Zero" growth DDM

Assumption: $D_1 = D_2 = D_3 = \ldots = D_\infty$, that means $D_t = D_{t-1}$ and $g = 0$.

The basic DDM formula for ***stock valuation using "zero" growth model*** becomes as follows:

$$V = D_1/k \quad \text{or} \quad D_0/k_0 \qquad\qquad (4.4)$$

Constant growth DDM

Assumption: if last year (t_0) firm was paying D_0 dividends, then in period t=1 its dividends will grow at growth rate g:

$$D_1 = D_0 (1 + g) \quad \text{or} \quad D_t = D_{t-1} (1 + g) = D_0(1 + g)$$

The basic DDM formula for ***stock valuation using constant growth model*** becomes as follows:

$$V = \sum_{t=1}^{\infty} D_0 (1 + g)/ (1 + k)^t \quad \text{(continuing series)} \qquad\qquad (4.5)$$

or

$$V = D_1/ (k - g) \quad \text{(Gordon formula)} \qquad\qquad (4.6)$$

Multistage growth DDM

Assumption: after some defined period in the future T dividends expected each year will grow at the constant growth rate g. Dividends before period T (D_1, D_2, D_3,..

D_t) are forecasted individually. Investor individually defines then the period T will start.

Future dividend cash flows for the stock, using this model:

before period T: $V_{T1} = \sum_{t=1}^{T} D_t / (1 + k)^t$;

after period T : $V_{T2} = D_{T+1} / (k - g)(1 + k)^T$

Stock value using multistage growth method:

$$V = V_{T1} + V_{T2} = \sum_{t=1}^{T} D_t / (1 + k)^t + D_{T+1} / (k - g)(1 + k)^T \qquad (4.7)$$

Valuation, when the stock keeping period is fixed

Example for 1 year:

$$V = (D_1 + P_1) / (1 + k) = + P_1 / (1 + k), \qquad (4.8)$$

here P_1 - selling price for the stock after 1 year:

$P_1 = D_2 / (1 + k) + D_3 / (1 + k)^2 + \ldots + D_t / (1 + k)^{t-1}$

And value of the stock will be:

$V = D_1 / (1 + k) + [D_2 / (1 + k) + D_3 / (1 + k)^2 + \ldots + D_t / (1 + k)^{t-1}] / (1 + k) =$

$= \sum_{t=1}^{N} D_t / (1 + k) t$ \qquad (DDM basic formula, see 4.2)

Decisions for the investor in stocks:

- ➢ If $P_m < V$ - decision to buy the stock, because it is under valuated;
- ➢ If $P_m > V$ - decision to sell the stock, because it is over valuated;
- ➢ If $P_m = V$ - stock is valuated at the same range as in the market and its current market price shows the intrinsic value.

Valuation using multiples

Practitioners value stock price ***using multiples.***

The most common used multiply is the Price Earning Ratio (PER):

$$\textbf{PER} = \textbf{P} / \textbf{EPS}, \qquad (4.9)$$

here: P – market price of the stock;

EPS - earnings per share

Given PER and EPS, price

P = PER x EPS   **(4.10)**

Observed PER. Prices of stock and earnings measures, from which observed PERs are derived, are publicly available. Earnings per share are observed or estimates of analysts. The observed PERs for a firm, a group of firms, an industry, of the index derives directly from such data. What should be the PER, according to analysts, might differ from observed PER. It is important to make a distinction between observed PER with normative PER*, or what the PER should be.

PER* = V / EPS$_0$,   **(4.11)**

here: PER* **-** normative PER

V - intrinsic value of the stock;

EPS$_0$ - earnings per share for the last period.

Investor might consider that the PER* that should apply to the firm, of which stock value has to be estimated, should be in line with peer firms selected or the industry average.

Decision making for investment in stocks, using PER:

➢   If PER* > PER **-** decision to buy or to keep the stock, because it is under valuated;

➢   If PER* < PER **-** decision to sell the stock, because it is over valuated;

➢   If PER* = PER - stock is valuated at the same range as in the market. In this case the decision depends on the additional observations of investor.

There are remarkable variations of PERs across firms, industries, etc. This is because PERs are a synthetic measure combining all effects of different equity value drivers: growth, profitability, risk. PER is increasing, then the profitability of the firm and its growth rates are increasing. PER is decreasing then the risk of the firm is increasing. Interest rates are correlated with inverse of PER, because PER increases when risk free rate decreases.

The other alternative multiples used for stock valuation by investors include:

•   Sales / Market capitalization of the firm

•   Sales / Equity value

•   Market capitalization /Book Value of the Equity Ratio.

These alternative multiples are used when earnings are not representative. Example could be the high growth (Internet) firms with negative net income, negative EPS and actual stock price irrelevant usage.

When using these multiplies investors usually consider that the PER* that should apply to the firm, of which stock value has to be estimated, should be in line with peer firms selected or the industry average.

4.4. Formation of stock portfolios

In this section we review the important principles behind the stock selection process that are relevant in the formation and management of the stock portfolios. We focus on the explanation of the principal categories of common stock, especially the investment characteristics that make a category of stock suitable for one portfolio but not for another.

The most widely ***used categories of stocks*** are:

- blue chip stocks;
- income stocks;
- cyclical stocks;
- defensive stocks;
- growth stocks;
- speculative stocks;
- Penny stocks.

Blue chip stock is the best known of all the categories of stocks presented above. These stocks represent the best-known firms among the investment community. But it is difficult to define exactly this category of stock, because in most cases blue chip stocks are presented using the examples of the firms. One common definition of Blue Chip Company is that this company has long continuous history of divided payments. For example, Coca Cola has a history of dividend payments more than for 100 years. But it doesn't mean that the younger successful companies running business for some decades and paying dividends can't be categorized as "blue chips" in the specific investment environment. From the other side, many high quality stocks do not meet the criterion of uninterrupted dividend history. It is a practice that brokerage firms recommend for their clients – individual investors the list of blue chip stock as high quality ones in their understanding, based on the analysis of   information about the firm.

Income stocks are the stocks, the earnings of which are mainly in the form of dividend income, as opposed to capital gains. It is considered a conservative, dependable investment, suitable to supplement other income. Well-established corporations with a consistent record of paying dividends are usually considered income stock. In addition, income stocks usually are those that historically have paid a larger-than-average percentage of their net income after taxes as dividends to their shareholders and the payout ratio for these companies are high. The common examples of income stocks are the stocks of public utilities, such as telecommunication companies, electric companies, etc.

Cyclical stocks are the securities that go up and down in value with the trend of business and economy, rising faster in the periods of rapidly improving business conditions and sliding very noticeably when business conditions deteriorate. During a recession they do poorly. The term cyclical does not imply that these stocks are more predictable than other categories. They are cyclical because they follow business cycle. The examples of cyclical stocks can be industrial chemicals, construction industry, automobile producers, etc.

Defensive stocks (synonymous – protective stocks) are those which are opposite to cyclical stocks. These stocks shift little in price movements and are very rarely of interest to speculators. The defensive stocks have low Betas and thus are assigned to the stocks with lower risk. Held by long-term investors seeking stability, these stocks frequently withstand selling pressure in a falling market. The best examples of defensive stocks are food companies, tobacco and alcohol companies and utilities. Other defensive products include cosmetics, drugs, and health care products. They continue to sell their products regardless of changes in macroeconomic indicators.

Growth stocks (synonymous – performance stocks) are stocks of corporations whose existing and projected earnings are sufficiently positive to indicate an appreciable and constant increase in the stock's market value over the extended time period. The rate of increase in market value for these stocks is larger than those of most corporate stock. Income stocks pay out a relatively high percentage of their earnings as dividends, but growth stocks do not. Instead, the company reinvests its earnings into profitable investment opportunities that are expected to increase the value of the firm, and therefore, the value of the firm's stock. Many firms have never

paid a dividend and publicly state they have no plans to do so. By default it seems these should be a growth stocks, because a stock that pays no dividend and does not increase in value would not be a very attractive investment. Though the analysts and the experienced investors themselves spend the time trying to discover little-known growth stocks.

Speculative stocks are the stocks issued by relatively new firms of unproven financial status and by firms with less than average financial strength. Speculation, by definition, involves a short time horizon, and the speculative stocks are those thet have a potential to make their owners a lot of money quickly. At the same time, though, they carry an unusually high degree of risk. Some analysts consider speculative stocks to be a most risky growth stocks. However, some new established technological companies that paid no dividends and had short history would probably be considered a speculative rather than a growth stock.

Penny stocks are low-priced issues, often highly speculative, selling at very small price a share. Thus, such stocks could be affordable even for the investors with small amounts of money.

The categories of the stocks presented above are not really mutually exclusive. As an examples show, some blue chip stocks at the same time can be an income stock. Similarly, both cyclical and defensive stocks can be income stocks.

4.5. Strategies for investing in stocks

In this section we focus on the three main types of strategies than investing in stocks:

- Sector rotation and business cycle strategy;
- Market timing strategy;
- Value screening strategy.

Sector rotation and business cycle strategy. *The essentiality of this strategy*: each economic sector as potential investment object has the specific patterns of market prices which depend upon the phase of the economic (business) cycle.

Sector rotation and business cycle strategy intends the movement of invested funds from one sector to the other depending on the changes in the economic (business) conditions.

This strategy use the classification of all stocks traded in the market on the bases of their behavior in regard to business cycle. The following groups are identified:

> ➢ Defensive stocks

> ➢ Interest-sensitive stocks

> ➢ Consumer durables

> ➢ Capital goods

Defensive stocks were defined in the previous section (4.4). These stocks are usually related with food industry, retail, tobacco, beverages industries, pharmaceuticals and other suppliers of the necessity goods and services. The prices of these stocks reach their highest levels in the later phases of business cycle.

Interest-sensitive stocks are related with the sectors of communications, utilities, housing industry, also with the insurance and other financial institutions. The behavior of these stocks is most unfavorable for the investor in the phase of economic crises/ recession. These stocks are considered as a good investment in the early phases of business cycle, i.e. in the optimistic phase.

Consumer durables are related with automobile, domestic electric appliances, furniture industries, and luxury goods and also with the wholesale. These stocks are a good investment in the middle of business cycle.

Capital goods are related with industries producing machinery, plant, office equipment, computers and other electronic instruments. Because of the remarkable time gap between the orders of this production and the terms of their realization, these stocks demonstrate their high and stabile prices in the latest phases of business cycle.

Thus by knowing and identifying the different patterns of prices relating to the industries in the real investment environment the investor can diversify his / her stock portfolio which will reflect to the changes in the economic (business) cycle.

Market timing strategy. *The essentiality of this strategy*: the investors endeavor to be „in-the-market" when market is in a „bullish" phase, i.e., when prices are growing, and to withdraw from the market in the „bearish" phase, i.e., when prices are slumping.

Investors use several different techniques for forecasting the major ups and downs in the market. The most often applied techniques using market timi9ng strategies:

- Technical analysis;

- Stock valuation analysis

- Analysis of economic forecasting

Technical analysis is based on the diagrams of price fluctuations in the market, the investors continuously watch the stocks which prices are growing and which falling as they signalize about the presumable changes in the stock market.

The purpose of the stock valuation analysis is to examine whether the stock market is a supply market, or is it a demand market. If the under valuated stocks prevail in the market it reflects to supply market and vice versa – if the over valuated stocks prevail, it reflects to demand market. The concept and key methods of stock valuation was discussed in section 4.2. The valuation tools frequently used when applying for market timing strategy are:

- Price/Earnings ratio (PER);
- The average market price/ book value ratio;
- The average dividend income.

Analysis of economic forecasting. Investors by forecasting changes in the macro economy and in interest rates endeavor to decrease the investment in stocks in the phases of economic downturn and to return to these investments during upturn phases of the economy.

Valuation screening strategy. *The essentiality of this strategy:* by choosing and applying one or combining several stock valuation methods and using available information about the stocks from the data accumulated in the computer database, the valuation screens are set by investor. All stocks on these screens are allocated on the basis of their ratings in such an order: on the top of the screen – under valuated stocks, at the bottom – over valuated stocks. Using these screens investors can form their diversified stock portfolio and exercise the changes in the existent portfolio.

Various financial indicators and ratios can be used for the rating of stocks when applying valuation screening strategy. The most often used are following indicators:

- Price/Earnings ratio (PER);
- Dividend income
- Return on Equity (ROE)
- Return on Investments (ROI).

Valuation screening is very popular strategy; it is frequently used together with the other investment strategies, because the investors in the market have possibility to choose from the variety of stocks even in the same market segment.

What could be the best choose? – rating of the stocks as alternatives using the screen can be the answer. Usually investors setting the screens combine more than one indicator for rating of stocks searching for the better results in picking the stocks to their portfolios. The examples of the other financial indicators used applying valuation screening strategy:

- Return on assets (ROA)
- Net profit margin
- Debt to assets
- Debt to equity
- Earnings per share (EPS)
- Market price to Book value

Summary

1. Higher investment income, possibility to receive an operating income in cash dividends, high liquidity and low costs of transactions are the main advantages of investment in common stock.

2. The relatively higher risk in comparison with many other types securities, the complicated selection of the stocks because of their high supply in the financial market, the relatively low the operating income are the main disadvantages of investment in common stock.

3. E-I-C analysis includes: Economic (macroeconomic) analysis, Industry analysis and Company analysis. Two alternative approaches used for analysis: (1) "Top-down" forecasting approach; (2) "Bottom-up" forecasting approach. Using "top-down" forecasting approach the investors are first involved in making the analysis and forecast of the economy, then for industries, and finally for companies. Using "bottom-up" forecasting approach, the investors start with the analysis and forecast for companies, then made analysis and forecasts for industries and for the economy. The combination of two approaches is used by analysts too.

4. The Macroeconomic analysis includes the examining of economic cycle, fiscal policy of the government, monetary policy, the other economic factors: inflation, the level of unemployment; the level of consumption; investments into businesses; the possibilities to use different types of energy, their prices; foreign trade and the exchange rate, etc.

5. The Industry analysis includes the examining of the nature of the industry, the level of regulation inside this industry, the situation with the self-organization of the human resources the key factors which influence this industry (production resources, the perspectives for raising capital, competition form the other countries, etc), the stage of the industry's development cycle. The alternative approach to the industry analysis suggests the examining of four key areas: demand, pricing, costs and the influence of the whole economics and financial markets.

6. The base for the company analysis is fundamental analysis is the publicly disclosed and audited financial statements of the company: (Balance Sheet; Profit/ Loss Statement; Cash Flow Statement; Statement of Profit Distribution). Analysis use the period not less than 3 years.

7. Ratio analysis is useful when converting raw financial statement information into a form that makes easy to compare firms of different sizes. This analysis includes the examination of the main financial ratios: profitability ratios, which measure the earning power of the firm; liquidity ratios, which measure the ability of the firm to pay its immediate liabilities; debt ratios, which measure the firm's ability to pay the debt obligations over the time; asset – utilization ratios, which measure the firm's ability to use its assets efficiently and market value ratios are an additional group of ratios which reflect the market value of the stock and the firm.

8. The investor must compare the ratios of the firm with the ratios of a relevant benchmark. For this reason firms are frequently benchmarked against other firms with similar size and in the same home country and industry.

9. Stock valuation process includes four stages: (1) forecasting of future cash flows for the stock; (2) forecasting of the stock price; (3) calculation of Present value of these cash flows. This result is intrinsic (investment) value of stock; (4) comparison of and current and decision making: to buy or to sell the stock. If market price of the stock is lower than intrinsic value of the stock decision would be to buy the stock, because it is under valuated; if market price of the stock is higher than intrinsic value of the stock decision would be to sell the stock, because it is over valuated; if market price of the stock is equal to the intrinsic value of stock is valuated at the same range as in the market and its current market price shows the intrinsic value.

10. Most frequently used methods for valuation of common stocks are: the method of income capitalization; discounted dividend models and valuation using multiples.

11. The discounted dividends models (DDM) are based on the method of income capitalization and considers the stock price as the discounted value of future dividends, at the risk adjusted required return of equity, for dividend paying firms. Various types of DDM, depending upon the assumptions about the expected growth rate in dividends (g):"Zero" growth DDM; Constant growth DDM; Multistage growth DDM.

12. The most common used multiply is the Price Earning Ratio (PER). Decision making for investment in stocks, using PER: if the normative PER is higher than observed decision would be to buy or to keep the stock, because it is under valuated; if the normative PER is lower than observed decision would be to sell the stock, because it is over valuated; If normative and PER is equal to observed PER, stock is valuated at the same range as in the market. In this case the decision depends on the additional observations of investor.

13. The other alternative multiples used for stock valuation by investors include Sales / Market capitalization of the firm; Sales / Equity value; Market capitalization /Book Value of the Equity Ratio etc. These alternative multiples are used when earnings are not representative.

