

Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Economics



Bachelor Thesis

Analysis of Selected Stocks (NYSE, NASDAQ, DAX, PX)

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BACHELOR THESIS ASSIGNMENT

Ramizkhon Rovshanov

Economics and Management

Thesis title

Analysis of Selected Stocks (NYSE, NASDAQ, DAX, PX)

Objectives of thesis

Objectives of thesis: Examine current and perspective development of the stocks NYSE, NASDAQ, DAX and PX. Mainly evaluate the stocks and indexes with each other and evaluate their market performance. Also, it is necessary to examine factors that contribute to their performance.

Methodology

Literature review is directed to utilizing techniques for extraction, synthesis, induction and deduction. Goals of the analytical section are achieved by using regression analysis and various precise techniques of technical analysis of quantitative data.

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Brandt, S. Data Analysis. Springer, Berlin, 2014. ISBN 978-3-319-03762-2

BURTON G. A random walk down Wall Street: the time-tested strategy for successful investing. Norton, 2007. ISBN 0393330338

GRAHAM, B. – ZWEIG, J. The intelligent investor. Harper Business Essentials, 2003. ISBN 0060555661

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Tycho Press, Stock Market Investing for Beginners: Essentials to Start Investing Successfully, 2013. ISBN: 978-1623152574

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Declaration

I declare that I worked on my bachelor thesis entitled " Analysis of Selected Stocks (NYSE, NASDAQ, DAX, PX)", by myself and I used only those sources that were mentioned at the end of the thesis. As the author of the thesis, I declare that the thesis does not violate the copyright of any third party.

In Prague

.....

Ramizkhon Rovshanov

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Analysis of Selected Stocks (NYSE, NASDAQ, DAX, PX)

Analýza vybraných burzovních akcií (NYSE, NASDAQ, DAX, PX)

Summary

The purpose of this thesis is to analyze the world's stocks, NYSE, NASDAQ, DAX and PX. It is divided into two parts, which complement each other as a source of information. The theoretical part checks the idea of stocks, then checks the stocks separately, comparing their overall performance, details and history. It also talks about the motives for investing in stock finance and how a person can invest in such element. The analytical part uses technical assessment as a key component for comparing past and future performance and gives recommendations as to whether the current signal is a purchase or a sale. Regression analysis determines whether stocks affect each other, and in this case, how great the relationship is. The result of this thesis is a forecast of how individual stocks, their specific performance and recommendations, whether there are any huge or terrible warnings for trading.

Keywords: stock, index, charts, NYSE, NASDAQ, DAX, PX, stock market, technical analysis, forecast, regression analysis

Souhrn

Cílem práce je analyzovat světové akcie, NYSE, NASDAQ, DAX a PX. Je rozdělen na dvě části, které se navzájem doplňují jako zdroj informací. Teoretická část poukazuje na myšlenku akcií, poté zkoumá akcie samostatně, porovnává jejich celkový výkon, detaily a historii. Rovněž hovoří o motivacích investovat do akcií a jak někdo může investovat do tohoto prvku. Analytická část používá technické posouzení jako klíčový prvek pro porovnání minulých a budoucích výkonů a dává doporučení, zda je současným signálem nákup nebo prodej. Regresní analýza určuje, zda se akcie navzájem ovlivňují, a v tomto případě, jak velký je mezi nimi vztah. Výsledkem práce je prognóza toho, jak jednotlivé akcie, jejich specifické výkony a doporučení, zda existují nějaké obrovské nebo strašné varování pro obchodování.

Klíčová slova: akcie, index, grafy, NYSE, NASDAQ, DAX, PX, akciový trh, technická analýza, prognóza, regresní analýza

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1 INTRODUCTION

There are comments on the stock market almost everywhere we look. Almost all the media, from television to radio, is full of talks about "market performance." The question is, who or what is this market they are talking about? In fact, when somebody talks about the market, they refer to the stock.

Stocks play a vital role in the measurement of economic indicators, and some of them are even considered as guidelines for the economy. It is important to understand what the stock is, how it behaves and what are the consequences of the growth and fall in its value in our daily lives. There are many stocks around the world with different parts and different criteria. Stocks are usually demonstrated as long-term investments, but in very rare cases are analyzed from a short-term perspective.

This is the place where this thesis comes to its senses. An analysis of the index with values in the last month may show not only secrets and opportunities that will not be shown in a broader analysis. The reason why author decided to enter the world of investments in stock is to deepen my knowledge in trade, using technical analysis as the main tool for assessing the future development of securities.

The purpose of this is to understand the future development and behavior of the stocks, starting with the biggest in this thesis, NYSE, New York Stock Exchange, no less significant NASDAQ (National Association of Securities Dealers Automated Quotation), the large European (German) DAX stock index and smallest one in this thesis, PX, traded on Prague Stock Exchange.

2 OBJECTIVES AND METHODOLOGY

2.1 Objectives

Objectives of the thesis are the following: To examine current and perspective development of the stocks NYSE, NASDAQ, DAX and PX. Mainly compare the stocks and indexes with each other and evaluate their market performance. The main purpose of this thesis is to carefully evaluate selected stocks - NYSE, NASDAQ, DAX, PX, as tradable instruments thorough analysis of the development of these stocks. There is a long tradition of diversifying the portfolio by allocating a certain portion of resources to the index fund as a long-term investment. However, this thesis considers the short-term development of these tools and their possible relationships and consequences between them (US and European Market). It is for this reason that this diploma thesis carefully analyzes, grows or falls the current state of the markets. All these goals are achieved using the methods described in the next subsection.

2.2 Methodology

Literature review is directed to utilizing techniques for extraction, synthesis, induction and deduction. In other words, By the end of thesis we seek to have a basic understanding about the selected indicators. Goals of the analytical section are achieved by using regression analysis and various precise techniques of technical analysis of quantitative data. This is part of an introduction to the basic methods that were used in this thesis.

Technical analysis is the main part of the analytical part, and I consider it to be the most important. Using charts and applied technical tools, the selected stocks display the current state and show the effect of certain events on the performance of the tool. Regression and Correlation Analysis. As technical analysis tools, I have chosen (Moving Average – (MA) and Moving average convergence divergence (MACD)

3 LITERATURE REVIEW

3.1 Definition of Stock

According to Investopedia Stock *“is a type of security that signifies ownership in a corporation and represents a claim on part of the corporation's assets and earnings.*

There are two main types of stock: common and preferred. Common stock usually entitles the owner to vote at shareholders' meetings and to receive dividends. Preferred stock generally does not have voting rights, but has a higher claim on assets and earnings than the common shares. For example, owners of preferred stock receive dividends before common shareholders and have priority in the event that a company goes bankrupt and is liquidated.

Also known as "shares" or "equity.””¹

- **Common Stock**

“Common stock is a security that represents ownership in a corporation. Holders of common stock exercise control by electing a board of directors and voting on corporate policy. Common stockholders are on the bottom of the priority ladder for ownership structure; in the event of liquidation, common shareholders have rights to a company's assets only after bondholders, preferred shareholders and other debtholders are paid in full.”²

- **Preferred Stock**

“A preferred stock is a class of ownership in a corporation that has a higher claim on its assets and earnings than common stock. Preferred shares generally have a dividend that must be paid out before dividends to common shareholders, and the shares usually do not carry voting rights.

Preferred stock combines features of debt, in that it pays fixed dividends, and equity, in that it has the potential to appreciate in price. The details of each preferred stock depend on the issue.”³

¹Investopedia:Stock. Retrieved from: [://www.investopedia.com/terms/s/stock.asp](http://www.investopedia.com/terms/s/stock.asp)

²Investopedia:Common Stock. Retrieved from: [://www.investopedia.com/terms/c/commonstock.asp](http://www.investopedia.com/terms/c/commonstock.asp)

³Investopedia:Preferred Stock. Retrieved from: [://www.investopedia.com/terms/p/preferredstock.asp](http://www.investopedia.com/terms/p/preferredstock.asp)

Thus, stock can be said that this is the signed capital of a corporation or a limited liability company, usually divided into shares and represented by the transferred certificates. Certificates can contain detailed contractual relationships between the company and its shareholders or shareholders, as well as determine the division of risk, income and control over the business.

3.2 Stocks Investing

History has shown that investing in stocks is one of the simplest and most profitable ways of accumulating wealth in the long run. With a few notable exceptions, almost every member of the Forbes 400 list got there because they have a large stake in a state or private corporation. But this does not mean that with a modest amount of money you cannot start investing in stocks, in this part of work author will try to explain about investing in stocks and how you can earn on them, and much more.

3.2.1 How to invest in stocks

My example of how to invest in stocks will consist of two geographically different places. Since 2 out of 4 selected shares belong to a market physically located in the US, the remaining 2 are in different European markets.

For example, in the United States there are four main ways to invest your money

- Investing through a 401k⁴ plan or, if you work for a non-profit, a 403b plan⁵.
- Investing through a Traditional IRA⁶, Roth IRA⁷, Simple IRA⁸ or SEP-IRA account.

⁴401k: In the United States, a 401(k) plan is the tax-qualified, defined-contribution pension account defined in subsection 401(k) of the Internal Revenue Code.

⁵403b: In the United States, a 403(b) plan is a U.S. tax-advantaged retirement savings plan available for public education organizations, some non-profit employers.

⁶Traditional IRA: A traditional IRA is an individual retirement arrangement (IRA), established in the United States by the Employee Retirement Income Security Act of 1974 (ERISA)

⁷Roth IRA: A Roth IRA (individual retirement account) is a retirement plan under United States law that is generally not taxed, provided certain conditions are met.

⁸Simple IRA: A Savings Incentive Match Plan for Employees Individual Retirement Account.

- Investing through a **brokerage account**:
A brokerage account is an agreement between an investor and a licensed brokerage firm that allows an investor to invest in a firm and place investment orders through brokerage activities. The investor owns the assets held on the brokerage account, and usually must claim as income any capital gains that he takes from the account.
- Investing through a direct stock purchase plan⁹ or dividend reinvestment plan (DRIP)¹⁰.

So how to invest in stocks?

