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PORTFOLIO PERFORMANCE MEASURING

Diploma Thesis

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Bratislava 2014 **Dominika Kmeťová, BSc.**

DECLARATION

Hereby, I declare that I wrote this thesis on my own and that I listed all sources of literature that I used.

Bratislava, April 30th 2014

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author's signature

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ABSTRACT

KMEŤOVÁ, Dominika: *Portfolio Performance Measurement* – University of Economics in Bratislava. International Programmes Institute. – Diploma thesis consultant: Ing. Miroslav Kmeťko, PhD. – Bratislava: IPI EU, 2014, 75 p.

The goal of this thesis is to choose the best mutual fund from the selected number of funds based on the data obtained from the Slovak association of asset management companies in the form weekly reports since January 1st 2011 until December 31st 2013. The funds are tested and compared on weekly and yearly returns, volatility, Sharpe ratio, Treynor ratio and fees tied to the investment into the funds. The thesis is divided into four chapters. It includes sixteen equations, nine graphs, ten tables and two appendices.

The first chapter consists of outline of fundamental theoretical background and its connection to portfolio performance measuring. The second chapter describes the main goal of the thesis as well as minor goals that allow the main goal to be reached. In the third chapter, the methodology of the research and analysis is described, along with the model of calculations and supplementary data used. The fourth and last chapter includes the calculations, analysis and comparison of the results with the explanations, limitations of the research, recommendation and considerations that an investor needs to keep in mind.

Key words:

Portfolio Performance. Mutual Funds. Risk. Return. Volatility. Performance ratios.

ABSTRAKT

KMEŤOVÁ, Dominika: *Meranie výkonnosti portfólia* – Ekonomická univerzita v Bratislave. Ústav medzinárodných programov. – Vedúci záverečnej práce: Ing. Miroslav Kmeťko, PhD. – Bratislava: UMP EU, 2014, 75 s.

Cieľom záverečnej práce je vybrať najlepší podielový fond z vybraných fondov, na základe dát získaných od Slovenskej asociácie správcovských spoločností vo forme týždenných výkazov od 1. Januára 2011 do 31. Decembra 2013. Fondy sú testované a porovnávané podľa týždenných a ročných výnosov, nestálosti, Sharpovho pomeru, Treynorovho pomeru a poplatkov spojených s investovaním do týchto fondov. Diplomová práca je rozdelená do štyroch kapitol. Obsahuje šestnásť vzorcov, deväť grafov, desať tabuliek a dve prílohy.

Prvá kapitola pozostáva z prehľadu základných teoretických poznatkov a ich spojitosti s meraním výkonnosti portfólia. Druhá kapitola sa venuje cieľu práce a takisto čiastkovým cieľom, ktoré umožňujú dosiahnutie hlavného cieľa. V tretej kapitole je popísaná metodológia výskumu a analýzy, spolu s modelom výpočtov a doplnkovými dátami, ktoré boli použité. Vo štvrtej a zároveň poslednej kapitole sú zahrnuté výpočty, analýza a porovnanie výsledkov s vysvetleniami, limitujúce faktory výskumu, odporúčanie a aspekty, ktoré musí investor zvážiť.

Kľúčové slová:

Výkonnosť portfólia. Podielové fondy. Riziko. Výnos. Nestálosť. Ukazovatele výkonnosti.

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Introduction

Why measure portfolio performance?

Committing resources in any way will automatically bring the questions about the potential returns of such commitment. People, be it investors, employers, or regular people, are usually unwilling to invest in anything that will not be beneficial to them at the end. That is why it is necessary to consider potential returns before the investment. When investing into financial instruments, such as funds, this analysis of performance is a crucial pre-requisite for decision-making. An investor will not commit his or her resources into a fund that will be more costly than beneficial. For these purposes investors create, establish or use (if readily available) different approaches to portfolio performance measurement, that measure the utility and benefits compared to the cost tied to investing and holding the investment. Relevance of measuring portfolio performance for people interested in investing into those portfolios is immense. However, the investor must be able to determine what is a good and what is a bad performance, as simply stated returns do not address this issue.