14. The categories of stocks most widely used in the selection process and relevant in the formation and management of the stock portfolios. are: blue chip stocks; income stocks; cyclical stocks; defensive stocks; growth stocks; speculative stocks; penny stocks.

15. Sector rotation and business cycle strategy intends the movement of invested funds from one sector to the other depending on the changes in the economic (business) conditions. This strategy use the classification of all stocks traded in the market on the bases of their behavior in regard to business cycle.

16. The essentiality of market timing strategy is that the investors endeavor to be „in-the-market"when market is in a „bullish"phase, i.e., when prices are growing, and to withdraw from the market in the „bearish"phase, i.e., when prices are slumping.

17. Valuation screening strategy use the valuation screens set by investor. All stocks on these screens are allocated on the basis of their ratings in such an order: on the top of the screen – under valuated stocks, at the bottom – over valuated stocks.

Using these screens investors can form their diversified stock portfolio and exercise the changes in the existent portfolio.

Key-terms

- Asset – utilization ratios
- Blue chip stocks
- "Bottom-up" forecasting approach
- Capital goods
- Cyclical stocks
- Company analysis
- Constant growth DDM
- Consumer durables
- Debt ratios
- Defensive stocks
- Discounted dividend models (DDM)
- Economic analysis
- E-I-C analysis
- Fundamental analysis
- Growth stocks
- Income stocks
- Income capitalization

- Industry analysis
- Interest-sensitive stocks
- Intrinsic (investment) value
- Liquidity ratios
- Market timing strategy
- Market value ratios
- Multiples method
- Multistage growth DDM
- Penny stocks
- Profitability ratios
- Sector rotation and business cycle strategy
- Speculative stocks
- Stock valuation process
- Technical analysis
- "Top-down" forecasting approach
- Value screening strategy
- "Zero" growth DDM

Questions and problems

1. The investor wants to identify if the stock of firm A is cyclical. How he/ she would proceed?

2. Common stock hasn't term to maturity. How then can a stock that does not pay dividends have any value? Give an examples of such firms listed in the domestic market of your country.

3. What is the difference between blue chip and income stocks?

4. Give examples of defensive stocks in the domestic market of your country.

5. Present the examples of blue chip stocks in the domestic market Explain, why did you categorize them as blue chips.

6. What is meant by the intrinsic (investment) value of a stock?

7. How can investors obtain EPS forecasts? Which sources could be used?

8. What are the variables that affect the price/ earnings ratio? Is the effect direct or inverse for each component?

9. What is meant by normalized price/earnings ratio?

10. If the intrinsic value for the stock is 8 Euro and the market price for this stock is 9 Euro, than:

   a) Stock is over valuated and could be good investment;

   b) Stock is over valuated and isn't good investment;

   c) Stock is under valuated and could be good investment;

   d) Stock is under valuated and isn't good investment.

11. Firm currently pays a dividend of 4 EURO per share. That dividend is expected to grow at a 5 % rate indefinitely. Stocks with similar risk provide a 10 % expected return. Estimate the intrinsic value of the firm's stock based on the assumption that the stock will be sold after 2 years from now at its expected intrinsic value.

12. Using the given historical data of the company for 5 previous years analyze and comment on the company's performance. Upon the analysis based on this historical data do you find this company attractive for investment in stocks? Explain.

FINANCIAL RATIOS	2010-01-01	2009-01-01	2008-01-01	2007-01-01	2006-01-01
LIQUIDITY RATIOS					
Current ratio	0.81	0.99	1.24	2.60	4.43
Quick ratio	0.39	0.45	1.02	0.89	1.61
PROFITABILITY RATIOS					
Gross profit margin	38.8%	57.9%	57.6%	52.0%	47.4%
Profit from operations margin	10.0%	26.9%	27.3%	26.9%	22.3%
Net profit margin	7.9%	23.8%	33.1%	18.0%	14.5%
ROA	10.6%	18.5%	24.8%	12.4%	6.8%
ROE	15.0%	25.5%	38.2%	19.6%	9.4%
DEBT RATIOS					
Debt to assets	29.2%	27.5%	34.9%	36.9%	27.6%
Debt to equity	41.2%	38.0%	53.7%	58.4%	38.0%
ASSET-UTILIZATION RATIOS					

Inventory turnover	88	91	133	166	240
Receivables turnover	31	49	50	34	51
Long term assets turnover	0.37	0.95	1.05	0.96	0.63
Asset turnover	0.31	0.78	0.75	0.69	0.47
MARKET VALUE RATIOS					
Capitalization, mln. EURO	118,221,72	116,442,06	240,002,85	71,950,00	42,373,38
P/E ratio	7.72	4.60	8.08	6.90	10.03
Earnings per share, EURO	0.60	0.99	1.17	1.23	0.50
Market price to book value	1.16	1.18	3.08	1.35	0.94
Book value of share, EURO	4.01	3.90	3.06	6.28	5.33
Cash dividend per share, EURO	0.06	0.16	0.16	0.25	0.12
Payout ratio	10.2%	16.1%	13.7%	20.3%	24.2%

13. The new little known firm is analyzed from the prospect of investments in its shares by two friends. The firm paid dividends last year 3 EURO per share. Tomas and Arnas examined the prices of similar stocks in the market and found that they provide 12 % expected return. The forecast of Tomas is as follows: 4 % of growth in dividends indefinitely. The forecast of Arnas is as follows: 10% of growth in dividends for the next two years, after which the growth rate is expected to decline to 3 % for the indefinite period.

    a) What is the intrinsic value of the stock of the firm according to Tomas forecast?

    b) What is the intrinsic value of the stock of the firm according to Arnas forecast?

    c) If the stocks of this firm currently are selling in the market for 40 EURO per share, what would be the decisions of Tomas and Arnas, based on their forecasting: is this stock attractive investment? Explain.

14. Look through the listed companies on the domestic stock exchange. What industries they represent? Would you be able to construct the stock portfolio applying sector rotation strategy in the domestic stock exchange?

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5. Investment in bonds

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5.1. Identification and classification of bonds

Bonds are securities with following basic characteristics:

- They are typically securities issued by a corporation or governmental body for specified term: bonds become due for payment at maturity, when the par value/ face value of bond are returned to the investors.

- Bonds usually pay fixed periodic interest installments, called coupon payments. Some bonds pay variable income.

- When investor buys bond, he or she becomes a creditor of the issuer. Buyer does not gain any kind of owner ship rights to the issuer, unlike in the case with equity securities.

The main advantages of bonds to the investor:

- They are good source of current income;

- Investment to bonds is relatively safe from large losses;

- In case of default bondholders receive their payments before shareholders can be compensated.

A major disadvantage of bonds is that potential profit from investment in bonds is limited.

Currently in the financial markets there are a lot of various types of bonds and investor must understand their differences and features before deciding what bonds would be suitable for his/ her investment portfolio.

Bonds classification by their key features:

➢ *By form of payment:*

• *Noninteresting bearing bonds* - bonds issued at a discount. Throughout the bond's life its interest is not earned, however the bond is redeemed at maturity for face value.

• *Regular serial bonds* - serial bonds in which all periodic installments of principal repayment are equal in amount.

• *Deferred –interest bonds* –bonds paying interest at a later date;

• *Income bonds* – bonds on which interest is paid when and only when earned by the issuing firm;

• *Indexed bonds* - bonds where the values of principal and the payout rise with inflation or the value of the underlying commodity;

• *Optional payment bonds* – bonds that give the holder the choice to receive payment on interest or principal or both in the currency of one or more foreign countries, as well as in domestic currency.

➢ *Coupon payment:*

• *Coupon bonds* – bonds with interest coupons attached;

• *Zero-coupon bonds* – bonds sold at a deep discount from its face value and redeemed at maturity for full face value. The difference between the cost of the bond and its value when redeemed is the investor's return. These securities provide no interest payments to holders;

• *Full coupon bonds* – bonds with a coupon rate near or above current market interest rate;

• *Floating-rate bonds* – debt instruments issued by large corporations and financial organizations on which the interest rate is pegged to another rate, often the Treasury-bill rate, and adjusted periodically at a specified amount over that rate.

➢ *Collateral:*

• *Secured bonds* – bonds secured by the pledge of assets (plant or equipment), the title to which is transferred to bondholders in case of foreclosure;

- *Unsecured bonds* – bonds backed up by the faith and credit of the issuer instead of the pledge of assets.

- *Debenture bonds* – bonds for which there is no any specific security set aside or allocated for repayment of principal;

- *Mortgage bonds* (or mortgage-backed securities) – bonds that have as an underlying security a mortgage on all properties of the issuing corporation;

- *Sinking fund bonds* – bonds secured by the deposit of specified amounts. The issuing corporation makes these deposits to secure the principal of the bonds, and it is sometimes required that the funds be invested in other securities;

- *Asset-Backed Securities (ABS)* – similar to mortgage bonds, but they are backed by a pool of bank loans, leases and other assets. The ABS are related with the new market terminology – *securitization* which understood as the process of transforming lending vehicles such as mortgages into marketable securities. The main features of ABS for investor: relatively high yield, shorter maturities (3-5 years) and monthly, rather than semiannual principal/ interest payments. From their introducing to the market they were ranked as high credit quality instruments. But the recent financial crises showed that these debt instruments could be extremely risky investment when banks loans portfolios as a guarantee of ABS become worthless causing banks' insolvency problems.

- *General obligation bonds* – bonds, secured by the pledge of the issuer's full faith and credit, usually including unlimited tax-power;

- *Guaranteed bonds* – bonds which principal or income or both are guaranteed by another corporation or parent company in case of default by the issuing corporation;

- *Participating bonds* – bonds which, following the receipt of a fixed rate of periodic interest, also receive some of the profit generated by issuing business;

- *Revenue bonds* – bonds whose principal and interest are to be paid solely from earnings.

➤ *Type of circulation:*

- *Convertible bonds* – bonds that give to its owner the privilege of exchanging them for other securities of the issuing corporation on a preferred basis at some future date or under certain conditions;

- *Interchangeable bonds* – bonds in coupon form that can be converted to the other form or its original form at the request of the holder paying the service charge for this conversion.

➢ *Type of issuers:*

- *Treasury (government) bonds* – an obligation of the government. These bonds are of the highest quality in each domestic market because of their issuer – Government. This guarantee together with their liquidity makes them popular with both individual and institutional investors. The government bonds are dominant in the fixed-income market.

- *Municipal bonds* - bonds issued by political subdivisions in the country (county, city, etc.);

- *Corporate bonds* – a long-term obligation of the corporation;

- *Industrial bonds* – bonds issued by corporations other than utilities, banks and railroads. This debt is used for expansion, working capital and retiring other debts;

- *Public utility bonds* – high quality debt instruments issued by public utility firms.

➢ *Recall possibility:*

- *Callable (redeemable) bonds* – bonds issue, all or part of which may be redeemed by the issuing corporation under definite conditions, before the issue reaches maturity;

- *Noncallable (irredeemable) bonds* – bonds issued which contains no provision for being "called" or redeemed prior to maturity date.

➢ *Place of circulation:*

- *Internal bonds* - bonds issued by a country payable in its own currency;

- *External bonds* - bonds issued by government or firm for purchase outside the nation, usually denominated in the currency of the purchaser. The term *Eurobond* is often applied to these bonds that are offered outside the country of the borrower and outside the country in whose currency the securities are denominated. As the Eurobond market is neither regulated

nor taxed, it offers substantial advantages for many issuers and investors in bonds.

➢ *Quality*:

• *Gilt-edged bonds* – high-grade bonds issued by a company that has demonstrated its ability to earn a comfortable profit over a period of years and to pay its bondholders their interest without interruption;

• *Junk bonds* - bonds with low rating, also regarded as high yield bonds. These bonds are primarily issued y corporations and also by municipalities. They have a high risk of default because they are issued as unsecured and have a low claim on assets.

➢ *Other types of bonds:*

• *Voting bonds* - unlike regular bonds, these bonds give the holder some voice in corporation management;

• *Senior bonds* - bonds which having prior claim to the assets of the debtor upon liquidation;

• *Junior bonds* – bonds which is subordinated or secondary to senior bonds.

5.2.   Bond analysis: structure and contents

Similar to analysis when investing in stocks investor before buying bonds must evaluate a wide range of the factors which could influence his/ her investment results. The key factors are related with the results of the performance and the financial situation of the firm which is issuer of the bonds. Various indicators are used for the evaluation of these factors.

Bond analysis includes:

> ➢   Quantitative analysis.
> ➢   Qualitative analysis.

5.2.1. Quantitative analysis.

Quantitative indicators – the financial ratios which allows assessing the financial situation, debt capacity and credibility of the company –issuer of the bonds.

Since the bonds are debt instruments and the investor in bonds really becomes the creditor the most important during analysis is the assessment of the credibility of the firm – issuer of the bonds. Basically this analysis can be defined as the process of assessment the issuer's ability to undertake the liabilities in time. Similar to the

performing of fundamental analysis for common stock, bond analysis (or credit analysis) uses financial ratios. However the analysis of bonds differs from the analysis of stock, because the holder of the regular bonds has not any benefit of the fact that the income of the firm is growing in the future and thus the dividends are growing – these things are important to the share holder. Instead of this investor in bonds is more interested in the credibility of the firm, its financial stability. Estimation of financial ratios based on the main financial statements of the firm (Balance sheet; Profit/ loss statement; Cash flow statement, etc.) is one of the key instruments of quantitative analysis. Some ratios used in bond analysis are the same as in the stock analysis. But most important financial *ratios for the bond analysis are:*

1. Debt / Equity ratio;
2. Debt / Cash flow ratio;
3. Debt coverage ratio;
4. Cash flow / Debt service ratio.

$$\text{Debt / Equity ratio } = \text{ } D_L / SE_T \text{ ,} \tag{5.1}$$

here: D_L - long-term debt;

SE_T - total stockholders 'equity.

Debt/ Equity ratio shows the financial leverage of the firm. Equity represents the conservative approach of the firm financing, because in the case of financial crises of the firm dividends are not paid to the shareholders. While repayment of debt and interest payments must be undertaken despite of what is the level of firm's profitability. The higher level of this ratio is the indicator of increasing credit risk. Estimation of this ratio is based on the data from the Balance sheet of the firm.

$$\text{Debt / Cash flow ratio} = (D_L + \text{ } LP) / (NI + DC), \tag{5.2}$$

here: LP - lease payments;

NI – net income;

DC – depreciation.

Debt/ cash flow ratio shows the number of years needed to the firm to undertake all its long-term liabilities and leasing contracts using current generated funds (cash flow) by firm. Of course this is practically unbelievable that the firm could use such an aggressive debt repayment plan; however this ratio is an effective measure of the

firm's financial soundness and financial flexibility. Firms with the low Debt /Cash flow ratio can borrow funds needed easily at any time. From the other side, firms with the high Debt /Cash flow ratio could meet substantial problems if they would like to increase the capital for their business activity by borrowing. Estimation of this ratio is based on the data from the balance sheet (long term debt), profit/loss statement (net income, depreciation) or cash flow statement (if the depreciation is not showed a profit/loss statement of the firm. Information about future leasing payments of the firm often is presented in the of-balance sheet statements.

Debt coverage ratio = EBIT / I, (5.3)

here: EBIT - earnings before interest and taxes;

I - interest expense.

Debt coverage ratio sometimes is presented as "Interest turnover" ratio. This is very important analytical indicator. The firm with the higher ratio is assessed as financially stronger. When analyzing this ratio it is not enough to take only a one year result of the firm, but it is necessary to examine the tendencies of changes in this ratio during longer period. It is especially important to analyze how the firm has managed to pay the interest on the debt when it generated low income, i.e. in the period of economic crises and other unfavorable conditions for the firm. Besides this ratio shows what the reserve the firm has for the coverage of the interest, if the income of the firm would decrease. The higher the reserve, the lower is the risk of the bonds issued by the firm.

Cash flow/Debt service ratio = $(EBIT+ DC)/ [I + DR (1-T_r)^{-1} + LP (1-T_r)^{-1}]$, (5.4)

here: DR – debt retirement;

T_r – corporation tax rate.

Note that the estimation of the Cash flow/Debt service ratio includes the adjustment of the debt and interest payments by the corporation tax. This is necessary because the sum of the debt repayment must be increased by the sum of corporation tax. Thus, the debt is redeemed using net income, and the interest expenses and often leasing payments are the part of financial expenses of the firm. Although Debt coverage ratio is a good measure for the evaluation of the credit level of the firm however many credit analysts consider Cash flow/Debt service ratio as the best measure for evaluation of the firm's credibility. Their main arguments are: generated

income of the firm shows not only net income but the non-cash expenses – depreciation expenses - as well; for creditor not only ability of the firm to pay interest is important, but the ability to repay the debt and to cover leasing payments in time too.