1. Define your type of investor before plunging into the purchase of shares, it is important to know that there are several ways to approach investing in stocks. Choose the option below that best reflects your situation.
2. Choose between stocks and stock mutual funds
 - Stocks (also called joint-stock companies) of mutual investment funds or exchange-traded funds. These mutual funds allow you to buy small pieces of different stocks in one transaction. Index funds and ETF¹¹ track the index; for example, Standard & Poor's 500 replicates this index, buying shares of companies in it. When you invest in a fund, you also own small parts of these companies. You can collect several funds to create a diversified portfolio.
 - Individual stocks. If you are after a certain company, you can buy one share or several shares as a way to plunge into the water for trading stocks. Building a diversified portfolio of many individual stocks is possible, but it requires significant investment.

⁹A direct stock purchase plan (DSPP) is an investment service that allows individuals to purchase a stock directly from a company or through a transfer agent.

¹⁰Dividend reinvestment plan (DRIP) is an equity investment option offered directly from the underlying company.

ETF¹¹ (Exchange Traded Funds): – foreign exchange investment funds which securities are trading at the exchange, or, in other words, transparent "packing" in which it is possible to buy "all market entirely", i.e. through the brokerage account to invest in all securities entering the corresponding index.

ETF¹¹ Retrieved from:

<https://www.google.cz/search?q=ETF&oq=ETF&aqs=chrome..69i57&sourceid=chrome&ie=UTF-8>

3. Determine your budget

- **How much money do I need to start?** The amount of money you must invest in. If you have a limited pool of money, a broker offering fractional shares - pieces of stock, may be for you. But, remember, we like mutual funds, right? If you want to get mutual funds and have a small budget, ETF11 can be your best bet. Mutual funds (including index funds) have a minimum of 1,000 US dollars or more, but ETF11s are traded as stocks, which means that you buy them at the lowest price. This share price will be \$ 10 from the low side and \$ 100 or more on the How much money should I invest?
- If you invest through means - you can allocate a fairly large part of your portfolio to fund funds, especially if you have a long-term horizon. A 30-year investment for retirement can have 80% of its portfolio in equity funds; the rest will be in bond funds. Individual actions are another story. We recommend saving them to 10% or less of your investment portfolio. This is due to the fact that trading in individual stocks carries a greater risk - it does not have a built-in fund diversification - and more practical efforts. These stock quotes do not always continue on an upward trajectory.

4. Open an account

- If you open a new account, think about the broker, who has low commission and low minimum amounts. Many of those who are on the list of the best brokers for beginners do not require a minimum deposit. Most brokers offer a list of interest-free ETFs or mutual funds without a transaction that will allow you to avoid charging each time you buy or sell. With individual stocks, you can expect to pay between \$ 5 and \$ 10 for stock trading, depending on the broker, although there are free services, such as the Robinhood application.

When comparing brokers, be sure to think:

1. Research resources. Reliable data on leading companies can greatly simplify your homework on buying shares, and many large brokers offer it.
2. Customer support. The best brokers offer real-time help through several channels, including by phone, email or chat.
3. Educational resources. Brokerage manuals and tutorials can help beginners to speed up the process of buying shares.
4. Trading platform. You can buy through the online broker's website, but if you plan to develop this habit, you can go to a more advanced and user-friendly system.

Let's talk about European market:

If you want to buy and sell stocks in some of the largest European names or your smaller, undiscovered gems, you can do it through an exchange broker. Another option is to open an online stock account where you can quickly create a portfolio and usually cheaper. Many trading platforms make it easy to place deals, and some allow you to track the performance of your holdings in real time on your smartphone. Check the payment structure of your chosen platform, as many will charge a transaction fee. Some will set a monthly limit on trade costs, while others will not.

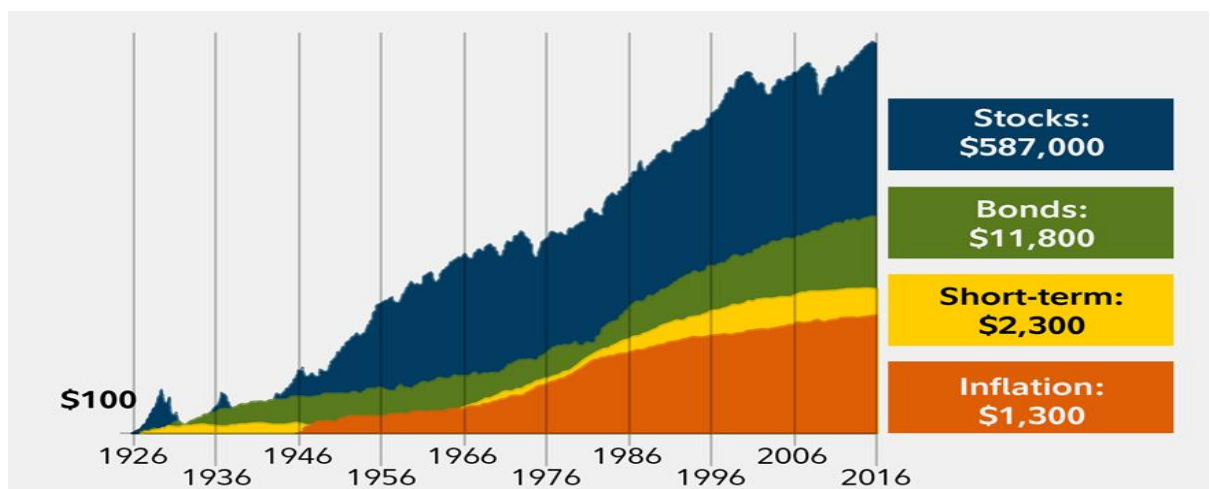
Brief basic information about the situation in European markets:

Continental Europe boasts some of the most high-quality companies in the world, with leading pharmaceutical companies, automakers, telecommunications giants, banks and insurers listed on their markets. Banks experienced a difficult period after the financial crisis in 2008, but the banking system seems to have stabilized in many countries. There have been other crises, such as the diesel engine scandal in Volkswagen, but in recent years large circles of corporate Europe have done very well. As with all equity investments, there are risks, so that your research, choice of a diversified portfolio and rebalancing is regular.

3.2.2 Reason for stock investing

Stocks have offered the most potential for growth: *“The US stocks for a long time earned more than bonds, despite the constant ups and downs in the market. Look at the fact that \$ 100 would be worth for the history of the stock market (S & P began tracking the figures in 1926). During this time, the shares returned an average of almost 10% per annum, bonds - by 5.4%, and short-term investments - by 3.5% to inflation.² Of course, this was not a constant straight line for all this time, but this shows that stocks historically offer more opportunities for growth in the long term. That's why investing in stocks, fund mutual funds or ETFs is important for saving on retirement or other long-term goals. Yes, the market has its own problems (especially in recent memory), but in time you are ready to get more from investments in stocks than with corporate bonds, commodities or treasury bonds. From a historical point of view, the reserves provided almost 10% in the long term, and the US Treasury bonds returned only about 5%.”¹²*

Figure 1 What \$100 would be worth over the history of the stock market



Source: *fidelity.com*

¹²Retrieved from:<https://www.fidelity.com/viewpoints/retirement/why-you-need-stocks>

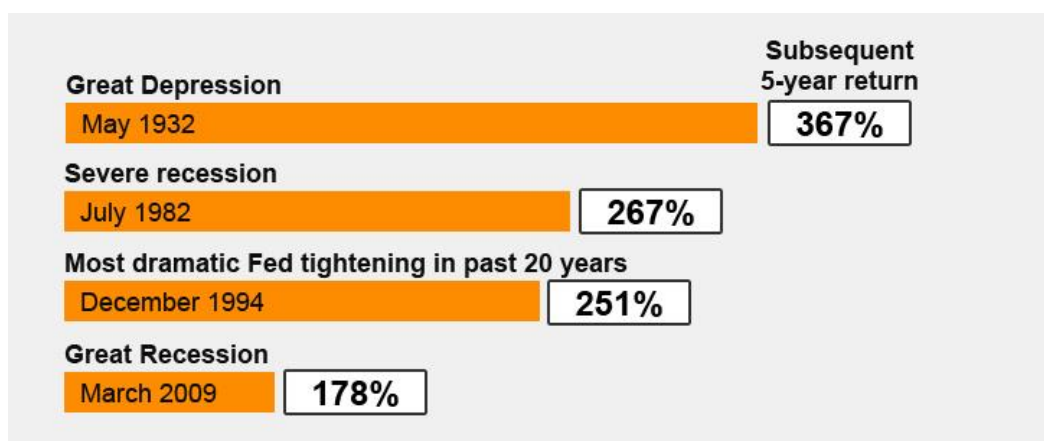
Probably, you can refuse to fall in the stock market

It makes sense to own many stocks, but if the market drop still makes you nervous, remember this: it may seem painful for a while, but if the stock market behaves the way it does for long periods of time, you can overcome it. That is why stocks should be owned in the long term. It took many years, even many decades, to recover from the worst historical fall in the stock market. But, in general, reserves still provide the greatest growth potential, of course, if you can stay for a long time.

Thinking about it can also help: Losing is just on paper, if you do not sell your investments. If you are tempted to sell investments when they are not working, remind yourself that you are investing in the future. So, why block the losses when you have time to return to the market? In addition, if you regularly maintain and continue to invest in the downstream markets (and the market demonstrates the long-term growth that it has historically), you will add to your savings during these market failures or "buy low". When the market recovers, you can be even better positioned for growth.

In fact, as the diagram shows, what looked like the worst times in the stock market turned out to be the best time. The best five-year return in the US stock market began in May 1932 - at the height of the Great Depression. The next best five-year period began in July 1982, when the US economy experienced one of the worst downturns.

Figure 2 It has paid to stay invested in US stocks during troubled times.



