

Czech University of Life Sciences Prague

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Master's Thesis

Investment Portfolio Design

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DIPLOMA THESIS ASSIGNMENT

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Thesis title

Investment portfolio design

Objectives of thesis

The purpose of this thesis is to analyse stocks from different industries and using fundamental analysis to create a diversified financial portfolio consisting of 4 stocks for long-term investment. Another partial goal is to make criteria based on which promising stocks will be selected to create a portfolio.

Methodology

The theoretical part was created using the descriptive method based on insights gained from literary research and completed using Internet sources. In the practical part based on diversification of the portfolio, joint stock companies were chosen from four industries. The companies were selected and sorted based on the methods of the fundamental and the financial statement analysis.

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Keywords

Investment, securities, investor, portfolio, financial market, capital market

Recommended information sources

- GIBSON, Roger C. Asset allocation : balancing financial risk. New York: Mcgraw Hill Education, 2013. ISBN 9780071804189
- GRAHAM, Benjamin a Jason ZWEIG. The intelligent investor: a book of practical counsel. Rev. ed. New York: HarperBusiness Essentials, 2003. ISBN 9780060555665.
- MURPHY, John J. a John J. MURPHY. Technical analysis of the financial markets: a comprehensive guide to trading methods and applications. New York: New York Institute of Finance, c1999. ISBN 0735200661.

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Declaration

I declare that I have worked on my master's thesis titled "Investment Portfolio Design" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not break any copyrights.

In Prague on 31.03.2022

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Investment Portfolio Design

Abstract

This diploma thesis focuses on investment portfolio design. The thesis is split into two sections. The theoretical section goes into the financial market, money market and capital market, securities and market structure, stocks, stock exchange, investment portfolio characteristics (such as profitability, risk and liquidity) and diversification. The practical part consists of 4 industries, each with 3 joint stock entities because of diversification. The final portfolio is created by choosing 4 stocks one from each industry based on economic indicators and multi-criteria decision analysis. The study for selected companies is based on yearly reports. Companies are described in terms of their scope, internal structure, goods, and future plans. On the basis of the financial accounts, a technical analysis is also performed. Profitability, dividends, debtness, and a comparison of a company's index to equity indexes are all part of the technical analysis. A correlation matrix was created based on market prices to determine correlation coefficients among companies. The share of each company in the portfolio was determined using a multi-criteria decision analysis that included diluted earnings per share (EPS), price to earnings ratio to growth (PEG), price to book value ratio (P/B), dividend payout ratio, and free cash flow.

Keywords: Investment, securities, investor, portfolio, analysis, capital market, financial market, shares

Návrh investičního portfolia

Abstrakt

Tato diplomová práce se zaměřuje na návrh investičního portfolia. Práce je rozdělena do dvou částí. Teoretická část se zabývá finančním trhem, peněžním a kapitálovým trhem, cennými papíry a strukturou trhu, akcemi, burzou cenných papírů, charakteristikami investičního portfolia (jako je výnosnost, riziko a likvidita) a diverzifikací. Praktická část se skládá ze 4 odvětví, z nichž každé má z důvodu diverzifikace 3 akciové společnosti. Konečné portfolio je vytvořeno výběrem 4 akcií po jedné z každého odvětví na základě ekonomických ukazatelů a vícekritériální rozhodovací analýzy. Studie u vybraných společností vychází z ročních zpráv. Společnosti jsou popsány z hlediska jejich působnosti, vnitřní struktury, zboží a budoucích plánů. Na základě finančních výkazů je provedena také technická analýza. Součástí technické analýzy je ziskovost, dividendy, zadluženost a srovnání indexu společnosti s akciovými indexy. Na základě tržních cen byla vytvořena korelační matice pro stanovení korelačních koeficientů mezi společnostmi. Podíl každé společnosti v portfoliu byl stanoven pomocí multikritériální rozhodovací analýzy, která zahrnovala zředěný zisk na akcii (EPS), poměr ceny a zisku k růstu (PEG), poměr ceny a účetní hodnoty (P/B), poměr výplaty dividend a volný peněžní tok.

Klíčová slova: Investice, cenné papíry, investor, portfolio, analýza, kapitálový trh, finanční trh, akcie

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Introduction

In recent years, investing has become increasingly popular. People are becoming more and more interested in maximizing the value of their money. People save money in bank accounts. However, owing of the low interest rates, this is not very profitable. As a result, many people look for other ways to invest money in order to increase their percentage of return. One of these options is stock.

Investment in particular objects and stocks is becoming also popular due to various online and offline means that are readily available, and the investors can make a decision to take action on these sticks and objects. The COVID-19 brought a condition that was not predicted and forecasted. The investors may find various risks that can be predicted or the unknown that they might not be aware of due to the constantly changing perspectives and the management process. This has brought a challenging situation for investors to manage a portfolio without considering the market facts. The portfolio design is a prolonged process including the facts of market indicators, including capitalization of markets, price to book value ratio, dividend yield, price to sales ratio, return on equity, and debt to equity ratio¹.

The investors can face quick changes in prices and quickly decline the stock price like seasonal products, and businesses may not give a stable stock price. The investors need to observe the phenomena of stock management in which they can see the type of stocks and risks related to these stocks². The portfolio management increases their awareness to purchase the stock for the long term and to control for investing in more risky stocks. The risks are usually controlled by having multiple stock options (diversification) instead of investing only in one company. A variety of industries are selling and issuing stocks in the market. The healthcare, technology, energy, textile, water, and regulatory compliance industry are attractive markets to invest in for stock purchase, but the risks are present at different levels with all these industries. The current research is developed to solve the

¹ Buszko, M., Orzeszko, W. and Stawarz, M. (2021). COVID-19 pandemic and stability of stock market—A sectoral approach. *PLOS ONE*, [online] 16(5), p.e0250938. Available at: <https://doi.org/10.1371/journal.pone.0250938> [Accessed 2 Mar. 2022].

² Czech, K., Wielechowski, M., Kotyza, P., Benešová, I. and Laputková, A. (2020). Shaking Stability: COVID-19 Impact on the Visegrad Group Countries' Financial Markets. *Sustainability*, [online] 12(15), p.6282. Available at: <https://doi.org/10.3390/su12156282> [Accessed 2 Mar. 2022].

problem and to indicate the industries where stock can be a minimum risk for long-term investment. The basic purpose is to assess the level of risks associated with each industry ways to assess the risks.

This thesis is designed to solve this problem and the choice of industries in which shares can be with a minimum risk for long-term investment. The main purpose is to assess the level of risk associated with each industry by way of risk assessment.

Objectives and Methodology

1.1 Objectives

The main aim of this thesis is to create a diversified stock portfolio consisting of four stocks for long-term investments for non-risky investor. To achieve aims, technical analysis of selected stocks, descriptions of internal structures, and actions of stock joint enterprises should be used. Assessing selected economic indicators and comparing the growth of the price of shares on the market with the evolution of a sector index and the evolution of an exchange index is one of the primary purposes. The calculation of multiple-criteria decision analysis is also included in the objectives, as is the determination of stock weights for the future portfolio. The correlation matrix should be used to test portfolio diversification.

1.2 Methodology

For my practical part I chose the names of shares that are suitable for a non-risky investor with an 8-10 years investment horizon. To diversify portfolio, I chose joint stocks from four different sectors, such as: automotive, petroleum, technology and defence industry.

Firstly, leading firms from selected industries were chosen.

Secondly, economic indicators were compared within the companies in the chosen sector and according to the criteria I have acquired the resulting stock companies for the portfolio.

The selected companies were then analyzed using annual reports and data from external sources. The companies were described in terms of their own operations, internal structure, describing main products and describing the future direction of the company. Earnings, debt, dividends, intrinsic stock price, market share price, and stock performance compared to stock indices and industry indices were all considered in the technical analysis. To track company earnings, gross profit was used consistently.

The internal price was calculated according to formula 1 and then it was compared to the market price. On this basis a recommendation to buy was given. In case the intrinsic price of the stock is higher than the market price of the stock, it can be considered that it is a great time to buy, in case it is lower than the market price of the of the stock, it is not a good time to buy the stock.

The internal price is calculated using the following formula 1:

$$\text{Internal Price} = \frac{P}{E} \text{ actual} * \text{EPS estimate} \quad [1]$$

Indebtedness was tracked using a ratio of long-term debt to total assets, from which we know how much the debt to assets ratio is.

The correlation coefficient was used to determine the correlation between stock returns.

The share of each company in the investment portfolio was determined using a multi-criteria decision analysis. This analysis takes into account financial indicators such as:

- Diluted earnings per share (EPS) - The amount of diluted earnings per share (EPS) shows the maximum possible degree of decrease in profit (increase in loss) attributable to one common share of a joint stock company in cases of conversion of all convertible securities of the joint stock company into common shares or upon execution of all purchase and sale contracts for ordinary shares from the issuer at a price below their market value.

$$\text{Diluted EPS} = \frac{(\text{Net Income} - \text{Dividends on preferred stock})}{(\text{Average Outstanding Shares} + \text{Diluted Shares})} \quad [2]$$

- Price to earnings ratio to growth ratio (PEG) – shows the degree of overvaluation or undervaluation of the stock. It is a variation of the P/E multiple, which removes its shortcoming in the form of a point estimate of net income at the current moment or taking the average value for the last year. The PEG multiplier adjusts for possible future earnings per share of the company.

$$\text{PEG Ratio} = \frac{\left(\frac{\text{Price}}{\text{EPS}}\right)}{\text{EPS growth}} \quad [3]$$

- Price to book value ratio (P/B) – shows the ratio of the market value of a share to the current value of net assets (equity capital). Net assets are defined as what will remain with the owners of the company after the repayment of their liabilities. It is used to assess the undervaluation of a company's stock.

$$\frac{P}{B} \text{ Ratio} = \frac{\text{Market price per share}}{\text{Book value per share}} \quad [4]$$

- Dividend payout ratio (DPR) – an indicator reflecting what share of net profit goes to dividend payments. The more profits a company pays out through dividends (that is, the higher the Payout Ratio), the less money it leaves for reinvestment in its business and growth.

$$DPR = \frac{\textit{Dividends paid}}{\textit{Net Income}} \quad [5]$$

- Free Cash Flow – is cash for a certain period remaining in the company after all necessary expenses, payments and capital expenditures have been repaid. In fact, the cash net.

$$\textit{Free Cash Flow} = \textit{Operating Cash Flow} - \textit{Capital Expenditures} \quad [6]$$

The companies' economic indicators were obtained from yahoo.finance.com and marketscreener.com. Graphs, tables, and figures were created to help visualize the results. The data obtained was evaluated using Microsoft Excel.

Literature Review

In the theoretical part basic concepts of stocks markets will be described. They will include portfolio characteristics, such as evaluation of financial investment returns, profitability, diversification and correlation coefficient, liquidity and risk. Also, I will describe types of markets, investment strategies and types of stocks.

1.3 Types of Markets

1.3.1 Financial Market

According to Astapov et al. (2020), the question of great importance for a company is financing because modern firms raise capital through stock and bond issuing. The securities are sold in the financial markets that investors can buy or sell. These are issued by companies. However, companies and investors looking for financing understand their interest in financial markets. The interaction among firms and financial markets disclosed the main study area. Investment can be different from corporate finance to apply relevant search methods for decision making. A quantitative analysis modeling is implemented to solve investment problems. The corporate finance issues are solved through a quantitative approach.

The key theoretical investments are based on decision-making in a broader context. Corporate finance covers these issues like short-term and long-term financing, current asset management, and project analysis. The capital structure identified the question of long-term financing and its importance for a company under the present and forecasted conditions of the market. Similarly, project analysis is bound with the concerns of whether a project will be undertaken or not. This is led by the current assets and liabilities that assist in addressing the routine management of the cash flow. Corporate finance also comes with the solution of allocating the profits among shareholders (by using the dividend payments).

Financial markets are assessed for direct financing, but financial intermediaries are required for indirect investment. A fundamental difference, in this case, is the application of direct investment is followed by buying and selling financial assets, and it also helps to manage a portfolio for individual investment. Investors buy and sell financial instruments of financial institutions and invest a large pool of funds in financial markets to hold the portfolios. The indirect investment gives the investor a time span to decide about the portfolio, and they act as shareholders with their interest ownership in portfolios managed

by financial institutions, including pension funds, investment companies, commercial banks, and insurance companies.

1.3.2 Money Market

A money market is a financial market that only trades the short-term debt instruments that has less than one year of maturity. Another function of the money market is transactions for short-term loans in wholesales, and it also deposits short-term financial instruments. Central Banks and Governments are major players in the money market. The money market introduces a platform of organized exchange markets in which participants lend and borrow high-quality, short-term debt securities with average one-year maturities. A financial market plays a role in enabling banks, governments, and large institutions to trade short-term securities. The fundamental function of the money market is the provision of efficient facilities to adjust liquidity positions for non-financial banks, commercial banks, business firms, and other investors. The money markets are said to be meeting the situation of liquidity for lenders and for short-term fund requirements (Kravchenko, 2017).

1.3.3 Capital Market

The capital market is an organized system, a place where, on the one hand, private companies and government agencies can obtain long-term funds to finance their projects, and on the other hand, investors, individuals and organizations can place free money. The capital market is a fundamental concept in the modern economy. It is here that assets are redistributed from depressed industries to more efficient ones at the expense of supply and demand, and from stagnating countries to those where production is developing.

The capital market offers such instruments as government bonds, bonds and stocks of joint-stock companies, shares and stocks of investment funds, derivative securities (derivatives), and generally an infinite number of instruments in which investors can invest their money. The capital market must be distinguished from the money market, where currencies and short-term debt instruments are traded, which includes deposits and loans.

The structure of the capital market consists of professional securities market participants: brokers, dealers, depositories, fund managers, registrars, clearing companies, stock exchanges (Astapov et al., 2020).

1.4 Investing versus Speculation

Investors and traders take a certain amount of risk, which they try to calculate. They do this in an attempt to make money by making transactions on the open market. And the level of risk in transactions is the key difference between investing and speculating.

Graham, Buffett and Zweig (2013) states, that *“An investment operation is one which, upon thorough analysis promises safety of principal and an adequate return. Operations not meeting these requirements are speculative.”*

Investments can take many different forms. In finance, investment means buying and selling financial instruments in the hope of earning a return. At the same time, investors strive to ensure that the risk in their transactions is medium or below average. The return itself may be in the form of a rise in the price of an asset, the receipt of dividends or interest payments, or a full return of capital.

Most often, this can be achieved by buying and holding an asset in a portfolio for quite a long time - it can be a year or more.

Analysis and research are key factors in investing. Investors study various assets, industries, trends in specific market segments, and apply fundamental and technical analysis tools to develop an investment strategy. The investor's task is to understand what factors influence the price of stocks or other financial instruments and determine the best time to make a transaction.

Speculation is the act of investing finances in an event with great risks in the hope of obtaining a higher return. It is incorrect to compare speculation on the stock market, for example, with casinos or sports betting. Speculators as well as investors all the same try to make decisions based on certain analysis. But in any case, the risk of speculation is always higher.

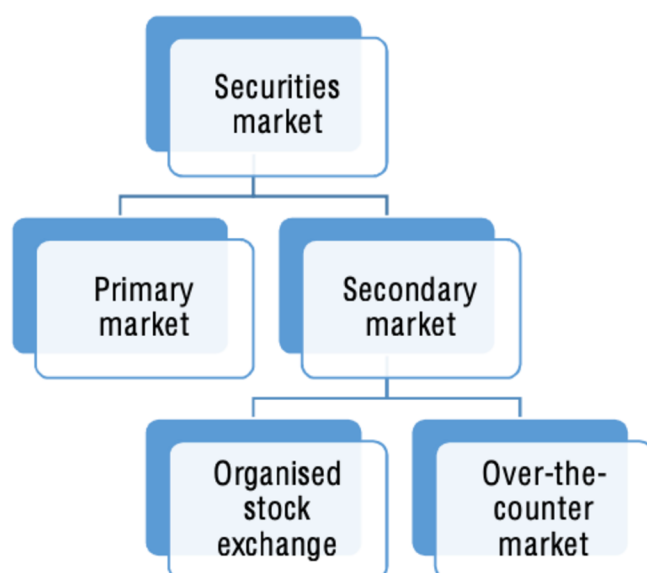
Speculators buy stocks, understanding that they won't keep them in the portfolio for long. They can move in and out of positions frequently.

Speculative trading at the stock exchange has its own peculiarities. For example, the influence of trends is very strong here. When certain market segments and companies rise, more people tend to make speculative transactions in the corresponding instruments. The trading volume grows which leads to bubble inflating (Graham, Buffett and Zweig, 2013).

1.5 Securities and Market Structure

The market securities structure indicates entire systems, protocols, and procedures that identify the way to handle orders, translate this order in trading, determination of the transaction price. All markets are the same in this aspect, matching the buyers and sellers. However, the industrial securities market indicates the market for bonds and shares of the new and existing companies. The investment environment indicates the exiting vehicles of investment in a market that is directly available for investors and transactions of places with investment vehicles. The main investment vehicles, including the type of markets as these, can be the primary (new) and secondary (secondary) markets³. Investors can apply both direct and indirect investing techniques.

Figure 1. Security market structure



Source: Kravchenko, 2017

1.5.1 Primary and Secondary Markets

A **primary stock market** is a place where the securities are developed the firm's float (sell) new stocks and bonds to the public in a primary market. It is also termed as an initial public offering (IPO) that is one of the examples of the primary markets activity.