Currently, more and more ordinary people become interested in investing on the financial markets. Especially investing through mutual funds is establishing itself as one of the popular choice of people, who have no experience with investing whatsoever. The information is readily available and the accessibility is increasing. Additionally, the pre-chosen portfolio composition also adds to the attractiveness of this choice. People move away from investing with banks, as the returns continue to decrease and become unsatisfying for investors.

The general tendency, not only concerning previously uneducated investors, but also some of the professionals, is to buy when price is rising and sell when the price is decreasing. This is the reason majority of people investing on the markets will not earn sufficient returns. The correct way is exactly the opposite. However, the timing of trades is a very fine art and in many cases even the professionals come across difficulties. The decision to buy or to sell is one of the most complex and undoubtedly difficult decisions to make. That is why mutual funds have manager overseeing them and the choice of the right type of manager will also be included in this thesis. However, even amateur investors relying on the services of professionally managed funds should be able to assess and evaluate the successfulness of a portfolio on a basic level.

Efficient market hypothesis

A market is considered to be efficient if it reflects all the information available to the investors.[1] That would mean that in an effective market, the investors would not be able to obtain returns which would be higher than holding a randomly created portfolio even if they used different types of analysis. Prices that are relevant today depend only on the information available today and prices relevant tomorrow will only be dependent on the information available tomorrow, which implies that price developments are independent. The hypothesis is closely tied to the idea of random walk – buying a diversified portfolio at given prices, amateurs will achieve very similar rate of return as experts.[2] If there would be any patterns that would be predictable and would allow for larger returns and thus make the efficient market hypothesis not valid, the size of the patterns would have to be large enough to cover transaction costs, which is unlikely.

Rational portfolio management is required even if the markets are efficient, even though it seems that it would not be useful because the rate of return would not significantly top the rate of a randomly created portfolio. The role of the manager is to create a diversified portfolio with risk levels attractive to potential investors.[3] This notion about portfolio management brings about the topic of two basic types of portfolio managers – active and passive – and the ever on-going discussion about which approach is more suitable for achieving higher performing portfolios.

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[1] TIMMERMANN, A. - GRANGER, C.W.J. 2002. Efficient market hypothesis and Available at <http://www.forecasters.org/pdfs/ijf/TimmermannGranger.pdf>. ISSN 0169-2070.

[2] MALKIEL, B.G. 2003. The efficient market hypothesis and its critics. In *Journal of Economic Perspectives*. [online]. 2003, vol. 17, no.1 [retrieved October 15th 2013]. Available at <http://emlab.berkeley.edu/~craine/EconH195/Fall_13/webpage/Malkiel_Efficient%20Mkts.pdf>. ISSN 0895-3309.

[3] BODIE, Z. - KANE, A. - MARCUS, A.J. 2009. *Investments*. 8th edition. New York: McGraw-Hill/Irwin, 2009. p. 353. ISBN 978-0-07-338237-1.

1 Current development of portfolio performance measurement

1.1 Types of portfolio managers

The question of the type of portfolio manager taking care of a portfolio of financial assets is an important one. Investors should know the approach the manager is going to take to eliminating risk and increasing returns. Generally there are two types of management styles present in the world; however, combination of the two is also possible, with both approaches being directed at all types of assets, whether it is stocks, bonds or funds. It is fairly clear that the management approach will have a profound impact on the overall performance of the portfolio and thus this topic is very relevant to this subject.