Source: fidelity.com

3.2.3 Stock Investing and the Efficient Market Hypothesis

Since the effective market hypothesis, known to Burton G. Malkiel, describes this hypothesis as a "Random walk", and by definition, she says that "*the logic of the idea of a random walk is that if the flow of information is unimpeded and information is immediately reflected in stock prices, then the price change tomorrow will reflect only tomorrow's news and does not depend on price changes today. But the news is unpredictable, so the price change must be unpredictable and random. As a result, prices completely reflect all the known information, and even ignorant investors buying a diversified portfolio at the price of prices provided by the market will receive a rate of return as generous as those that were achieved experts.*"¹³

In other words, this means that it is impossible to predict the future development of prices in stocks / indexes, because all information is already included in the cost of security, and there is no way to outwit the market. Therefore, it is logical to invest in mutual index funds, because what they do is they copy the index with the same return on investment. He also ignores the reason for technical analysis. However, not only technical analysis, but also any other type of analysis. This, of course, is a very contradictory opinion, and there are many investors who beat the market on an annual basis. One of the most famous investors, who managed to outwit the market almost every year, is Warren Buffet

3.3 Selected Stocks

This chapter examines selected world stocks, which in this thesis are New York Stock Exchange (NYSE), National Association of Securities Dealers Automated Quotation (NASDAQ), Deutscher Aktienindex (DAX), Prague Stock Exchange (PX).

¹³BURTON G. MALKIEL. A random walk down Wall Street: the time-tested strategy for successful investing.Rev. and updated ed. New York, NY [u.a.]: Norton, 2007. ISBN 0393330338.

There are many shares around the world, but there is a good reason why these four selected stocks are in this thesis. First, NYSE and NASDAQ are the largest stock markets in the world, and these shares play a big role in the US economy, and fluctuations in these markets are reflected in different economies of the world, even if they are physically located in the US. The third DAX share was chosen because it is the index of one of the largest European stock exchanges in Frankfurt. And finally, the reason for choosing the last PX action was that the author of this project was studying in the Czech Republic, so it was a personal interest to technically evaluate PX, which is an indicator of the Czech stock exchange.

3.4 New York Stock Exchange (NYSE)

NYSE is arguably one of the most famous and most often mentioned stock among the selected four. It is also known as a means of measuring the American economy.

The New York Stock Exchange (NYSE) is a stock exchange based in New York, which is considered the world's largest stock exchange, based on the total market capitalization of listed securities. Previously, as a private organization, the NYSE became a public organization in 2005 after the acquisition of the electronic trading Archipelago. The parent company of the New York Stock Exchange is now called NYSE Euronext after the merger with the European Exchange in 2007; NYSE Euronext was acquired by Intercontinental Exchange¹⁴.

3.4.1 History of NYSE

The American Stock Exchange has a long and colorful history. Originally known as “curbstone brokers,” the ancestors of today's Amex market professionals traded on the street in all kinds of weather conditions - in the rain and snow, and in the summer days of the dog.

Brokers with a cabinet were open and inclusive, independent and rigid. They took advantage of the new industries, invested in small companies and seized new investment opportunities. By providing a reliable market for companies doing business, Amex has helped a large segment of corporations grow and prosper.

¹⁴Retrieved from:<https://www.investopedia.com/terms/n/nyse.asp>

For two centuries, Amex is at the forefront of US financial markets, serving the listed corporations and investors.

In 2008, the NYSE welcomed the historic US stock exchange in the largest and most liquid exchange group in the world. This alliance has significantly improved the scale of the NYSE in US options, stock exchanges (ETFs), closed-end funds, structured products and equity shares. In addition, the merged company:

- Allows NYSE to manage an attractive structure with two markets, giving all customers a choice of the priority of the price on NYSE Arca and the traditional model of the market-maker Amex;
- Provides additional volume of highly professional NYSE business in the USA;
- In addition to NYSE and NYSE, Arca manages the third, additional exchange of shares in US dollars.
- Strengthens the leading positions of NYSE Arca in ETF listing and trading; and
- Offers a leading place for listing and trading in closed- end funds and structures

The Amex share market was renamed as “NYSE MKT” in 2012. Designed to support younger, high-performing companies, the NYSE MKT is the leading exchange for small-cap companies. These companies benefit from a fully integrated trading platform that uses the same high-tech / high-end sensor market model as the NYSE, with dedicated liquidity providers at the point of sale.

NYSE Amex Options, as one of two different trading platforms of the NYSE, offers a traditional market-maker model with advanced e-commerce services. NYSE Amex Options "The Wall Street shopping center is a platform for transactions with intermediaries, for large institutional orders, solid orders for simplified procedures and complex orders.

NYSE, NYSE MKT and NYSE Options of AMEX belong to Intercontinental Exchange now. Intercontinental Exchange (NYSE: ICE), operates the leading network of the adjusted exchanges and clearing houses. Exchanges ICE Futures and clearing houses give the global commodity and financial markets, providing risk management and efficiency of the capital.¹⁵

¹⁵Retrieved from:https://www.nyse.com/publicdocs/American_Stock_Exchange_Historical_Timeline.pdf

3.4.2 NYSE Trading and current volume

When the company is registered on NYSE (generally for attraction of the capital), stocks of the company are available to the public auction. Traders who want to invest in the stock market can buy and sell shares online through the exchange companies. Trade is carried out on trading floor through intermediaries on a floor and the appointed market makers. NYSE appoints market makers for each action for ensuring liquidity - the only exchange which demands this work.¹⁶⁾

Opening and closing of bells happens at the beginning and the end of each trading day; Business hours of NYSE - Monday through Friday from 9:30 till 16:00 EET. From 1870th years it was offered to participants of the market to call by phone, including heads, celebrities, etc. to D. ¹⁷⁾

Trade is automated, except for rare valuable actions that does NYSE by the main hybrid market. The auction takes place less than in a second when electronic while manual transactions usually occupy nine seconds¹⁸. The same way, the auction is held in a format of a continuous auction. Now investors need to find only broker company which is a member of NYSE. Within broker activity investors take and sell shares and other products from the quotations provided to NYSE broker company.

Table 1 Values of NYSE

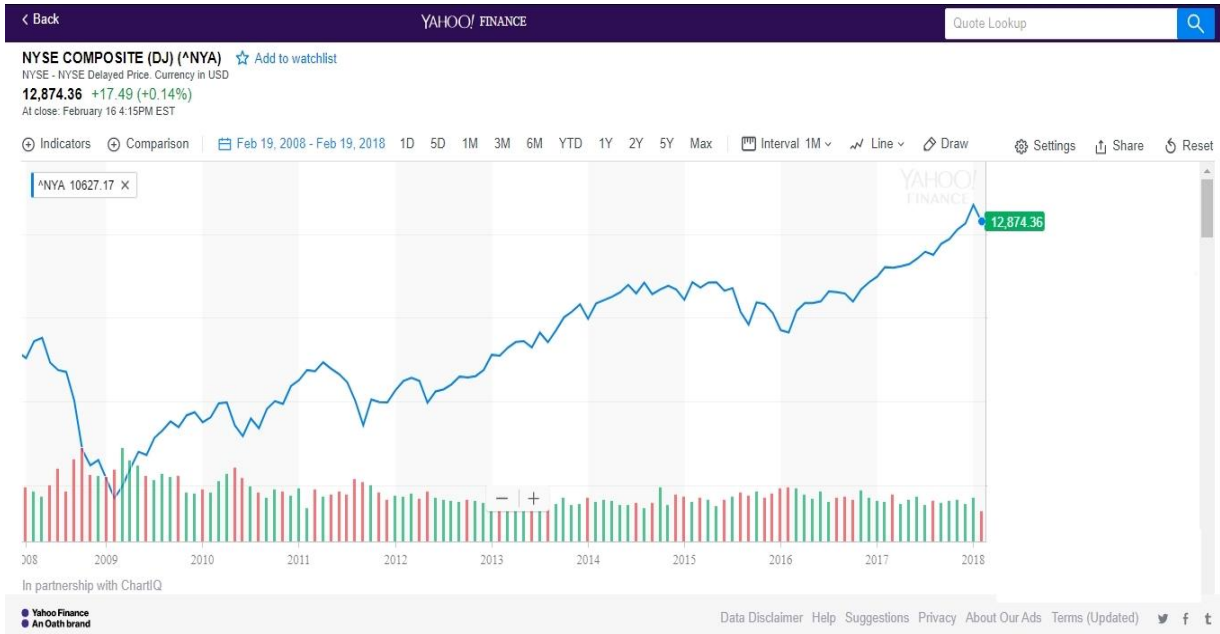
| | |
|-------------------|-----------------------------|
| Type | Stock exchange |
| Location | New York, U.S. |
| Founded | May 17, 1792; 225 years ago |
| Key people | Jeffrey Sprecher (Chairman) |
| Market cap | US\$19.3 trillion |
| Volume | US\$20.161 trillion (2011) |

¹⁶Retrieved from:<https://www.nyse.com/market-model#power>

¹⁷Retrieved from:<https://www.nyse.com/global-visibility#widen-your-reach>

¹⁸Retrieved from:http://www.investopedia.com/terms/h/hybrid_market.asp

Figure 3 NYSE Interactive stock chart for last 10 years



Source: finance.yahoo.com, 2018 year

For all interactive charts in theoretical part taken period was from 18.02.2008 to 18.02.2018.

3.4.3 NYSE Composite Index

The index of NYSE Connection - the index which measures the level of all actions registered at the New York Stock Exchange. The summary index of NYSE includes more than 1,900 actions which is more than 1,500 American companies. Therefore, its width does it much more by the best indicator of efficiency of the market, than narrow indexes with much smaller quantity of components. Coefficients of weight of the index are calculated on the basis of their market capitalization. The index is calculated based on price return and cumulative profit which includes dividends

3.5 National Association of Securities Dealers Automated Quotation (NASDAQ)

NASDAQ - the American stock exchange specializing in the hi-tech companies (electronics, the software, etc.). One of three largest stock exchanges in the USA (along with NYSE and AMEX) is division of NASD which is operated by SEC. The owner of

exchange - the American company Nasdaq OMX Group. In addition to NASDAQ it also has 8 European exchanges.

3.5.1 History of NASDAQ

NASDAQ has been founded in 1971 by National association of dealers on securities (NASD) which left him in many sales in 2000 and 2001. It belongs and NASDAQ OMX GROUP which actions have been listed at his own exchange since July 2, 2002 under a ticker of NASDAQ copes: NDAQ. It is adjusted by Financial Industrial Supervisory authority (FINRA), the successor of NASD.