³ Dolgoplov, S. (2014). The Maker-Taker Pricing Model and Its Impact on the Securities Market Structure: A Can of Worms for Securities Fraud? *SSRN Electronic Journal*, [online] 42(2), pp.231–272. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2399821 [Accessed 13 Mar. 2022].

The primary market securities include bills, notes, government bonds, stock of companies, and corporate bonds.

As a result, it can be concluded that free cash resources in the primary market are distributed across branches and spheres of the national economy. The criterion for this placement in a market economy is the income received by the securities. This means that unrestricted currency flows are directed to businesses, industries, and sectors of the economy that generate the most profit. The primary market acts as a means of constructing a national economy structure that is effective in terms of market criteria and preserves the economy's proportionality at the existing level of profit for individual firms and industries.

All of this indicates that the primary stock market is the market economy's actual regulator. It significantly influences the quantity of the country's savings and investments, serves as a natural way of maintaining proportionality in the economy that fits the profit maximization criterion, and so dictates the national economy's pace, scale, and efficiency. The primary market is where issuers deposit their new securities issuance. Corporations, the federal government, and municipalities can all operate as issuers at the same time.

In a secondary stock market, investors buy and sell securities they already possess. These stocks are not the first issues in the secondary market as they come in the form of interconnected trade in the secondary markets. It is only the secondary market that steers an asset price by the natural supply and demand process.

As a result, unlike the main market, the secondary market has little impact on the level of assets and savings in the country. It only allows for the ongoing redistribution of funds accumulated through the primary market among diverse economic actors. The secondary market's operation assures that the economy is constantly restructured in order to improve market efficiency, and it is just as important for the stock market's existence as the main market.

The secondary market's role, however, is not confined to this. The secondary market:

- provides securities with liquidity;
- allows them to be sold at a reasonable price;
- generates favourable conditions for their initial placement.

Secondary markets are divided into broker markets, direct search markets, dealers markets, and auction markets. A few popular secondary markets are New York Stock Exchange, London Stock Exchange, and NASDAQ (Astapov et al., 2020).

1.6 Stock Exchange

A platform facilitating the stockbrokers for trading company stocks and other securities is known as stock exchange. A stock can be purchased and sold when it is listed on the exchange. Therefore, the stock exchange becomes a place where sellers and buyers meet directly.

There is a national stock exchange in every country that has a market economy. It is a regulated market for the purchase and sale of securities such as bonds, stocks, and other financial instruments. Commodity markets trade more physical assets (oil, gold).

In reality, the stock exchange is a legal institution that regulates securities trading by establishing trading rules, organizing the process, determining the equilibrium exchange price, providing transaction guarantees, and resolving disputes. The exchange's revenues are made up of member contributions and commissions calculated as a proportion of transaction volume.

A regular person will not be able to directly participate in stock trading. This is only possible through brokerage firms. They are authorized to act as professional intermediaries on a specific exchange.

1.7 Stocks

A share is a security issued by a joint-stock company, in other words, by the issuing company. All investors who have bought shares have become co-owners of the company. A share confirms that its owner has a stake in the company, even if it is very small.

By buying not a controlling stake, but only a tiny piece of the company, the owner of a share becomes a shareholder and also acquires rights, the main ones of which are:

- The right to vote at shareholder meetings and thus participate in the management of the company (if the share is voting);
- The right to receive dividends - part of the company's profits (if they are paid out);
- The right to receive part of the company's assets in the event of liquidation.

Why is the right to vote important? Because all the most important decisions are made by the general meeting of shareholders. Including decisions on liquidation and reorganization of the company. It is the meeting that decides how best to dispose of profits at the end of the year: to direct all the money to business development or part of it to the payment of dividends.

Shares of companies come in common stock and preferred stock. The differences are related to the two main rights - to vote and to receive dividends.

All shares can be ranked by the order of dividend payment. If the shareholders' meeting has decided to pay dividends, holders of preferred non-voting shares receive them first. They have a fixed dividend - a specific amount or percentage of their nominal value. Holders of preferred non-voting shares participate in voting only in those cases, when there is a question of liquidation of the joint-stock company.

The second in line for the payment of dividends are the owners of standard preference shares. The amount of dividends on these shares may be a specific amount or a percentage of the face value of the share. But more often it is defined as a percentage of the company's net profit for the year divided by the number of preferred shares. The procedure for calculating the dividend is usually prescribed in the charter. Holders of such shares cannot vote in the case of dividend payments. But if dividends were not accrued, they get the right to vote on all issues at the next meeting.

One joint stock company may have several types of preferred shares, including shares with special rights. The company charter must clearly stipulate the order of payment of dividends to their holders. Therefore, before buying preference shares, carefully study the charter of the joint-stock company.

Dividends are not paid to common shareholders until the company has fully satisfied its obligations to all preferred shareholders (Astapov et al., 2020).

1.7.1 Common Stock

When it comes to shares, we often talk about ordinary shares. They are the most common on the stock market. Ordinary shares are bought up by big players (banks, investment funds, other companies) to manage the issuer. Private investors are more interested in the growth in value of the security to resell it at a higher price in the future. They are also interested in dividend payments.

The owners of even one common equity security have the right to vote at the shareholders' meeting. True, it is not equal to the vote of the holder of 25% or 75% of the share. No one would trust the owner of one thousandth to make decisions on the management of the company. Therefore, private investors, are more interested in investment income.

Dividends on common stock are paid, but by no means always. If profits are negative, the board of directors has the right to reduce or even cancel them in the current

period. The dividend policy can also be changed if there is a need for money to maintain operations or to further develop and improve the business.

1.7.2 Preference Stock

When a company needs to attract investment, but does not want to share power, it issues preferred shares. Their holders have no voting rights and cannot participate in shareholder meetings, even if they own half of them. In return, they receive stable dividend payments.

Dividends on preference shares are different in that it is in many ways not a right, but almost an obligation. Their holders are entitled to payments in the first instance when profits are available. The exception is incurring losses, in which case even holders of preferred assets will be deprived of dividends.

Despite all the above, the shareholders' meeting has the authority to revise the dividend policy even with regard to the preferred equity securities. Also, the number of preferred shares cannot exceed 25% of all shares.

1.8 Investment Portfolio Characteristics

1.8.1 Profitability

Fisher states (2003, p.199): *„Profitability can be expressed in two ways. The fundamental way, which is the yardstick used by most managements, is the return on invested assets. This is the factor that will cause a company to decide whether to go ahead with a new product or process. What the investor usually sees is not the return on a specific amount of present-day dollars utilized in a specific subdivision of the business but the total earnings of the business as a percentage of its total assets.“*

Profitability is a relative indicator of economic efficiency. Profitability of the enterprise comprehensively reflects the degree of efficiency of the use of material, labor, money and other resources. Profitability coefficient is calculated as the ratio of profit to the assets or flows that form it.

In a general sense, the profitability of production implies that the production and sale of a given product brings profit to the enterprise. Unprofitable production is production that is not profitable. Negative profitability is unprofitable activity. The level of profitability is determined by means of relative indicators - ratios. Profitability indicators can be divided into two groups (two types): return on sales and return on assets.

Factors that affect profitability:

External factors:

- Competition;
- Demand for products;

Internal factors:

- Revenue;
- The amount of goods sold;
- Production costs;
- Product quality;

Profitability is affected by the same factors that affect profits.

Important indicators for profitability:

- Return on equity (ROE) is an indicator of net profit compared to the organization's own capital. This is the most important financial return indicator for any investor, business owner, showing how effectively the capital invested in the business was used.
- Profitability of production is the ratio of net profit to the value of fixed and current assets. In fact, the profitability of production shows the efficiency of the entire company. Multidisciplinary companies calculate profitability for each type of production separately.
- Profitability of production is the ratio of profit to the cost of production, i.e., to the costs of production and sales. It provides interested parties with information about how much profit each dollar spent on production gives, i.e., it shows the return on expenses incurred.

1.8.2 Evaluation of financial investment returns

Estimates of investment returns have already been made in the investment world for ex-post investments or ex-ante earnings. Ex-ante earnings estimates, or attempts to forecast earnings for a given investment, are the most common in practice. There can be significant differences when calculating returns on specific financial investments, mainly because of the methodology used. The application of one or another methodology always depends on the investor.

There are numerous methods for calculating profitability, either ex post or ex ante. Profitability methods can be divided into two categories based on their subsequent use: static methods and dynamic methods.

Static methods of calculation do not account for time in their calculations. In practice, they are used to calculate short-term investments with no time factor, as well as investments with low interest rates for the duration of the investment.

Dynamic methods for computing investments includes time factor in their calculations, combined with higher interest rates over the life of the investment.

1.8.3 Risk

Investing involves risk in one way or another, no matter how much or what an investor invests their money in.

Determining an acceptable level of risk should be a top priority for anyone thinking about investing. Financial risk is often intimidating, especially if you are not used to taking risks in your normal life. But in investing, more risk is often associated with higher possible returns over the long term. So, risk will have to be taken, but it is important to determine the degree of risk that you are comfortable with. If you choose to take too much risk, the value of your investments may fall just when you need them. If the level of risk is insufficient, the investment portfolio will under-perform, and the investor will face the main risk of not being able to achieve their own goals.

The group of investment risks can be divided into two subgroups: macro-risks and micro-risks.

The subgroup of **macro risks** includes everything that is usually analyzed in the framework of fundamental analysis at the macro level.

- Systemic risk is the risk of default or ill-being of the country's economy as a whole. It affects all instruments - from deposits to futures and currency pairs. The management tool is country diversification.
- Regional risk is the risk that a certain region will suffer. Important for holders of municipal bonds, or for shares of a city-forming company. Management tool - diversification by regions.
- Industry risk - affects mainly stocks, within a particular industry. The more developed the industry in the country, the less the impact of this risk.

Micro risks are risks associated with a particular issuer or an exchange-traded instrument. They include: liquidity risk, credit risk, issuer risk, selective risk and exchange (or price) risk.

- Liquidity risk can apply to both stocks and bonds - it is the inability to sell an exchange-traded instrument promptly due to low trading volumes and wide spreads. The method of management is compliance with the instrument's liquidity requirements sufficient for you.
- Credit risk is the risk of insolvency of the issuer. At first glance - a purely bond risk, but then we see that the non-creditworthiness of the issuer affects not only the dynamics of bonds, but also the dynamics of stocks. Credit risk is part of the selective risk - it is also the risk of the issuer, but the selective risk is wider - the issuer may not only go bankrupt, but also lose market share, deposits, sales markets, in short - worsen its economic situation without leading to bankruptcy, and then the bonds will be less affected, and the shares will be more affected.
- Exchange risk is an almost exclusive prerogative of the stock market. The risk of adverse price changes relative to your position. It is possible to make smart investment decisions, use methods of information analysis, estimate probability, make forecasts, but this risk cannot be avoided completely - it can only be managed so that its size is a controllable and predetermined value (Astapov et al., 2020).

1.8.4 Liquidity

Liquidity is the ability of financial assets to be quickly exchanged for cash by selling them at market price.

From the definition, we can distinguish two main liquidity factors.

- Speed, i.e., the faster you can exchange your stock for cash, the more liquid the asset is.
- Realization at market value. Here it is important to understand that even the most liquid assets are not sold at a 1:1 ratio with the market price, but the degree of liquidity determines the difference between bid and market price (the less liquid the asset, the greater the gap between bid and market price). The gap between the market price and bid prices is called the spread.

Liquidity depends on the following factors:

- Supply and Demand. This is an intuitive factor, so there is little to add here. Since liquidity is the ability of financial assets to be exchanged for money, having high supply and demand ensures high returns.
- Free float indicator. This indicator demonstrates the number of securities traded on the stock markets, respectively, the more shares are traded on the organized market, the more liquidity is.
- Trading volume. A composite index showing the level of supply and demand, and also depending on the number of shares in circulation, can be an excellent indicator of liquidity, the lower, the less liquid the company is.
- Investor interest. This factor can also play a key role in the formation of liquidity. Firstly, this factor shows itself in shares of the 3rd tier (shares of small and unpopular companies), and also it is often reflected in fundamentally undervalued companies which are deprived of the interest of investors for some reasons (Astapov et al., 2020).

1.9 Diversification

Gibson (2013, p.127) states: *“diversification in the naive sense is simply avoiding putting all of your eggs in one basket. Certainly, there is value in spreading your risks across a number of different investments, but diversification is both more powerful and more subtle than this.”*

Diversification helps to reduce such risks as an investor invests money not in a single asset, but assembles a portfolio of many different exchange-traded instruments, which have little to do with each other. Then even if one of the investor's securities falls in price, the others are likely to grow - and the return on them will eventually cover the losses incurred.

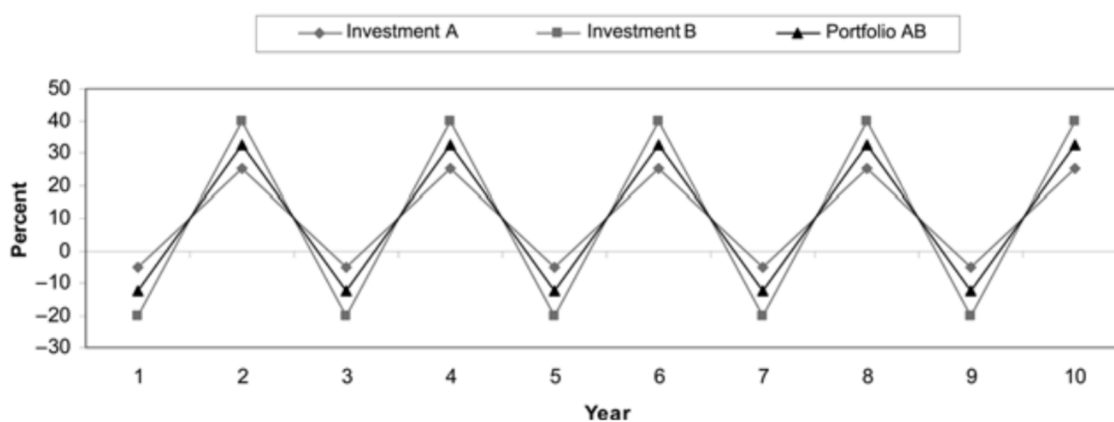
But diversification is not just buying securities from different companies. For example, a portfolio will not be diversified if it only has shares of Gazprom, Total and Chevron, because while these are companies from three different countries, they all belong to the same industry - oil and gas. If the oil price falls, the investor's entire portfolio will fall in price.

Proper portfolio diversification involves buying securities from companies in different countries and from different sectors - then there is a chance that they will not react to the same events in the same way and rise or fall at the same time.

1.9.1 Perfectly positively correlated investments

Figure 2 shows the annual return trends for two investments, A and B, as well as the portfolio AB. Portfolio AB is made up of an equal mix of these two investments that is annually rebalanced. Investments A and B follow each other in lock step. An above-average return on investment A is always accompanied by an above-average return from investment B on investment B. When investment A yields a below-average return, so does investment B. The returns of investments A and B are **perfectly positively correlated**, according to a statistician (Gibson, 2013).

Figure 2. Annual return from investment AB – correlation 1.0

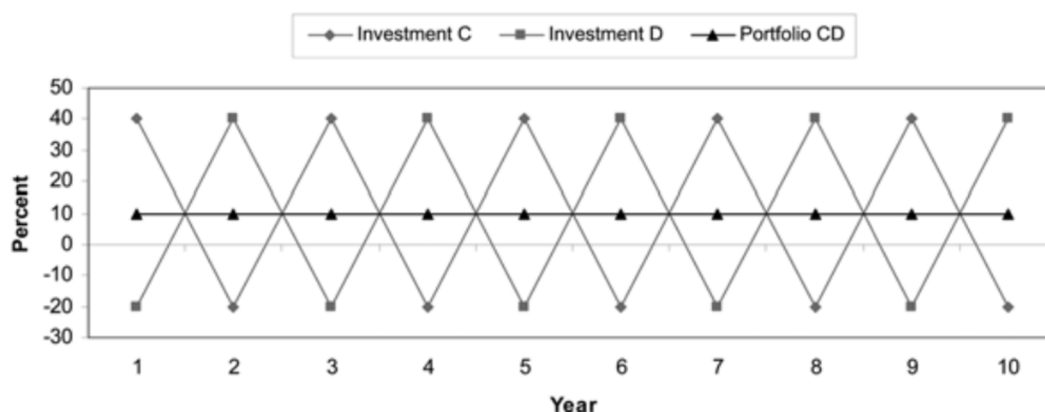


Source: Gibson (2013)

1.9.2 Perfectly negatively correlated investments

Figure 3 shows two investments, C and D, as well as portfolio CD, which is made up of an equally allocated, annually rebalanced combination of these two investments. The simple average return on investments C and D is 10%, with a standard deviation of 31.62 percent. Unlike the example on picture 1, however, investments C and D cycle in opposite directions. When investment C earns a higher-than-average return, investment D earns a lower-than-average return, and vice versa. This is a **perfect negative correlation** example (Gibson, 2013).

Figure 3. Annual return from investment CD – correlation -1.0



Source: Gibson (2013)

1.10 Charts

Stock market price charts resemble a cardiogram on a medical monitor: the more frequent the change, the livelier the market. But if you know where to look, the monitor will show much more: breathing rate, blood oxygen saturation and blood pressure levels. It is the same with a chart in the stock market: it does not only show the rise or fall of the price.