5.2.2. Qualitative analysis

Qualitative indicators are those which measure the factors influencing the credibility of the company and most of which are subjective in their nature and valuation, are not quantifiable.

Although the financial ratios discussed above allows evaluating the credit situation of the firm, but this evaluation is not complete. For the assessment of the credibility of the firm necessary to analyze the factors which are not quantifiable. Unfortunately the nature of the majority of these factors and their assessment are subjective wherefore it is more difficult to manage these factors. However, this part of analysis in bonds based on the qualitative indicators is important and very often is the dividing line between effective and ineffective investment in bonds.

Groups of qualitative indicators/ dimensions:

➢ **Economic fundamentals** (the current economic climate – overall economic and industry-wide factors);

➢ **Market position** (market dominance and overall firm size: the larger firm – the stronger is its credit rating);

➢ **Management capability** (quality of the firm's management team);

➢ **Bond market factors** (term of maturity, financial sector, bond quality, supply and demand for credit);

➢ **Bond ratings** (relationship between bond yields and bond quality).

Analysis of *Economic fundamentals* is focused on the examining of business cycle, the macroeconomic situation and the situation of particular sectors / industries in the country's economy. The main aim of the economic analysis is to examine how the firm would be able to perform under the favorable and unfavorable conditions, because this is extremely important for the investor, when he/ she is attempting to evaluate his/ her risk buying the bonds of the firm.

Market position is described by the firm's share in the market and by the size of the firm. The other conditions being equal, the firm which share in the market is lager and which is larger itself generally has credit rating higher. The predominance of

the firm in the market shows the power of the firm to set the prices for its goods and services. Besides, the large firms are more effective because of the effect of the production scale, their costs are lower and it is easier for such firms overcome the periods of falls in prices. For the smaller firms when the prices are increasing they are performing well but when the markets are slumping – they have the problems. Thus it is important for the creditor to take it in mind.

Management capability reflects the performance of the management team of the firm. It is often very difficult to assess the quality of the management team, but the result of this part of analysis is important for the investor attempting to evaluate the quality of the debt instruments of the firm. The investors seeking to buy only high quality (that means – low risk) bonds most often are choosing only those firms managers of which follow the conservative policy of the borrowing. Contrary, the risk-taking investors will search for the firms which management uses the aggressive policy of borrowing and are running with the high financial leverage. In general the majority of the holders of the bonds first of all are want to know how the firm's managers control the costs and what they are doing to control and to strengthen the balance sheet of the firm (for this purpose the investor must analyze the balance sheet for the period of 3-5 years and to examine the tendencies in changes of the balance sheet main elements.

Bond market factors (term of maturity, financial sector, bond quality, supply and demand for credit); The investor must understand which factors and conditions have the influence on the yield and the prices of the bonds. The main factors to be mentioned are:

- **Term to maturity**. Generally term to maturity and the interest rate (the yield) of the bond are directly related; thus, the bonds with the longer term to maturity have the higher yield than the bonds with shorter terms to maturity.

- **The sector in the economy** which the issuer of the bonds represents. The yields of the bonds vary in various sectors of the economy; for example, generally the bonds issued by the utility sector firms generate higher yields to the investor than bonds in any other sector or government bonds.

- **The quality of the bonds**. The higher the quality of the bond, the lower the yield. For the bonds with lower quality the yield is higher.

- **The level of inflation;** the inflation decreases the purchasing power of the future income. Since the investors do not want to decrease their real yield generated from the bonds cash flows, they require the premium to the interest rate to compensate for their exposure related with the growing inflation. Thus the yield of the bond increases (or decreases) with the changes in the level of inflation.

- **The supply and the demand for the credit;** The interest rate o the price of borrowing money in the market depend on the supply and demand in the credit market; When the economy is growing the demand for the funds is increasing too and the interest rates generally are growing. Contrary, when the demand for the credits is low, in the period of economic crises, the interest rates are relatively low also.

Bond ratings. The ratings of the bonds sum up the majority of the factors which were examined before. A bond rating is the grade given to bonds that indicates their credit quality. Private independent rating services such as Standard & Poor's, Moody's and Fitch provide these evaluations of a bond issuer's financial strength, or it's the ability to pay a bond's principal and interest in a timely fashion. Thus, the role of the ratings of the bonds as the integrated indicator for the investor is important in the evaluation of yield and prices for the bonds. The rating of the bond and the yield of the bond are inversely related: the higher the rating, the lower the yield of the bond. Bond ratings are expressed as letters ranging from 'AAA', which is the highest grade, to 'C' ("junk"), which is the lowest grade. Different rating services use the same letter grades, but use various combinations of upper- and lower-case letters to differentiate themselves (see more information about the bond ratings in Annex 1 and the relevant websites of credit ratings agencies).

5.2.3. Market interest rates analysis

It s very important for the investor to the bonds to understand what causes the changes in the interest rates in the market in the different periods of time. We could observe frequent changes in the interest rates and the wide amplitude of it fluctuations during last decade, thus the interest rates became the crucial factor in managing fixed income securities portfolios as well as stock portfolios. The understanding of the macroeconomic processes and the causality of the various economic factors with the interest rates helps the investors to forecast the direction of the changes in interest

rates. At the macroeconomic level the relationship between the interest rate and the level of savings and investments, changes in government spending, taxes, foreign trade balance is identified.

Macroeconomic factors with positive influence to the interest rates (from the investors in bonds position - increase in interest rates):

- Increase in investments;
- Decrease in savings level;
- Increase in export;
- Decrease in import;
- Increase in government spending;
- Decrease in Taxes.

Macroeconomic factors with negative influence to the interest rates (from the investors in bonds position - decrease in interest rates):

- Decrease in investments;
- Increase in savings level;
- Decrease in export;
- Increase in import;
- Decrease in government spending;
- Increase in Taxes.

By observing and examining macroeconomic indicators presented above the investors can assess the situation in the credit securities market and to revise his/ her portfolio (the investment strategies in bonds will be discussed later in this chapter).

For interest rates forecasting purpose such tool as the term structure of interest rates is used. ***Term structure of interest rates*** is a yield curve displaying the relationship between spot rates of zero-coupon securities and their term to maturity. The resulting curve allows an interest rate pattern to be determined, which can then be used to explain the movements and to forecast interest rates. Unfortunately, most bonds carry coupons, so the term structure must be determined using the prices of these securities. Term structures are continuously changing, and though the resulting yield curve is usually normal, it can also be flat or inverted. Usually, longer term interest rates are higher than shorter term interest rates. This is called a *"normal yield curve".* A small or negligible difference between short and long term interest rates is

called a *"flat" yield curve.* When the difference between long and short term interest rates is large, the *yield curve* is said to be *"steep".*

The *3 main factors influencing the yield curve* are identified:

• market forecasts and expectations about the direction of changes in interest rates;

• presumable liquidity premium in the yield of the bond.

• market inefficiency or the turn from the long-term (or short-term) cash flows to the short-term (or long term cash flows.

On the bases of these key factors three ***interest rates term structure theories*** are developed to explain the shape of the yield curve.

1. The ***Market expectations theory***, which states that since short term bonds can be combined for the same time period as a longer term bond, the total interest earned should be equivalent, given the efficiency of the market and the chance for arbitrage (speculators using opportunities to make money). According to this theory, yield to maturity for the 5 year bond is simply the average of 1 year yield to maturity during next 5 years. Mathematically, the yield curve can then be used to predict interest rates at future dates.

2. The ***Liquidity preference theory***, which states that the profile of yield curve depends upon the liquidity premiums. If the investor does not consider short-term and long-term bonds as the good substitutes for the investments he / she may require the different yields to the maturity, similar to the stocks with high and low Beta. Thus, Liquidity preference theory states that the yield curve of interest term structure depends not only upon the market expectations, but upon the spread of liquidity premiums between shorter-term and longer-term bonds.

3. The ***Market segmentation theory*** is based on the understanding of market inefficiency in defining the prices of the bonds. This theory states that each segment in the bonds'market, identified on the basis of the yield to maturity of the bonds could be treated as independent segment from the others. These segments are represented by different groups of investors which are resolute about the necessity to invest in the bonds with this particular yield to maturity. These different groups of investors (for example – banks, insurance companies, non-financial firms, individuals, etc.) need to „employ" their funds for specific periods of time, hence a preference for long or short term bonds which is

reflected in the shape of the yield curve. An inverted curve can then be seen to reflect a definite investor preference for longer term bonds. The profile of terms structure will depend not on the market expectations or risk Premium but most often because of the changes in the direction of cash flows (similar to swing effect).

Investors in bonds often use yield curves in making investment decisions. Analyzing the changes in yield curves over the time provides the investors with information about future interest rate movements and how they an affect price behavior and comparative returns. For example, if the yield curve begins to rise sharply, it usually means that inflation is growing or is expected to grow in the nearest future. In this case investors can expect that interest rates will rise also. Under these conditions, the active investors will turn to short or intermediate maturities, which provide reasonable returns and minimize exposure to capital loss hen prices fall. Another example could be steep yield curves. They are generally viewed as a sign of bullish market. For aggressive investors in bonds this profile of the yield curve can be a signal to start moving into long-term bonds segment. Flatter yield curves, contrary, reduce the incentive for investing in long-term debt securities.

5.3. Decision making of investment in bonds. Bond valuation.

Selection of bond types relevant for investor and bond analysis are the important components of overall investment in bonds decision making process.

 Investment in bonds decision making process:

1. Selection of bond's type according to the investor's goals (expected income and risk).
2. Bond analysis (quantitative and qualitative).
3. ***Bond valuation.***
4. ***Investment decision making.***

In this section the third and the fourth components of the decision making process are examined.

In the bond market investment decisions are made more on the bond's yield than its price basis.

There are three widely used measures of the yield:

> ➢ Current Yield
>
> ➢ Yield-to-Maturity

➢ Yield- to- Call

Current yield (CY) is the simples measure of bond's return and has a imitated application because it measures only the interest return of the bond. The interpretation of this measure to investor: current yield indicates the amount of current income a bond provides relative to its market price. CY is estimated using formula:

$$CY = I / P_m, \qquad\qquad (5.5)$$

here: I - annual interest of the bond;

Pm - current market price of the bond

Yield- to- Maturity (YTM) is the most important and widely used measure of the bonds returns and key measure in bond valuation process. YTM is the fully compounded rate of return earned by an investor in bond over the life of the security, including interest income and price appreciation. YTM is also known as the ***promised-yield-to- maturity.*** Yield-to-maturity can be calculated as an internal rate of return of the bond or the discount rate, which equalizes present value of the future cash flows of the bond to its current market price (value). Then YTM of the bond is calculated from this equation:

$$P = \sum_{t=1}^{n} C_t / (1 + YTM)^t + P_n / (1 + YTM)^n, \qquad (5.6)$$

here: P - current market price of the bond;

n - number of periods until maturity of the bond;

C_t - coupon payment each period;

YTM - yield-to-maturity of the bond;

P_n - face value of the bond.

As the callable bond gives the issuer the right to retire the bond prematurely, so the issue may or may not remain outstanding to maturity. Thus the YTM may not always be the appropriate measure of value. Instead, the effect of the bond called away prior to maturity must be estimated. For the callable bonds the ***yield-to-call (YTC)*** is used. YTC measures the yield on the bond if the issue remains outstanding not to maturity, but rather until its specified call date. YTC can be calculated similar to YTM as an internal rate of return of the bond or the discount rate, which equalizes present value of the future cash flows of the bond to its current market price (value). Then ***YTC of the bond*** is calculated from this equation:

$$P = \sum_{t=1}^{m} C_t / (1 + YTC)^t + P_c / (1 + YTC)^m, \tag{5.7}$$

here: P -   current market price of the callable bond;

    n -   number of periods to call of the bond;

    C_t -   coupon payment each period before the call of the bond;

    YTC - yield-to-call of the bond;

    P_c -   call price of the bond.

But the result from the estimation of the yields using the current market price could be a relevant measure for investment decision making only for those investors who believe that the bond market is efficient (see chapter 3.4). For the others who do not believe that market is efficient, an important question is if the bond in the market is over valued or under valued? To answer this question the investor need to estimate the intrinsic value of the bond and then try to compare this value with the current market value. *Intrinsic value of the bond* (*V*) can be calculated from this equation:

$$V = \sum_{t=1}^{n} C_t / (1 + YTM_*)^t + P_n / (1 + YTM_*)^n, \tag{5.8}$$

here: YTM_* - appropriate yield-to-maturity for the bond, which depends on the investor's analysis – what yield could be appropriate to him/ her on this particular bond;

    n   -   number of periods until maturity of the bond;

    C_t -   coupon payment each period;

    P_n -   face value of the bond.

The *decision for investment in bond* can be made on the bases of two alternative approaches: (1) using the comparison of yield-to-maturity and appropriate yield-to-maturity or (2) using the comparison of current market price and intrinsic value of the bond (similar to decisions when investing in stocks). Both approaches are based on the capitalization of income method of valuation.

(1) approach:

➢ If YTM > YTM* - decision to buy or to keep the bond as it is under valuated;

➢ If YTM < YTM * - decision to sell the bond as it is over valuated;

➢ If YTM = YTM * - bond is valuated at the same range as in the market and its current market price shows the intrinsic value.

(2) approach:

➢ If P > V - decision to buy or to keep the bond as it is under valuated;

➢ If P < V - decision to sell the bond as it is over valuated;

➢ If P = V - bond is valuated at the same range as in the market and its current market price shows the intrinsic value.

5.4. Strategies for investing in bonds. Immunization

Two types of strategies investing in bonds:

➢   Passive management strategies;

➢   Active management strategies.

Passive bond management strategies are based on the proposition that bond prices are determined rationally, leaving risk as the portfolio variable to control. *The main features of the passive management strategies:*

• They are the expression of the little volatile in the investor's forecasts regarding interest rate and/ or bond price;

• Have a lower expected return and risk than do active strategies;

• The small transaction costs.

The passive bond management strategies include following two broad classes of strategies:

✓ Buy and hold strategies;

✓ Indexing strategies.

Buy and hold strategy is the most passive from all passive strategies. This is strategy for any investor interested in nonactive investing and trading in the market. An important part of this strategy is to choose the most promising bonds that meet the investor's requirements. Simply because an investor is following a buy-and-hold strategy does not mean that the initial selection is unimportant. An investor forms the diversified portfolio of bonds and does not attempt to trade them in search for the higher return. Following this strategy, the investor has to make the investment decisions only in these cases:

• The bonds held by investor lost their rating, it decreases remarkably;

• The term to maturity ended;

• The bonds were recalled by issuer before term to maturity.

Using **Indexing strategy** the investor forms such a bond portfolio which is identical to the well diversified bond market index. While indexing is a passive strategy, assuming that bonds are priced fairly, it is by no means a simply strategy. Each of the broad bond indexes contains thousands of individual bonds. The market indices are continually rebalanced as newly issued bonds are added to the index and existing bonds are dropped from the index as their maturity falls below the year. Information and transaction costs make it practically impossible to purchase each bond in proportion to the index. Rather than replicating the bond index exactly, indexing typically uses *a stratified sampling approach.* The bond market is stratified into several subcategories based on maturity, industry or credit quality. For every subcategory the percentage of bonds included in the market index that fall in that subcategory is computed. The investor then constructs a bond portfolio with the similar distribution across the subcategories.

There are various indexing methodologies developed to realize this passive strategy. But *for all indexing strategies the specific feature is that the return on bond portfolio formed following this strategy is close to the average bond market return.*

Active bond management strategies *are based on the assumption that the bonds market is not efficient and, hence, the excess returns can be achieved by forecasting future interest rates and identifying over valuate bonds and under valuated bonds.*

There are many different active bond management (speculative) strategies. The **main classes of active bond management strategies** are:

- ✓ The active reaction to the forecasted changes of interest rate;
- ✓ Bonds swaps;
- ✓ Immunization.

The essentiality of **the active reaction to the anticipated changes of interest rate** *strategy*: if the investor anticipates the decreasing in interest rates, he / she is attempting to prolong the maturity of the bond portfolio or duration, because long-term bonds' prices influenced by decrease in interest rates will increase more than short-term bonds' prices; if the increase in interest rates is anticipated, investor attempts to shorten the maturity of the bond portfolio or duration, by including more bonds with the shorter maturity of the portfolio.

*The essentiality of **bond swaps strategies*** is the replacement of the bond which is in the portfolio by the other bond which was not in the portfolio for the meantime. The aim of such replacement - to increase the return on the bond portfolio based on the assumptions about the tendencies of changes in interest rates. There are various types of swaps, but all are designed to improve the investor's portfolio position. The bond swaps can be:

- Substitution swap;
- Interest rate anticipation swap;
- Swaps when various bond market segments are used.