When the NASDAQ stock exchange has begun to trade on February 8, 1971, it was the first-ever electronic stock market. At first it was just information display for computers and hasn't connected buyers and sellers. NASDAQ has helped to reduce distribution (difference between the offer price and the price of the requirement of a stock), but a little as it was paradoxically unpopular among broker companies because they used the most part of the money for distribution.

NASDAQ became the successor of OTC (OTC) trade system. In 1987 the NASDAQ exchange is still often mentioned as the market of OTC in media and in the monthly reference books published by Standard & Poor's.

For these years NASDAQ became many the stock market, having added trade and reports on volume and automated trade systems. NASDAQ also became the first stock market in the USA which has begun to count on the Internet. Any of them hasn't made it before, having emphasized the companies which traded on NASDAQ (usually in technology) and have agreed with the statement that NASDAQ was "the stock market during the following one hundred years". His main indicator - Connection of NASDAQ which has been published since its beginning. However, his stock market traces the NASDAQ 100 index with a large sum which has been entered in 1985 together with the financial NASDAQ 100 index

Till 1987 most of agreements spoke by phone, but during a collapse of the stock market in October 1987, participants of the market often didn't react to their phones. To counteract it, Small Order Execution System (SOES) has been created which provides an electronic method which allows dealers to enter the transactions. NASDAQ demands that participants of the market have made transactions through SOE

In 1992 he has connected the London Stock Exchange to create the first intercontinental bond market for securities. NASD has assigned NASDAQ in 2000 to create publicly sold company NASDAQ Stock Market, Inc.

In 2006 NASDAQ have changed from the stock market before the licensed national exchange.

On November 8, 2007 NASDAQ have bought the Philadelphian Stock exchange (PHLX) for \$652 million. PHLX - the oldest stock exchange in America which worked since 1790.

To have the right for listing at the exchange, the company has to be registered in the USA Securities and Exchange Commission (SEC) has at least three participants of the market (finance companies which work as brokers or dealers for certain securities), and meet the minimum requirements for assets, the capital, public actions and shareholders.

In February 2011, after merge which declare, NYSE Euronext with Deutsche Borse, appear, that Nasdaq and Intercontinental Exchange (ICE) could establish their own offer on NYSE. Nasdaq can count on stock acquisition in the American stock market, ICE - derivative business. During the assumption, "the market value of NYSE Euronext was \$9.75 billion. Nasdaq is estimated at 5.78 billion dollars while ICE is estimated at 9.45 billion dollars". At the end of the month of Nasdaq according to messages thought of examination that either ICE or the Chicago board of trade have joined what will probably be if it proceeds at the level of \$11-12 billion.

EASDAQ (European association of automatic systems of the quote of dealers by securities) originally as the European equivalent of NASDAQ, it has been acquired by NASDAQ in 2001 and there was NASDAQ Eur03, it has closed operations as a result of explosion of a bubble. In 2007 NASDAQ Europe has been restored as Equiduct and now works in Bers in Berlin.

3.5.2 NASDAQ Trading and current volume

Shares are sold at many exchanges, including the New York Stock Exchange, the American Stock exchange and the market of NASDAQ. NASDAQ is the homeland of many technological stocks, and it is generally connected with technical stocks. Investors who look for a way to play in the technological market often invest the capital in the stocks available in the market of NASDAQ, or in a fond of stocks which controls efficiency of this widely operated index.

- **Go to the section of the exchange chart of your favorite financial publication.** All tables d'hote have to include the section in which all stocks of NASDAQ are described in detail. All actions are listed with tickers instead of names. You can find a symbol of exchange prices of NASDAQ and receive her name of subsidiary on the Internet on financial websites, such as Yahoo! Finance and money of CNN.
- **Choose actions in which you want to invest the capital.** You can choose stocks of the companies which products you use every day or the companies which you admire. You ask the annual report for each company which you consider, and carefully you consider this annual report. The look considers, such as profit markup or as the company can grow over time. Other factors to consider include dividend profitability and how changeable they were in the past.
- **Consider investment into an exchange collection which controls the market of NASDAQ** instead of trying to choose separate stocks. For even professional investors it is very difficult to choose the correct stocks, thus, the best choice can

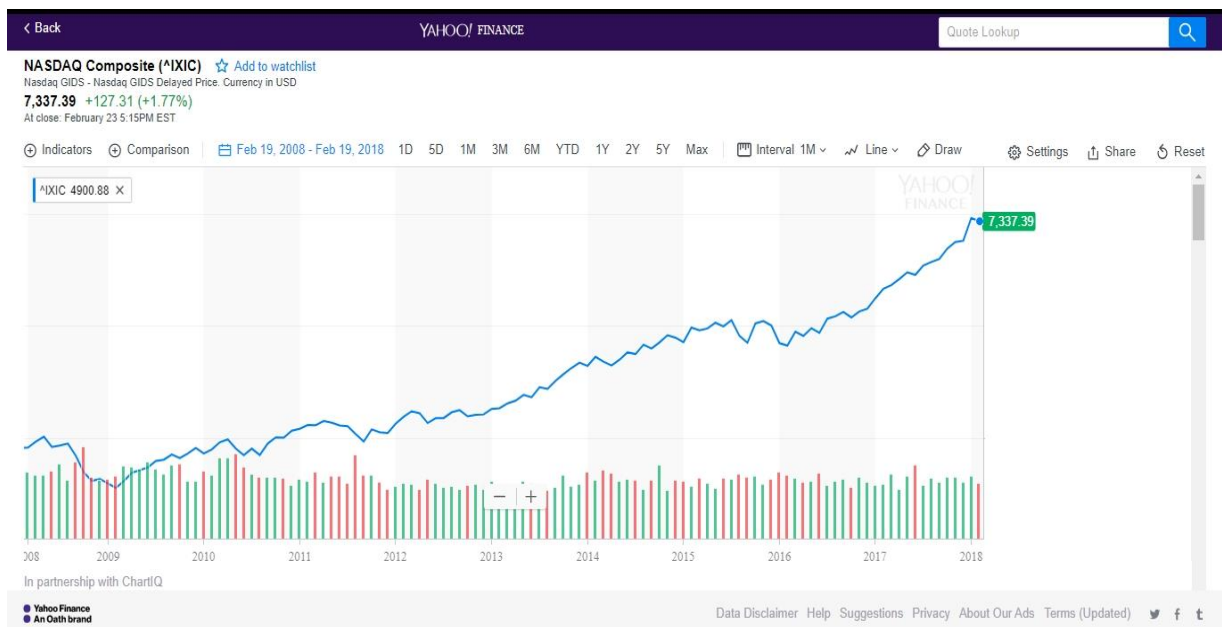
invest the capital in the index. Observation exchange of NASDAQ trades in transactions of a stock under QQQQ symbol.

- **Enter the brokerage account and enter a symbol** of a ticker of a stock or a stock which you want to buy. Enter number of actions that you want to buy and consider the total cost of the transaction. Check the balance of the account to make sure that at you is enough to conclude the bargain, and then to confirm purchase. Keep account of the confirmations of purchase with your tax documents.

Table 2 Values of NASDAQ

| | |
|------------------------------|--------------------------------------|
| Type | Stock exchange |
| Location | One Liberty Plaza 165, New York U.S. |
| Founded | February 4, 1971; 47 years ago |
| Owner | Nasdaq, Inc. |
| Currency | United States dollar |
| Market capitalization | \$7 trillion |

Figure 4 NASDAQ Interactive stock chart for last 10 years from



Source: finance.yahoo.com, 2018 year

3.5.3 NASDAQ Composite Index

The summary index of Nasdaq - the index of capitalization about 3,000 common stocks on the Nasdaq stock exchange. Types of securities in the index include the American depository receipts, common stocks, investment funds of the real estate (REIT) and tracking of a stock and interests with limited participation. The index includes all stocks of Nasdaq which are not the derivatives preferred by actions, funds, exchange index funds (ETF) or debt securities.

3.6 Deutscher Aktienindex (DAX)

Stock index, representing the biggest 30 and most the liquid German companies, is sold on the Frankfurt Stock exchange. The prices were calculated earlier, the DAX Index gets through Xetra, electronic trade system. The methodology of free circulation is used to calculate index weight together with a measure of average volume of trade. DAX has been founded in 1988 with the basic index 1000. The member companies DAX make about 75% of full market capitalization which is sold on the Frankfurt Stock exchange¹⁹

3.6.1 History of DAX

DAX (Deutscher Aktienindex) has been published since June 1988 and has replaced older Hardy index and Börsen-Zeitung index. DAX has entered the transaction on 1,163.52 points. This level was because the price at the time of closing of the exchange for 1987 has been established on 1000 points, and the prices of DAX have been calculated till June 1988. DAX - the "first-class" index in Germany also consists of 30 German companies with the maximum market capitalization and the biggest commodity turnover of the stock market which results are reflected in DAX. Everything, the companies listed in DAX make about 79 percent of value of the German stock exchange. Therefore, DAX and its efficiency also consider as the indicator for the German stock market in general.

¹⁹Retrieved from: <https://www.investopedia.com/terms/d/dax.asp>

3.6.2 DAX Trading and current volume

To be included in the DAX, a company must fulfill certain criteria. For example, shares must be listed in the Prime Standard of the Deutsche Börse. In this exchange segment, companies must meet specific international transparency requirements. For example, the companies must present regular quarterly reports and annual financial statements as well as hold an annual analyst conference. In addition, ad hoc reports must be published in German and English.