You can follow trades in real time on the charts. This allows you to make more informed buying and selling decisions and trade more frequently. To get the most out of the chart, you can customize it by segment and by type of quote display.

There are a few types of charts that every smart investor should be familiar with.

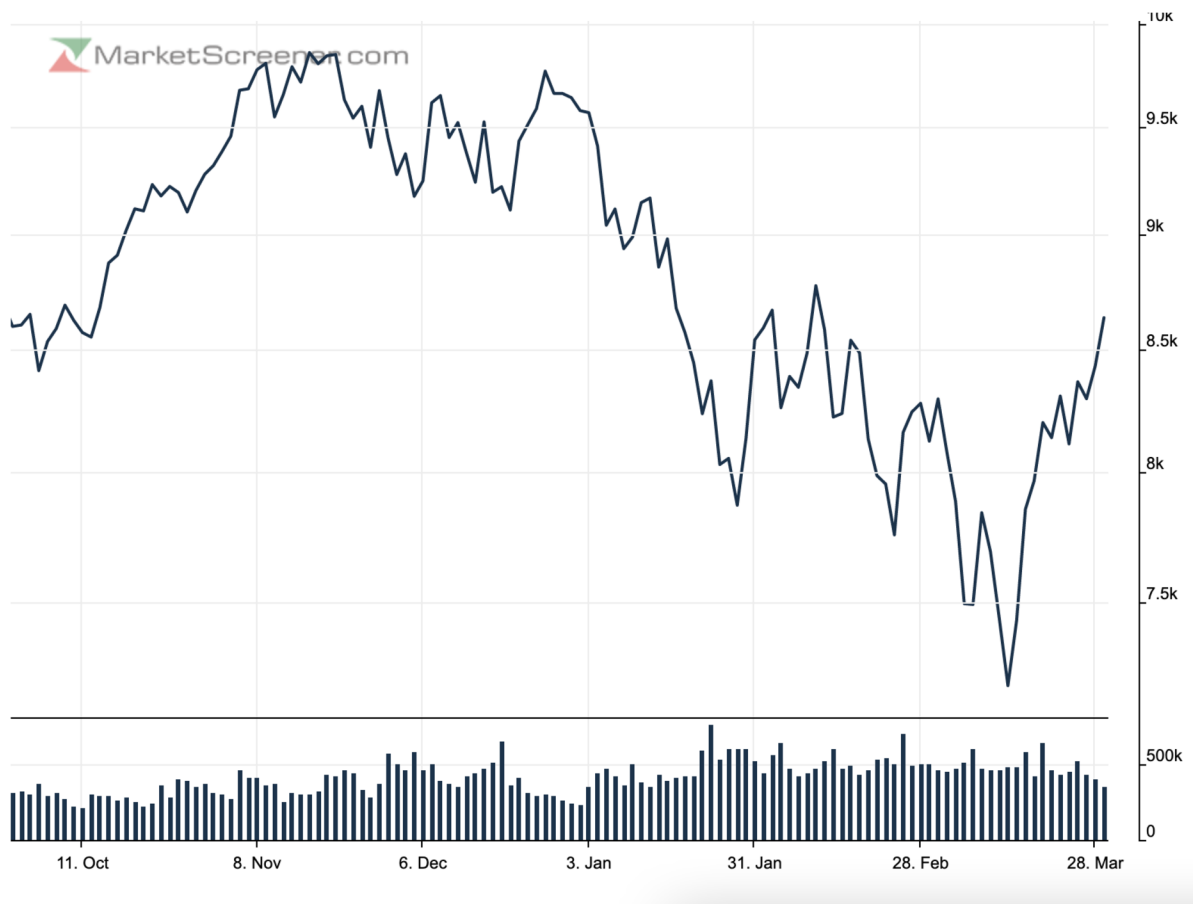
1.10.1 Line Stock Chart

A line chart is a broken line. Each segment reflects the result of trading for a unit of time (for example - 1 minute, 15 minutes, 1 hour). Each point on the line chart is the price (closing price) of an exchange instrument at the end of the selected unit of time.

The line chart is often used online to provide users with the current prices of stocks, currencies in real time.

If you need to know not just the current price but also to analyze the market in order to form your own opinion about its strength/weakness/prospects - then it is better to pay attention to other, more professional types of charts (Murphy, 1999).

Figure 4. Line Stock Chart



Source: Marketscreener.com

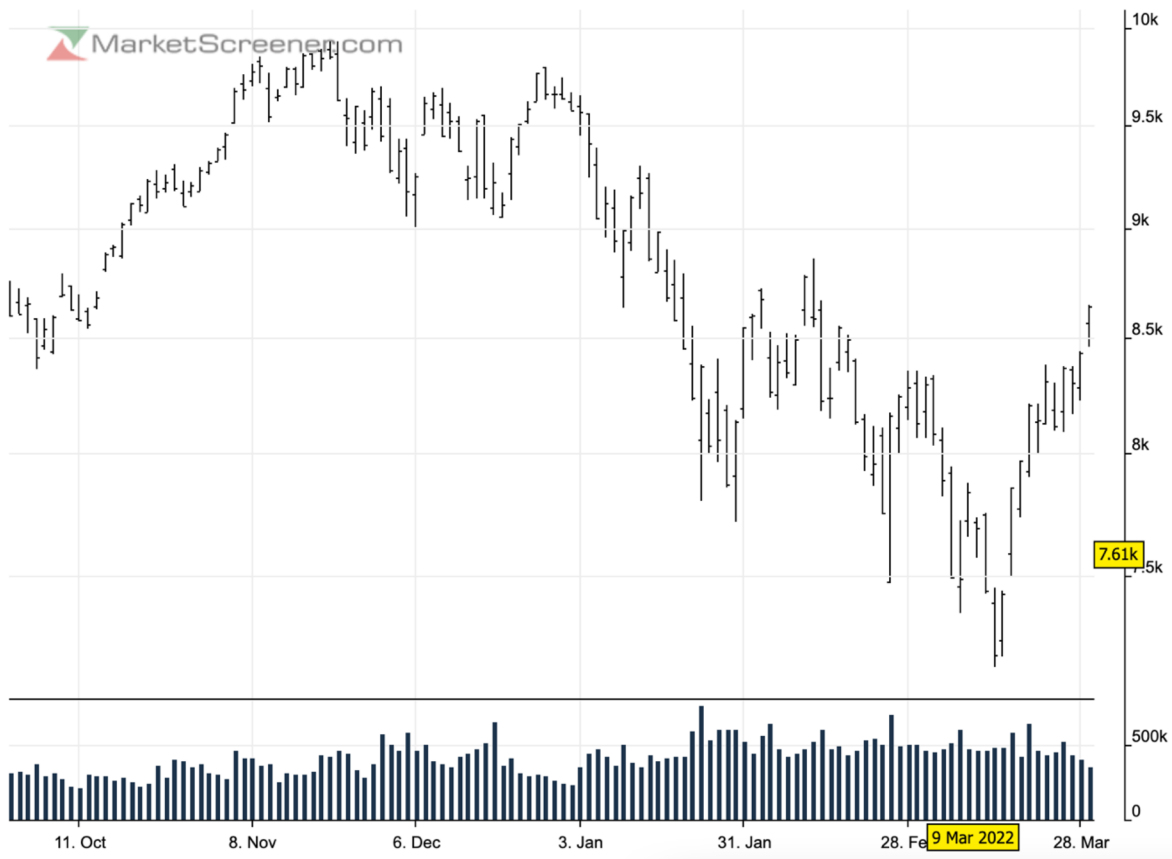
1.10.2 Bar Chart

The bar chart differs from the simple linear chart in that the bars contain information about the price dynamics for the selected time period:

- left bar line - price of instrument at the period opening,
- the right bar line - the symbol price at the period closing,
- the vertical bar line - the spread of price from minimum to maximum during the selected period.

The bar chart appeared during the development of Western markets. In the first half of the 20th century, it was a standard for Wall Street. The figure below is the original illustration from the Trading and Investing Course written by Richard Wyckoff.

Figure 5. Bar Chart



Source: Marketscreener.com

1.10.3 Japanese Candles

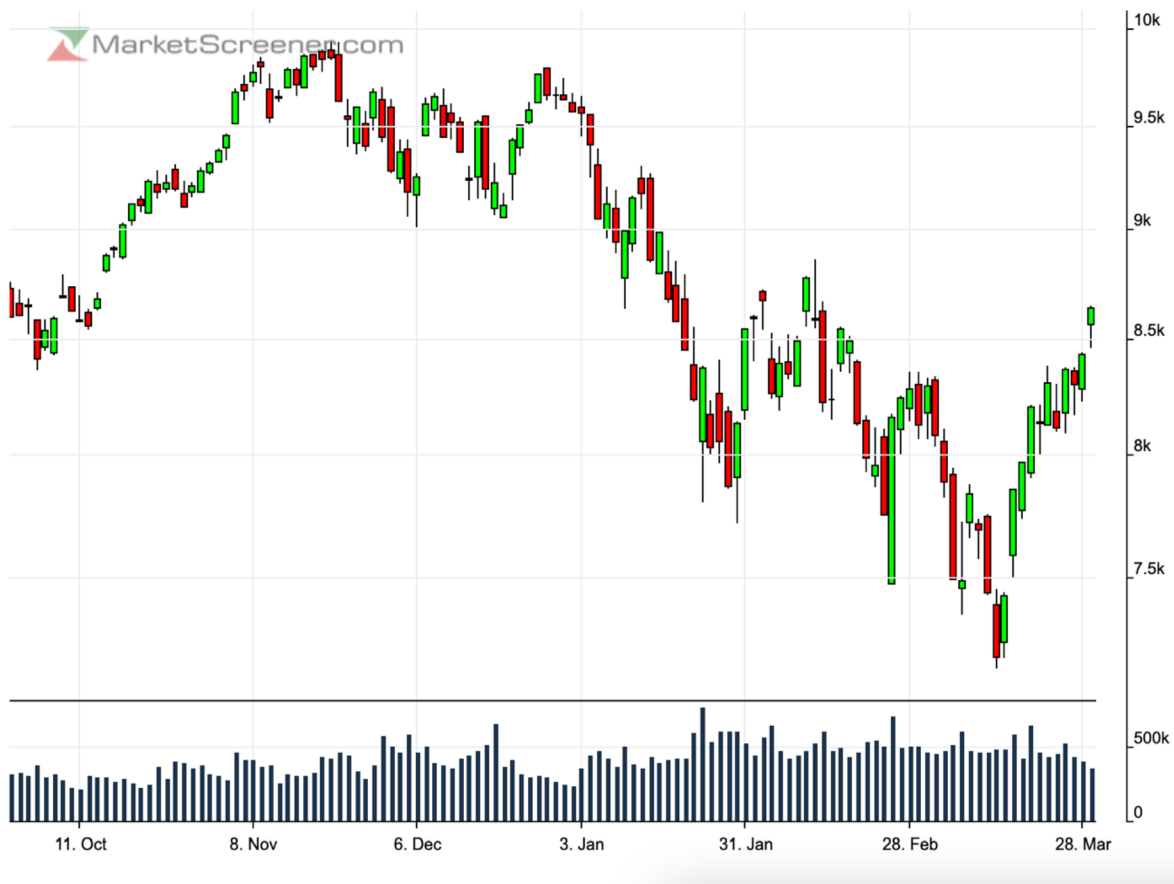
Japanese Candles chart is a type of chart with additional data about the price movement over a time period. If on the line chart we depicted only the closing price, the candlestick chart shows all the data from the table: the opening and closing price, the maximum and minimum price value for the trading session.

There are two main types of candlesticks:

- Growing - if the price has increased during the formation of the candle.
- Falling - if the price decreased during the formation of the candle.

Standard candlesticks and bars are coloured in two colours, depending on the growth or decline in price over a period of time. The green body indicates growth in price, and the red one - decline. But the colour of candlesticks or bars can always be customized (Murphy, 1999).

Figure 6. Japanese Candles Chart



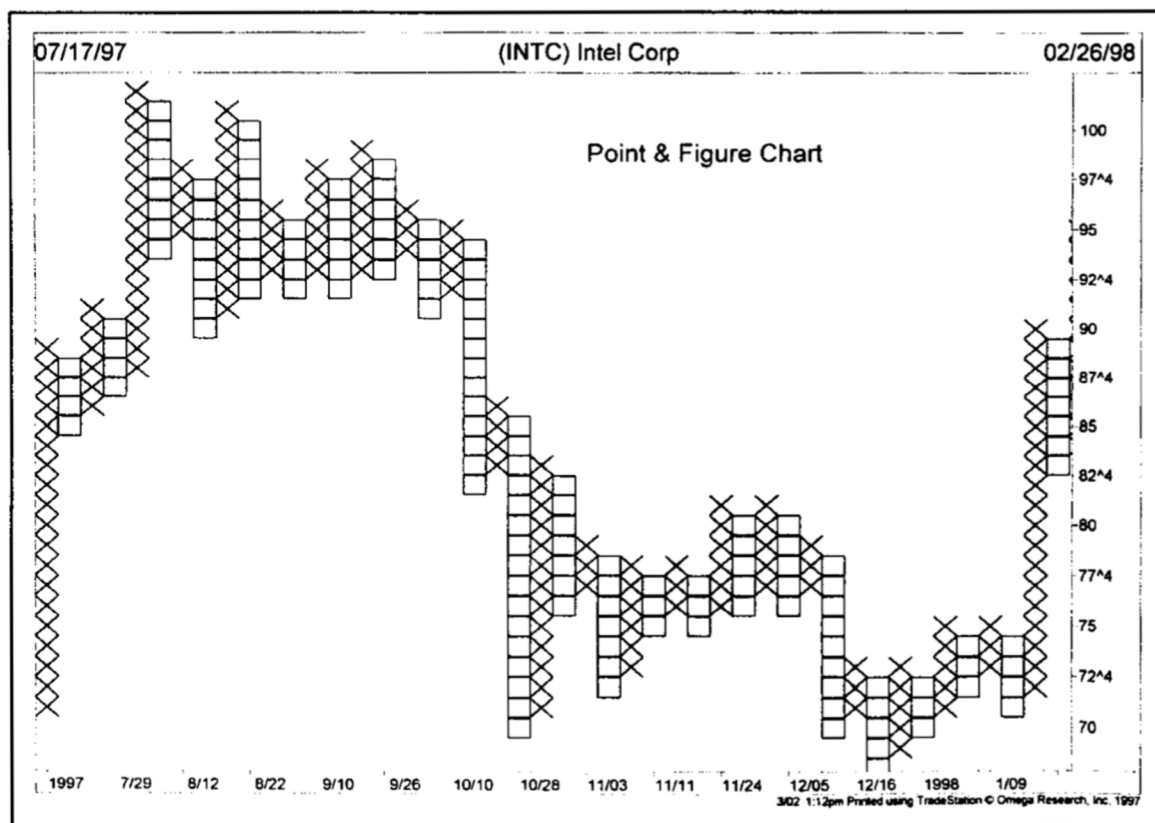
Source: Marketscreener.com

1.10.4 Point and Figure (P&F) Charts

A Point and Figure (P&F) chart is made up of multiple columns of X's that represent increases in a security's price and O's that represent decreases in price. A column of X's is always followed by a column of O's, and vice-versa. The chart is composed of multiple boxes, with each box equal to a certain price level. The box is filled with an X if price increases to that level. The box is filled with an O if price decreases to that level.

P&F charts are regarded as "timeless" because, unlike traditional charts, time is not a factor. On traditional charts, a security's price is plotted for specified time intervals, even if the price remains unchanged. With P&F charts, new information is plotted on the chart only if there is price action, a price change. If the price is static, even for a long period of time, then the chart is left unaltered. These charts are a useful tool in technical analysis, particularly helpful for identifying resistance and support levels (Murphy, 1999).

Figure 7. Point and Figure (P&F) Chart



Source: Murphy (1999)

Practical Part

In the practical part, I will create a portfolio of selected shares based on the analyzed data and the selected methods.

The portfolio should consist of four stocks. The portfolio will be diversified. Companies that dominate their industries and have a global presence will be included in the investment portfolio.

1.11 Stock Selection

The portfolio will consist of four stocks. The portfolio will be diversified. Companies that dominate their industries and have a global presence will be included in the investment portfolio.

1.12 Automotive industry

At some point, car companies ceased to be an attractive asset for investment. But now, against the backdrop of the market's rebound after the 2020 global lockdown, there is renewed interest in them.

After March 2020, when the entire market began to collapse under the onslaught of the coronavirus lockdown, companies in the consumer sector, on the contrary, began to come to their senses and gain strength. The pandemic especially "emphasized" the importance of everything private. As a consequence, the demand for cars also increased: in contrast to risky trips by public transport, they became a kind of "safety islands" for those who were not ready to give up driving.

In addition, two obvious points of growth have appeared in companies lately: the production of electric cars and the development of unmanned technologies. If before the statements about the expansion of the electric lineup and development of automotive "intelligence" were boasted by a couple of three companies, including Tesla, at the moment the majority of conservative automakers are investing huge resources in the approach of the electric future. The market, in turn, is greeted by such statements with a rapid growth of shares. Now large concerns like BMW and Toyota have everything they need to get ahead of Tesla and become market leaders in electric cars.