*The essentiality **of substitution swap:*** one bond in the portfolio is replaced ***by*** the other bond which fully suits the changing bond by coupon rate, term to maturity, credit rating, but suggests the higher return for the investor. The risk of substitution swap can be determined by the incorrect rating of the bonds and the exchange of the unequal bonds causing the loss of the investor.

Interest rate anticipation swap is based on one of the key features of the bond – the inverse relationship between the market price and the interest rate (this means that when the interest rates are growing, the bonds prices are decreasing and vice versa. The investor using this strategy bases on his steady belief about the anticipated changes of interest rates and attempts to change frequently the structure of his/ her bond portfolio seeking to receive the abnormal return from the changes in bonds' prices. This type of swaps is very risky because of the inexact and unsubstantiated forecasts about the changes in the interest rates.

Swaps when various bond market segments are used are based on the assessment of differences of yield for the bonds in the segregated bond market segments.

The differences of the yields in the bond market are called ***yield spreads*** and their existence can be explained by differences between

- Quality of bonds credit (ratings);
- Types of issuers of the bonds (government, company, etc.);
- The terms to maturity of the bonds (2 years, 5 years, etc.).

This strategy is less risky than the other swaps' strategies; however the return for such a portfolio is lower also.

The immunization is the strategy of immunizing (protecting) a bond portfolio against interest rate risk (i.e., changes in the general level of interest rates).Applying this strategy the investor attempts to keep the same duration of his portfolio.

Duration is the present value weighted average of the number of years over which investors receive cash flow from the bond. It measures the economic life or the effective maturity of a bond (or bond portfolio) rather than simply its time to maturity. Such concept, called duration (or **Macaulay's duration**) was developed by Frederick Macaulay. **Duration (Macaulay duration)** can be calculated using formula:

$$DR = \frac{\sum_{t=1}^{n} \{[C_t/(1+YTM)^t] \times t\} + [P_n/(1+YTM)^n] \times n}{P}, \qquad (5.9)$$

here: DR   -   duration (or Macaulay's duration);

      n   -   term to maturity, years;

      C_t -   interest rate of the bond during period t;

      P_n -   face value of the bond;

      YTM   -   yield-to-maturity of the bond;

      P   -   current market price of the bond.

The duration is expressed in years, because using formula (5.5) a weighted average of the number of years is calculated. Duration will always be less than time to maturity for bonds that pays coupon interest. For the zero coupon bonds the duration will be equal to the term to maturity.

The duration concept is the basis for **the immunization theory.** *A portfolio is said to be immunized if the duration of the portfolio is made equal to a selected investment horizon for the portfolio.* The immunization strategy will usually require holding bonds with the maturities in excess of the investment horizon in order to make the duration match the investment horizon. The duration of the portfolio consisting of several bonds can be calculated using the technique of weighted average, similar to calculation of portfolio expected rate of return:

$$DR_p = \sum_{i=1}^{n} w_i\, DR_i = w_1\, DR_1 + w_2\, DR_2 + \ldots + w_n\, DR_n, \qquad (5.10)$$

here w_i -   the proportion of the portfolio's initial value invested in bond i;

DR_i - the duration of bond i;

n - the number of bonds in the portfolio.

Summary

1. The main advantages of bonds to the investor: they are good source of current income; investment to bonds is relatively safe from large losses; in case of default bondholders receive their payments before shareholders can be compensated. A major disadvantage of bonds is that potential profit from investment in bonds is limited.

2. Currently in the financial markets there are a lot of various types of bonds and investor must understand their differences and features before deciding what bonds would be suitable for his/ her investment portfolio. Bonds can be classified by such features as form of payment, coupon payment, collateral, type of circulation, recall possibility, issuers.

3. Investment in bonds decision making process: (1) selection of bond's type according to the investor's goals (expected income and risk); (2) bond analysis (quantitative and qualitative); (3) bond valuation; (4) Investment decision making.

4. Quantitative analysis of bonds is based on the financial ratios which allow assessing the financial situation, debt capacity and credibility of the company – issuer of the bonds. Since the bonds are debt instruments and the investor in bonds really becomes the creditor the most important during analysis is the assessment of the credibility of the firm – issuer of the bonds. The most important financial ratios for the bond analysis are: Debt / Equity ratio; Debt / Cash flow ratio; Debt coverage ratio; Cash flow / Debt service ratio.

5. Quantitative analysis of bonds is based on the qualitative indicators which measure the factors influencing the credibility of the company and most of which are subjective in their nature and valuation, are not quantifiable. The main groups of qualitative indicators/ dimensions are: economic fundamentals (the current economic climate – overall economic and industry-wide factors); market position (market dominance and overall firm size: the larger firm – the stronger is its credit rating); management capability (quality of the firm's management team); bond market factors (term of maturity, financial sector, bond quality, supply and demand for credit); bond ratings (relationship between bond yields and bond quality).

6. The role of the bond ratings as the integrated indicator for the investor is important in the evaluation of yield and prices for the bonds. The bond rating and the yield of the bond are inversely related: the higher the rating, the lower the yield of the bond.

7. Macroeconomic factors, changes of which have an influence to the interest rates (increase or decrease), are: level of investment; savings level; export/ import; government spending; taxes.

8. Term structure of interest rates is a yield curve displaying the relationship between spot rates of zero-coupon securities and their term to maturity. The resulting curve allows an interest rate pattern to be determined, which can then be used to explain the movements and to forecast interest rates. The 3 main factors influencing the yield curve are identified: market forecasts and expectations about the direction of changes in interest rates; presumable liquidity premium in the yield of the bond; market inefficiency or the turn from the long-term (or short-term) cash flows to the short-term (or long term cash flows.

9. In the bond market investment decisions are made more on the bond's yield than its price basis. There are three widely used measures of the yield: Current Yield; Yield-to-Maturity; Yield- to- Call. Current Yield indicates the amount of current income a bond provides relative to its market price. Yield- to- Maturity is the fully compounded rate of return earned by an investor in bond over the life of the security, including interest income and price appreciation. Yield- to- Maturity is the most important and widely used measure of the bonds returns and key measure in bond valuation process. Yield-to-Call measures the yield on the bond if the issue remains outstanding not to maturity, but rather until its specified call date.

10. The decision for investment in bond can be made on the bases of two alternative approaches: (1) using the comparison of yield-to-maturity and appropriate yield-to-maturity or (2) using the comparison of current market price and intrinsic value of the bond (similar to decisions when investing in stocks). Both approaches are based on the capitalization of income method of valuation.

11. Using yield-to-maturity approach, if yield-to-maturity is higher than appropriate yield-to-maturity, bond is under valuated and investor's decision should be to buy or to keep bond in the portfolio; if yield-to-maturity is lower than appropriate yield-to-maturity, bond is over valuated and investor's decision should be not to

buy or to sell the bond; if yield-to-maturity is lower than appropriate yield-to-maturity, bond is valuated at the same range as in the market and its current market price shows the intrinsic value.

12. Two types of strategies investing in bonds: (1) passive management strategies; (2) active management strategies. Passive bond management strategies are based on the proposition that bond prices are determined rationally, leaving risk as the portfolio variable to control. Active bond management strategies are based on the assumption that the bonds market is not efficient and, hence, the excess returns can be achieved by forecasting future interest rates and identifying over valuate bonds and under valuated bonds.

13. The passive bond management strategies include two broad classes of strategies: "buy and hold" and indexing. "Buy and hold" is strategy for any investor interested in non active investing and trading in the market. An important part of this strategy is to choose and to buy the most promising bonds that meet the investor's requirements. Using Indexing strategy the investor forms such a bond portfolio which is identical to the well diversified bond market index.

14. The active reaction to the anticipated changes of interest rate is based on the investor's decision making in his/ her portfolio as reaction to the anticipated changes in interest rates.

15. The essentiality of bond swaps strategies is the replacement of the bond which is in the portfolio by the other bond which was not in the portfolio for the meantime. The aim of such replacement - based on the assumptions about the tendencies of changes in interest rates to increase the return on the bond portfolio. The bond swaps can be: Substitution swaps; Interest rate anticipation swap; Swaps when various bond market segments are used.

16. The immunization is the strategy of immunizing (protecting) a bond portfolio against interest rate risk (i.e., changes in the general level of interest rates). Applying this strategy the investor attempts to keep the same duration of his/her portfolio.

17. Duration is the present value weighted average of the number of years over which investors receive cash flow from the bond and it measures the economic life or the effective maturity of a bond (or bond portfolio) rather than simply its time to maturity.

Key-terms

- Active management strategies
- Asset-Backed Securities (ABS)
- Bond ratings
- Bonds swaps
- Buy and hold strategy
- Callable (redeemable) bonds
- Cash flow / Debt service ratio
- Convertible bonds
- Corporate bonds
- Coupon bonds
- Current Yield
- Debenture bonds
- Debt / Equity ratio
- Debt / Cash flow ratio
- Debt coverage ratio
- Deferred –interest bonds
- Duration (Macaulay duration)
- Full coupon bonds
- Floating-rate bonds
- External bonds
- Eurobonds
- General obligation bonds
- Gilt-edged bonds
- Guaranteed bonds
- Immunization
- Income bonds
- Industrial bonds
- Indexing strategy
- Indexed bonds
- Interchangeable bonds

- Internal bonds
- Intrinsic value of the bond
- Junior bonds
- Junk bonds
- Liquidity preference theory
- Market expectations theory
- Market segmentation theory
- Mortgage bonds
- Municipal bonds
- Noncallable (irredeemable) bonds
- Noninteresting bearing bonds
- Optional payment bonds
- Passive management strategies
- Participating bonds
- Public utility bonds
- Regular serial bonds
- Revenue bonds
- Quantitative indicators
- Qualitative indicators
- Secured bonds
- Senior bonds
- Sinking fund bonds
- Term structure of interest rates
- Treasury (government) bonds
- Unsecured bonds
- Voting bonds
- Yield-to-Call
- Yield-to-Maturity
- Zero-coupon bonds

Questions and problems

1. How the zero coupon bond provide returns to investors?

2. Is any mortgage bond or asset backed security necessarily a more secure investment than any debenture? Comment.

3. What features of the Eurobond market make Eurobonds attractive both for issuers and investors?

4. What is the purpose of bond ratings? If the bonds ratings are so important to the investors why don't common stock investors focus on quality ratings of the companies in making their investment decisions?

5. How would you expect interest rates to respond to the following economic events (what would be the direction of the interest rates changes)? Explain why.

   a) Increase in investments;

   b) Increase in savings level;

   c) Decrease in export;

   d) Decrease in import;

   e) Increase in government spending;

   f) Increase in Taxes.

6. Distinguish between an interest rate anticipation swap and a substitution swap.

7. What is a key factor in analyzing bonds? Why?

8. Distinquish between yield-to-call and yield-to-maturity.

9. What is the difference between the market expectation theory and the liquidity preference theory?

10. Bond with face value of 1000 EURO, 2 years time to maturity and 10 % coupon rate, makes semiannual coupon payments and provides 8% yield-to-maturity.

    a) Calculate the price of the bond.

    b) If the yield-to-maturity would increase to 9%, what will be the price of the bond? How this change in the yield-to-maturity would influence bond price?

11. The callable bond has a par value of 100 LT, 8% coupon rate and five years to maturity. The bond makes annual interest payment. Investor purchased this bond for 90 LT when it was issued in May 2008.

    a) What is the yield-to-maturity of this bond?

    b) What is the duration of this bond if currently its market price is 95 LT?

c) If this bond would be called in May 2010 for 98 LT, what would be the yield-to-call of this bond?

12. Investor plans his investments for the period of four years and selects for his portfolio two different bonds with the same face values:

• Bond A has 4 years time to maturity, 8% coupon rate, and 960 LT current market price.

• Bond B has 8 years time to maturity, 12% coupon rate, and 1085 LT current market price.

How should be bonds A and B allocated in the portfolio if the investor is using the immunization strategy?

13. Anna is considering investing in a bond currently selling in the market for 875 EURO. The bond has four years to maturity, a 1000 EURO face value and a 7% coupon rate. The next annual interest payment is due one year from today. The appropriate discount rate for the securities of similar risk is10%.

a) Estimate the intrinsic value of the bond. Based on the result of this estimation, should Ann purchase the bond? Explain.

b) Estimate the yield-to-maturity of the bond. Based on the result of this estimation, should Ann purchase the bond? Explain.

14. Using the resources available in your domestic investment environment select any 4 bonds issued by Government and corporations relevant to you.

a) Determine the current yield and yield-to maturity for each bond.

b) Assuming that you put an equal amount of money into each of 4 bonds selected, estimate the duration for the 4 bonds portfolio.

c) What would happen to this bond portfolio if (1) market interest rates increase by 1%; (2) market interest rates decrease by 1%.

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Relevant websites

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• www.standardpoors.com	Standard&Poors (bond credit ratings)
• www.ft.com/bonds&rates	The Financial Times (bonds)
• www.riskgrades.com	Risk Grades
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• http://www.bloomberg.com/markets/rates-bonds	Bloomberg
• http://www.investopedia.com/calculator/	Investopedia

6. Psychological aspects in investment decision making

Mini-contents

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The finance and investment decisions for some decades in the past are based on the assumptions that people make rational decisions and are unbiased in their predictions about the future. The modern portfolio theory as well as other theories, such as CAPM, APT presented in chapter 3, was developed following these assumptions. But we all know that sometimes people act in obvious irrational way and they do the mistakes in their forecasts for the future. Investors could be the case of irrational acting to. For example, people usually are risk averse, but the investors will take the risk if the expected return is sufficient. Over the past decade the evidence that psychology and emotions influence both financial and investment decisions became more and more convincing. Today not only psychologists but the economists as well agree that investors can be irrational. And the predictable decision errors can affect the changes in the markets. So it is very important to understand actual investors' behavior and psychological biases that affect their decision making. In this chapter some important psychological aspects and characteristics of investors' behavior are discussed.

6.1. Overconfidence

Overconfidence causes people to overestimate their knowledge, risks, and their ability to control events. Interestingly, people are more overconfident when they feel like they have control of the outcome – even when this clearly not the case, just the illusion. This perception occurs in investing as well. Even without information, people believe the stocks they own will perform better than stocks they do not own. However, ownership of a stock only gives the illusion of having control of the performance of the stock. Typically, investors expect to earn an above -average return.

Investing is a difficult process. It involves gathering information, information analysis and decision making based on that information. However, overconfidence causes us to misinterpret the accuracy of the information and overestimate our skills in analyzing it. It occurs after people experience some success. The self-attribution bias leads people to believe that successes are attributed to skill while failure is caused by bad luck. After some success in the market investors may exhibit overconfident behavior.

Overconfidence can lead investors to poor trading decisions which often manifest themselves as excessive trading, risk taking and ultimately portfolio losses. Their overconfidence increases the amount they trade because it causes them to be to certain about their opinions. Investors' opinions derive from their beliefs regarding accuracy of the information they have obtained and their ability to interpret it. Overconfident investors believe more strongly in their own valuation of a stock and concern themselves less about the believes of others.

Consider an investor who receives accurate information and is highly capable of interpreting it. The investor's high frequency of trading should result in high returns due to the individual's skill and the quality of the information. In fact, these returns should be high enough to beat a simple buy-and-hold strategy while covering the costs of trading. On the other hand, if the investor does not have superior ability but rather is suffering from a dose of overconfidence, then the high frequency of turnover will not result in portfolio returns large enough to beat the buy-and-hold strategy and cover costs.

Overconfidence–based trading is hazardous when it comes to accumulating wealth. High commission costs are not the only problem caused by excessive trading. It has been observed that overconfidence leads to trading too frequently as well as to purchase the wrong stocks. So, overconfidence can also cause the investor to sell a good –performing stock in order to purchase a poor one.

If many investors suffer from overconfidence at the sane time, then signs might be found within the stock market. Specifically, after the overall stock market increase, many investors may attribute their success to their own skill and become overconfident. This will lead to greater trading by a large group of investors and may impact overall trading volume on the stock exchanges. Alternatively, overall trading is lower after market declines. Investors appear to attribute the success of the good period

to their own skill and begin trading more. Poor performance makes them less overconfident and is followed by lower trading activity.

Overconfidence also affects investors' risk-taking behavior. Rational investors try to maximize returns while minimizing the amount of risk taken. However, overconfident investors misinterpret the level of risk they take. After all, if an investor is confident that the stocks picked will gave a high return, then there is risk? The portfolios of overconfident investors will have higher risk for two reasons. First is the tendency to purchase higher risk stocks. Higher risk sticks are generally from smaller, newer companies. The second reason is a tendency to under diversify their portfolio. Prevalent risk can be measured in several ways: portfolio volatility, beta and the size of the firms in the portfolio. Portfolio volatility measures the degree of ups and downs the portfolio experiences. High-volatility portfolios exhibit dramatic swings in price and are indicative of under diversification. A higher beta of the portfolio indicates that the security has higher risk and will exhibit more volatility than the stock market in general.