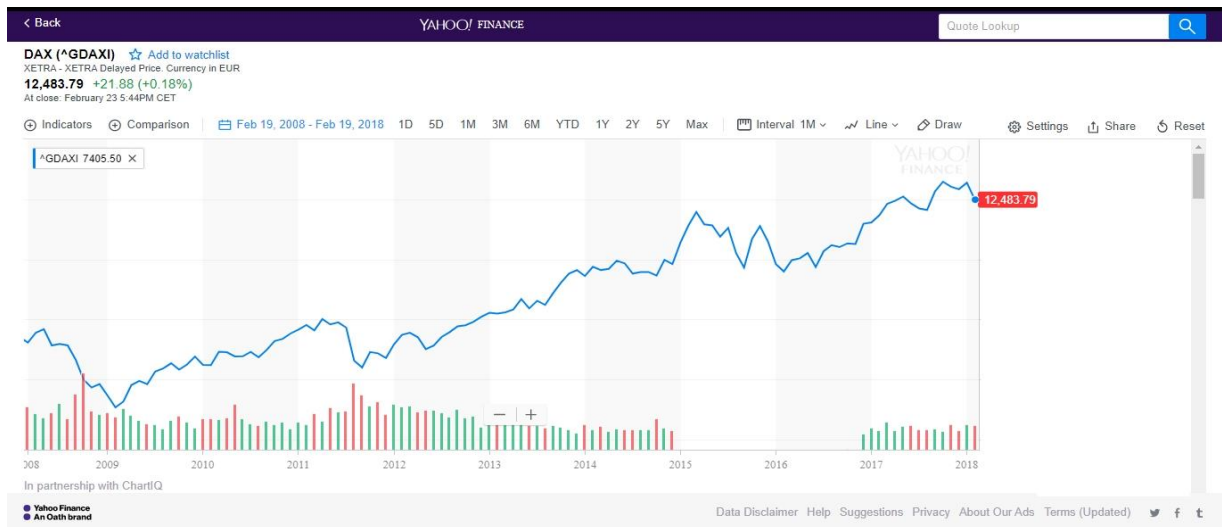
The composition of the DAX is reviewed once annually and adjusted where necessary. The adjustments are always made in September after the close of trading.

DAX is on sale each operational day during Xetra trading from 9:00 till 17:30; Level of the index is calculated continuously once a second in real time. After the Xetra DAX auction is sold on a trading platform till 22:00 (L-DAX, the last DAX). DAX also costs before branches of Xetra begin from 8:00 in electronic DAX (early DAX). Besides, branches of X-DAX from 8:00 till 9:00 and from 17:45 till 22:00 on the basis of futures of DAX sold at the future exchange Eurex and official interest rates of Euribor are published by the European Central Bank.

Table 3 Values of DAX

| | |
|------------------------------|-----------------------------------|
| Foundation | 1 July 1988 |
| Operator | Deutsche Börse |
| Exchanges | Frankfurt Stock Exchange |
| Market capitalization | €971.8 billion (Feb 28, 2017) |
| Currency | €Euro |
| Location | Germany: Frankfurt am Main, Hesse |

Figure 5 DAX Interactive stock chart for last 10 years



Source: finance.yahoo.com, 2018 year

3.7 Prague Stock Exchange (PX)

According to Bloomberg.com, web portal for everything related to finance, the PX index can be defined as follows: "The PX stock index - the official index of the Prague Stock exchange. The index has been calculated for the first time on March 20, 2006 when it has replaced the PX50 and PX-D indexes. The index has taken historical values of the PX50 index. Start date was in April 1994 with a basis of 1000 points. Since September 24, 2012, the structure completely reflects freedom of participants of a travel because of changes in methodology".²⁰

3.7.1 History of PX

After the initial boom caused by privatization of the voucher (the top part has been backdating calculated in February 1994 on 1,245 points), the index has begun to decrease quickly and finished in 1994 to 557 points. In 1995 recession continued (because of the Mexican crisis which has prevented foreign investors from emerging markets), and the index has reached the first basis on June 29 with 387 points. Then the index slowly increased and came to an end in 1995 to 426 points.

²⁰Retrieved from: <https://www.bloomberg.com/quote/PX:IND>

Slow increase has continued in 1996, and the index has reached on December 25, 1997 the second level with 629 points. In 1998, under the influence of the Russian financial crisis 1998, the index has reached the historical basis on October 8 and has made 316 points. In 1999 the index has raised up to 500 points. By means of bankruptcy of a dotcom and the beginning of privatization of banks, the index having taken the second place on March 24, 2000 with 691 points. From the end of a bubble of dotcoms and Bank IPB crisis, the index has fallen to 500 points. In 2001 the index has decreased a little, and by means of attacks on September 11, 2001, it has reached the basis of September 17 with 320 points. In 2002, the index which is slowly increased up to 500 points. In 2003 the index has raised and has finished year with 659 points. With the accession to the European Union the index continued to grow in the Czech Republic in 2004. He has reached 1000 points on November 19 and has finished year 1032 points.

The index has continued the growth in 2005 and has finished year 1473 points. On March 20, 2006 the PN 50 index has been combined with PX-D in the PX index. The index has reached the basis on June 13 with 1,167 points after elections to legislature, but has finished year with 1,589 points. On October 29, 2007 he has reached top with 1936 points and has finished year with 1815 points. Because of financial crisis on October 27, 2008, it has reached a point of 700 points, losing 50% of its cost within two months, the second level, based on financial crisis, has been reached on February 18, 2009 from 629 points.²¹

3.7.2 How PX is Calculated

This formula serves as a tool on how to calculate PX Index:

$$PX_{(t)} = Base\ Value * \frac{\sum_{i=1}^{N(t)} q_i * p_i(t) * FF_i * RF_i}{Start\ cap} * AF(t)$$

²¹Retrieved from: https://en.wikipedia.org/wiki/PX_Index#History

Formula:

- Base Value = launch value of the index 1 000
- AF(t) = Adjustment Factor
- q_i = denotes the number of securities of the i-th index issue used for the calculation of the index at time t;
- $p_i(t)$ = denotes the price quotation of the i-th index issue at time t;
- FFi = denotes the free float factor
- RFi = denotes the representation factor
- N (t) = denotes the number of index issues at time t.
- Start cap. = market capitalization of the index on the launch date = 379 786 853 620 (April 5.1994)²²

Time of calculation 9 a.m. - 4:28 p.m.

Table 4 Values of PX

| | |
|-------------------------------|-------------------------|
| Calculation start date | 5 April 1994 |
| Exchanges | Prague Stock Exchange |
| Maximum value | 1589 (29 October 2007) |
| Currency | Czech koruna (Kč) |
| Components | 50 |

Criteria for entering the index

Criteria of inclusion of an acceptable share issue can be included in the PX index if certain requirements are met: market capitalization and volume of trade before a certain date. It is more than 0.5 billion Czech korunas. This cost is established by Committee on the index. Last exchange days which are excluded for calculation of market capitalization belong to February, May, August and November.

Average daily trade in stocks without sale of off-exchange trade is indecisive the period is more than 2 million Czech korunas. To calculate the average volume, days included in the decisive period since registration of the capital to exchange are considered.

²²Retrieved from: <https://www.pse.cz/en/indices/description-of-indices/px-index/>

²³Retrieved from: <https://www.pse.cz/en/indices/description-of-indices/px-index/en-px-pxtr-rules/>

Figure 6 PX Interactive stock chart for last 10 years



As you can see from the figure №6, current volume of PX stock index is 1120.47 Kč.

Source: investing.com, 2018 year

3.8 Regression Analysis

One of important parts of a practical part of a thesis - the regression analysis. According to Alan O. Skye's, the regression analysis is the statistical tool for a research of the relations between variables. Usually, the researcher tries to learn relationship of cause and effect of one variable on another - effect of the growing prices on demand, for example, or impact of changes in money supply on inflation. To investigate such problems, the researcher collects data on the main variables of interest and uses regress to estimate quantitative influence of causal variables on a variable to which they are related. The researcher also usually estimates "statistical value" of assessment relations, that is, confidence degrees that the true relations is close to the estimated relations.²⁴

Two main types of regress - linear regress and repeated linear regress though there are nonlinear methods of regress for more difficult data and the analysis. Linear regress uses one independent variable to explain or predict result of a dependent variable Y while repeated regress uses two or more independent variables to predict result.

²⁴Alan O. Sykes, "An Introduction to Regression Analysis" (Coase-Sandor Institute for Law & Economics Working Paper No. 20, 1993)

Regress can help experts with finance and investments and professionals of other enterprises. Regress can help to predict sales to the company depending on weather, the previous sales, GDP growth or other conditions. Assessment model for fixed assets (CAPM) is often used regress model for assessment and definition of capital expenditure. General form of each type of regress:²⁵

- **Linear Regression:** $Y = a + bX + u$
- **Multiple Regression:** $Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_tX_t + u$

Where:

Y = the variable that you are trying to predict (dependent variable)

X = the variable that you are using to predict Y (independent variable)

a = the intercept

b = the slope

u = the regression residual

3.9 Technical Analysis – Introduction

According to Investopedia, the technical analysis - the trade tool used to estimate securities, and tries to predict their future movement, analyzing the statistical data obtained from trade operations, such as dynamics of the prices and volume. Unlike fundamental analysts who try to estimate the valid cost of safety technical analysts focus on dynamics of the prices and various analytical tools to estimate force or weakness of safety and to predict future changes in price.²⁶

3.9.1 Moving average convergence divergence (MACD)

Moving average convergence divergence (MACD) is a trend-following momentum indicator that shows the relationship between two moving averages of prices. The MACD is calculated by subtracting the 26-day exponential moving average (EMA) from the 12-day EMA. A nine-day EMA of the MACD, called the "signal line", is then plotted on top of the MACD, functioning as a trigger for buy and sell signals²⁷.

²⁵Retrieved from: <https://www.investopedia.com/terms/r/regression.asp>

²⁶Retrieved from: <https://www.investopedia.com/terms/r/regression.asp>

²⁷Retrieved from: <https://www.investopedia.com/terms/m/macd.asp>

Figure 7 Example of MACD graph



Source: investopedia.com

There are three ways to interpret MACD: **Crossovers, Divergence and Dramatic Rise.**

Crossovers - Typical use of MACD which will be used in this work consists that the MACD line falls below the alarm line. It indicates a bear signal for the investor who assumes that there can be time for purchase of securities.

The Divergence - this situation occurs when the price of safety differs from MACD. It indicates the end of a tendency

Dramatic Rise - As the name means, it occurs when a sliding average value (12-day) moves significantly.

3.9.2 Moving Average – (MA)

According to Investopedia, the sliding average value (MA) - is a widely used indicator of the technical analysis which helps to smooth price action, filtering "noise" from casual price fluctuations. It is a measure of a tendency or a delay as it is based on the last prices.