As in other industries, the automobile sector has its own peculiarities. One of the most noticeable problems today is the temporary crisis caused by the shortage of electronic chips for control units and onboard electronics. Because of the shortage of these

components, car manufacturers are suspending operations at their assembly plants and are urgently looking for alternative solutions⁴.

In this part, I will show manufacturers such as Tesla, Toyota, and BMW. Each of them is a major representative of the automotive industry in the United States, Japan and Europe.

1.12.1 Toyota Motor Corporation (TM)

The Toyota automotive industry is one of the best motor businesses in the world. The automotive company manufactures, designs, and markets numerous automobile products ranging from minivans, SUVs, trucks, luxury & sports utility vehicles, and buses, among others. The Toyota company has other automobile manufacturing subsidiaries that include Diahatsu motors for manufacturing mini-cars and Hino motors for manufacturing trucks and buses. Toyota motor engines are designed with either lately hybrid engines or combustion engines like for Prius. The automobile company recorded \$ 245 B in worldwide income in 2021. About 90% of the company revenue comes from motor sales.

Figure 8. Toyota Motor Corporation (TM) 2010-2021



Source: finance.yahoo.com (2022)

⁴ AUTO.RU (2021). *How to invest in car companies - read in the Parsing section in Auto.ru Magazine*. [online] Auto.ru. Available at: <https://mag.auto.ru/article/kak-investirovat-v-avtomobilnye-kompanii/> [Accessed 24 Mar. 2022].

We can see a growing trend since 2010, with regular corrections. From 2020 to the end of 2021, we can see strong growth. For the last five years, the average dividend per share has been \$2.24.

Table 1. Toyota Motor Corporation (TM), economic indicators, 2021

Toyota Motor Corporation (TM)	Statistical data
Total debt/equity	97,17
Trailing P/E	8,29
Forward P/E	8,20
Price/Sales	0,83
ROA	3,31%
Profit Margin	9,98%
Forward Dividend	4,55 USD
Market cap	236,798 B USD
Price	172,98 USD

Source: finance.yahoo.com (2022)

Toyota Motor Corporation (TM) has a market capitalization of \$ 236,798 billion as of 2021. During 2021, the price per share increased to \$ 172,98. The profit margin is 9.98%. The net profit-to-asset ratio is 3.31 percent. The price/sales ratio is 0.83, indicating that the shares are underpriced. A comparison of forward P / E values of 8,20 and trailing P / E values of 8,29 indicates that future earnings will be higher. The dividend for 2022 is expected to be \$4.55 per share. The total debt to equity ratio is 97.17.

1.12.2 Tesla, Inc. (TSLA)

An American company specializing in the production of electric cars and the development of new technologies for storing electricity. One of the co-founders of Tesla is Elon Musk.

Founded in July 2003 in California. Tesla specializes in the production of electric cars and the development of technologies for efficient electricity storage. The company's name is a tribute to the famous physicist Nikola Tesla. Since 2005, the company has produced five Tesla-branded electric cars:

- the Roadster,
- Model S,
- Model X,

- Model 3
- Model Y

Tesla is also expanding its Supercharger network of electric charging stations.

In 2021, Tesla became the number one automotive company in terms of capitalization, surpassing Japanese carmaker Toyota. At the end of October 2021, the capitalization of Tesla exceeded \$1 trillion for the first time, previously this mark was reached only by 4 American companies (Apple, Microsoft, Amazon and Alphabet)⁵.

Figure 9. Tesla Inc. (TSLA) 2010-2021



Source: finance.yahoo.com (2022)

From 2010 to 2013, we see a stable price as the company did not gain in popularity at that time. From 2014 to 2020 we see a small gradual increase with small corrections and in 2021 the stock price shoots up very strongly against the problems of other manufacturers due to the lack of chips.

⁵ Mazina, M. (2021). *Tesla's value reached \$1 trillion for the first time in history*.

[online] RBC Investments. Available at:

<https://quote.rbc.ru/news/article/6176c8e69a7947c6d23a77f7> [Accessed 20 Mar. 2022].

In year 2021 Tesla reported record growth in electric car sales despite a global chip shortage. Elon Musk's company sold more than 241,000 electric cars in the third quarter of 2021, an increase of 72% over the same period in 2020⁶.

Table 2. Tesla Inc. (TSLA) economic indicators, 2021

Tesla Inc. (TSLA)	Statistical data
Total debt/equity	28,19
Trailing P/E	162,32
Forward P/E	80,65
Price/Sales	16,68
ROA	7,14%
Profit Margin	10,25%
Forward Dividend	-
Market cap	822 B USD
Price	1056,78 USD

Source: finance.yahoo.com (2022)

According to the results for 2021, Tesla has a market capitalization of \$822 billion. During 2021, the price per share increased to \$ 1056,78. The profit margin is 10% and the cost of goods sold is 10%. The net profit-to-asset ratio is 7.14 percent. The price/sales ratio is 16,68, indicating that the shares are overpriced. The leading P / E value is 80,65, and the trailing P / E value is 162,32. There will be no dividend in 2022. The total debt to equity ratio is 28.19.

1.12.3 Bayerische Motoren Werke Aktiengesellschaft (BMW.DE)

BMW AG is a car, motorcycle, engine and bicycle manufacturer headquartered in Munich, Germany. The company owns the Mini and Rolls-Royce brands. It is one of the top three German manufacturers of premium cars, which lead in sales worldwide.

In 2011, BMW and Toyota signed an agreement on joint work. Under its terms, the Germans will provide the Japanese with turbodiesels, and the Asians, in turn, will share with the Europeans developments in the field of hybrid technology. In 2012, Akio Toyoda

⁶ Krapivina, J. (2021). *Tesla announces record sales despite chip shortages*. [online] secretmag.ru. Available at: <https://secretmag.ru/news/tesla-obyavila-o-rekordnykh-prodazhakh-nesmotrya-na-deficit-chipov-03-10-2021.htm> [Accessed 20 Mar. 2022].

met with BMW CEO Norbert Reithofer in Munich, where they signed another agreement on joint cooperation. According to it, German and Japanese companies will develop electric propulsion systems and fuel cell cars, work together in the field of weight reduction of vehicle construction. And the most important thing in this story: the Germans and the Japanese will create a new car platform for a family of sports models⁷. As time has shown, it was about the revival of the legendary Toyota Supra mk5.

At the annual conference in 2021, the BMW concern not only showed off the BMW i4 electric car, but also shared its development plans for the next ten years. Of course, the main task is the gradual transition to electric power. Now the BMW concern has only three electric cars - it is already not young hatchback BMW i3, three-door Mini Cooper SE and crossover BMW iX3. By the end of this year, the BMW iX and BMW i4 models will hit the market. But by 2023, the range will include 13 electric models, and BMW will have at least one battery-operated car in every market segment⁸.

All this means for the investor the competitiveness of BMW on the car market in the context of current trends and new regulations and legislative requirements.

⁷ Esenov, R. (2012). *BMW and Toyota expand cooperation - DRIVE*. [online]

www.drive.ru. Available at:

<https://www.drive.ru/business/bmw/toyota/4ff56742b72142d65b0001a0.html> [Accessed 22 Mar. 2022].

⁸ Vladimirsky, I. (2021). *BMW Plans: Electrification of the Mini and New Class*. [online]

autoreview.ru. Available at: <https://autoreview.ru/news/plany-bmw-elektrifikaciya-mini-i-novyy-klass> [Accessed 22 Mar. 2022].

Figure 10. Bayerische Motoren Werke Aktiengesellschaft (BMW.DE) 2010-2021



Source: finance.yahoo.com (2022)

The stock reached a historical high in 2015, and showed a downward trend in the following years. The pandemic also hit the stock quite hard, and it was not until mid-November 2020 that it recovered to its 2020 initial level. Now the uptrend continues.

Table 3. Bayerische Motoren Werke Aktiengesellschaft (BMW.DE), economic indicators, 2021

Bayerische Motoren Werke Aktiengesellschaft (BMW.DE)	Statistical data
Total debt/equity	137,71
Trailing P/E	4,04
Forward P/E	4,87
Price/Sales	0,42
ROA	3,75%
Profit Margin	11,13%
Forward Dividend	5,8 EUR
Market cap	47,31 B EUR
Price	88,49 EUR

Source: finance.yahoo.com (2022)

According to the results for 2021, Bayerische Motoren Werke Aktiengesellschaft has a market capitalization of € 47,31 billion. During 2021, the price per share increased to € 88,49. The profit margin is 11.13 %. The net profit-to-asset ratio is 3.75 percent. The price/sales ratio is 0.42, indicating that the shares are underpriced. P / E values of 4,87 and trailing P / E – 4,04 can indicate that the company is expanding. The dividend for 2022 is expected to be € 5,8 per share. The total debt to equity ratio is 137,71.

1.13 Petroleum Industry

When planning investments in oil companies, it is important to understand the current state of the black gold market, as well as its prospects for the future.

Despite all the current problems in the industry, of course, oil companies are not planning to just shut down and leave the market - many of them are already planning to invest in the same emission reduction technologies. For example, ExxonMobil Corporation has announced plans to spend \$15 billion on environmental projects in the next 5-10 years, and this is not the only example⁹.

In most cases, extractive companies have the greatest earning potential from rising oil prices. At the same time, such activities are associated with rather high risks.

To manage the risks associated with investing in oil companies, investors prefer to invest in shares of companies from different segments of the oil industry or choose integrated companies¹⁰.

This part will feature shares of such giants as ExxonMobil Corporation, PetroChina Company Limited and The British Petroleum p.l.c.

⁹ Lesnykh, A. (2022). *Betting on the “black”*: is it worth it to buy shares of oil companies. [online] Известия. Available at: <https://iz.ru/1288294/aleksandr-lesnykh/stavka-na-chnoe-stoit-li-pokupat-akcii-neftianykh-kompanii> [Accessed 22 Mar. 2022].

¹⁰ Petrov, B. (2021). *Shares of oil companies: how to invest in them?*. [online] Admirals. Available at: <https://admiralmarkets.com/ru/education/articles/shares/akcii-neftyanykh-kompanij> [Accessed 22 Mar. 2022].

1.13.1 ExxonMobil Corporation (XOM)

ExxonMobil Corporation is an American corporation, one of the largest oil companies in the world, formed in 1999 through the merger of the American companies Exxon and Mobil. The company is headquartered in Irving, a suburb of Dallas, Texas.

ExxonMobil Corporation has several divisions and hundreds of subsidiaries, which operate and sell products on all 6 continents. The company's business is divided into several reportable segments:

- Upstream - includes the exploration, production and sale of crude oil and natural gas.
- Downstream. This ExxonMobil Corporation segment is engaged in refining, transporting, and selling petroleum products (gasoline, naphtha, heating oils, kerosene, diesel oils, jet fuel, etc.).
- Chemical. ExxonMobil Corporation is a major producer and marketer of petrochemicals and a wide range of specialty products: olefins, polyolefins, etc.

ExxonMobil Corporation is a large, diversified business with global logistics, trading, refining and marketing operations. The corporation has a presence in established markets in North and South America and Europe, as well as in the growing Asia-Pacific region¹¹.

¹¹ Fin-plan (2019). *Exxon Mobil Corporation - Financials and Stock List*. [online] Fin-plan.org. Available at: [https://fin-plan.org/lk/obligations/company_usa/exxon_mobil_corporation/#:~:text=Exxon%20Mobil%20Corporation%20\(%D0%B4%D0%B0%D0%BB%D0%B5%D0%B5%20Exxon](https://fin-plan.org/lk/obligations/company_usa/exxon_mobil_corporation/#:~:text=Exxon%20Mobil%20Corporation%20(%D0%B4%D0%B0%D0%BB%D0%B5%D0%B5%20Exxon) [Accessed 23 Mar. 2022].

Figure 11. ExxonMobil Corporation (XOM) 2010-2021



Source: finance.yahoo.com (2022)

From 2010 to 2014, we have seen the share price rise with adjustments. In 2014 the price reaches a peak, where due to geopolitical problems a prolonged decline begins until the beginning of the pandemic, where we can see a very sharp drop. In 2021, fuel production dropped below 3.6 million barrels per day. However, on the back of rising oil prices in October 2021, the company is beginning to recover.

Table 4. ExxonMobil Corporation (XOM), economic indicators 2021

ExxonMobil Corporation (XOM)	Statistical data
Total debt/equity	30,18
Trailing P/E	15,76
Forward P/E	12,99
Price/Sales	1,31
ROA	4,98%
Profit Margin	8,26%
Forward Dividend	3,52 USD
Market cap	359,52 B USD
Price	61,19 USD

Source: finance.yahoo.com (2022)

ExxonMobil Corporation has a market capitalization of \$359,52 billion as of 2021. During 2021, the price per share increased to \$ 61,19. The profit margin stands at 8.26%.

The net profit-to-asset ratio is 4.98 percent. The price/sales ratio is 1.32, indicating that the shares are not overpriced. P/E values of 12,99 and trailing P/E – 15,76 may indicate that future earnings will be higher. The dividend for 2022 is expected to be \$3,52 per share. The total debt to equity ratio is 30,18.

1.13.2 PetroChina Company Limited (PTR)

PetroChina Company Limited is the largest Chinese company in the oil and gas industry. It was founded in 1999. It is engaged in a wide range of oil and gas activities, including: exploration, development, production and marketing of crude oil and natural gas, refining of crude oil and petroleum products, and production and marketing of basic petrochemical products, chemical derivatives and other chemical products, transportation of natural gas, crude oil and refined products.

At present, almost all of the company's oil and natural gas reserves and production-related assets are located in China, mainly in the Northeast, North, Southwest and Northwest regions, including: Daqing Oil Region, Changqing, Xinjiang, Tarim Oil and Gas Region and ChuanYu Gas Region. Meanwhile, PetroChina Company Limited is expanding its strategic presence in the international market.

PetroChina's production facilities include 29 enterprises located in nine provinces, four autonomous regions and three municipalities that process their own crude oil and petroleum products and produce and market basic petrochemical products, chemical derivatives and other chemical products. In addition, the company has agreements with China Petroleum & Chemical Corporation (Sinopec) to mutually supply raw materials for its enterprises. We also purchase some of the crude oil we need for production from third-party international suppliers located in different countries and regions¹².

¹² Dotbig (2021). *5 foreign oil and gas companies attractive to investors in 2021-2022 - Finance on vc.ru*. [online] vc.ru. Available at: <https://vc.ru/finance/311359-5-zarubezhnyh-kompaniy-iz-neftegazovoy-otrasli-privlekatelnyh-dlya-investorov-v-2021-2022-godah> [Accessed 23 Mar. 2022].

Figure 12. PetroChina Company Limited (PTR) 2010-2021



Source: finance.yahoo.com (2022)

From 2010 to 2015, we see the price being in the range of \$100 to \$150, depending on adjustments. In 2015, there was a sharp drop due to geopolitical events, which lasted until 2020, where we see that the price reached the bottom and began to regrow. Shares of the energy supplier have risen about 50% since the beginning of 2021, despite weakness in the securities of many Chinese companies and fears of regulatory repression. It's a great time to buy shares at an attractive price, as experts expect another rise.

Table 5. PetroChina Company Limited (PTR), economic indicators, 2021

PetroChina Company Limited (PTR)	Statistical data
Total debt/equity	36,51
Trailing P/E	6,89
Forward P/E	5,72
Price/Sales	0,24
ROA	2,32%
Profit Margin	3,52%
Forward Dividend	3,38 USD
Market cap	153,44 B USD
Price	44,21 USD

Source: finance.yahoo.com (2022)

PetroChina Company Limited has a market capitalization of \$ 154,44 B in 2021, according to the results. During 2021, the price per share increased to \$ 50.24. The profit margin is 35.2%. The net profit-to-asset ratio is 2.32 percent. The price/sales ratio is 0.24, indicating that the shares are underpriced. A comparison of forward P / E values of 5,72 and trailing P / E values of 6,89 can indicate that future earnings will be higher. The dividend for 2022 is expected to be \$ 3,38 per share. The total debt to equity ratio is 36.51.

1.13.3 The British Petroleum p.l.c. (BP)

BP is a British oil and gas company that is actively developing in the field of "green energy. BP Plc has set a goal of reducing net carbon dioxide emissions to zero by 2025 or earlier and reorganizing its gas- and oil-focused divisions to switch to cleaner fuels. For example, in 2020, British Petroleum's generating capacity for energy production from renewable sources was 3.3 GW. By 2030, the company plans to increase this figure to 50 GW.

The company has launched a share buyback and dividend payout program that will allow the company to generate double-digit returns. It is planned to return more than 60% of free cash to shareholders. At the same time BP increased the volume of the planned buyback to \$1.5 bln. Combined with the dividend payments the total cash return in 2022 and 2023 could be 10.6% and 13.9% respectively¹³.

BP is present in more than 100 countries all over the world, is engaged in mineral exploration in more than 26 countries, and employs about 80 thousand people. The headquarters are in London.

¹³ Dotbig (2021). *5 foreign oil and gas companies attractive to investors in 2021-2022 - Finance on vc.ru*. [online] vc.ru. Available at: <https://vc.ru/finance/311359-5-zarubezhnyh-kompaniy-iz-neftegazovoy-otrasli-privlekatelnyh-dlya-investorov-v-2021-2022-godah> [Accessed 23 Mar. 2022].