Overconfidence comes partially from the illusion of knowledge. This refers to the tendency for people to believe that the accuracy of their forecasts increases with more information; that is, more information increases one's knowledge about something and improves one's decisions. Using the Internet, today investors have access to huge quantities of information. This information includes historical data, such as past prices, returns, the firms' operational performance as well as current information, such as real-time news, prices, etc. However, most individual investors lack the training and experience of professional investors and therefore are less sure of how to interpret this information. That is, this information does not give them as much knowledge about the situation as they think because they do not have training to interpret it properly. Many individual investors realize they have a limited ability to interpret investment information, so they use the Internet for help. Investors can get analyst recommendations, subscribe to expert services, join news groups, etc. However, online investors need to take what they see on the screen, but not all recommendations really are from experts. However if investors perceive the messages as having increased their knowledge, they might be overconfident about their investment decisions.

Another important for investor psychological factor is the illusion of control. People often believe they have influence over the outcome of uncontrollable events. Early positive results give the investor greater illusion of control than early negative results. When a greater amount of information is obtained by investor, illusion of control is greater as well.

Overconfidence could be learned through the past success. The more successes the investors experience, the more they will attribute it to their own ability, even when much luck is involved. As a consequence, overconfident behavior will be more pronounced in bull markets than in bear markets (see Geervais, Odean, 2001).

6.2. Disposition effect

People usually avoid actions that create regret and seek actions that cause pride. Regret is the emotional pain that comes with realizing that a previous decision turned out to be a bad one. Pride is the emotional joy of realizing that a decision turned out well.

Avoiding regret and seeking pride affects person's behavior and this is the true for the investors' decisions too. Shefrin and Statman (1985) were the first economists who showed that fearing regret and seeking pride causes the investors to be predisposed to selling winners (potential stocks with growing market prices) to early and riding losers (stocks with the negative tendencies in market prices) too long. They call this the *disposition effect.*

Do the investors behave in a rational manner by more often selling losers or are investors affected by their psychology and have a tendency to sell their best stocks? Several empirical studies provide evidence that that investors behave in a manner more consistent with the disposition effect. Researchers (Shapira, Venezia, 2001; Chen, at al, 2007) have found the disposition effect to be pervasive. They found that the more recently the stock gains or losses occurred, the stronger the propensity was to sell winners and hold losers. Investors usually hold in their portfolios losers remarkably longer than winners.

The disposition effect not only predicts selling of winners but also suggests that the winners are sold too soon and the losers are held too long. How such investor behavior does affect the potential results from his investments? Selling winners to soon suggests that those stocks will continue to perform well after they are sold and holding losers too long suggests that those stocks will continue to perform poorly. The fear of

regret and the seeking of pride can affect investors' wealth in two ways: first, investors are paying more in taxes because of the disposition to sell winner instead of losers; second, investors earn a lower return on their portfolio because they sell the winners too early and hold poorly performing stocks that continue with decreasing market results.

Interesting are the results of some other studies (Nofsinger, 2001) in which individual investors' reaction to the news about the economy and about the company was investigated. Good news about the company that increases the stock price induces investors to sell stock (selling winners). And, controversially, bad news about the firm does not induce investors to sell (holding losers). This is consistent with avoiding regret and seeking pride. However, news about the economy does not induce investor trading. Investors are less likely than usual to sell winners after good economic news and these results are not consistent with the disposition effect. How such results could be explained? Investors' actions are consistent with the disposition effect for company news because the feeling with the disposition effect of regret is strong. In the case of economic news, investors have a weaker feeling of regret because the outcome is considered beyond their control. This leads to actions that are not consistent with the predictions of the disposition effect.

6.3. Perceptions of investment risk

People's perception of risk appears to vary. One important factor in evaluating a current risky decision is a past outcome: people are willing to take more risk after earning gains and less risk after losses.

After experiencing a gain or profit, people are willing to take more risk. After gaining big sum of money in gambling people don't fully consider the new money as their own. So, when they are taking additional risk they act as if they gamble with opponent's money (casino money). This is called as *"house-money" effect*. The "house-money" effect predicts that investors are more likely to purchase higher-risk stocks after locking in gain by selling stocks at a profit.

After experiencing a financial loss, people become less willing to take a risk. This effect is recognized as *"snakebite" effect* - the people remember this for a long time and become cautious. Likewise, after having their money lost people often feel they will be unsuccessful in the future too and they avoid taking risk in their investment decisions. For example, picking new stocks to the portfolio can give better

diversification of investors' portfolio, but if the newly purchased stocks quickly decline in price, the investor might feel snakebite effect and be afraid of picking stocks in his portfolio in the future.

But we can observe that sometimes losers don't avoid risk. Then losers use the chance to make up their losses. And the need for breaking even becomes to be stronger than the "snakebite" effect.

People without significant gains or losses prefer not to take the risk.

Examining the risks of the investor the ***endowment effect*** must be mentioned too. The endowment effect is when people demand much more to sell thing than they would be willing to pay to buy it. A closely related to endowment effect is a status quo bias - behavior of the people when they try to keep what they have been given instead of exchanging. How can endowment or status quo bias affect investors? People have tendency to hold the investments they already have. The status quo bias increases as the number of investment options increases. That means, the more complicated the investment decision that was needed becomes, the more likely the person is to choose to do nothing. In the real world investors face the choice of investing in thousands of companies stocks, bonds, other investment vehicles. All these possibilities may affect the investors, and as a result they often choose to avoid making a change. This can be a particular problem when the investments have lost money. We can observe such a behavior of the investors during last years.

Memory is discussed as one of the factors which could affect the investors' behavior too. Memory can be understood as a perception of the physical and emotional experience. These experiences for different people could be different. Memory has a feature of adaptively and can determine whether a situation experienced in the past should be desired or avoided in the future. Usually the people feel better about experiences with a positive peak and end. And the memory of the large loss at the end of the period is associated with a higher degree of emotional pain. For example, the investor feels better about those stocks in his portfolio which price increase dramatically at the end of the period and is more skeptical about other stocks which prices were constantly growing during all period. As a consequence, making decisions about these stocks for the following period the investor might be to optimistic about the stock with good short term results and to pessimistic about constantly growing stock.

Close related with the memory problems affecting the investors behavior is *cognitive dissonance*. Cognitive dissonance is based on evidence that people are struggling with two opposite ideas in their brains: "I am nice, but I am not nice". To avoid psychological pain people used to ignore or reject any information that contradicts with their positive self-image. The avoidance of cognitive dissonance can affect the investor's decision-making process in two ways. First, investor can fail to make important decisions because it is too uncomfortable to contemplate the situation. Second, the filtering of new information limits the ability to evaluate and monitor investor's decisions. Investors seek to reduce psychological pain by adjusting their beliefs about the success of past investment decisions. For example, if the investor made a decision to buy N company's stocks and over time information about the results of this company were good and validate the past decision, investor feels as "I am nice", but if the results of the picked-up company were not good ("I am not nice"), the investor tries to reduce the cognitive dissonance. The investor's brain will filter out or reduce the negative information about the company and fixate on the positive information. Investor remembers that he/she has done well regardless of the actual performance. And obviously it is difficult to evaluate the progress seeking for the investment goals objectively when assessment of past performance is biased upward.

6.4. Mental accounting and investing

People use financial budgets to control their spending. The brain uses mental budgets to associate the benefits of consumption with the costs in each mental account. *Mental budgeting* matches the emotional pain to the emotional joy. We can consider pain of the financial losses similar to the costs (pain) associated with the purchase of goods and services. Similarly, the benefits (joy) of financial gains is like the joy (or benefits) of consuming goods and services.

People do not like to make payments on a debt for a purchase that has already been consumed. For example, financing the vacation by debt is undesirable because it causes a long-term cost on a shot-term benefit. People show the preference for matching the length of the payments to the length of time the goods or services are used.

Economic theories predict that people will consider the present and future costs and benefits when determining a course of action. Contrary to these predictions, people

usually consider historic costs when making decisions about the future. This behavior is called the *"sunk-cost" effect*. The sunk cost effect might be defined as an escalation of commitment – to continue an endeavor once an investment in money or time has been made. The sunk costs could be characterized by size and timing. The size of sunk costs is very important in decision making: the larger amount of money was invested the stronger tendency for "keep going". The timing in investment decision making is important too: pain of closing a mental account without a benefit decreases with time – negative impact of sunk cost depreciates over time.

Decision makers tend to place each investment into separate mental account. Each investment is treated separately, and interactions are overlooked. Mental budgeting compounds the aversion to selling losers. As time passes, the purchase of the stock becomes a sunk cost. It may be less emotionally distressing for the investor to sell the losing stock later as opposed to earlier. When investors decide to sell a losing stock, they have a tendency to bundle more than one sale on the same day. Investors integrate the sale of losing stocks to aggregate the losses and limit the feeling of regret to one time period. Alternatively, investors like to separate the sale of the winning stocks over several trading sessions to prolong the feeling of joy (Lim, 2006).

Mental accounting also affects investors' perceptions of portfolio risks. The tendency to overlook the interaction between investments causes investors to misperceive the risk of adding a security to an existing portfolio. In fact, people usually don't think in terms of portfolio risk. Investors evaluate each potential investment as if it were the only one investment they will have. However, most investors already have a portfolio and are considering other investments to add to it. Therefore, the most important consideration for the evaluation is how the expected risk and return of the portfolio will change when a new investment is added. Unfortunately, people have trouble evaluating the interactions between their mental accounts. Standard deviation (see chapter 2.2) is a good measure of an investment's risk. However, standard deviation measures the riskiness of the investment, but not how the risk of the investment portfolio would change if the investment were added. It is not the level of risk for each investment that is important – the important measure is how each investment interacts with the existing portfolio. Mental accounting sets the bases for segregating different investments in separate accounts and each of them consider as alone, evaluating their gains or losses.

People have different mental accounts for each investment goal, and the investor is willing to take different levels of risk for each goal. Investments are selected for each mental account by finding assets that match the expected risk and return of the mental account. Each mental account has an amount of money designated for that particular goal. As a result, investor portfolio diversification comes from the investment goals diversification rather than from a purposeful asset diversification according to Markowitz portfolio theory. That means, that most investors do not have efficient portfolios and investors are taking too much risk for the level of expected return they are getting.

This mental accounting leads to other psychological biases, like the disposition effect.

6.5. Emotions and investments

How important might be the emotions in the investors' decision making? The investment decisions are complex and include risk and uncertainty. In recent years the psychologists as well as economists have examined the role of emotions in decision making. People who have stronger emotional reactions seem to let them impact their financial decisions. As some researchers conclude the more complex and uncertain a situation is, the more emotions influence a decision. Of course, the background feelings or mood may also influence investment decisions.

The mood affects the predictions of the people about the future. People often misattribute the mood they are in to their investment decisions. This is called **misattribution bias**. People who are in bad mood are more pessimistic about the future than people who are in a good mood. Translating to the behavior of investors it means that investors who are in good mood give a higher probability of good events/ positive changes happening and a lower probability of bad changes happening. So, good mood will increase the likelihood of investing in riskier assets and bad mood will decrease willingness to invest in risky assets. Even those investors who use quantitative methods such as fundamental analysis must use some assumptions estimating fair value of the stock. Given the influence of mood on uncertain decisions, the expected growth rate taken for estimations of value of the stock using DDM (dividend discount models, see chapter 4) may become biased and affect the overall result of estimated value of the stock. An investor who is in good mood may overestimate the growth rate and this would cause the investor to believe the stock is worth more than the believe of

unbiased investor. As a consequence for the optimistic investor in this case might be his decision to buy the stock which is underestimated based on his calculations, when in reality it is not. Similar, the investor who is in bad mood may underestimate growth rate and stock value based on his calculations shows the stock is overestimated, when it is not in reality. So, the investors making biased and mood-driven decisions might suffer losses.

Investors who are in a good mood can also suffer from too optimistic decisions. Optimizm could affect investors in two ways: first, investors tend to be less critical in making analysis for their decisions investing in stocks; second, optimistic investors tend to ignore the negative information about their stocks (even then they receive information about negative results of the company they were invested in they still believe that the company is performing well). This is why the price of the stock is frequently set up by the optimistic investors. Even if there are enough optimistic and pessimistic investors in the market, the optimists drive up the stock price with their buying, because pessimists are passive. For firms with the high degree of uncertainty optimistic investors tend to set the stock price until that uncertainty is resolved. The prospects of large, well established firms have less uncertainty and their stock prices are generally more reflective of actual prospects than of optimistic prospects of investors. (Nofsinger, 2008).

It is obvious that the weather has an influence on the mood of the people. Sunshine usually is associated with good mood and optimistic thinking and without sun people feel bad. Some studies were performed to answer the question how the weather might affect investors' behavior (Hirshleifer, Shumway, 2003). The researchers found that the daily returns for sunny days are higher than the daily returns for non sunny days. The results of this research allow to conclude that sunshine affects the investors that they become more optimistic and are used to buy rather than sell the stocks. Than this tendency prevails in the market the stock prices are growing.

The investors' behavior might be influenced by other factors which affect the emotions. Sport is investigated as one of such factors). The research results of Edmans, Garcia, Norli (2007) showed that stock market reaction to soccer game loss day after for losing team stock market was negative (decreasing). And the stock market reaction was stronger in countries which have positive historical results in soccer.

However general level of optimism and pessimism or social mood changes over time. as Nofsinger (2005) showed in his investigation. Investors tend to bee most optimistic when the market reaches the top and they are most pessimistic when market is at the bottom. This fluctuating social mood is defined as ***market sentiment.*** Knowing the phenomenon of market sentiment might allow to predict the returns in the market when investors become too optimistic on the top of the market or too pessimistic when market reaches its bottom.

A market bubble could be explained by the situation when high prices seem to be generated more by investors (traders in the market) optimism then by economic fundamentals. Extreme prices that seem to be at odds with rational explanations have occurred repeatedly throughout history.

Summary

1. Overconfidence causes people to overestimate their knowledge, risks, and their ability to control events. This perception occurs in investing as well. Even without information, people believe the stocks they own will perform better than stocks they do not own. Typically, investors expect to earn an above -average return.

2. Overconfidence can lead investors to poor trading decisions which often manifest themselves as excessive trading, risk taking and ultimately portfolio losses. If many investors suffer from overconfidence at the same time, then signs might be found within the stock market.

3. Overconfidence affects investors' risk-taking behavior. Rational investors try to maximize returns while minimizing the amount of risk taken. However, overconfident investors misinterpret the level of risk they take.

4. Avoiding regret and seeking pride affects person's behavior and this is called the disposition effect. Fearing regret and seeking pride causes the investors to be predisposed to selling winners (potential stocks with growing market prices) to early and riding losers (stocks with the negative tendencies in market prices) too long. Selling winners to soon suggests that those stocks will continue to perform well after they are sold and holding losers too long suggests that those stocks will continue to perform poorly.

5. The "house-money" effect predicts that after experiencing a gain or profit, people are willing to take more risk. The investors are more likely to purchase higher-risk stocks after locking in gain by selling stocks at a profit.

6. The "snakebite" effect predicts that *after* experiencing a financial loss, people avoid to take risk in their investment decisions.

7. The endowment effect is when people demand much more to sell thing than they would be willing to pay to buy it. A closely related to endowment effect is a status quo bias - behavior of the people when they try to keep what they have been given instead of exchanging. The status quo bias increases as the number of investment options increases. That means, the more complicated the investment decision that was needed becomes, the more likely the person is to choose to do nothing.

8. Memory can be understood as a perception of the physical and emotional experience. Memory has a feature of adaptivity and can determine whether a situation experienced in the past should be desired or avoided in the future. Usually the people feel better about experiences with a positive peak and end. And the memory of the large loss at the end of the period is associated with a higher degree of emotional pain.

9. Cognitive dissonance is based on evidence that people are struggling with two opposite ideas in their brains: "I am nice, but I am not nice". To avoid psychological pain people used to ignore or reject any information that contradicts with their positive self-image. The avoidance of cognitive dissonance can affect the investor's decision-making process. Investors seek to reduce psychological pain by adjusting their beliefs about the success of past investment decisions.

10. Mental budgeting matches the emotional pain to the emotional joy. The pain of the financial losses could be considered as similar to the costs (pain) associated with the purchase of goods and services. Similarly, the benefits (joy) of financial gains is like the joy (or benefits) of consuming goods and services.

11. People behavior which more consider historic costs when making decisions about the future is called the "sunk-cost" effect. The sunk cost effect might be defined as an escalation of commitment – to continue an endeavor once an investment in money or time has been made. The size of sunk costs is very important in decision making: the larger amount of money was invested the stronger tendency for "keep going".