Two the main and often used moving averages of value - simple moving averages of value (SMA) which are the simple average cost of safety for a certain number of the periods of time and the indicative sliding average value (EMA) which gives more than the weight to later prices. The most widespread applications of moving averages of values - identification of the direction of a tendency and determination of levels of support and resistance. Though moving averages of value are useful in themselves, they also form the

basis for other technical indicators, such as convergence of the moving average value (MACD).²⁸

4 PRACTICAL PART

This part of a thesis is devoted to the analysis of a problem. There are two parts which key role is the technical analysis (more precisely, MA and MACD) which estimates last and future execution of stocks. The used software is the additional table available to use on investing.com.

This software can freely be used on the web page; thus, it provides the powerful tool for the technical analysis. The second is auxiliary analysis (the regression analysis). The software used for Regression and Correlation analysis is the SAS Enterprise Guide software which provides all necessary tools for the comprehensive analysis.

4.1 Technical analysis of NYSE Composite

The first stock index of a practical part of this thesis will be Connection of NYSE. For this analysis (MA and MACD), the author of a thesis will use methodological tools under the auspices of investing.com, which is free and which provides the tool for the full analysis of a tendency.

4.1.1 Moving Average – (MA) of NYSE Composite

This moving average value will begin with SMA 15 and SMA 30. In other words, of the simple moving average value within 15 days and the simple sliding average value within 30 days. The moment when shorter moving average value crosses longer moving averages of value, is illuminated blue. The point when longer sliding average value crosses shorter moving average value, is illuminated by red circle.

²⁸Retrieved from: <https://www.investopedia.com/terms/m/movingaverage.asp>

Figure 8 NYSE - MA 15, 30 30-min Interval



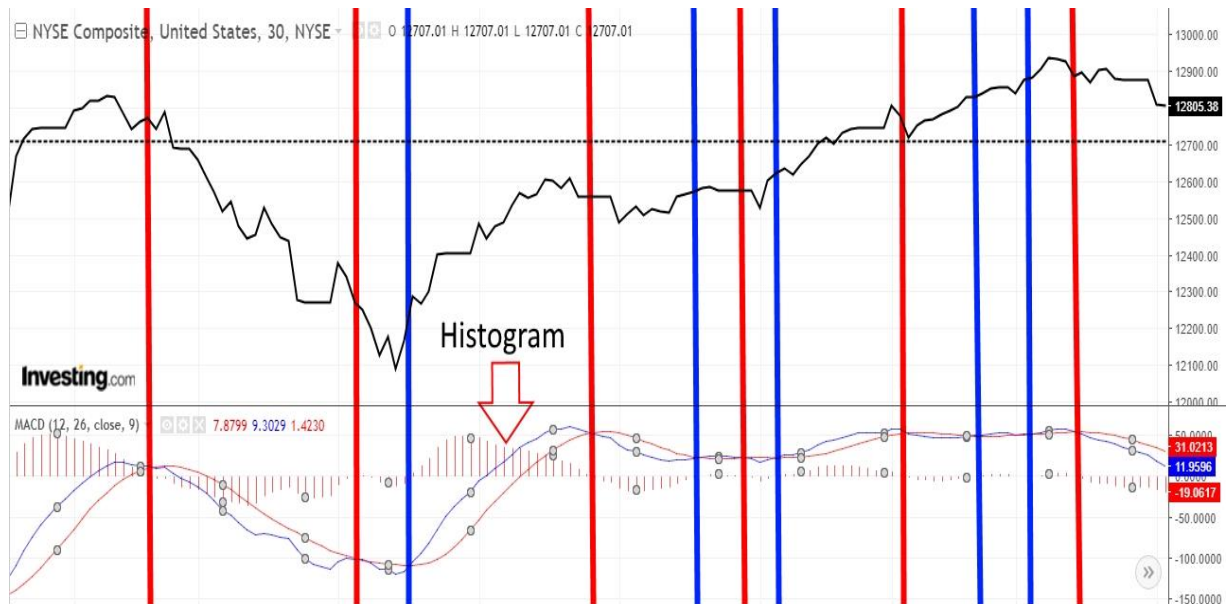
Source: investing.com, own processing

This graph has been built, using 30-minute intervals between November 2 and on November 20. There was some important news which have led to the fact that the index behaves unusually, and this time the 3rd and 4th quarters 2017 when there was a small sale in the markets. Partially, it was because forecasts of the eurozone and the USA weren't good. The intersection of moving averages of values has occurred on August 7, 2017 at 15:30 the whole day after peak of the index which was in the whole afternoon after the end of summer. If the investor could feel the hung turmoil in share prices and has been considered in this analysis of the sliding average value, it could save him convulsively if he doesn't abandon this market. Now, when they say that it is an index research, not, safety, but this research can create the idea sensations in the markets which are extremely important for the investor. The next week was incredibly difficult.

4.1.2 MACD of NYSE Composite

In the graph given below the author defines four important speak rapidly when the histogram shows us market tendencies.

Figure 9 NYSE - MACD 30-min Interval



Source: *investing.com, own processing*

The first red line where shorter moving average value crosses longer moving average value, is an entrance and the beginning of the ascending movement which remains about two days. After that the tendency was very changeable, moving averages of value have promoted and back by decisive day. The convergence of the moving average value can precisely define day when the bear tendency occurs. It could save to some daily investors a lot of money because they could use MACD as support of proofs that the optimistically tendency comes to an end, and now securities in the index move a bear tendency. On November 16 the tendency has again entered, but it wasn't so deep because the territory of a bear and a current trend were doubtful, and with these researches, few investors can make. But the last red line which has appeared on November 2 indicates falling again. Now there is nothing new, although it is possible to claim that the tendency begins to grow, thus, the investor can expect that the index will strike bearish tendency.

4.2 Regression Analysis of the NYSE

As we talk about four indexes of a stock, the author wants to know whether there is an influence on DAX, PX with NYSE that means between the European and American markets. As the author doesn't accept the relations, a zero hypothesis is the following:

H₀: There is no influence on DAX and PX from NYSE Composite.

Therefore, the other hypothesis is follow

H₁: There is an influence on DAX and PX from NYSE Composite.

The data for this analysis based on daily basis closing prices from February 18th, 2008 to February 18th, 2018 – which means that there are 2,506 points of data in set. For the analysis the author chooses the software of SAS Enterprise Guide which, has appeared, it was incredibly useful for statistical measurements.

4.2.1 SAS Results of the Regression Analysis NYSE

Model № 1: Using number of observations 1-2506

Depended variable: NYSE

Table 5 SAS output NYSE

| Dependent Variable: NYSE | | | | | |
|-----------------------------|-----------|--------------------|----------------|---------|---------|
| Number of Observations Read | | 2506 | | | |
| Number of Observations Used | | 2506 | | | |
| Analysis of Variance | | | | | |
| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
| Model | 2 | 8329272791 | 4164636396 | 13542.0 | <.0001 |
| Error | 2503 | 769757999 | 307534 | | |
| Corrected Total | 2505 | 9099030790 | | | |
| Root MSE | | 554.55762 | R-Square | 0.9154 | |
| Dependent Mean | | 9058.39014 | Adj R-Sq | 0.9153 | |
| Coeff Var | | 6.12203 | | | |
| Parameter Estimates | | | | | |
| Variable | DF | Parameter Estimate | Standard Error | t Value | Pr > t |
| Intercept | 1 | 2720.78515 | 68.62649 | 39.65 | <.0001 |
| DAX | 1 | 0.75220 | 0.00537 | 140.06 | <.0001 |
| PX | 1 | 0.13580 | 0.07630 | 1.78 | 0.0752 |
| Correlation of Estimates | | | | | |
| Variable | Intercept | DAX | PX | | |
| Intercept | 1.0000 | -0.0513 | -0.8178 | | |
| DAX | -0.0513 | 1.0000 | -0.5159 | | |
| PX | -0.8178 | -0.5159 | 1.0000 | | |

We can interpret the output in equation:

$$2720,78515 = 0,75220x_1 + 0,13580x_2$$

R_2 , in that case equals to $0,9154 = 91,54\% > 60\%$, which means that our model is significant.

The main objectives of MRA are paired correlation coefficients, which defines the multicollinearity of the model, where each variable should be like each other. We will use the same steps for the second model.

Intercept- x_1

DAX - x_2

PX - x_3

$X_1x_2 = x_2x_1$

$X_1x_3 = x_3x_1$

$X_2x_3 = x_3x_2$ means that there is a correlation between variables.

4.2.2 Economic verification of the model NYSE Composite

- If the NYSE rise by one point, DAX will increase by 0,75220 this positive relationship which is surprising, but looking at the fact, that the data set has over 2,506 daily data from 2008 to 2018m it can suggest positive relationship between European and American stock indexes.

$$t_1 = 140,06 \Rightarrow p = 0,0001$$

$$\alpha = 0,05$$

$p < \alpha \Rightarrow H_0$ rejected (there is an influence on DAX from NYSE Composite)

- However, if NYSE rise by one point, it will not have any affects to PX, here is the t-test looks like:

$$t_1 = 1,78 \Rightarrow p = 0,0752$$

$$\alpha = 0,05$$

$p > \alpha \Rightarrow H_0$ accepted (there is no influence on PX from NYSE Composite)

In case of DAX and NYSE Composite, we rejected H_0 and accepted H_1 , that means there is an influence on the biggest German stock index from NYSE.

On the other hand, we accepted H_0 , which leads to that PX is not influenced by NYSE Composite.

4.3 Technical analysis of NASDAQ Composite

Let's address the technical analysis of Connection of NASDAQ now. The tool used for this stock will remain the same as for Connection of NYSE - Moving averages of value and MACD.

4.3.1 Moving Average – (MA) of NASDAQ Composite

To check whether it is time to trade in Connection of NASDAQ, buy or sell, you must check it, using a combination of several moving averages of values. To support integrity in structure of this thesis, to analyses this safety, 15.30 moving averages of values will be used in 30 minutes. Since then there was a recent weekly loss in index value, it is interesting to see how moving averages of value react during this period.