Figure 13. BP p.l.c. (BP) 2010-2021



Source: finance.yahoo.com (2022)

2010 for the company began with a record drop in the share price, all because traders reacted to the news of increased spending on the liquidation of the accident in the Gulf of Mexico.

The cost of the work increased to 2.35 billion dollars. Because of this, the share price hit a record low since 1996.

The oil spill in the Gulf of Mexico began on April 22. After a two-day fire that killed 11 people, the Deepwater Horizon platform sank. The spill, recognized as the largest in US history, created an oil slick that soon reached the shores of the state of Louisiana. A state of emergency was declared here and in several neighboring states¹⁴.

Investors were left without dividends in 2010 due to the enormous losses.

After the resolution of this problem, the company's shares gradually began to rise with small adjustments, until 2015 and again, due to geopolitical events in Ukraine, the price once again fell. From 2016 through 2019, we see another rise of almost 100% before the pandemic hit. The next historical low for stock prices came at the end of 2020. Currently, we can see an increase of more than 100% over the last year.

¹⁴ Lenta.ru (2010). *BP shares fell to their lowest level since 1996*. [online] Lenta.RU. Available at: <https://lenta.ru/news/2010/06/25/bp/> [Accessed 23 Mar. 2022].

Table 6. BP p.l.c. (BP), economic indicators 2021

BP p.l.c. (BP)	Statistical data
Total debt/equity	77,17
Trailing P/E	12,62
Forward P/E	6,16
Price/Sales	0,61
ROA	2,99%
Profit Margin	4,82%
Forward Dividend	1,3 USD
Market cap	92,54 B USD
Price	26,63 USD

Source: finance.yahoo.com (2022)

According to the results for 2021, BP p.l.c. has a market capitalization of \$ 92,54 B. During 2021, the price per share increased to \$ 26,63. Profit margin is 4.82 percent. The net profit-to-asset ratio is 2.99 percent. The price/sales ratio is 0.61, indicating that the shares are underpriced. A comparison of forward P / E values of 6,16 and trailing P / E values of 12,62 can indicate that future earnings will be higher. The dividend for 2022 is expected to be \$1.33 per share. The total debt to equity ratio is 77,17.

1.14 Technological industry

The technology sector is growing all over the world: if ten years ago only the oil and gas industry was at the top of the list of the most expensive companies in the world, now it is exclusively technology companies. And this is not surprising, because technology is developing very rapidly, helping people to cope with the rapid speed of life.

In 2020, shares of many technology companies outperformed the broader market as the pandemic and quarantine turned many companies engaged in: cloud technology, e-commerce and financial technology into better investments. These companies were

insulated from the pandemic, and some of them even delivered accelerated growth throughout the crisis¹⁵.

This part will feature shares Meta Platforms, Amazon.com and Apple.

1.14.1 Meta Platforms Inc. (FB)

Meta platforms Inc commonly known as Facebook, is a multinational technology company that is a parent company to Instagram, Facebook, and WhatsApp. It is one of the most valuable organizations in the world and part of the big 5 American information technology organizations alongside Amazon, Alphabet, Microsoft, and Apple Inc.

Facebook was rebranded in 2021 and now is called Meta. Its founder Mark Zuckerberg announced this at a presentation on Thursday, October 28 2021. In addition to social networks, Mark Zuckerberg also owns Oculus, a manufacturer of virtual reality devices. In September, Facebook has already allocated \$50 million to create a meta-universe. The company is currently testing a virtual reality application for remote work that will allow users to attend meetings as their avatars using a special headset¹⁶.

¹⁵ Kovach, D. (2021). *Shares of technology companies are falling - is it time to invest? - Finance on vc.ru*. [online] vc.ru. Available at: <https://vc.ru/finance/228649-akcii-tehnologicheskikh-kompaniy-padayut-pora-li-investirovat> [Accessed 22 Mar. 2022].

¹⁶ Koval, I. (2021). *Facebook changed its name to Meta, but the name of the social network remains*. [online] DW.COM. Available at: <https://www.dw.com/ru/kompanija-facebook-smenila-nazvanie-na-meta-no-imja-socseti-ostaetsja/a-59658334> [Accessed 23 Mar. 2022].

Figure 14. Meta Platforms, Inc. (FB) 2012-2021



Source: finance.yahoo.com (2022)

The chart shows that since 2012, Facebook stock has been actively rising with small adjustments until 2018, when Facebook stock plummeted 24%. The company became worth \$150 billion less, which was due to the fact that the company's quarterly financial report was worse than most analysts expected.

After that drop, we see another surge through 2021, but the year ended with Facebook stock falling more than 5 percent amid a massive crash in its social media holdings¹⁷.

¹⁷ Plavskaya, E. (2021). *Facebook shares plummeted amid a massive social media outage*. [online] Izvestiya. Available at: <https://iz.ru/1230868/2021-10-04/aktcii-facebook-upali-na-fone-massovogo-sboia-sotcsetei> [Accessed 22 Mar. 2022].

Table 7. Meta Platforms Inc. (FB), economic indicators 2021

Meta Platforms Inc. (FB)	Statistical data
Total debt/equity	11,57
Trailing P/E	13,62
Forward P/E	14,45
Price/Sales	4,55
ROA	17,97%
Profit Margin	33,38%
Forward Dividend	-
Market cap	510,66 B USD
Price	336,35 USD

Source: finance.yahoo.com (2022)

Meta Platforms Inc. has a market capitalization of \$ 510,66 B in 2021, according to the results. During 2021, the price per share increased to \$336,35. The profit margin is 33.38 %. The net profit-to-asset ratio is 17.97 percent. The price/sales ratio is 4,55, indicating that the shares are overpriced. A comparison of forward P/E ratios of 14,45 and trailing P/E ratios of 13,62 can indicate higher future earnings. There will be no dividend in 2022. The total debt to equity ratio is 11,57.

1.14.2 Amazon.com, Inc. (AMZN)

Amazon is one of the largest and most famous companies in the world. Amazon was founded in 1994 by Jeff Bezos, who recently stepped down as head of the company.

But Amazon Amazon is more than just a big e-commerce marketplace. Amazon owns one of the most powerful and widely used cloud computing infrastructures in the world: Amazon Web Services (AWS). In 2020, AWS had a 31% market share. This market share makes AWS the undisputed leader in the cloud computing industry, ahead of Microsoft (20% market share) and Google (7% market share).

Firms such as Netflix run entirely on Amazon's cloud computing platform (Netflix, in fact, has no infrastructure of its own). Facebook, Zoom and LinkedIn are supported by AWS infrastructure. Even NASA has contracted to use Amazon's cloud computing infrastructure to leverage its huge, globe-spanning computing network to perform complex calculations.

Amazon also owns many other businesses and subsidiaries, such as TV and movie studios (Amazon Studios), a video-on-demand platform (Amazon Prime Video) and a long list of emerging startups and other consolidated companies: IMDb, Twitch, Zappos, Ring, Whole Foods Market, Audible, Souq...

Amazon is now present in 58 countries across 5 continents, including China, the United Arab Emirates, Turkey, Singapore, Brazil... Since its birth, Amazon has never stopped expanding geographically, and it is clear that Bezos has a very clear plan: to turn Amazon into a global e-commerce platform.

The global crisis caused by COVID-19 has by no means affected Amazon, but has catapulted and further accelerated its growth. After all, Amazon had to "suspend" the sale of some "non-priority" items in some countries in order to provide essentials such as food, hygiene products and parapharmaceuticals.

The introduction of COVID-19 resulted in many users who had been using Amazon on an ad hoc basis or who were not yet customers of the platform, starting to use it on an ongoing basis: Amazon's adoption accelerated¹⁸.

Figure 15. Amazon.com, Inc. (AMZN) 2010-2021



Source: finance.yahoo.com (2022)

¹⁸ INVESTOR TIMES (2021). *5 reasons why you should invest in Amazon stock right now*. [online] INVESTOR TIMES. Available at:

<https://investortimes.com/ru/%D0%B8%D0%BD%D0%B2%D0%B5%D1%81%D1%82%D0%B8%D1%80%D0%BE%D0%B2%D0%B0%D1%82%D1%8C-%D0%B2-%D0%B0%D0%BA%D1%86%D0%B8%D0%B8-amazon/> [Accessed 23 Mar. 2022].

As you can see in the chart, Amazon stock has rallied rapidly and continuously since 2010 until 2018, when there was a massive collapse in tech stocks such as Amazon, Apple, Facebook, Netflix and Google. The market crash was caused by trade friction between the U.S. and China. Amazon's stock continued to fall after it released its fourth-quarter outlook for the year on Oct. 25, 2018, which showed lower-than-expected financial results¹⁹. But that was followed by another sharp rise in the stock price through 2021, when the company reported financial results for the second quarter of 2021, causing the stock to drop 7.5%.

Table 8. Amazon.com Inc. (AMZN), economic indicators 2021

Amazon.com Inc. (AMZN)	Statistical data
Total debt/equity	100,86
Trailing P/E	44,91
Forward P/E	50,00
Price/Sales	3,19
ROA	4,19%
Profit Margin	7,10%
Forward Dividend	-
Market cap	1,48 T USD
Price	3256,93 USD

Source: finance.yahoo.com (2022)

According to the results for 2021, Amazon.com Inc. has a market capitalization of \$ 1,48 T. During 2021, the price per share increased to \$ 3256,93. Profit margin is 7.1 percent. The net profit-to-asset ratio is 4.19 percent. The price/sales ratio is 3,19, indicating that the shares are overpriced. A comparison of forward P / E values of 50,00 and trailing P / E values of 44,91 may indicate that the company is expanding. There will be no dividend in 2022. The total debt to equity ratio is 100,86.

¹⁹ Shmyrova, V. (2018). *Trump's spat with China crashed shares of Facebook, Amazon, Apple, Netflix and Google*. [online] CNews.ru. Available at: https://www.cnews.ru/news/top/2018-11-21_aktcii_pyati_krupnejshih_itkompanij_ruhnuli_odnovremenno [Accessed 22 Mar. 2022].

1.14.3 Apple Inc. (AAPL)

Apple Inc. - is an American technology company based in Cupertino, California, that designs and develops consumer electronics, software and online services. It is the first U.S. company whose capitalization surpassed \$1 trillion, which happened during the company's stock trading on Aug. 2, 2018. On that day, the company also became the most expensive publicly traded company in history, surpassing the capitalization of the previous record holder, PetroChina (\$1.005 trillion in November 2007).

Figure 16. Apple Inc. (AAPL) 2010-2021



Source: finance.yahoo.com (2022)

Since 2010, Apple's stock has skyrocketed. In 2014, the company made a so-called split, in which each share of the company was turned into seven and their value was reduced proportionally to attract new investors. A big drop in the stock price occurred in 2018 (I mentioned it when I talked about Amazon's stock performance). The reason was that Apple reported losses for five weeks in a row, the first time this has happened since 2012. The stock was also affected by the negative outlook for new iPhone shipments, as well as the fact that the company announced that it would no longer publish unit-sales figures, focusing on providing an "overall picture." Apple shares fell by 6.6%. In 2020 there was another 4:1 stock split. In 2021, the company's stock price hit an all-time high. On Dec. 9, the stock was trading at a record high of \$176.6, according to the Nasdaq stock exchange²⁰.

²⁰ Ermakova, S. (2021). *Apple shares set an all-time record*. [online] Lenta.RU. Available at: <https://lenta.ru/news/2021/12/09/aapl/> [Accessed 23 Mar. 2022].

Table 9. Apple Inc. (AAPL), economic indicators 2021

Apple Inc. (AAPL)	Statistical data
Total debt/equity	170,71
Trailing P/E	25,66
Forward P/E	25,91
Price/Sales	6,84
ROA	19,88%
Profit Margin	26,58%
Forward Dividend	0,88 USD
Market cap	2,53 T USD
Price	177,57 USD

Source: finance.yahoo.com (2022)

According to the results for 2021, Apple Inc. has a market capitalization of \$ 2,53 T. During 2021, the price per share increased to \$ 177,57. The profit margin stands at 26.58 percent. The net profit-to-asset ratio is 19.88 percent. The price/sales ratio is 6.84, indicating that the shares are overpriced. A comparison of forward P / E values of 25,91 and trailing P / E values of 25,66 can indicate that future earnings will be higher. The dividend for 2022 is expected to be \$0.88 per share. The total debt to equity ratio is 170,71.

1.15 Defense industry

Against a backdrop of growing global instability, the defense industry is undergoing record modernization. States around the world are investing significant sums to develop more powerful and durable weapons to defend against potential threats and support modern armies. Increased investment is projected to be relevant through 2024 and beyond, depending on current budgets.

Shares of U.S. arms companies listed on world stock exchanges allow to legally earn money in the production of weapons, aircraft equipment and special technical means for the security services. Almost all major players in the U.S. defense industry are public, their securities are freely traded on the market and have good liquidity. Investing in shares of

U.S. military companies is one of the most affordable means of investing in the defense sector²¹.

In this part I will present such companies, as Raytheon Technologies Corporation, Northrop Grumman Corporation and General Dynamics Corporation.

1.15.1 Raytheon Technologies Corporation (RTX)

Raytheon Technologies Corporation was founded on April 3, 2020 as a result of the merger of United Technologies Corporation (founded 1934) and Raytheon Company (founded 1922). Provides high-tech products and services to the aerospace industry worldwide. The company combines segments such as:

- Pratt & Whitney and Collins Aerospace Systems - provides aircraft engines for military, commercial and private aircraft. In addition, Pratt & Whitney is involved in aircraft fleet management and aircraft repair systems.
- The Collins Aerospace Systems segment provides aerospace products as well as aircraft and airline services.

RTC is also a major military contractor, receiving a significant portion of its revenues from the U.S. government. Aerospace is subject to significant competition from various domestic and foreign manufacturers, such as GE Aviation, Honeywell, Safran Helicopter Engines and CFM International.

RTC common stock is listed on the New York Stock Exchange.

²¹ Titova, Y. (2018). *Defence budget. How an investor can make money from the arms race*. [online] Forbes.ru. Available at: <https://www.forbes.ru/finansy-i-investicii/359589-oboronnyy-byudzheth-kak-investoru-zarabotat-na-gonke-vooruzheniy> [Accessed 23 Mar. 2022].

Figure 17. Raytheon Technologies Corporation (RTX) 2010-2021



Source: finance.yahoo.com (2022)

Since 2010, the company's stock has risen continuously with minor adjustments, the main ones occurring in 2015 and 2018. This was followed by a severe downturn in the airline industry, caused by travel restrictions due to COVID-19 - the company was kept afloat by the defense and space businesses, which provide two-thirds of revenue. That same year, the company made a split of its stock 15890:10000.

Raytheon Technologies was capitalized at \$128.6 billion in the third quarter of 2021. The military contractor was able to bypass rivals and enter into a lucrative agreement with the U.S. Air Force to develop a new long-range weapon system. The contract was the largest in the missile industry for the entire year of 2021. The manufacturer also received several more valuable contracts from the U.S. Air Force, which should pay off well in the coming years and strengthen the company's image and financial position. This was followed by a strong rise in the company's share price²².

²² Belyaevskova, O. (2021). *Shares of U.S. defense companies of the military-industrial complex*. [online] BestStocks. Available at: <https://beststocks.ru/journal/us-defense-stocks-review/> [Accessed 23 Mar. 2022].

Table 10. Raytheon Technologies Corporation (RTX), economic indicators 2021

Raytheon Technologies Corporation (RTX)	Statistical data
Total debt/equity	44,92
Trailing P/E	39,24
Forward P/E	20,62
Price/Sales	2,37
ROA	2,63%
Profit Margin	6,00%
Forward Dividend	2,04 USD
Market cap	150,86 B USD
Price	86,06 USD

Source: finance.yahoo.com (2022)

Raytheon Technologies Corporation has a market capitalization of \$ 150,86 B in 2021, according to the results. During 2021, the price per share increased to \$ 86,06. The profit margin is 6,00%. The net profit-to-asset ratio is 2.63 percent. The price/sales ratio is 2.37, indicating that the shares are not overpriced. A comparison of forward P/E values of 20,62 and trailing P/E values of 39,24 indicates that the company is expanding. The dividend for 2022 is expected to be \$2.04 per share. The total debt to equity ratio is 44,92.

1.15.2 Northrop Grumman Corporation (NOC)

Northrop Grumman (NOC) is a developer and manufacturer of high-tech weapons and military equipment.

The company designs, develops, integrates and manufactures the following products:

- aerospace systems - aircraft, spacecraft, autonomous vehicles, high-energy lasers;
- innovative systems - rockets, launch vehicles, high precision weapons;
- mission systems - navigation and launchers for missiles, optical, infrared, acoustic and other sensors;
- technological solutions - software and support, training and logistics solutions, modernization of services.

Northrop Grumman is a leading supplier in defense and intelligence. About 85% of sales come from the U.S. market, mostly government orders, and about 15% from the international market²³.

Figure 18. Northrop Grumman Corporation (NOC) 2010-2021



Source: finance.yahoo.com (2022)

Since 2010, the company's share price has been rising continuously until 2018, when there was a drop when stocks lost more than one third of its value. This was followed by quite active growth and the share price returned to the value it had before the fall. But in 2020 COVID-19 followed, which caused the share price to fall, though not as much as in 2018. In year 2021 company reduced net debt by 100 million and won a number of significant contracts with a lifecycle of several decades. At the end of 2021, the price reached its peak in the history of the company and according to experts should continue its growth.