12. People have different mental accounts for each investment goal, and the investor is willing to take different levels of risk for each goal. Investments are selected for each mental account by finding assets that match the expected risk and return of

the mental account. Each mental account has an amount of money designated for that particular goal. As a result, investor's portfolio diversification comes from the investment goals diversification rather than from a purposeful asset diversification according to the portfolio theory.

13. The mood affects the predictions of the people about the future. Misattribution bias predicts that people often misattribute the mood they are in to their decisions. People who are in bad mood are more pessimistic about the future than people who are in a good mood. Translating to the behavior of investors it means that investors who are in good mood give a higher probability of good events/ positive changes happening and a lower probability of bad changes happening.

14. General level of optimism and pessimism or social mood changes over time. Investors tend to bee most optimistic when the market reaches the top and they are most pessimistic when market is at the bottom. This fluctuating social mood is defined as market sentiment.

15. A market bubble could be explained by the situation when high prices seem to be generated more by investors (traders in the market) optimism then by economic fundamentals.

Key-terms

- Cognitive dissonance
- Disposition effect
- Emotions
- Endowment effect
- "House-money" effect
- Market bubble
- Market sentiment

- Memory
- Mental accounting
- Misattribution bias
- Overconfidence
- "Snakebite" effect
- "Sunk-cost" effect

Questions and problems

1. Why the portfolios of overconfident investors have a higher risk? Give the reasons.
2. Give the characteristic of the overconfident investor.
3. Why do the investors tend to sell losing stocks together, on the same trading session, and separate the sale of winning stocks over several trading sessions?
4. Explain how mental accounting is related with the disposition effect.

5. How do you understand the disposition effect?

6. Give the examples how „snakebite effect" influence the investors behavior.

7. The behavior of the people when they demand much more to sell thing than they would be willing to pay to buy it is understood as

      a) „Snakebite" effect

      b) „House-money" effect

      c) Endowment effect

      d) Disposition effect

      e) „Sunk-cost"effect.

8. Explain how the avoidance of cognitive dissonance can affect the investor's decision making process.

9. Give the examples how the emotions influence investors'decision making.

10. How could you define the market sentiment?

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7. Using options as investments

Mini contents

7.1. Essentials of options
7.2. Options pricing
7.3. Using options. Profit or loss on options
7.4. Portfolio protection with options. Hedging
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7.1. Essentials of options

Option   is a type of contract between 2 persons where one person grants the other person the right to buy or to sell a specific asset at a specific price within a specific time period. The most often options are used in the trading of securities.

Option buyer is the person who has received the right, and thus has a decision to make. Option buyer must pay for this right.

Option writer is the person who has sold the right, and thus must respond to the buyer's decision.

Types of option contracts:

- **call option.** It gives the buyer the right to buy (to call away) a specific number of shares of a specific company from the option writer at a specific purchase price at any time up to including a specific date.

- **put option.** It gives the buyer the right to sell (to put away) a specific number of shares of a specific company to the option writer at a specific selling price at any time up to including a specific date.

Option contract specifies four main items:

1. *The company* whose shares can be bought or sold;

2. *The number of shares* that can be bought or sold;

3. The purchase or selling price for those shares, known as the ***exercise price*** (or ***strike price***);

4. The date when the right to buy or to sell expires, known as ***expiration date.***

Types of call and put options:

- European options

- American options

European options can be exercised only on their expiration dates.

American options can be exercised any time during their life (defined by the option contract).

The major advantages of investing in options:

• possibility of hedging: using options the investor can "lock in the box" his/ her return already earned on the investment;

• the option also limits exposure to risk, because an investor can lose only a set amount of money (the purchase price of option);

• put and call options can be used profitably when the price of the underlying security goes up or down.

The major disadvantages of investing in options:

• the holder enjoys never interest or dividend income nor any other ownership benefit;

• because put and call options have limited lives, an investor have a limited time frame in which to capture desired price behavior;

• this investment vehicle is a bit complicated and many of its trading strategies are to complex for the non-professional investor.

Further in this chapter we focus only on some fundamental issues of investing in stock options including some most popular strategies.

7.2. Options pricing

The value of put or call options is closely related with the market value/ price of the security that underlies the option. This relationship is easily observed just before the expiration date of the option. The relationship between the intrinsic value of option and price of underlying stock graphically is showed in Fig. 1. (a – for call option, b – for put option). These graphs demonstrate the intrinsic value of the call and put options. In the case of call option (a), if the underlying stock price at the end of expiration period is less than the exercise price, intrinsic value of call option will be 0, because the investor does not use the option to buy the underlying stock at exercise price as he/ she can buy it for more favorable price in the market. But if the underlying stock price at the end of expiration period is higher than the exercise price, intrinsic value of call option will be positive, because the investor will use call option to buy the underlying stock at exercise price as this price is more favorable (lower) than price in the market. However it is not necessarily for the option buyer to exercise this option.

Instead the option writer can simply to pay buyer the difference between the market price of underlying stock and exercise price. In the case of put option (b), if the underlying stock price at the end of expiration period is higher than the exercise price, intrinsic value of put option will be 0, because the investor does not use the option to sell the underlying stock at exercise price as he/ she can sell it for more favorable price in the market. But if the underlying stock price at the end of expiration period is lower than the exercise price, intrinsic value of put option will be positive, because the investor will use put option to sell the underlying stock at exercise price as this price is more favorable (higher) than price in the market. In both cases graphs a and b demonstrates not only the intrinsic value of call and put options at the end of expiration date, but at the moment when the option will be used.

a) Value of a Call   b) Value of a Put
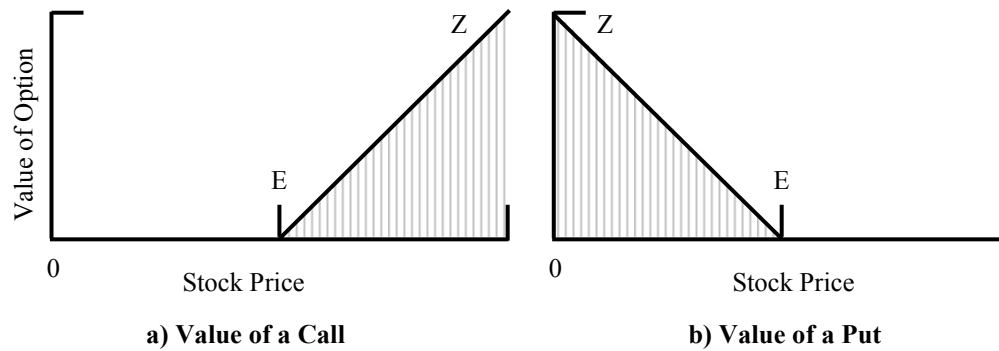
Fig. 7.1. Intrinsic value of option

Exploring the same understanding of the intrinsic value of the call/ put option as it was examined above*, **intrinsic value of the call/put options** can be more precisely estimated using analytical approach:*

$$IV_c = \max \{ 0, \ P_s - E \}, \tag{7.1}$$

$$IV_p = \max \{ 0, \ E - P_s \}, \tag{7.2}$$

here: IV_c - intrinsic value of the call option;

   IV_p - intrinsic value of the put option;

   P_s - the market price of the underlying stock;

   E - the exercise price of the option;

   max - means to use the larger of the two values in brackets.

When evaluating the call and put options market professionals frequently use the terms „in the money", „out of money", „at the money". In table 7.1 these terms together with their application in evaluation of call and put options are presented. These terms are

much more than only exotic terms given to options - they characterize the investment behavior of options.

Table 7.1.

The intrinsic value of call and put options

Stock price > Exercise price		
	Call option	**Put option**
Intrinsic value	Stock price – Exercise price	Zero
Evaluation of the option	"In the money"	"Out of money"
Stock price < Exercise price		
	Call option	**Put option**
Intrinsic value	Zero	Exercise price - Stock price
Evaluation of the option	"Out of money"	"In the money"
Stock price = Exercise price		
	Call option	**Put option**
Intrinsic value	Zero	Zero
Evaluation of the option	"At the money"	"At the money"

Intrinsic values of put and call options, estimated **using** formulas 7.1 and 7.2 reflect what an option should be worth. In fact, options very rarely trade at their intrinsic values. Instead, they almost always trade at the price that exceeds their intrinsic values. Thus, put and call options nearly always are traded at the premium prices. ***Option premium*** is the quoted price the investor pays to buy put or call option. Option premium is used to describe the market price of option.

The time value (TV) reflects the option's potential appreciation and can be calculated as the difference between the option price (or premium, P_{op}) and intrinsic value (IV_{op}):

$$TV = P_{op} - IV_{op} \tag{7.3}$$

Thus, **the premium for an option** can be understood as the sum of its intrinsic value and its time value:

$$P_{op} = IV_{op} + IV_{op} \tag{7.4}$$

7.3. Using options. Profit and loss on options.

Fig.7.1 shows the intrinsic values of call and put options at expiration. However, for the investor even more important is the question, what should be his/ her profit (or loss) from using the option? In order to determine profit and loss from buying or writing these options, the premium involved must be taken into consideration. Fig.7.2, 7.3, 7.4 demonstrates the profits or losses for the investors who are engaged in some of the option strategies. Each strategy assumes that the underlying stock is selling for the same price at the time an option is initially bought or written.

Outcomes are shown for each of 6 strategies. Because the profit obtained by a buyer of option is the writer's loss and vice versa, each diagram in Fig. 7.2, 7.3 and 7.4 has a corresponding mirror image.

Fig. 7.2 shows the profits and losses associated with buying and writing a call respectively. Similarly, Fig.7.3 shows the profits and losses associated with buying and writing a put, respectively. If we look at the graphs in these figures we identify that the kinked lines representing profits and losses are simply graphs of the intrinsic value equations (7.1. 7.2), less the premium of the options.

Thus, the profit or loss of using options is defined as difference between the intrinsic value of the option and option premium:

Profit (or loss) on call option $= IV_c - P_{op} = \max\{0, P_s - E\} - P_{op} =$
$$= \max\{-P_{op}, P_s - E - P_{cop}\}, \quad (7.5)$$

Profit (or loss) on put option $= IV_p - P_{op} = \max\{0, E - P_s\} - P_{op} =$
$$= \max\{-P_{op}, E - P_s - P_{pop}\}, \quad (7.6)$$

here P_{cop} - premium on call option;
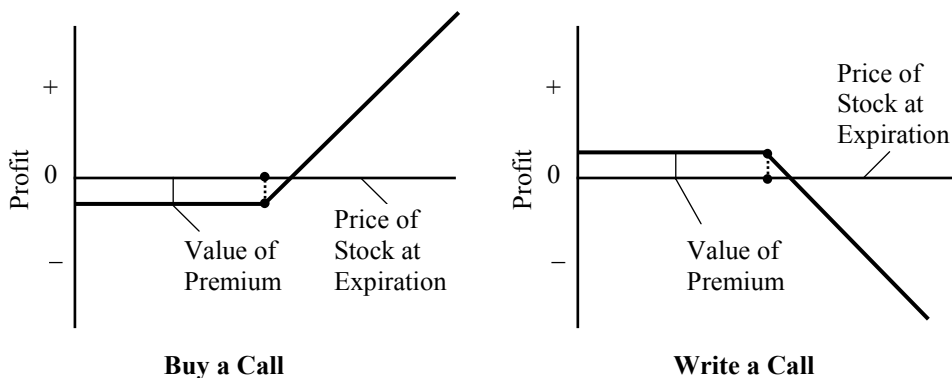P_{pop} - premium on put option.

Fig. 7.2. Profit/ loss on the call options
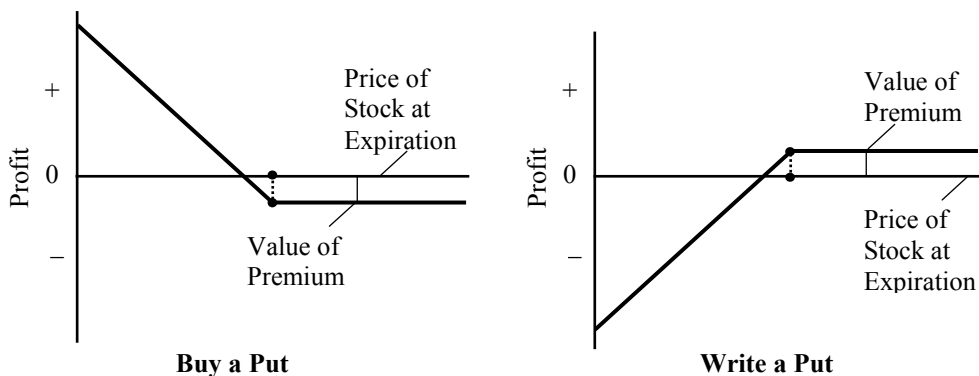
Fig. 7.3. Profit/ loss on the put options

Fig. 7.4 illustrates a more complicated option strategy known as ***straddle.*** This strategy involves buying (or writing) both a call and put options on the same stock, with the options having the same exercise price and expiration date. The graph in Fig. 7.4 representing profit and loss from the strategy "Buy a put and a call" can be easily derived by adding the profits and the losses shown in Fig. 7.2 (Buy call) and 7.3 (Buy put); profit and loss from the strategy "Write a put and a call" can be derived by adding the profits and the losses shown in Fig. 7.2 (Write call) and 7.3 (Write put).

**Buy a Put and a Call
(i.e., a Straddle)**

**Write a Put a Call
(i.e., a Straddle)**
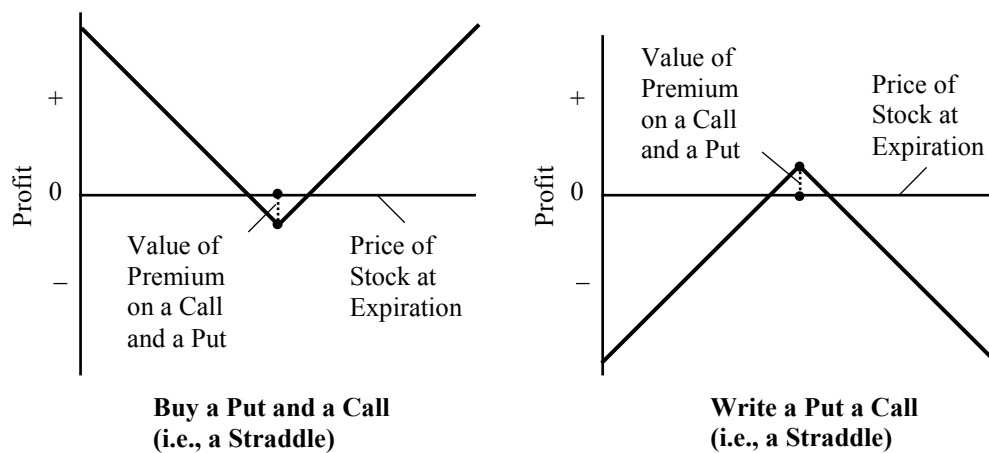
Fig. 7.4. Profit/ loss on a straddles

For more precise valuation of options some fairly sophisticated options pricing models have been developed. The most famous of them is ***Black-Scholes model for estimating the fair value of the call options*** published by Black and Scholes in 1973.

5 main parameters used in Black-Scholes model:

1. Continuously compounded risk free rate of return expressed on the annual basis;

2. Current market price of the underlying stock;

3. Risk of the underlying common stock, measured by the standard deviation of the continuously compounded annual rate of return on the stock;

4. Exercise price of the option;

5. Time remaining before expiration, expressed as a fraction of a year.

Many active options traders use the complex formulas of this model (see Annex 2) to identify and to trade over- and under valuated options.

7.4. Portfolio protection with options. Hedging.

Hedging with options is especially attractive because they can give protection against loss or the stock protects the option against loss.

A *hedger* is an individual who is unwilling to risk a serious loss in his or her investing position and takes the actions in order to avoid or lessen loss.

Using options to reduce risk. Suppose the investor currently holds the shares of the company X in his portfolio. The price of the share is 8,5 EURO. Looking to the future the investor is not sure in what direction the price of the share will change. If the price will grow, may be to 9 EURO, by holding these shares investor could receive the profit.   But if the price will fall, may be to 8 EURO, the investor could suffer the loss. One way to avoid this downside risk is to sell the shares. The problem is that the investor may regret this action if the fall of the price of the share does not occur and investor has forgone the opportunity to earn a profit. An alternative approach is to retain the shares and buy a put option. This option will rise in value as the share price falls. If the share price increases the investor gains from his/ her underlying shareholding.