Figure 10 NASDAQ - MA 15, 30 30-min Interval



Source: investing.com, own processing

Obviously, the bear tendency among NASDAQ and other indexes was very strong within one and a half weeks. At first there was a small disorder. The first significant growth has begun on March 2, 2018 when the bear tendency has begun to come to an end, ignoring small decrease which continued to this day. It is supposed that this tendency can repeat within the next weeks of trade in March, the verdict of this author contains news that the threat of the president Donald Trump to establish import tariffs for steel and aluminum, and it can happen again when Trump's threat will be realized.

4.3.2 MACD of NASDAQ Composite

As in the case of usual MACD, it becomes the excellent analytical tool, mainly because it could define precisely the correct signal for purchase or sale for money.

Figure 11 NASDAQ - MACD 30-min Interval



Source: investing.com, own processing

Red and blue line indicates the intersection 12 and 26-day MA. Positive MACD points to the PURCHASE signal at the end of the period. It is interesting how well he reacts between February 28 and on March 4 (the first red and blue points) where the value of Connection of NASDAQ has moved from 7117 to 7,328 points less than in five days. In this case more attention has been paid on to SELL a signal. When the price for this period was unstable, but it hasn't fallen also quickly as in case of growth²⁹.

²⁹S&P 500 gains for day but posts weekly losses on trade war fears Retrieved from: <https://www.investing.com/news/stock-market-news/stock-futures-lower-as-trump-sets-stage-for-trade-war-1321790>

4.4 Regression Analysis of the NASDAQ

Since we are talking about four stock indices, the author wants to know if there is any influence on DAX, PX from NASDAQ, which means between the European and American markets. Since the author does not accept any relations, the null hypothesis is as follows:

H₀: There is no influence to DAX and PX from NASDAQ Composite.

Therefore, the other hypothesis is follow

H₁: There is an influence on DAX and PX from NASDAQ Composite.

As it was before with (NYSE composite) the data for this analysis based on daily basis closing prices from 18th of February 2008 to 18th February 2018 – that means there are a 2,506 data points in the set. For analysis, again the author chooses SAS Enterprise Guide software, which proved to be incredibly useful for statistical measurements.

4.4.1 SAS Results of the Regression Analysis NASDAQ

Model № 2: Using number of observations 1-2506

Dependent Variable: NASDAQ

Table 6 SAS output NASDAQ

| Dependent Variable: NASDAQ | | | | | |
|------------------------------------|-----------|--------------------|-----------------|---------|---------|
| Number of Observations Read | | 2506 | | | |
| Number of Observations Used | | 2506 | | | |
| Analysis of Variance | | | | | |
| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
| Model | 2 | 5023125988 | 2511562994 | 27739.0 | <.0001 |
| Error | 2503 | 226628211 | 90543 | | |
| Corrected Total | 2505 | 5249754199 | | | |
| Root MSE | | 300.90303 | R-Square | 0.9568 | |
| Dependent Mean | | 3654.15205 | Adj R-Sq | 0.9568 | |
| Coeff Var | | 8.23455 | | | |
| Parameter Estimates | | | | | |
| Variable | DF | Parameter Estimate | Standard Error | t Value | Pr > t |
| Intercept | 1 | -1454.34976 | 37.23674 | -39.06 | <.0001 |
| DAX | 1 | 0.57439 | 0.00291 | 197.11 | <.0001 |
| PX | 1 | 0.36370 | 0.04140 | 8.79 | <.0001 |
| Correlation of Estimates | | | | | |
| Variable | Intercept | DAX | PX | | |
| Intercept | 1.0000 | -0.0513 | -0.8178 | | |
| DAX | -0.0513 | 1.0000 | -0.5159 | | |
| PX | -0.8178 | -0.5159 | 1.0000 | | |

We can interpret the output in equation:

$$-1454,34976 = 0,57439_{x1} + 0,36370_{x2}$$

R_2 , in that case equals to $0,9568 = 95,68\% > 60\%$, which means that our model is significant.

Throughout the last investigation, an author explained the procedures of correlation analyses.

Intercept- x_1

DAX - x_2

PX - x_3

$X_1x_2 = x_2x_1$

$X_1x_3 = x_3x_1$

$X_2x_3 = x_3x_2$ means that there is a correlation between variables.

4.4.2 Economic verification of the model NASDAQ Composite

- If the NASDAQ rise by one point, DAX will increase by 0,57439 this positive relationship which is surprising, but looking at the fact, that the data set has over 2,506 daily basis data from 2008 to 2018m it can suggest positive relationship between European and American stock indexes.

$$t_1 = 197,11 \Rightarrow p = 0,0001$$

$$\alpha = 0,05$$

$p < \alpha \Rightarrow H_0$ rejected (there is an influence on DAX from NASDAQ Composite)

- However, if NASDAQ rise by one point, it will increase by 0,36370

T-test for PX looks like:

$$t_1 = 197,11 \Rightarrow p = 0,0001$$

$$\alpha = 0,05$$

$p > \alpha \Rightarrow H_0$ rejected (there is an influence on PX from NASDAQ Composite)

In both cases, we rejected H_0 and accepted H_1 that means there is an influence on two European stock indexes.

This relationship clearly shows us why stocks in European markets so painfully reacted to the statement President Donald Trump about Trade War.

4.5 Technical analysis of DAX

In this chapter, author start doing technical analysis for stock indexes in Europe. As it was, the first two indexes, DAX is going to get the exact same treatment as NYSE and NASDAQ and that is Moving Averages (MA), Moving Average Convergence Divergence (MACD).

4.5.1 Moving Average – (MA) of DAX

As it is usual, the input was 15,30 MA 30-min to see the development of the index (Figure 12).

Figure 12 DAX - MA 15, 30 30-min Interval



Source: investing.com, own processing

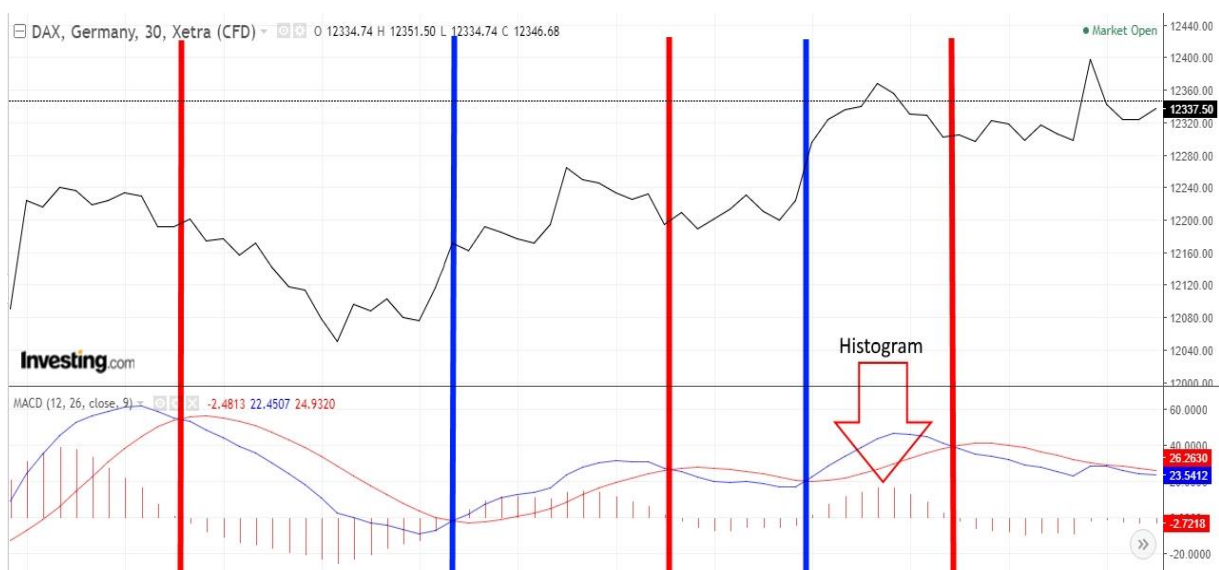
Interestingly, during the entire period which is longer, than a month, when 15 MA have crossed 30 MA from above, having specified that the cost of the index will decrease, it almost immediately follows opposite, specifying that the value of the index will be really

interesting, since then with this combination of moving averages of values it is possible to tell that the threat of the president Donald Trump is also effected in the European markets because as it is noticed on the last cross, cost constantly increases, and it follows a tendency of last days/week in the European markets.

4.5.2 MACD of DAX

The last, but a not least technical tool used for DAX technical analysis is Moving Average Convergence Divergence.

Figure 13 DAX - MACD 30-min Interval



Source: investing.com, own processing

In MACD, which tells, buy or sell, in the first half of the month there were big shocks. On the other hand, with almost any input, the MACD can accurately determine the period of purchase and sale. The reason for this decline from February 26 to March 1 is the fear of the Trade War, which was declared a threat to President Donald Trump to introduce import tariffs on steel and aluminum, because one of the largest components of the DAX index is the Volkswagen auto giant, which is a large metal consumer. However, an interesting part is the signal SELL, which, looking at the histogram after March 2 (the first blue signs), means that the index corresponds to the latest trends in the markets. The latest trend shows that fear of a war of war disappears. According to the author, this trend will be

observed for a long time, because Trump is expected to complete the tariffs later in the week.³⁰

4.6 Technical analysis of PX

This chapter - the final chapter of the technical analysis of all four indexes of a stock. As in case of the first three indexes of a stock, PX will receive the same approach as NYSE Composite, NASDAQ Composite and DAX, and these are Moving Averages (MA), Moving Average Convergence Divergence (MACD). As it was with the first three indexes of a stock, author will use methodological tools under the auspices of investing.com. This stock index - the second index which is in Europe which author will analyse in this thesis.

4.6.1 Moving Average – (MA) of PX

As it was with the other stock indexes this graph was created by using 30-minutes intervals in the period from 21st February until 4th March.

Figure 14 PX - MA 15, 30 30-min Interval



Source: investing.com, own processing

There was some important news which have led to the fact that the index behaved unusually, and this time on February 27 and on March 2-3, 2018 when there was a huge sale in the foreign markets which also falls on the Prague Stock exchange.