²³ Belyaevskova, O. (2021). *Shares of U.S. defense companies of the military-industrial complex*. [online] BestStocks. Available at: <https://beststocks.ru/journal/us-defense-stocks-review/> [Accessed 23 Mar. 2022].

Table 11. Northrop Grumman Corporation (NOC), economic indicators 2021

Northrop Grumman Corporation (NOC)	Statistical data
Total debt/equity	113,39
Trailing P/E	16,97
Forward P/E	17,86
Price/Sales	2,02
ROA	10,76%
Profit Margin	19,64%
Forward Dividend	6,28 USD
Market cap	69,77 B USD
Price	387,07 USD

Source: finance.yahoo.com (2022)

Northrop Grumman Corporation has a market capitalization of \$ 69,77 B in 2021, according to the results. During 2021, the price per share increased to \$387,07. The profit margin is 196.44%. The net profit-to-asset ratio is 10.76 percent. The price/sales ratio is 2,02, indicating that the shares are not overpriced. A comparison of forward P / E values of 17,86 and trailing P / E values of 16,97 can indicate that future earnings will be higher. The dividend for 2022 is expected to be \$6,28 per share. The total debt to equity ratio is 113,39.

1.15.3 General Dynamics Corporation (GD)

General Dynamics (GD) is a developer and manufacturer offering a wide range of products and services for the needs of the defense industry. The company's activities are conducted in four main areas:

- Naval systems - coastal warships, submarines, destroyers, oil tankers and dry bulk carriers;
- Combat systems - armored personnel carriers, tanks, fighting vehicles, ammunition;
- Information systems and technologies - missile control systems, telecommunications surveillance and satellite reconnaissance data processing, signal recognition and processing;

- Aerospace engineering - business jets, space satellites and automation systems for them²⁴.

Figure 19. General Dynamics Corporation (GD) 2010-2021



Source: finance.yahoo.com (2022)

From 2010 to 2013, we have seen a stable share price with the exception of minor adjustments, but the company is starting 2013 with a new leader, changing its business structure. On January 1, former CIA operative and senior Pentagon official Phoebe Novakovich became CEO and chairman of General Dynamics, ending her decade-long ascent to the top of the nation's oldest military contractor²⁵. After that change at the company, the stock price rose continuously and very rapidly from 2013 to early 2018. This was followed by a drop until late 2020. The company has not yet recovered to its 2019 pre-recession levels, but its margins, growing contract package and the recently unveiled two new Gulfstream business jets are encouraging for investors.

²⁴ Belyaevskova, O. (2021). *Shares of U.S. defense companies of the military-industrial complex*. [online] BestStocks. Available at: <https://beststocks.ru/journal/us-defense-stocks-review/> [Accessed 23 Mar. 2022].

²⁵ Thompson, L. (2012). *General Dynamics Begins 2013 With New Leader, Changing Business Mix*. [online] Forbes. Available at: <https://www.forbes.com/sites/lorenthompson/2012/11/26/general-dynamics-begins-2013-with-new-leader-changing-business-mix/?sh=48ec007c78ff> [Accessed 26 Mar. 2022].

Table 12. General Dynamics Corporation (GD), economic indicators 2021

General Dynamics Corporation (GD)	Statistical data
Total debt/equity	74,68
Trailing P/E	20,75
Forward P/E	19,76
Price/Sales	1,76
ROA	5,40%
Profit Margin	8,47%
Forward Dividend	5,04 USD
Market cap	66,56 B USD
Price	208,47 USD

Source: finance.yahoo.com (2022)

According to the results for 2021, General Dynamic Corporation has a market capitalization of \$ 66,56 B. During 2021, the price per share increased to \$ 208,47. The profit margin stands at 8.47 percent. The net profit-to-asset ratio is 5.40 percent. The price/sales ratio is 1.76, indicating that the shares are not overpriced. A comparison of forward P / E values of 19,76 and trailing P / E values of 20,75 can indicate that profitability will remain constant regardless of share price. The dividend for 2022 is expected to be \$5,04 per share. The total debt to equity ratio is 74,68.

1.16 Portfolio

Data analysis and multi-criteria decision analysis were used to select the joint stock companies presented in. The evaluation was based on such indicators as total debt/equity, return on assets and forward dividends.

Table 13. Multiple-criteria decision analysis

Industry	Company	ROA	Total debt/equity	Forward Dividend	Evaluation
Automotive	Toyota Motor Corporation	3,31%	97,17	\$ 4,55	1
	Tesla, Inc.	7,14%	28,19	N/A	2
	BMW	3,75%	137,71	€ 5,8 (aprox. \$ 6,37)	3
Petroleum	Exxon Mobil Corporation	4,98%	30,18	\$ 3,52	1
	PetroChina Company Limited	2,32%	36,51	\$ 3,38	2
	The British Petroleum p.l.c.	2,99%	77,17	\$ 1,3	3
Technological	Meta Platforms Inc.	17,97%	11,57	N/A	2
	Amazon.com, Inc.	4,19%	100,86	N/A	3
	Apple Inc.	19,88%	170,71	\$ 0,88	1
Defence	Raytheon Technologies Corporation	2,63%	44,92	\$ 2,04	3
	Northrop Grumman Corporation	10,76%	113,39	\$ 6,28	1
	General Dynamics Corporation	5,40%	74,68	\$ 5,04	2

Source: finance.yahoo.com and author (2022)

Based on the data gained from the table 13 and taking into account the fact that the portfolio is compiled for the non-risky investor, I selected for the stock portfolio Toyota Motor Corporation, ExxonMobil Corporation, Apple Inc. and Northrop Grumman Corporation.

1.16.1 Toyota Motor Corporation (TM) analysis

Toyota Motor Corporation is a Japanese automobile manufacturing corporation. The world's largest automobile manufacturer. The company began its operations in 1933 in Japan. The company's main activities are designing, manufacturing, assembling and selling cars.

Toyota cars include three categories:

- HV (hybrid vehicles),
- cars with a conventional engine;
- FCV (electric vehicles).

Toyota's product lineup includes small and compact cars, mini-cars, midsize, luxury, sports and specialty vehicles, SUVs and off-road vehicles, pickup trucks, minivans, trucks and buses.

Outside Japan, Toyota vehicles are sold through approximately 169 distributors in 194 countries and regions. The main markets for Toyota cars are Japan, North America,

Europe and Asia. Geographical structure of revenue: Japan - 25%, North America - 31%, Europe - 11%, Asia - 19%, other - 14%.

The Future of the Company

At a briefing on December 14, 2021, Akio Toyoda, president and CEO of Toyota since 2009 and grandson of company founder Kiichiro Toyoda, made several important statements indicating that the company does not intend to be at the back of the departing train.

In particular, Toyota expects to launch about 30 new EV models by 2030 and bring total sales of electric cars to 3.5 million units by the end of this decade. Thus, the company has increased its planned EV sales by 75% compared to the previous target of 2 million units by 2030, at the same time doubling the number of new electric vehicle models. The Japanese automotive leader plans to invest 4 trillion yen (\$35 billion) in the development and production of its new electric lineup.

In addition, Toyota announced that the company will increase investment in electric battery development to 2 trillion yen (\$18 billion) from the 1.5 trillion yen announced in September 2021 (this amount will include both capital expenditures and R&D expenses) and expects to bring total battery production capacity to 280 gigawatt hours by 2030 (which again, significantly, by about 40%, above the targets announced three months ago). On December 6, Toyota officially announced that it was starting to build the first mega battery plant in North Carolina, Toyota Battery Manufacturing (which will initially be designed to produce lithium-ion batteries for 800,000 vehicles per year).

Technical analysis

Profitability

Toyota annual gross profit for 2021 was \$45.424B, a 8.7% decline from 2020. Toyota annual gross profit for 2020 was \$49.75B, a 1.54% increase from 2019. Toyota annual gross profit for 2019 was \$48.995B, a 0.85% decline from 2018.

Table 14. Gross Profit for TM 2019-2021

	2019	2020	2021
Gross profit, B USD	48.995	49.75	45.424

Source: Macrotrends and author (2022)

Dividend

The dividend for Toyota Motor Corporation increased from \$6.94 per share in 2019 to \$7.95 in 2020 and \$8.09 in 2021. The values of dividend payouts are shown in the table 15.

Table 15. Dividend for TM 2019-2021 (USD)

	2019	2020	2021
First payout	3,41	3,86	4,38
Second payout	3,53	4,09	4,52
Total	6,94	7,95	8,9

Source: Nasdaq and author (2022)

Debt

Table 16 depicts the evolution of TM indebtedness. Long-term debt to total assets increased insignificantly from 0.2 to 0.22 during 2020-2021. Long-term debt increased by \$ 31 448 billion in the years 2019-2021, along with total assets.

Table 16. Long-term debt/assets TM 2019-2021

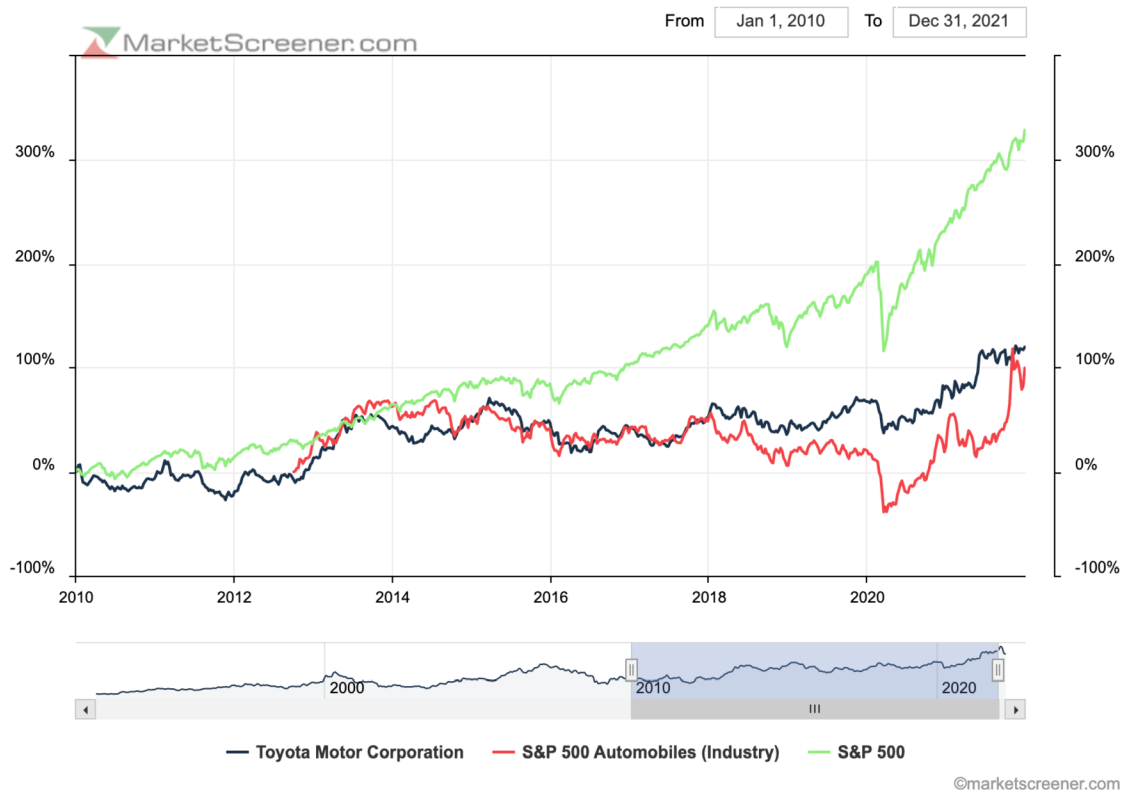
	2019	2020	2021
Long-term debt B USD	94 959	98 375	126 407
Assets B USD	467 433	484 660	585 311
Long-term debt/Assets	0,20	0,20	0,22

Source: Macrotrends and author (2022)

Comparison with indices

Figure 20 compares the performance of TM shares, the S&P 500 stock index, and the S&P 500 Automobiles industry index. The chart shows that Toyota's shares have fallen by 200 percent in comparison to the S&P 500 index since 2013, but have increased in comparison to the sector index TM.

Figure 20. Comparison TM vs. S&P500 vs. industry



Source: www.marketscreener.com (2022)

Internal price vs. market price

The internal stock price was calculated using formula [1] and is \$ 174,88. In comparison to the market value of TM on December 31, 2021 – \$ 172,98, it is clear that both prices are nearly identical, but due to the easily fluctuating market price, stocks are still relevant to buy.

1.16.2 ExxonMobil Corporation (XOM) analysis

ExxonMobil Corporation, which was formed in 1999 as a result of the merger of the two major oil companies Exxon and Mobil, is a large, diversified business with global logistics, trading, refining and marketing operations. The corporation has a presence in established markets in North and South America and Europe, as well as in the growing Asia-Pacific region. ExxonMobil Corporation sells crude oil and natural gas from its production facilities under various contractual arrangements, some of which may specify delivery of fixed and determinable quantities over periods longer than one year. ExxonMobil Corporation also enters into natural gas sales contracts where the source of natural gas used to fulfill the contract may be a combination of its own production and the

spot market. The company's current delivery commitments: about 57 million barrels of oil and 2,400 billion cubic feet of natural gas between 2019 and 2021.

ExxonMobil Corporation has several divisions and hundreds of subsidiaries that operate and sell products on all 6 continents. The company's business is divided into several reportable segments:

- **Upstream** includes exploration, production and sales of crude oil and natural gas. As of early 2019, the company's total reserves were estimated at 24.2 billion barrels of oil equivalent, including: 9.3 billion barrels of oil, 51816 billion cubic feet of natural gas. Thirty-two percent of this volume is under development. The corporation expects several projects to emerge in the next few years that will provide additional production capacity.
- **Downstream.** This segment of ExxonMobil Corporation is engaged in refining, transporting, selling petroleum products (gasoline, naphtha, heating oils, kerosene, diesel oils, jet fuel, etc.). Refining and supply operations encompass a global network of production facilities, transportation systems and distribution centres that provide a wide range of fuels, lubricants and other products and raw materials to customers around the world.
- **Chemical.** ExxonMobil Corporation is a major producer and seller of petrochemicals and a wide range of specialty products: olefins, polyolefins, etc. Key production assets of the petrochemical sector are located in the USA, Europe (Belgium, Great Britain, France, the Netherlands)²⁶.

The future of the company

ExxonMobil Corporation will develop the green direction progressively. At first, the company will focus on technologies for capturing carbon, for example, from power plant emissions, and injecting it underground. In the future, ExxonMobil Corporation also plans to develop other technologies, including hydrogen production.

²⁶ Fin-plan (2019). *Exxon Mobil Corporation - Financials and Stock List*. [online] Fin-plan.org. Available at: [https://fin-plan.org/lk/obligations/company_usa/exxon_mobil_corporation/#:~:text=Exxon%20Mobil%20Corporation%20\(%D0%B4%D0%B0%D0%BB%D0%B5%D0%B5%20Exxon](https://fin-plan.org/lk/obligations/company_usa/exxon_mobil_corporation/#:~:text=Exxon%20Mobil%20Corporation%20(%D0%B4%D0%B0%D0%BB%D0%B5%D0%B5%20Exxon) [Accessed 23 Mar. 2022].

Carbon capture technology, especially carbon dioxide from fuel combustion, is in high demand. Global warming has already increased the number of weather anomalies, and further growth of greenhouse gas emissions could lead to a global climate catastrophe by the end of this century.

ExxonMobil Corporation plans to benefit from future stricter environmental regulations. In the next few years, the company is going to implement more than 20 projects on carbon capture and storage. ExxonMobil Corporation will also invest \$3 billion in low-carbon energy projects by 2025. Probably the first will be projects to collect large amounts of carbon dioxide at facilities along the U.S. Gulf Coast. Subsequently, the gas will be injected into post-mining and offshore rocks for storage.

ExxonMobil Corporation already has similar projects, such as those in Australia and Qatar, capturing a total of 9 million tons of carbon per year, the equivalent of planting 150 million trees.

ExxonMobil Corporation is the latest major oil producer to increase its investment in green solutions. Other players are planning much bigger changes, e.g., BP will reduce its oil and gas business by 40% in the next decade.

Technical analysis

Profitability

ExxonMobil Corporation annual gross profit for 2021 was \$31.234B, a 0.94% increase from 2020. ExxonMobil Corporation annual gross profit for 2020 was \$30.942B, a 42.47% decline from 2019. ExxonMobil Corporation annual gross profit for 2019 was \$53.786B, a 16.86% decline from 2018.

Table 17. Gross Profit of XOM 2019-2021

	2019	2020	2021
Gross profit, B USD	53.786	30.942	31.234

Source: Macrotrends and author (2022)

Dividend

ExxonMobil Corporation's dividend climbed from \$2.88 per share in 2015 to \$3.06 in 2016 and \$3.06 in 2017. The quarterly dividend amounts are shown in the table 18.