1.1.1 Passive portfolio management

The aspiration of a passive portfolio manager is to, in any circumstances, match a benchmark, which is determined in advance. This is what measures or indicates a successful portfolio manager. The issue of benchmarks, their types, availability and appropriateness is going to be discussed later on in the thesis. The essentials of the efficient market hypothesis are directly reflected in the behaviour of passive managers. They believe that the market value reflects all the relevant information and thus beating the market to achieve substantially higher returns is very close to impossible. So the focus is on well-selected benchmark and the portfolio manager selects the securities or assets, which will create the portfolio with the use of a technique called indexing. This means that the assets selected mirror the index in their weights within the portfolio or the managers decide to go directly for index funds or exchange traded funds (ETFs), which popularity is growing and there are more than 1,000 of these available. As the word “passive” in the name suggests, the managers are rather inactive when it comes to trading. That does not mean that they do not care about the results of the portfolio. On the contrary, they believe that in the long-term, market volatility in market prices and values will balance out and lead to a fair result. To say it in a simpler way, it means that once a portfolio is created they tend to leave it as it is without any major changes. The changes will only occur, if there would be any changes in the benchmark fund, so that the manager’s fund would continue to mirror the benchmark. The composition of the portfolio to mirror the index is

far more important than frequent trades and seeking for opportunities to add value, in this case.[4]

1.1.2 Active portfolio management

On the other hand, the general aim of an active portfolio manager is to not be satisfied with average returns, but to consistently strive to beat the market and the set benchmark in order to deliver above-average results to the investors. They actively search for investment opportunities, price and market inefficiencies to increase their chance of increasing the earnings. The selection of financial assets within the portfolio is given a great prominence; usually the manager himself selects the assets. As the name of this management approach suggests, the portfolio is managed actively, which means that trading occurs frequently and the manager must be skilled in timing these trades. The amount of trading means that the assets or securities within the portfolio must be of higher liquidity to be traded quickly.[5] On one side, active portfolio management promises above-average returns, nevertheless this does not mean that it happens at the same cost as if the portfolio would be managed passively. Contrary to passive portfolio managers, who believe in efficient market hypothesis, active managers believe that it is not valid and by active approach higher returns can be achieved.

1.1.3 Advantages vs. disadvantages

When an investor is presented with a choice of which type of management he or she would prefer, knowing the advantages and disadvantages of both comes handy. Investors must be able to identify, at least on a very basic level, which type of portfolio management better serves the purposes he or she wants to achieve and which is better aligned with his or her personality. Of course, personal meeting and presentation of desires and requirements from both sides is necessary. To make the issues simpler, it is safe to assume that the advantages tied to one approach are the disadvantages of the other one.

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[4] BAIRD, R.W. 2012. Active vs. passive money management. In *Baird's Advisory Services Research* [online]. June 2012 [retrieved October 17th 2013] Available at <http://www.rwbaird.com/bolimages/Media/PDF/Whitepapers/active-vs-passive-money-mgrs.pdf>.

[5] BAIRD, R.W. 2012. Active vs. passive money management. In *Baird's Advisory Sevices Research,* [online]. June 2012 [retrieved October 17th 2013] Available at: <http://www.rwbaird.com/bolimages/Media/PDF/Whitepapers/active-vs-passive-money-mgrs.pdf>.

The most often cited and prominent advantage of passive portfolio over active portfolio management is the amount of costs tied to it, or rather the lack of costs. Generally speaking, because of the infrequency of trading, the fees are usually lower (however the fees for providing portfolio management services may differ). In March 2012, the average expense ratio of an ETF was 0,56%. This includes lower priced ETFs as well as higher priced ETFs; the expense for these differs as the lower priced usually track major indices, while the higher priced require more work as they track specific sectors or even industries.[6] Another advantage is the reduction of unnecessary exposure to risk. Investors expose themselves to market risk just by investing; however, actively trying to beat the market also means exposing oneself to a greater level of riskiness. The issue or wrong asset selection also arises here, as while passive management tries to mirror the benchmark, the active managers select the assets themselves, which gives more space for errors to occur.[7] Additionally to cost effectiveness of the passive style of portfolio management, there is also tax efficiency associated with this approach. The absence of frequent trades allows for fewer capital gains situations, which need to be taxed accordingly. For active managers, higher fees and taxes on any capital gains realized might become a problem, as these may effectively offset any above-average return they manage to achieve. [8]