The hedging reduces the dispersion of possible outcomes to the investor. There is a floor below which losses cannot be increased, while on the upside the benefits form any increasing in the price of the share is reduced due to the option premium paid. But if the price of the share stands still 8,5 EURO, however, the investor may feel that the option premium he/ she paid to insure against an adverse movement at 0,85 EURO or 10 percent of the share price was excessive. If the investor will keep buying this type of "insurance", though it can reduce investor's portfolio returns during the longer time (for example, a year), substantially.

Using options to reduce losses. Suppose that the investor wants to buy the attractive shares of company B to his / her portfolio. The current market price of this share is 9 EURO. The investor is fairly sure that this share will rise in price, but is not so confident as to discount possibility of a fall in price. May be the price of the share fall to 8,5 EURO? How could the investor behave? He/ she can either exercise a direct purchase of these shares in the market at current price or to purchase a call options with underlying stock of company B. If the price of the share does fall significantly, the size of the loss is greater with the share purchase, because the option loss is limited to the option premium paid.

Hedging portfolios of shares using index options. Large investors usually manage varied portfolios of shares so, rather than hedging individual shareholdings with options they may hedge their portfolios through the options on the entire index of shares

Index option is based on stock index instead of an underlying stock. When index option is exercised, settlement is made by cash payment, not delivery of shares. The most often index options are settled on the bases of such indexes as Standard&Poor's 500 (USA); FTSE 100 (UK); DAX (Germany), CAC (France), etc.

Suppose, the investor manage a well diversified portfolio of shares and currently is concerned that the market may fall over the next 3 months. One of possible investment strategies for the investor is to buy the put option on the stock index. If the market does fall, losses on the portfolio will be offset by gains on the value of the index put option. If the portfolio is unhedged, the investor suffers from the market fall substantially. But it is important to remember about the expenses of the insurance of portfolio: when the options premiums are high (during periods of market volatility caused by economic crises), hedging of the portfolio of stocks with index options over longer period could be expensive.

Using hedging strategies very important characteristic is the hedge ratio of the portfolio. ***Hedge ratio*** *is a number of stocks to buy or sell with options such that the future portfolio value is risk-free.* ***The hedged portfolio*** consists of m purchased shares and n options written (issued) on these shares.

Hedge ratio (HR) can be estimated using formula:

$$HR = m\ /\ n, \tag{7.5}$$

here: m - number of shares in the portfolio;

  n - a number of options written on the shares in the portfolio.

Riskless (perfect) hedge is when for m and n are chosen such a values which allow in each moment given to compensate the decrease in prices of the stocks by increase in value of options. This meaning of hedge ratio is called as a ***perfect hedge ratio.*** But *perfect hedge ratio could be achieved only under following assumptions:*

- There are no transaction costs in the market;
- There are no taxes;
- The numbers of all traded securities is unlimited (including   fractional numbers);

- All the securities are available for trading permanently (24 hours) and at any moment.

It is obvious that today even in the high developed markets these assumptions can not be realized. Thus any hedged portfolio and its hedge ratio reflects only the particular level of the "insurance" of the investor against the market risk.

Summary

1. Option is a type of contract between 2 persons where one person grants the other person the right to buy or to sell a specific asset at a specific price within a specific time period. The most often options are used in the trading of securities.

2. Two main types of option contracts: call option and put option. Call option gives the buyer the right to buy (to call away) a specific number of shares of a specific company from the option writer at a specific purchase price at any time up to including a specific date. Put option gives the buyer the right to sell (to put away) a specific number of shares of a specific company to the option writer at a specific selling price at any time up to including a specific date.

3. The most important characteristics of option contract are exercise price (or strike price) and expiration date. Exercise price is the purchase or selling price for the underlying shares. Expiration date defines the time than the option contract expires.

4. Regarding the condition when the option contract can be exercised two types of call/ put options exist. European options can be exercised only on their expiration dates. American options can be exercised any time during their life (defined by the option contract).

5. The major advantages of investing in options are the possibility of hedging; an investor can lose only a set amount of money (the purchase price of option); options can be profitably when the price of the underlying security goes up or down.

6. The major disadvantages of investing in options: the holder enjoys never interest or dividend income nor any other ownership benefit; an investor has a limited time frame in which to capture desired price behavior; this investment vehicle is a bit complicated and many of its trading strategies are to complex for the non-professional investor.

7. The value of put or call options is closely related with the market value/ price of the security that underlies the option.

8. Intrinsic value for call option will be 0, if the underlying stock price at the end of expiration period is less than the exercise price, intrinsic value of call option will be positive, if the underlying stock price at the end of expiration period is higher than the exercise price, because the investor will use call option to buy the underlying stock at exercise price as this price is more favorable (lower) than price in the market.

9. Intrinsic value for put option will be 0, if the underlying stock price at the end of expiration period is higher than the exercise price, intrinsic value of put option will be positive, if the underlying stock price at the end of expiration period is lower than the exercise price, because the investor will use put option to sell the underlying stock at exercise price as this price is more favorable (higher) than price in the market.

10. „In the money"is a situation in which strike price of the option is below the market price of underlying stock for a call, or the strike price is above the market price of the underlying stock for a put.

11. „Out of money"is a situation in which strike price of the option is above the market price of underlying stock for a call, or the strike price is below the market price of the underlying stock for a put.

12. „At the money"is used to denote an option (put or call) whose strike price is at or near the price of underlying stock.

13. Option premium is the quoted price the investor pays to buy put or call option. Option premium is used to describe the market price of option.

14. The time value reflects the option's potential appreciation and can be calculated as the difference between the option price (premium) and intrinsic value.

15. The profit or loss of using options is defined as difference between the intrinsic value of the option and option premium.

16. Black-Scholes model is developed for estimating the fair value of the call options. 5 main parameters used in Black-Scholes model are: (1) continuously compounded risk free rate of return expressed on the annual basis; (2) current market price of the underlying stock; (3) risk of the underlying common stock, measured by the standard deviation of the continuously compounded annual rate of return on the

stock; (4) exercise price of the option; (5) time remaining before expiration, expressed as a fraction of a year.

17. Option strategy known as straddle involves buying (or writing) both a call and put options on the same stock, with the options having the same exercise price and expiration date.

18. Hedging with options is especially attractive because they can give protection against loss or the stock protects the option against loss. Hedging reduces the dispersion of possible outcomes to the investor. There is a floor below which losses cannot be increased, while the size of the loss would be limited to the option premium paid.

19. Index option is based on stock index instead of an underlying stock. When index option is exercised, settlement is made by cash payment, not delivery of shares.

20. Using hedging strategies very important characteristic is the hedge ratio of the portfolio. Hedge ratio is a number of stocks to buy or sell with options such that the future portfolio value is risk-free.

21. Riskless (perfect) hedge is such a hedge which allows in each moment given to compensate the decrease in prices of the stocks by increase in value of options.

Key-terms

- American options
- „At the money"
- Black-Scholes model
- Call option
- European options
- Exercise price (strike price)
- Expiration date
- „In the money"
- Intrinsic value of option
- Hedger
- Hedging
- Hedge ratio

- Option
- Option buyer
- Option premium
- Option writer
- „Out of money"
- Riskless (perfect) hedge
- Perfect hedge ratio
- Put option
- Profit or loss on option
- Straddle
- Time value
- Underlying security

Questions and problems

1. Distinguish between a put and a call.

2. What does it mean to say „an option buyer has a right but not an obligation?

3. Explain the following terms used with the options:

     a) „In the money"

     b) „Out of money"

     c) „At the money"

4. What is the difference between option premium and option price?

5. What is the relationship between option prices and their intrinsic value?

6. Why is the call or put writer's position considerably different from the buyer's position?

7. What is an index option? What are the main differences between index option and stock option?

8. How can a put used to protect a particular investor's position?

9. What is the maximum amount the buyer of an option can lose?

10. Draw the profit/ loss graph for the following option strategies:

     a) Buy a put with 3 EURO premium and 70 EURO exercise price;

     b) Write a call with 2 EURO premium and 50 EURO exercise price.

11. Robert has only one day left to decide whether to exercise a call option on the Company X stock, which he purchased six months ago for 300 dol. (3 dol. per share). The call option exercise price is 54 dol.

    a) For what range of stock price should Robert exercise the call on the last day of the call life?

    b) For what range of stock price would Robert realize a loss (including the premium paid for the call option)?

12. Using information about several call and put options in the table below, identify, which of these options are „in the money", „at the money" or „out of money" and fulfill the last column in the table.

Type of option	Exercise price	Premium	Current price of underlying stock	Your evaluation
Call	18	0,25	19,50	
Put	30	0,50	31,20	
Call	24	0,25	21,40	
Call	45	0,30	46,10	
Put	60	1,25	56,25	
Call	20	0,25	20,00	

Put	35	1,00	37,80	
Put	20	0,80	17,60	
Call	65	0,50	65,50	

13. Using information in the table above calculate the profit or loss for each option contract, if they would be exercised.

14. Assume you hold a well-diversified portfolio of common stocks. Under what conditions might you want to hedge it using a stock index option?

   a) Explain how these options can be used for hedging.

   b) What happens with your hedged portfolio if the stock market will fall?

   c) What happens with your hedged portfolio if the stock market will grow?

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Relevant websites

- www.fow.com   Futures and options world
- http://www.advfn.com   ADVFN
- www.bloomberg.com   Bloomberg
- www.euronext.com   Information and learning tools from NYSE Liffe to help the private investors

8. Portfolio management and evaluation

Mini content

8.1. Active versus passive portfolio management

8.2. Strategic versus tactical asset allocation

8.3. Monitoring and revision of the portfolio

8.4. Portfolio performance measures.

Summary

Key-terms

Questions and problems

References and further readings

8.1. Active versus passive portfolio management

2 types of investment portfolio management:

- Active portfolio management
- Passive portfolio management

The main points for the *passive portfolio management:*

- holding securities in the portfolio for the relatively long periods with small and infrequent changes;
- investors act as if the security markets are relatively efficient. The portfolios they hold may be surrogates for the market portfolio (index funds).
- passive investors do not try outperforming their designated benchmark.

The reasons when the investors with passive portfolio management make changes in their portfolios:

- the investor's preferences change;
- the risk free rate changes;
- the consensus forecast about the risk and return of the benchmark portfolio changes.

The main points for the *active portfolio management:*

- active investors believe that from time to time there are mispriced securities or groups of securities in the market;
- the active investors do not act as if they believe that security markets are efficient;

- the active investors use deviant predictions – their forecast of risk and return differ from consensus opinions.

Table 8.1

Active versus passive investment management

Area of comparisons	Active investment management	Passive investment management
Aim	To achieve better results then average in the market	To achieve the average market results
Strategies used and decision making	Short term positions, the quick and more risky decisions; keeping the "hot" strategy	Long term positions, slow decisions
Investor/manager	tense	laid-back
Taxes and turnover of investment portfolio	High taxes, relatively high turnover of portfolio	Low taxes, small turnover of portfolio
Performance results before costs and taxes	In average equal to the passively managed portfolios	In average equal to the actively managed portfolios
Performance results after costs and taxes	In average lower than market index after taxes	In average higher than the results of actively managed portfolio returns after taxes
Individual investors*	Over 85 % from total individual investors	Over 15 % from total individual investors
Institutional investors*	Over 56% from total institutional investors	Over 44% from total institutional investors
Supporters	All brokerage firms, investment funds, hedging fund, specialized investment companies	Passively managed pension funds, index funds
Analytical methods	Qualitative: avoiding risk, forecasts, emotions, intuition, success, speculation, gambling	Quantitative: risk management, long term statistical analysis, precise fundamental analysis

*Source: Statistical Data of Treasury Department USA, 2006.
Compiled by author on the basis of Cianciotto, 2008; Arnerich, Arnston, Perkins, Pruit at al. (2007); Voicu (2008); Wellington (2002), Sharpe (1993).

There are arguments for both active and passive investing though it is probably a case that a larger percentage of institutional investors invest passively than do individual investors. Of course, the active versus passive investment management decision does not have to be a strictly either/ or choice. One common investment strategy is to invest passively in the markets investor considers to be efficient and actively in the markets investor considers inefficient. Investors also combine the two by investing part of the portfolio passively and another part actively. Some active and passive management strategies commonly used for stocks and bonds portfolios were discussed in Chapters 4.4 and 5.4.

8.2. Strategic versus tactical asset allocation

An asset allocation focuses on determining the mixture of asset classes that is most likely to provide a combination of risk and expected return that is optimal for the investor. Asset allocation is a bit different from diversification. It focus is on investment in various asset classes. Diversification, in contrast, tends to focus more on security selection – selecting the specific securities to be held within an asset class. *Asset classes* here is understood as groups of securities with similar characteristics and properties (for example, common stocks; bonds; derivatives, etc.). Asset allocation proceeds other approaches to investment portfolio management, such as market timing (buy low, sell high) or selecting the individual securities which are expected will be the "winners". These activities may be integrated in the asset allocation process. But the main focus of asset allocation is to find such a combination of the different asset classes in the investment portfolio which the best matches with the investor's goals – expected return on investment and investment risk. Asset allocation largely determines an investor's success or lack thereof. In fact, studies have shown that as much as 90 % or more of a portfolio's return comes from asset allocation. Furthermore, researchers have found that asset allocation has a much greater impact on reducing total risk than does selecting the best investment vehicle in any single asset category.

Two categories in asset allocation are defined:

➢ Strategic asset allocation;

➢ Tactical asset allocation.

Strategic asset allocation identifies asset classes and the proportions for those asset classes that would comprise the normal asset allocation. Strategic asset allocation is used to derive long-term asset allocation weights. The fixed-weightings approach in strategic asset allocation is used. Investor using this approach allocates a fixed percentage of the portfolio to each of the asset classes, of which typically are three to five. Example of asset allocation in the portfolio might be as follows:

Asset class	Allocation
Common stock	40%
Bonds	50%
Short-term securities	10%
Total portfolio	100%

Generally, these weights are not changed over time. When market values change, the investor may have to adjust the portfolio annually or after major market moves to maintain the desired fixed-percentage allocation.

Tactical asset allocation produces temporary asset allocation weights that occur in response to temporary changes in capital market conditions. The investor's goals and risk- return preferences are assumed to remain unchanged as the asset weights are occasionally revised to help attain the investor's constant goals. For example, if the investor believes some sector of the market is over- or under valuated. The passive asset allocation will not have any changes in weights of asset classes in the investor's portfolio – the weights identified by strategic asset allocation are used.

Alternative asset allocations are often related with the different approaches to risk and return, identifying conservative, moderate and aggressive asset allocation. The conservative allocation is focused on providing low return with low risk; the moderate – average return with average risk and the aggressive – high return and high risk. The example of these alternative asset allocations is presented in Table 8.2.

Table 8.2.

Comparison between the alternative asset allocations

Asset class	Alternative asset allocation		
	Conservative	Moderate	Aggressive
Common stock	20%	35%	65%
Bonds	45%	40%	20%
Short-term securities	35%	15%	5%
Total portfolio	100%	100%	100%

For asset allocation decisions *Markowitz portfolio model* as a selection techniques can be used. Although Markowitz model (see Chapter 3.1) was developed for selecting portfolios of individual securities, but thinking in terms of asset classes, this model can be applied successfully to find the optimal allocation of assets in the portfolio. Programs exist to calculate efficient frontiers using asset classes and Markowitz model is frequently used for the asset allocation in institutional investors' portfolios.

The correlation between asset classes is obviously a key factor in building an optimal portfolio. Investors are looking to have in their portfolios asset classes that are negatively correlated with each other, or at least not highly positively correlated with each other (see Chapter 2.2). It is obvious that correlation coefficients between asset classes returns change over time. It is also important to note that the historical correlation between different asset classes will vary depending on the time period chosen, the frequency of the data and the asset class, used to estimate the correlation. Using not historical but future correlation coefficients between assets could influence

the results remarkably, because the historical data may be different from the expectations.

8.3. Monitoring and revision of the portfolio

Portfolio revision is the process of selling certain issues in portfolio and purchasing new ones to replace them. *The main reasons for the necessity of the investment portfolio revision:*

•   As the economy evolves, certain industries and companies become either less or more attractive as investments;

•   The investor over the time may change his/her investment objectives and in this way his/ her portfolio isn't longer optimal;

•   The constant need for diversification of the portfolio. Individual securities in the portfolio often change in risk-return characteristics and their diversification effect may be lessened.

*Three areas to monitor when implementing **investor's portfolio monitoring:***

1.   Changes in market conditions;

2.   Changes in investor's circumstances;

3.   Asset mix in the portfolio.

The need to monitor changes in the market is obvious. Investment decisions are made in dynamic investment environment, where changes occur permanently. The key macroeconomic indicators (such as GDP growth, inflation rate, interest rates, others), as well as the new information about industries and companies should be observed by investor on the regular basis, because these changes can influence the returns and risk of the investments in the portfolio. Investor can monitor these changes using various sources of information, especially specialized websites (most frequently used are presented in relevant websites). It is important to identify he major changes in the investment environment and to assess whether these changes should negatively influence investor's currently held portfolio. If it so investor must take an actions to rebalance his/ her portfolio.