Table 18. Dividend of XOM 2019-2021 (USD)

	2019	2020	2021
Q1	0,82	0,87	0,87
Q2	0,87	0,87	0,87
Q3	0,87	0,87	0,87
Q4	0,87	0,87	0,88
Total	3,43	3,48	3,49

Source: StreetInsider.com and author (2022)

Debt

Table 19 demonstrates that debt to total assets increased nearly twice during 2019-2020, from 0.07 to 0.14, and then fell somewhat in 2021, from 0.14 to 0.13. Total assets fell from \$ 362,597 billion to \$ 336,688 billion, while long-term debt increased by \$ 20,840 billion from 2019 to 2020 and then fell by \$ 3,543 billion in 2021.

Table 19. Long-term debt/assets XOM 2019-2021

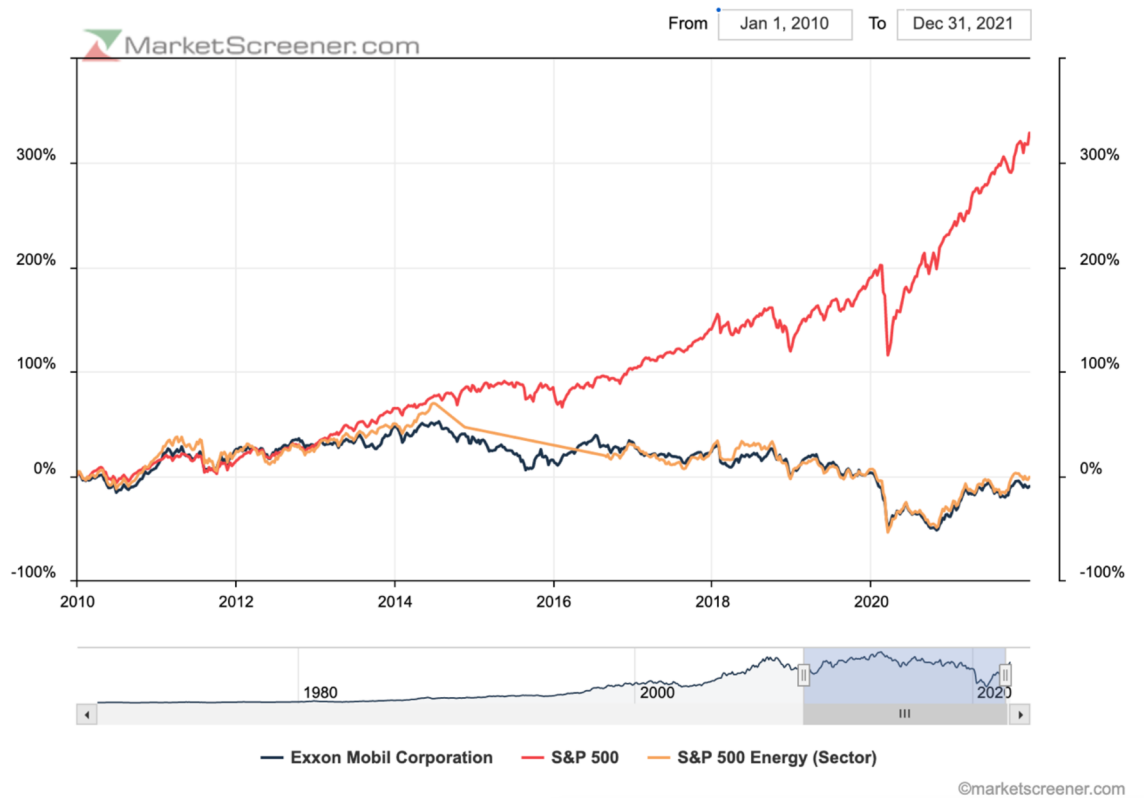
	2019	2020	2021
Long-term debt B USD	26 342	47 182	43 639
Assets B USD	362 597	332 750	336 688
Long-term debt/Assets	0,07	0,14	0,13

Source: Macrotrends and author (2022)

Comparison with indices

Figure 21 compares the performance of XOM shares, the S&P 500 stock index, and the S&P 500 Energy industry index. The figure indicates that ExxonMobil Corporation's shares have fallen 300 percent in contrast to the S&P 500 index since 2014, but remain the same in comparison to the sector index XOM.

Figure 21. Comparison XOM vs. S&P500 vs. sector



Source: www.marketscreener.com (2022)

Internal price vs. market price

The internal stock price was determined using formula [1] and is \$ 74,23. In compared to the market value of XOM on December 31, 2021 – \$ 61,19, the prices are clearly undervalued; yet, stocks are still relevant to buy.

1.16.3 Apple Inc. (AAPL) analysis

Apple Inc. - American technology company, founded in 1976 in California. Apple designs, manufactures and sells mobile communication devices, multimedia devices, PCs of its own brands iPhone, iPad, Mac, Apple Watch, AirPods, Apple TV, HomePod, iOS, macOS, watchOS and tvOS operating systems, and also sells various related programs and applications (iCloud, Apple Pay, iTunes Store, App Store, Mac App Store, TV App Store), services (Book Store and Apple Music), accessories and third-party digital content. The company is unique in that it creates virtually all of its product solutions, including hardware, operating system, numerous software applications and related services.

The geography of distribution of Apple Inc. products covers the entire world. In 2018, about 60% of net sales were in external world markets. The distribution of the figure

by geographic segment: 42% North, South America, 24% Europe, India, Middle East, Africa, 20% China, 6% Asia Pacific, Australia. Sales channels include: own retail stores, online stores and direct sales departments, as well as third-party cellular carriers, wholesalers, retailers and resellers. The ratio of net sales through direct and indirect distribution channels is 29% and 71%, respectively.

Apple common stock is traded on the Nasdaq stock market. Apple was the first publicly traded U.S. company to reach a market value of \$1 trillion. Today it is among the world's largest publicly traded corporations by market capitalization²⁷.

The future of the company

In early January 2022, Apple was the first company in history to cross the \$3 trillion mark in capitalization. The rise in the company's stock price in recent months is linked to expectations that it will enter the race to master virtual space. Since late October, when Mark Zuckerberg unveiled his concept of a meta-universe, Apple shares have risen 15.7 percent and Meta has gained 6.1 percent. Investors and analysts believe that Apple will release AR/VR devices (helmets or smart glasses) in the near future, which will provide financial growth in the coming years.

In the next two years, in addition to traditional sales of iPhones and other devices, investors will need to keep an eye on Apple's AR/VR developments. If Apple enters this market, it could lead to its explosive growth, writes WSJ, citing a December report by Morgan Stanley (about this we wrote in the article about meta universes and how to earn on them the investor). So far, it looks like Apple has a serious advantage in the race for supremacy in the meta-future: an ecosystem of apps and devices creates more useful user scenarios in AR (navigation, messages, and even video chats on transparent lenses) compared to full immersive VR from Meta. But looking into the future is beyond anyone's reach: if Meta universes don't shoot up, instead of becoming the "next big thing" for Apple, its AR and VR devices may never exceed watch sales²⁸.

²⁷ Fin-plan (2022a). *Apple Inc.* [online] Fin-plan.org. Available at: https://fin-plan.org/lk/obligations/company_usa/apple_inc/ [Accessed 26 Mar. 2022].

²⁸ Dvornikov, V. (2022). *Apple for Three Trillion. What Markets Expect from the World's Most Expensive Company.* [online] The Bell. Available at: <https://thebell.io/apple-za-tri-trilliona-chego-rynki-zhdut-ot-samoy-dorogoy-kompanii-mira-Lw8Uv> [Accessed 27 Mar. 2022].

Technical analysis

Profitability

Apple annual gross profit for 2021 was \$152.836B, a 45.62% increase from 2020. Apple annual gross profit for 2020 was \$104.956B, a 6.67% increase from 2019. Apple annual gross profit for 2019 was \$98.392B, a 3.38% decline from 2018.

Table 20. Gross Profit of AAPL 2019-2021

	2019	2020	2021
Gross profit, B USD	98.392	104.956	152.836

Source: Macrotrends and author (2022)

Dividend

The dividend paid by Apple Inc. grew from \$3.04 per share in 2019 to \$3.23 in 2020 and \$3.28 in 2021. The quarterly dividend amounts are shown in the table 21.

In 2020, the company made a 4:1 split of its stock, which means that stockholders received three additional shares to each existing one in their portfolio. The condition was only to fulfil one of these criteria:

- holders were on the shareholder register as of August 24, 2020, and had no sales transactions from August 21 through August 28, 2020, inclusive;
- Made only purchase transactions from and including August 21 through August 28, 2020;
- Had a net purchase position with settlement between August 31 and September 01, 2020.

So, in the table you can see the amount of dividends for 2021 and the last quarter of 2020 already multiplied by 4

Table 21 displays the quarterly dividend amounts.

Table 21. Table 18. Dividend of AAPL 2019-2021 (USD)

	2019	2020	2021
Q1	0,73	0,77	0,82
Q2	0,77	0,82	0,82
Q3	0,77	0,82	0,82
Q4	0,77	0,82	0,82
Total	3,04	3,23	3,28

Source: StreetInsider.com and author (2022)

Debt

Table 22 shows that the debt-to-total-assets ratio grew from 0.27 to 0.31 between 2019 and 2021. During the 2019-2021 fiscal years, total assets climbed from \$ 338,516 billion to \$ 351,002 billion, while long-term debt increased by \$ 17,299 billion.

Table 22. Long-term debt/assets AAPL 2019-2021

	2019	2020	2021
Long-term debt B USD	91 807	98 667	109 106
Assets B USD	338 516	323 888	351 002
Long-term debt/Assets	0,27	0,30	0,31

Source: Macrotrends and author (2022)

Comparison with indices

Figure 22 compares the performance of AAPL stock, the Nasdaq stock index, and the Nasdaq 100 Technology index. The graphic indicates that since 2013, Apple's shares have increased by over 1200 percent more than the Nasdaq index, while also increasing by approximately 1500 percent more than the Nasdaq 100 Technology index.

Figure 22. Comparison AAPL vs. NASDAQ vs. sector



Source: www.marketscreener.com (2022)

Internal price vs. market price

The internal stock price was determined using formula [1] and is \$ 177,86. In contrast to the market value of AAPL on 31.12.2021 – \$ 177,57, it is clear that both prices are nearly identical, but due to the easily fluctuating market price, stocks are still relevant to buy.

1.16.4 Northrop Grumman Corporation (NOC) analysis

Northrop Grumman Corporation is an American military-industrial company headquartered in West Falls, Virginia (USA). Founded in 1994, it offers a wide range of aerospace and military capabilities and technologies. Participates in many priorities defense and government programs in the U.S. and abroad. Conducts the majority of its business with the U.S. government, primarily with the Department of Defense and the intelligence community, as well as with foreign clients.

The company focuses on design, development, integration and production:

- Aerospace systems (manned aircraft, autonomous systems, spacecraft, high-energy laser systems, microelectronics and other systems, and subsystems).
- Innovative systems (launch vehicles and associated propulsion systems, missile products and defense electronics, precision weapons, weapons systems and munitions, satellites and related space components and services).
- "Mission systems" (radar, electro-optical, infrared and acoustic sensors, electronic warfare systems, cyber solutions, space systems, information processing systems, air and missile defense integration, navigation and onboard missile launch systems).
- Technology solutions (software and support systems, modernization of platforms and related subsystems, modern training solutions and integrated logistics support).

The company's common stock is listed on the NYSE. Northrop Grumman Corporation's largest customer is the U.S. government, accounting for 82% of sales.

The company's manufacturing facilities include 548 facilities totalling 53 million square feet for manufacturing, warehousing, research and testing, administration and various other purposes, located primarily in the United States.

The revenue structure by line of business is as follows:

- Aerospace Systems, 40% of total revenues;
- Innovation Systems, 10%;
- Mission Systems, 36%;

- Technology Solutions, 14%.

Geographic distribution of sales:

- U.S. - 85%;
- International sales - 15%.

Northrop Grumman Corporation's largest customer is the U.S. government, accounting for 82% of sales²⁹.

The future of the company

Northrop Grumman Corporation showed a video with a concept of a new generation fighter. The video also showed other winged vehicles, in particular a low-observable strategic bomber B-2. Work on the Next Generation Air Dominance program is kept secret. Earlier it became known about the tests of the prototype, but it is not known who exactly has created it. Also, the price of the project and the timing of the planned launch of the aircraft remain secret. The shown concept can be called original³⁰.

The next new project for Northrop Grumman is the launch of a second service station into orbit that revives communications satellites without fuel. The company is already ahead of the planet with its MEV robotic service stations. These stations are capable of docking in orbit with older satellites, extending their lives. Consequently, satellite owners/operators get an opportunity not to "bury" satellites after they run out of fuel, but by paying extra for a partner's services, to operate the system for about five more years³¹.

Multiple projects, as well as the fact that the company has a major customer in the face of the state, as well as the aggravation of relations between the United States and Russia makes the company very promising, as well as quite stable, because you always need weapons.

²⁹ Fin-plan (2022b). *Northrop Grumman Corporation*. [online] Fin-plan.org. Available at: https://fin-plan.org/lk/obligations/company_usa/northrop_grumman_corporation/ [Accessed 27 Mar. 2022].

³⁰ Vedmenko, I. (2021). *American Northrop Grumman unveiled a concept of a new generation fighter*. [online] Naked Science. Available at: <https://naked-science.ru/article/tech/amerikanskaya-northrop-grumman-2> [Accessed 27 Mar. 2022].

³¹ Sycheva, A. (2021). *Northrop Grumman has launched its second service station, which revives communication satellites without fuel*. [online] Habr. Available at: <https://habr.com/ru/company/selectel/blog/551460/> [Accessed 26 Mar. 2022].

Technical analysis

Profitability

Northrop Grumman annual gross profit for 2021 was \$7.268B, a 2.81% decline from 2020. Northrop Grumman annual gross profit for 2020 was \$7.478B, a 3.02% increase from 2019. Northrop Grumman annual gross profit for 2019 was \$7.259B, a 6.89% increase from 2018.

Table 23. Gross Profit of NOC 2019-2021

	2019	2020	2021
Gross profit, B USD	7.259	7.478	7.268

Source: Macrotrends and author (2022)

Dividend

The dividend for Northrop Grumman Corporation increased from \$5.16 per share in 2019 to \$5.67 in 2020 and \$6.16 in 2021. Table 24 displays the quarterly dividend amounts.

Table 24. Dividend of NOC 2019-2021 (USD)

	2019	2020	2021
Q1	1,2	1,32	1,45
Q2	1,32	1,45	1,57
Q3	1,32	1,45	1,57
Q4	1,32	1,45	1,57
Total	5,16	5,67	6,16

Source: Nasdaq and author (2022)

Debt

Table 25 shows that the debt to total assets ratio declined from 0.31 to 0.30 between 2019 and 2021. Total assets climbed from \$ 41,089 billion to \$ 42,579 billion, while long-term debt remained constant, increasing marginally by \$ 7 million between 2019 and 2021.

Table 25. Long-term debt/assets NOC 2019-2021

	2019	2020	2021
Long-term debt B USD	12 770	14 261	12 777
Assets B USD	41 089	44 469	42 579
Long-term debt/Assets	0,31	0,32	0,30

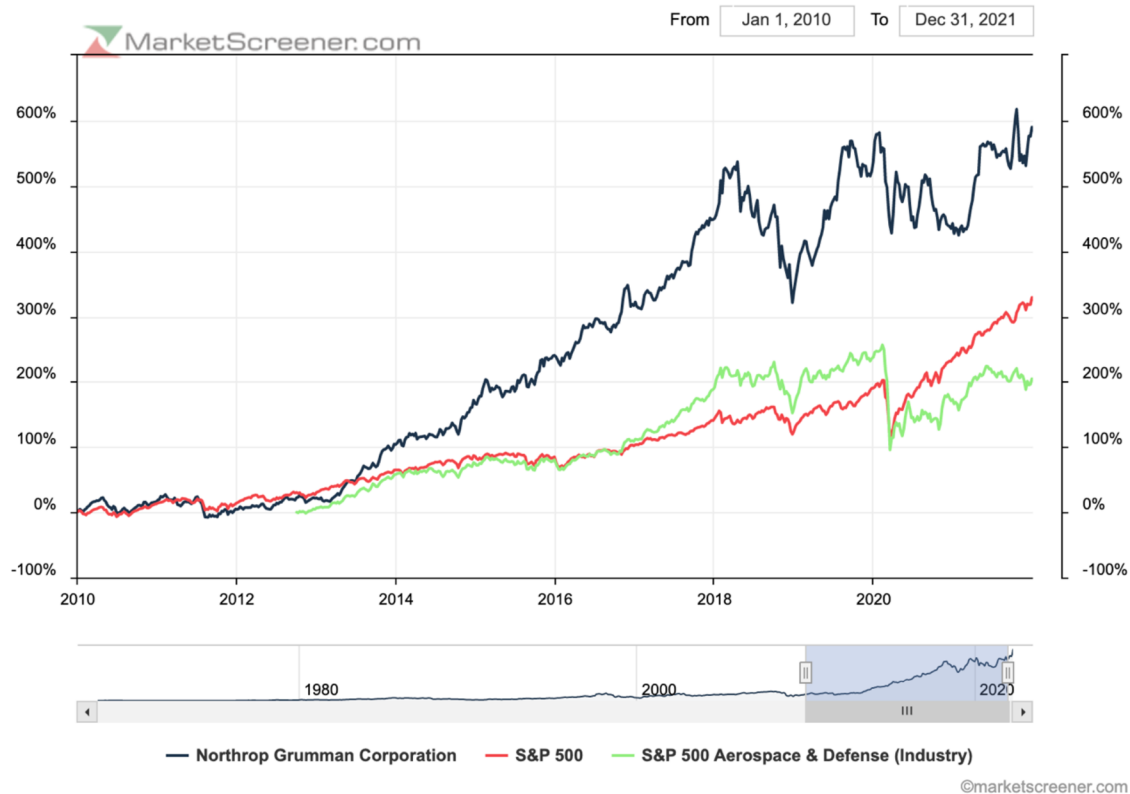
Source: Macrotrends and author (2022)

Comparison with indices

Figure 23 compares the performance of NOC shares, the S&P 500 stock index, and the S&P 500 Aerospace & Defense industry index. The figure indicates that since 2013, Northrop Grumman Corporation's shares have increased by around 300 percent more than

the S&P 500 index, and by approximately 400 percent more than the Aerospace & Defense industry index.