³⁰Stocks- U.S. Futures Surge as Trade War Fear Eases Retrieved from:

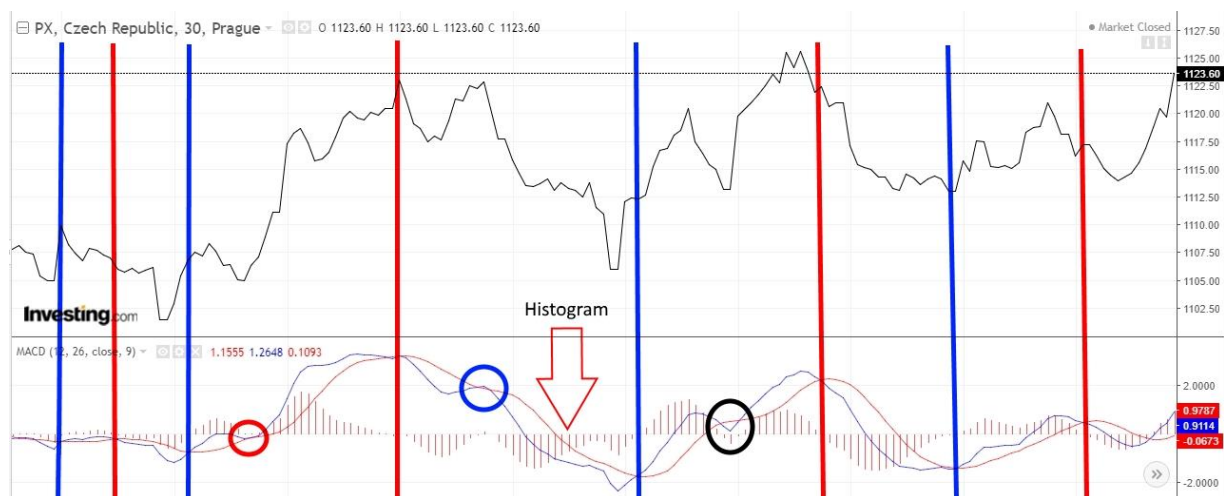
<https://www.investing.com/news/stock-market-news/stocks-us-futures-surge-as-trade-war-fear-eases-1326618>

It happened partially because of fear of trade war which has been caused by threats of the president Donald Trump. The intersection of moving averages of values has occurred on February 28, 2018 at 15:30 next day after peak of the index which was in the whole afternoon after the beginning of falling (the second red circle). If the investor could feel the hung turmoil in share prices and has been considered in this analysis of the sliding average value, it could save him convulsively if he doesn't abandon this market. Now, when they say that it is an index research, not, safety, but this research can create the idea of sensations in the markets which are extremely important for the investor. The next week was incredibly difficult not only in the Czech markets, but also in the foreign markets³¹

4.6.2 MACD of PX

As it is already mentioned, in the presence of bullish or bear tendencies in the market - or the 12-day sliding average value above of the 26-day sliding average value, or on the contrary.

Figure 15 PX - MACD 30-min Interval



Source: investing.com, own processing

³¹Stocks- Wall Street Falls as Investors Fear Trade War Retrieved from:

<https://www.investing.com/news/stock-market-news/stocks-wall-street-falls-as-investors-fear-trade-war-1324940>

The second blue line where shorter moving average value crosses longer moving average value, was a contribution and the beginning of the ascending movement which remained about two days.

After that the tendency was very changeable, moving averages of value have promoted and back by decisive day. The convergence of the moving average value can precisely define day when the bear tendency occurs. It could save to some daily investors a lot of money because they could use MACD as support of proofs that the bullish tendency comes to an end, and now securities in the index move a bear tendency. On February 28 (the second red line), this tendency has again entered a bear zone, and the current trend was doubtful (a blue circle), and with this research the investor can achieve little. It is possible to claim that the tendency begins to grow, thus, the investor can expect that the index will strike a bullish tendency

5 Results and Discussions

This chapter will serve as the review of a practical part of the thesis and investigates these four stock indexes separately, together with all technical used tools. To see the current image. In this thesis author used the technical analysis as the main tool for the analysis of indexes of a stock, and this head doesn't take the regression analysis which has been explained in other chapters of the thesis. In a subtitle now, each stock index is presented along with the latest data of all indicators.

5.1 Result of NYSE

Figure 16 Results for NYSE Composite



Source: investing.com, own processing

When it comes to final assessment of NYSE Composite, if today an investor wants to invest his/her money in NYSE Composite thanks to numerous index funds, this thesis serves for this purpose. Almost all indicators offer purchase and therefore author recommend buying. Since NYSE Composite shows the largest market in the world, it is suitable for individual investors.

SUMMARY: BUY

5.2 Result of NASDAQ

Figure 17 Results for NASDAQ Composite



Source: investing.com, own processing

As the analysis of NASDAQ Composite has been analyzed, using technical tools in this thesis, it has grown by 132.86 points, having received about 1.79%. Even values of all technical tools work in favor of this index. As author told in the chapter of how to invest. It is ideal time to place money in the stock market which is result of work of NASDAQ Composite. It is much more profitable opportunity for the investor.

SUMMARY: STRONG BUY

5.3 Result of DAX

Figure 18 Results for DAX



Source: investing.com, own processing

Here we are starting final assessment of biggest stock index Europe it is DAX, if today the investor wants that he/she invested his/her money in DAX for short-term investment via to numerous index funds, author against of this purpose. Almost all indicators offer sell for short-term investment but it is good way for long-term investment therefore author suggest selling when it comes to short-term investment, because from the time the DAX was analyzed with technical tools, during the 2 days DAX index lost some points. But when it comes to long term investment all indicators show that it is good way to invest money. Since DAX index represents one of the largest market in Europe, it is much more profitable opportunity for the investor (excepting short-term investment) for fast-growing economy of Germany and it is suitable for individual investors.

SUMMARY: BUY

5.4 Result of PX

Figure 19 Results for PX



Source: investing.com, own processing

Concerning second stock index from Europe in this thesis PX almost all indicators offer purchase of this index. It seems that the bullish tendency has appeared PX stock index to. During as the PX index has been analyzed in this thesis, PX index rise by 5,43 points it is about 0,49%. Currently all indicators show right now it is good time to purchase PX index via long and short-term investment. But you need to consider that PX stock index is based on the Czech Stock exchange which is small and not suitable for individual investors.

SUMMARY: BUY

6 Conclusion and Recommendations

The current situation in the markets is more than favorable for investors. Investors are highly likely to find the current situation of the financial markets as quite attractive ones. That being said, this situation is predicted to change in the near future, due to the trade war announced by the president of the United States Mr. Donald Trump. These are the indicators of the economic efficiencies of some of the countries: Germany – 2.4%, USA – 3.2%, the Czech Republic – 3.4%. As you can see, the highest indicator belongs to the Czech Republic, which means that it is quite a favorable stock market to invest.

In fact, all these indicators prove that the economic situations of the corresponding countries are in a pretty good shape, in economic sense.

Nonetheless, this thesis does not guarantee that the investments into these financial markets will be absolutely successful, but it merely suggests that indirect investments into stock indexes are worth considering. This thesis and the strategy it offers is mainly for those low-risk investors who are not willing to allocate considerable share of their resources into expenses as commission charges for transactions and who are looking for investment options other than savings accounts.

It should be also noted that although the risk of investing into stock index through index fund is rather low, the risk still does exist.

I agree with the strategy made by Benjamin Graham, who suggests that the protective investor should place the capital in a stock / index fund to automatically receive a sample of cross section of leading companies. This thesis, nevertheless, is not focused on the reactions of the indices short-term. Rather, the thesis examines the latest changes in the indices and how quickly they react. It shows how variable the index can be and how the index correlate with future trends of stocks.

Investors are ought to use additional analysis, most preferably technical analysis, and even then, they should not rely on the first results they achieve. To receive a more accurate prediction, good investors would employ other sorts of financial analysis as well, such as fundamental ones.

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8 Appendix

Appendix 1 Constituents of DAX

| S.No. | Company Name | Ticker (in Yahoo Finance) |
|-------|---|---------------------------|
| 1 | Adidas AG | ADS.DE |
| 2 | Allianz SE | ALV.DE |
| 3 | BASF SE | BAS.DE |
| 4 | Bayer Aktiengesellschaft | BAYN.DE |
| 5 | Bayerische Motoren Werke Aktiengesellschaft | BMW.DE |
| 6 | Beiersdorf Aktiengesellschaft | BEI.DE |
| 7 | Commerzbank AG | CBK.DE |
| 8 | Continental Aktiengesellschaft | CON.DE |
| 9 | Daimler AG | DAI.DE |
| 10 | Deutsche Bank AG | DBK.DE |
| 11 | Deutsche Börse Aktiengesellschaft | DB1.DE |
| 12 | Deutsche Lufthansa Aktiengesellschaft | LHA.DE |
| 13 | Deutsche Post AG | DPW.DE |
| 14 | Deutsche Telekom AG | DTE.DE |
| 15 | E.ON SE | EOAN.DE |
| 16 | Fresenius Medical Care AG & Co. KGAA | FME.DE |
| 17 | Fresenius SE & Co. KGaA | FRE.DE |
| 18 | HeidelbergCement AG | HEI.DE |
| 19 | Henkel AG & Co. KGaA | HEN3.DE |
| 20 | Infineon Technologies AG | IFX.DE |
| 21 | Linde Aktiengesellschaft | LIN.DE |
| 22 | Merck Kommanditgesellschaft auf Aktien | MRK.DE |
| 23 | Münchener Rückversicherungs-Gesellschaft Aktiengesellschaft | MUV2.DE |
| 24 | ProSiebenSat.1 Media SE | PSM.DE |
| 25 | RWE Aktiengesellschaft | RWE.DE |
| 26 | SAP SE | SAP.DE |
| 27 | Siemens Aktiengesellschaft | SIE.DE |
| 28 | ThyssenKrupp AG | TKA.DE |
| 29 | Volkswagen Aktiengesellschaft | VOW3.DE |
| 30 | Vonovia SE | VNA.DE |

Source: topforeignstocks.com, 2018 year