When monitoring the changes in the investor's circumstances, following aspects must be taken into account:

•   Change in wealth

•   Change in time horizon

•   Change in liquidity requirements

- Change in tax circumstances
- Change in legal considerations
- Change in other circumstances and investor's needs.

Any changes identified must be assessed very carefully before usually they generally are related with the noticeable changes in investor's portfolio.

Rebalancing a portfolio is the process of periodically adjusting it to maintain certain original conditions. Rebalancing reduces the risks of losses – in general, a rebalanced portfolio is less volatile than one that is not rebalanced. Several methods of rebalancing portfolios are used:

➢ Constant proportion portfolio;

➢ Constant Beta portfolio;

➢ Indexing.

Constant proportion portfolio. A constant proportion portfolio is one in which adjustments are made so as to maintain the relative weighting of the portfolio components as their prices change. Investors should concentrate on keeping their chosen asset allocation percentage (especially those following the requirements for strategic asset allocation). There is no one correct formula for when to rebalance. One rule may be to rebalance portfolio when asset allocations vary by 10% or more. But many investors find it bizarre that constant proportion rebalancing requires the purchase of securities that have performed poorly and the sale of those that have performed the best. This is very difficult to do for the investor psychologically (see Chapter 6). But the investor should always consider this method of rebalancing as one choice, but not necessarily the best one.

Constant Beta portfolio. The base for the rebalancing portfolio using this alternative is the target portfolio Beta. Over time the values of the portfolio components and their Betas will change and this can cause the portfolio Beta to shift. For example, if the target portfolio Beta is 1,10 and it had risen over the monitored period of time to 1,25, the portfolio Beta could be brought back to the target (1,10) in the following ways:

- *Put additional money into the stock portfolio and hold cash.* Diluting the stocks in portfolio with the cash will reduce portfolio Beta, because cash has Beta of 0. But in this case cash should be only a temporary component in the portfolio rather than a long-term;

- *Put additional money into the stock portfolio and buy stocks with a Beta lower than the target Beta figure.* But the investor may be is not able to invest additional money and this way for rebalancing the portfolio can be complicated.

- *Sell high Beta stocks in portfolio and hold cash.* As with the first alternative, this way reduces the equity holdings in the investor's portfolio which may be not appropriate.

- *Sell high Beta stocks and buy low Beta stocks.* The stocks bought could be new additions to the portfolio, or the investor could add to existing positions.

Indexing. This alternatives for rebalancing the portfolio are more frequently used by institutional investors (often mutual funds), because their portfolios tend to be large and the strategy of matching a market index are best applicable for them. Managing index based portfolio investor (or portfolio manager) eliminates concern about outperforming the market, because by design, it seeks to behave just like the market averages. Investor attempts to maintain some predetermined characteristics of the portfolio, such as Beta of 1,0. The extent to which such a portfolio deviates from its intended behaviors called *tracking error.*

Revising a portfolio is not without costs for an individual investor. These costs can be direct costs – *trading fees and commissions* for the brokers who can trade securities on the exchange. With the developing of alternative trading systems (ATS) these costs can be decreased. It is important also, that the selling the securities may have income tax implications which differ from country to country.

1.4. Portfolio performance measures

Portfolio performance evaluation involves determining periodically how the portfolio performed in terms of not only the return earned, but also the risk experienced by the investor. For portfolio evaluation appropriate measures of return and risk as well as relevant standards (or "benchmarks") are needed.

In general, the *market value of a portfolio at a point of time* is determined by adding the markets value of all the securities held at that particular time. The *market value of the portfolio at the end of the period* is calculated in the same way, only using end-of-period prices of the securities held in the portfolio.

The return on the portfolio (r_P):

$$r_p = (V_e - V_b) / V_b, \tag{8.1}$$

here: V_e - beginning value of the portfolio;

V_b - ending value of the portfolio.

The essential idea behind performance evaluation is to compare the returns which were obtained on portfolio with the results that could be obtained if more appropriate alternative portfolios had been chosen for the investment. Such comparison portfolios are often referred to as **benchmark portfolios**. In selecting them investor should be certain that they are relevant, feasible and known in advance. The benchmark should reflect the objectives of the investor.

Portfolio Beta (see Chapter 3.3) can be used as an indication of the amount of market risk that the portfolio had during the time interval. It can be compared directly with the betas of other portfolios.

You cannot compare the ex post or the expected and the expected return of two portfolios without adjusting for risk. To adjust the return for risk before comparison of performance risk adjusted measures of performance can be used:

➤ Sharpe's ratio;

➤ Treynor's ratio;

➤ Jensen's Alpha.

Sharpe's ratio shows an excess a return over risk free rate, or risk premium, by unit of total risk, measured by standard deviation:

$$\text{Sharpe's ratio} = (\check{r}_p - \check{r}_f) / \sigma_p, \tag{8.2}$$

here: $\check{r}_p$ - the average return for portfolio p during some period of time;

$\check{r}_f$ - the average risk-free rate of return during the period;

σ_p - standard deviation of returns for portfolio p during the period.

Treynor's ratio shows an excess actual return over risk free rate, or risk premium, by unit of systematic risk, measured by Beta:

$$\text{Treynor's ratio} = (\check{r}_p - \check{r}_f) / \beta_p, \tag{8.3}$$

here: β_p - Beta, measure of systematic risk for the portfolio p.

Jensen's Alpha shows excess actual return over required return and excess of actual risk premium over required risk premium. This measure of the portfolio manager's performance is based on the CAPM (see Chapter 3.2).

$$\textbf{Jensen's Alpha} = (\check{r}_P - \check{r}_f) - \beta_P(\check{r}_m - \check{r}_f), \qquad (8.4)$$

here: $\check{r}_m$ - the average return on the market in period t;

$(\check{r}_m - \check{r}_f)$ - the market risk premium during period t.

It is important to note, that if a portfolio is completely diversified, all of these measures (Sharpe, Treynor's ratios and Jensen's alfa) will agree on the ranking of the portfolios. The reason for this is that with the complete diversification total variance is equal to systematic variance. When portfolios are not completely diversified, the Treynor's and Jensen's measures can rank relatively undiversified portfolios much higher than the Sharpe measure does. Since the Sharpe ratio uses total risk, both systematic and unsystematic components are included.

Summary

1. The main points of passive portfolio management: holding securities in the portfolio for the relatively long periods with small and infrequent changes; investors act as if the security markets are relatively efficient; passive investors do not try outperforming their designated benchmark.

2. The main points for the active portfolio management: active investors believe that there are mispriced securities or groups of securities in the market; the active investors do not act as if they believe that security markets are efficient; the active investors use deviant predictions – their forecast of risk and return differ from consensus opinions.

3. Strategic asset allocation identifies asset classes and the proportions for those asset classes that would comprise the normal asset allocation. Strategic asset allocation is used to derive long-term asset allocation weights. The fixed-weightings approach in strategic asset allocation is used.

4. Tactical asset allocation produces temporary asset allocation weights that occur in response to temporary changes in capital market conditions. The investor's goals and risk- return preferences are assumed to remain unchanged as the asset weights are occasionally revised to help attain the investor's constant goals.

5. For asset allocation decisions Markowitz portfolio model as a selection techniques can be used. Thinking in terms of asset classes, this model can be applied successfully to find the optimal allocation of assets in the portfolio. The correlation between asset classes is a key factor in building such an optimal portfolio. Investors are looking to have in their portfolios asset classes that are

negatively correlated with each other, or at least not highly positively correlated with each other

6. Portfolio revision is the process of selling certain issues in portfolio and purchasing new ones to replace them.

7. Three areas to monitor when implementing investor's portfolio monitoring: (1) Changes in market conditions; (2) Changes in investor's circumstances; (3) Asset mix in the portfolio.

8. When monitoring the changes in the investor's circumstances, following aspects must be taken into account: change in wealth; change in time horizon; change in liquidity requirements; change in tax circumstances; change in legal considerations; change in other circumstances and investor's needs.

9. Rebalancing a portfolio is the process of periodically adjusting it to maintain certain original conditions. Rebalancing reduces the risks of losses – in general, a rebalanced portfolio is less volatile than one that is not rebalanced.

10. A constant proportion portfolio is one of the portfolio rebalancing methods in which adjustments are made so as to maintain the relative weighting of the portfolio components as their prices change. Investors should concentrate on keeping their chosen asset allocation percentage (especially those following the requirements for strategic asset allocation).

11. The bases for the rebalancing portfolio using constant Beta portfolio alternative is the target portfolio Beta. Over time the values of the portfolio components and their Betas might change. This can cause the portfolio Beta to shift and then the portfolio Beta should be brought back to the target.

12. Using indexing method for rebalancing the portfolio the investors match a market index best applicable for them. Managing index based portfolio investor (or portfolio manager) eliminates concern about outperforming the market, because by design, it seeks to behave just like the market averages.

13. Portfolio performance evaluation involves determining periodically how the portfolio performed in terms of not only the return earned, but also the risk experienced by the investor. For portfolio evaluation appropriate measures of return and risk as well as relevant standards (or "benchmarks") are needed. In selecting benchmark portfolios investor should be certain that they are relevant,

feasible and known in advance. The benchmark should reflect the objectives of the investor.

14. To adjust the return for risk before comparison of performance risk adjusted measures of performance can be used. Sharpe's ratio shows an excess a return over risk free rate, or risk premium, by unit of total risk, measured by standard deviation. Treynor's ratio shows an excess actual return over risk free rate, or risk premium, by unit of systematic risk, measured by Beta. Jensen's Alpha shows excess actual return over required return and excess of actual risk premium over required risk premium. This measure of the portfolio manager's performance is based on the CAPM.

Key-terms

- Asset classes
- Asset allocation
- Sharpe's ratio
- Treynor's ratio
- Jensen's Alpha
- Benchmark portfolios
- Tracking error
- Constant proportion portfolio method
- Constant Beta portfolio method

- Indexing method
- Rebalancing a portfolio
- Portfolio monitoring
- Portfolio revision
- Strategic asset allocation
- Tactical asset allocation.
- Active portfolio management
- Passive portfolio management

Questions and problems

1. Give the arguments for active portfolio management.
2. What are the reasons which cause investors managing their portfolios passively to make changes their portfolios?
3. What are the major differences between active and passive portfolio management?
4. Explain the role of revision in the process of managing a portfolio.
5. Distinguish strategic and tactical asset allocation.
6. What role does current market information play in managing investment portfolio?
7. Why is the asset allocation decision the most important decision made by investors?
8. What is the point of investment portfolio rebalancing?

9. What changes in investor's circumstances cause the rebalancing of the investment portfolio? Explain why.

10. Why is portfolio revision not free of cost?

11. Why benchmark portfolios are important in investment portfolio management?

12. Briefly describe each of the portfolio performance measures and explain how they are used:

      a) Sharpe's ratio;

      b) Treynor's ratio;

      c) Jensen's Alpha.

13. Assume that you plan to construct a portfolio aimed at achieving your stated objectives. The portfolio can be constructed by allocating your money to the following asset classes: common stock, bonds, and short-term securities.

    a) Identify state and comment your investment objectives.

    b) Determine an asset allocation to these three classes of assets considering your stated investment objectives. Explain your decision.

    c) What reasons could cause you to make changes in your asset allocations?

14. An investor's portfolio consists of 50000 EURO in stocks and 5000 EURO in cash. the Beta of the portfolio is 1,10. How the investor could reduce Beta of the portfolio to 0,95? Show and explain.

15. Select four stocks which were actively traded in the local stock exchange last calendar year, find the information about their prices at the beginning and at the end of the year, amount of dividends paid on each stock for this year and stock Beta at the end of the year. Also find a risk-free rate of return and the market return for the given year. Assume that these four stocks were put to the portfolio in equal proportions (25% in each stock). Assume that the standard deviation for this portfolio is 16, 75% and that standard deviation for the market portfolio is 13, 50%.

    a) Find the portfolio return for the given year (see chapter 3.1.2, formula 3.1).

    b) Calculate Sharpe's, Treynor's ratios and Jensen's Alpha.

    c) Compare and comment the results of measuring portfolio performance with different measures.

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Relevant websites

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- www.funds.ft.com/funds   Financial Times Fund Services
- www.funds-sp.com   Standard &Poor's Fund Service

ABBREVIATIONS AND SYMBOLS USED

Abbreviation or symbol	Explanation
A_J	Intercept – the point where the characteristic line of security J passes through the vertical axis
ABS	Asset-Backed Securities
APT	Arbitrage Pricing Theory
ATS	Alternative Trading System
β_J	Beta of security J, the measure of systematic risk
β_p	Beta of portfolio
CAPM	Capital Asset Pricing Model
CF	Cash Flow
CML	Capital Market Line
Cov (r_A, r_B)	Covariance between returns of two assets – A and B
CY	Current Yield
C_t	Coupon payment in time period t
D	Dividends
D_L	Long-term debt
DC	Depreciation
DDM	Dividend Discount Models
$Det_{A,B}$	Coefficient of determination between the returns of assets A and B
DR	Duration (Macaulay duration)
E	Exercise (strike) price
EBIT	Earnings Before Interest and Taxes
ECB	European Central Bank
E(r)	Expected rate of return
E(r_m)	Expected rate of return on the market
E(r_p)	Expected rate of return on the portfolio
EPS	Earnings per Share
E-I-C	Economy-Industry-Company Analysis
g	Growth rate
GDP	Gross Domestic Product
h	Probability
HR	Hedge Ratio
I	Interest expense
IV	Intrinsic value of the option
IPO	Initial Public Offerings
k	Discount rate
$k_{A,B}$	Coefficient of correlation between the returns of assets A and B
LP	Lease payments
NAV	Net Asset Value
NI	Net Income
OTC	Over-the-Counter Market
P_m	Market price

P_n	Face value (nominal value) of the bond
P_{op}	Option premium
PER	Price/Earnings Ratio
PER*	Normative Price/ Earnings ratio
r	Rate of return
ŕ	Arithmetic average return or Sample mean of returns
r_m	Return on the market
R_f	Risk-free rate of return
REPO	Repurchase Agreement
ROA	Return on Assets
ROE	Return on Equity
ROI	Return on Investment
SE_T	Total stockholders' equity
SML	Security Market Line
T_r	Income tax rate
TV	Time value of the option
V	Intrinsic (investment) value
YTC	Yield-To-Call
YTM	Yield-To-Maturity
YTM*	Appropriate Yield-To -Maturity
σ_p	Risk of the portfolio measured as standard deviation
σ_r	Standard deviation of returns
σ^2_r	Variance of Returns

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Annex 1.

Definitions of long-term credit ratings

Moody's	S&P	Fitch Ratings	Definition
Aaa	AAA	AAA	Prime. Maximum Safety
Aa1	AA+	AA+	High Grade High Quality
Aa2	AA	AA	
Aa3	AA-	AA-	
A1	A+	A+	Upper Medium Grade
A2	A	A	
A3	A-	A-	
Baa1	BBB+	BBB+	Lower Medium Grade
Baa2	BBB	BBB	
Baa3	BBB-	BBB-	
Ba1	BB+	BB+	Non-Investment Grade
Ba2	BB	BB	
Ba3	BB-	BB-	
B1	B+	B+	Highly Speculative
B2	B	B	
B3	B-	B-	
Caa1	CCC+	CCC	In Poor Standing
Caa2	CCC	-	
Caa3	CCC-	-	
Ca	CC	CC	Extremely Speculative
C	C	C	May be in Default
-	-	DDD	Default
-	-	DD	
-	D	D	

Source: Ministry of Finance of the Republic of Lithuania. **www.finmin.lt**

Annex 2.

Black-Scholes formula for estimating the fair value of the call options

$$\text{Vc} = \text{N(d}_1) * \text{P}_s - [\text{E*R* T* N(d}_2)] / \text{e,} \tag{1}$$

here P_s - current market price of the underlying stock;

E - exercise price of the option;

R -   continuously compounded risk free rate of return expressed on the annual basis;

T   - time remaining before expiration, expressed as a fraction of a year

N(d_1) and N(d_2) denote the probabilities that outcomes of less d_1 and d_2 respectively.

$$\text{N(d}_1) = \ln (\text{P}_s/\text{E}) + [(\text{R} + 0{,}5\ \delta)*\text{T}] / \delta \sqrt{\text{T}}; \tag{2}$$

$$\text{N(d}_2) = \ln (\text{ P}_s/\text{E}) + [(\text{R} - 0{,}5\ \delta)* \text{T}] / -\delta \sqrt{\text{T}}, \tag{3}$$

here: δ - risk o the underlying common stock, measured by the standard   deviation of the continuously compounded annual rate of return on the stock.