Figure 23. Comparison NOC vs. S&P500 vs. sector



Source: www.marketscreener.com (2022)

Internal price vs. market price

The internal stock price was determined using the method [1], and it is \$ 421,08. In comparison to the market value of NOC on December 31, 2021 – \$ 387,07, the prices are clearly undervalued, and stocks are appropriate to buy.

1.16.5 Correlation Matrix

Table 26 displays the monthly market price correlation coefficients. As you can see, the portfolio contains stocks with both positive correlation (TM-XOM, TM-AAPL, TM-NOC, AAPL-NOC), one pair with negative correlation (XOM-AAPL), and one pair with almost no correlation to each other (XOM-NOC).

As I mentioned in the theoretical part of the paper, in the case of positive correlation, if one stock grows, the other stock grows, and vice versa. In the case of negative correlation, if one stock rises, the value of the other stock falls, and vice versa. In the case of no

correlation, a change in the price of one stock does not cause a change in the price of another stock.

The strongest positive correlation is between TM stock and NOC stock, which is 0.88, and between TM stock and AAPL stock, which is 0.81.

The data were analyzed based on data from 2010-2021.

Table 26. Correlation matrix of market prices

	TM	XOM	AAPL	NOC
TM	1			
XOM	0,2152	1		
AAPL	0,8109	-0,2196	1	
NOC	0,8827	0,0712	0,7877	1

Source: author's processing

1.16.6 Portfolio layout

I used multicriteria decision analysis to compile the portfolio. Five important metrics were selected for evaluation, such as diluted EPS, price to earnings growth ratio (PEG), price to book value ratio (P/B), dividend payout ratio (DPR), and free cash flow.

Table 27 ranks the indicators based on their performance, with 1 indicating poor performance and 5 indicating excellent performance.

Table 27. Multi-Criteria Decision Analysis without included weight of indicators

Importance rank		TM	XOM	AAPL	NOC
1	Diluted EPS	1	2	3	4
2	Price to earnings ratio to growth ratio (PEG)	3	4	2	1
3	Price to book value ratio (P/B)	4	3	1	2
4	Dividend payout ratio (DPR)	4	3	2	1
5	Free Cash Flow	2	3	4	1

Sources: finance.yahoo.com, Nasdaq and author's calculations, 2022

Using collected data and calculations the table 27 was created. The highest diluted EPS is in Northrop Grumman Corporation (NOC) \$ 19,03 and the lowest is in Toyota Motor Corporation (TM) \$ 5,03. The higher the indicator, the more effective the company's activity.

The highest PEG is in Northrop Grumman Corporation (NOC) 2,92 and the lowest is in Toyota Motor Corporation (TM) 0,44 and ExxonMobil Corporation (XOM) 0,56. When $PEG < 0$, the company has a negative net profit and the criterion cannot adequately assess its potential. At $0 < PEG < 1$ the company is undervalued and is attractive for investment. In case $1 < PEG < 3$, the company is considered to be an optimal valuation. At

PEG > 3, the company is not interesting to an investor due to being overbought. So I gave the maximum points for the XOM as for the undervaluated company.

Apple Inc. (AAPL) has the highest P/B ratio, which is 39,84 and Toyota Motor Corporation has the lowest P/B ratio which is 1,132. In simple terms, the P/B ratio shows how much an investor is willing to pay for the company's assets, secured by one share. When $P/B < 0$, the company has more debt than assets and may go bankrupt. At $P/B < 1$, the market values the company below the value of its assets. When $P/B = 1$, the market value of the company is the same as the value of its assets. If $P/B > 1$, people are willing to pay more for the company than the value of its assets.

ExxonMobil Corporation (XOM) has the highest indicator in DPR ratio which is 65,31. For financially strong companies in these industries, a good dividend payout ratio is less than 75% of their earnings. However, companies in fast-growing sectors or those with more volatile cash flows and weaker balance sheets need a lower dividend payout ratio. Ideally, it should be below 50%. Historically, the safest dividend payout ratio has been around 41%. A high figure may indicate insecurity in the company. As a result, I gave XOM fewer points than TM, which has a DPR of 18.49 %.

In terms of free cash flow, Apple Inc. (AAPL) has the greatest – \$ 101,853 billion – while Northrop Grumman Corporation (NOC) has the lowest – \$ 2,152 billion.

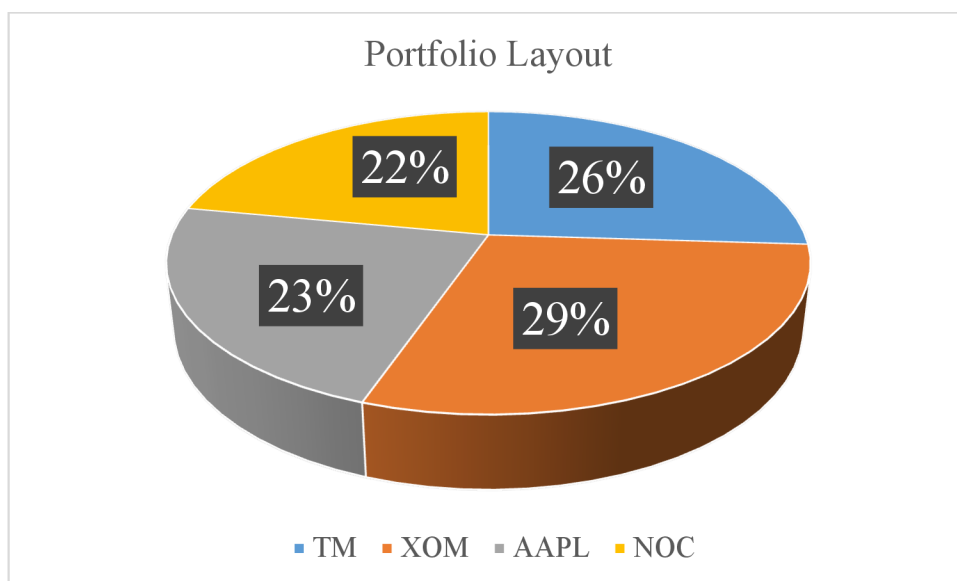
Table 28. Multi-Criteria Decision Analysis with included weight of indicators

Importance rank		TM	XOM	AAPL	NOC
1	Diluted EPS	5	10	15	20
2	Price to earnings ratio to growth ratio (PEG)	12	16	8	4
3	Price to book value ratio (P/B)	12	9	3	6
4	Dividend payout ratio (DPR)	8	6	4	2
5	Free Cash Flow	2	3	4	1
	Total scores	39	44	34	33
	Share	0,26	0,29	0,23	0,22

Source: author's processing

In the table 28, each of the scores was multiplied by the weight of the indicator being rated. In the case of the most important indicator, the score was multiplied by 5, in the case of the less important indicator, the score was multiplied by 1.

Figure 24. Portfolio Layout



Source: author's figure

Figure 24 shows the final portfolio layout. The final portfolio including ExxonMobil Corporation's shares of 29%, Toyota Motor Corporation is represented by 26%, Apple Inc. is represented by 23% and Northrop Grumman Corporation is represented by 22% in the portfolio.

Results and Discussion

Based on a methodological procedure, common stocks were selected from a total of four sectors. The automotive industry is represented by companies such as Toyota Motor Corporation, Tesla Inc. and BMW, each representing Japan, America and Europe, respectively. From the petroleum industry, three major companies represented worldwide were chosen, such as ExxonMobil Corporation, PetroChina Company Limited and The British Petroleum p.l.c. The technology industry is represented by Meta Platforms, Amazon.com and Apple Inc. The defense industry is represented by Raytheon Technologies Corporation, Northrop Grumman Corporation and General Dynamics Corporation. The majority of the portfolio's companies were presented in terms of their business emphasis, a basic financial study of economic performance, and an evaluation of stock price performance over the previous twelve years.

The stock companies represented in the final portfolio were selected based on data analysis and the criterion method. The stock was evaluated by total debt/equity, return on assets, and forward dividends. The portfolio includes Toyota Motor Corporation from the automotive industry, ExxonMobil Corporation from the petroleum industry, Apple Inc. from the technology industry and Northrop Grumman Corporation from the defense industry. The resulting portfolio of contains a total of four stocks.

The annual reports of the four selected companies, as well as data gathered from external sites, were analyzed. On the basis of the information received, the structure of the companies, the main goods and services produced, as well as their future prospects and the directions in which the company is moving. The technical analysis was the most important stage in the company analysis. Debt, profitability, and ex-post share price development were used to evaluate companies. Over the last twelve years, the stock index was compared to the S&P 500 index or with Nasdaq index (in case of Apple Inc.) and the industry index.

Toyota Motor Corporation cars include three categories: HV (hybrid vehicles), cars with a conventional engine and FCV (electric vehicles). Future plans of the company are to launch about 30 new EV models by 2030 and bring total sales of electric cars to 3.5 million units by the end of this decade and also to increase investments in electric battery development. As we can see, main aim of the company is to take a place in the developing market for electric cars. The company's gross profit has increased in year 2020 for 1,54% and then decreased in year 2021 for 8,7%. Dividends are paid twice a year. In general, dividends increased from \$6,94 per share in 2019 to \$8,9 per share in 2021. Toyota Motor

Corporation's long-term debt rose by \$ 31.448 billion in years 2019-2021. During 2019-2021, the long-term debt-to-asset ratio grew by 0.02. The internal price of the stock is \$174,88, and the market price is \$172,98. TM shares are advised for purchase based on technical analysis.

ExxonMobil Corporation has three divisions, such as: upstream, downstream and chemicals. The company's future plans are to develop the green direction progressively. Focusing on technologies for capturing carbon, and then planning to develop other technologies, including hydrogen production. The company's gross profit decreased by 42,47% in 2020 because of the Covid-19 and in year 2021 there was a small increase by 0,94%. Dividends are paid quarterly and has increased from \$3,43 per share in 2019 to \$3,49 per share in 2021. Long-term debt rose by \$20.840 billion in year 2020 and then decreased by \$3.543 billion in 2021. Long-term debt to assets ratio increased by twice in year 2020 and then decreased by 0,01 to 0,13 in year 2021. The stock's internal market price is \$74,23 and market value is \$61,19. The stock is recommended to buy.

Apple Inc. designs, manufactures and sells mobile communication devices, multimedia devices, PCs of its own brands (iPhone, iPad, Mac, Apple Watch, AirPods, Apple TV, HomePod, iOS, macOS, watchOS and tvOS operating systems), and also sells various related programs and applications (iCloud, Apple Pay, iTunes Store, App Store, Mac App Store, TV App Store), services (Book Store and Apple Music), accessories and third-party digital content. The future plans of the company are to enter the race to master virtual space. Apple is planning to release AR/VR devices (helmets or smart glasses) in the near future, which will provide financial growth in the coming years. The company's gross profit increased by 6,67% in year 2020 and by 45,62% in year 2021. Dividends are paid quarterly and has increased from \$3,04 per share in 2019 to \$3,28 per share in 2021. In year 2020 Apple made a split 4:1, so the holders got 3 more stocks for each one stock they already had. Long-term debt rose by 17.299 billion during years 2019-2021. Long-term debt to assets ratio increased from 0,27 in year 2020 to 0,31 in year 2021. The stock's internal market price is \$177,86 and market value is \$177,57. The stock is recommended to buy.

Northrop Grumman Corporation offers a wide range of aerospace and military capabilities and technologies. The company focuses on design, development, integration and production: Aerospace systems, Innovative systems, "Mission systems" and Technology solutions. The future plans of the company are to concept a new generation fighter and also launch of a second service station into orbit that revives communications

satellites without fuel. The company's gross profit increased by 3,02% in 2020 and then decreased by 2,81% in 2021. Dividends are paid quarterly and has increased from \$5,16 per share in 2019 to \$6,16 per share in 2021. Long-term debt remained almost the same during 2019-2021, increased by \$7 million. Long-term debt to assets ratio increased from 0,31 to 0,32 in 2020 and decreased by 0,01 in year 2021. The stock's internal market price is \$421,08 and market value is \$387,07. The stock is recommended to purchase.

A correlation matrix based on monthly market share prices revealed that the selected stock companies do not have a perfect correlation. The strongest correlation is observed between Toyota Motor Corporation and Northrop Grumman Corporation, the correlation coefficient in this case is 0.88, as well as between Toyota Motor Corporation and Apple Inc. in this case the correlation coefficient is 0.81. The pair ExxonMobil Corporation and Apple Inc. has a negative correlation of -0.22. The ExxonMobil Corporation and Northrop Grumman Corporation have almost zero correlation. Based on this data, we can say that the portfolio is sufficiently diversified. Based on the results of a multi-criteria decision analysis, taking five major indicators into account, including diluted earnings per share, price to earnings growth ratio, price to book value ratio, dividend payout ratio, and free cash flow, the stocks earned the following representation in the portfolio: ExxonMobil Corporation's shares of 29%, Toyota Motor Corporation is represented by 26%, Apple Inc. is represented by 23% and Northrop Grumman Corporation is represented by 22% in the portfolio.

Conclusion

An investment portfolio is a set of financial instruments owned by an investor, aimed at saving and increasing funds. Such a set can consist of stocks, bonds, mutual funds and other instruments. They differ not only in their basic characteristics, but also in the level of risk and return. Generally, the higher the risk, the higher the potential return. Forming an investment portfolio is an important task for every investor and crucial to future success in the background market.

The main purpose of this thesis was to create a diversified portfolio of shares, designed for long-term investment. To create a portfolio of shares were selected four sectors of joint stock companies: automotive, petroleum, technology and defense. For each of these sectors the shares of the major players in the world market were selected. Following an assessment of the economic situation, the major economic indicators were discovered using data from the server yahoo.finance.com. Following that, one stock from each industry was chosen using criteria such as ROA, Total Debt/Equity, and Forward Dividend. Toyota Motor Corporation was selected in the automotive industry, ExxonMobil Corporation was selected in the petroleum industry. Apple Inc. was selected in the technology industry and Northrop Grumman Corporation was selected in the defense industry. To assess the economic situation, key economic indicators were found based on data taken from the yahoo.finance.com server. Toyota Motor Corporation was selected in the automotive industry, ExxonMobil Corporation was selected in the petroleum industry. Apple Inc. was selected in the technology industry, and Northrop Grumman Corporation was selected in the defense industry.

The thesis' major objective was to perform a fundamental analysis, based on which the companies for the final portfolio were chosen. Individual company annual reports, as well as data from websites such as yahoo.finance.com, nasdaq.com, macrotrends.net, and streetinsider.com, were examined. The companies were presented in terms of scale, internal structure, products, and future direction based on the information obtained. A technical examination of the financial records of the individual joint stock firms was undertaken to learn more about the companies' economic status. The study was carried out to determine profitability, debt, dividend payout development, and to compare the stock performance of the companies to the industry index and the S&P 500 Index for the NYSE, as well as the NASDAQ Composite Index for Apple, which is traded on the NASDAQ Stock Exchange. The comparison charts were obtained from marketscreener.com. The average quarterly

dividend per share was calculated using a time series from yahoo.finance.com. The inside price was derived using a method based on current P/E and EPS predictions. A buy was concluded after comparing the market price and the intrinsic price.

In addition, to determine the comprehension of the link between individual stock names, a correlation matrix of monthly market prices of joint stock firms was developed. The matrix revealed that there was no perfect association between the selected companies. Toyota Motor Corporation and Northrop Grumman Corporation formed the strongest positive link, with a correlation of 0.88. Toyota Motor Corporation and Apple Inc. created the pair with the second highest correlation coefficient. The correlation coefficient in this situation is 0.81. ExxonMobil Corporation and Apple Inc. have a -0.22 negative correlation. There is almost no association between ExxonMobil Corporation and Northrop Grumman Corporation. The increased connection between the companies is attributable to these companies' interdependent and linked business areas. Parts and cars are critical to the defense industry. Based on the correlation analysis results, it can be argued that the portfolio is properly diversified.

Finally, the weight of individual stocks in the final portfolio was calculated based on Multicriteria Decision Analysis using five important metrics such as diluted EPS, price to earnings growth ratio, price to book value ratio, dividend payout ratio and free cash flow. Each of these indicators was given a level of importance. After doing all the calculations, the final portfolio looks as follows: ExxonMobil Corporation's shares of 29%, Toyota Motor Corporation is represented by 26%, Apple Inc. is represented by 23% and Northrop Grumman Corporation is represented by 22% in the portfolio.

I can confidently state that for academic purposes the work is quite complete, but in practical terms further diversification within the industry and the search for balancing instruments from other verticals at the expense of negative correlations is needed

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