As much as the passive managers may praise the efficient market hypothesis, the truth is that there are certain market anomalies, which reduce the efficiency of the market and present opportunities and advantages for the active managers. The first one is that the active managers are not restricted to investments in the large markets, where passive investors usually invest because of the weighted nature of indices. The fact that market is large does not mean that it will perform well or better than smaller markets. Active

[6] BAIRD, R.W. 2012. Active vs. passive money management. In *Baird's Advisory Sevices Research,* [online]. June 2012 [retrieved October 17th 2013] Available at: <http://www.rwbaird.com/bolimages/Media/PDF/Whitepapers/active-vs-passive-money-mgrs.pdf>.

[7] VOICU, A. 2007. Passive vs. active investment management strategies: Comparisons, perspectives and the relevance to financial advisors. In *Journal of Financial Planning*. [online]. Between the issues – web-only content [retrieved October 16th 2013] Available at: < http://fragassogroup.com/Articles/BTI.pdf>.

[8] VOICU, A. 2007. Passive vs. active investment management strategies: Comparisons, perspectives and the relevance to financial advisors. In *Journal of Financial Planning*. [online]. Between the issues – web-only content [retrieved October 16th 2013] Available at: < http://fragassogroup.com/Articles/BTI.pdf>.

managers can take and opportunity on a smaller market and be able to outperform passive managers.

Institutions investing in securities and assets, such as banks or insurance companies, have certain restrictions regarding the composition of their portfolios and can invest in some assets but not in others, perhaps for risk reasons. The advantage for active managers is that the behaviour of these institutions creates market inefficiencies, because they are not behaving as they are supposed to, based on efficient market hypothesis. Skilful active managers may be able take advantage of such opportunity and report higher returns.[9] Of course the supposed advantage of the active management is the desire to perform better and deliver better and higher results; however the extent to which this is just desire and to which it is reality is debatable a to be discussed in the following paragraph.

1.1.4 Rate of success

One thing is clear, without a doubt, in the market there is a need for both types of managers as they create a balance environment, providing each other with opportunities and challenging one another. Shift towards strictly passive management would decrease the efficiency of the markets as market coverage would be lower, which would in turn create opportunities for active managers. On the other hand, if there would be a predominantly active approach, markets would become more efficient as the coverage would increase, which would in turn increase the attractiveness of passive management.[10]

Research found out that time horizon considerations are very important when determining the rate of success of each management approach. For example, active managers have significantly increased their rate of success when extending the investment horizon from one year to five years, according to a research done by Baird. Subsequently, the frequency with which the active managers were able to add value increased from 59% to 73%. On the

[9] VOICU, A. 2007. Passive vs. active investment management strategies: Comparisons, perspectives and the relevance to financial advisors. In *Journal of Financial Planning*. [online]. Between the issues – web-only content [retrieved October 16th 2013] Available at: < http://fragassogroup.com/Articles/BTI.pdf>.

[10] VOICU, A. 2007. Passive vs. active investment management strategies: Comparisons, perspectives and the relevance to financial advisors. In *Journal of Financial Planning*. [online]. Between the issues – web-only content [retrieved October 16th 2013] Available at: < http://fragassogroup.com/Articles/BTI.pdf>.

other hand passive managers were most successful in shorter holding periods – one year or less.[11]

Another research from March of this year claims that only 24% of the active managers managed to outperform their benchmark over the period of past 10 years. The problem that the article suggests is that even though they managed to outperform the benchmark, the fees and charges effectively eliminated any positive results.[12]

Any number of researches may be presented, claiming one thing or another, the decision of choosing one style over another is purely dependent on the fit between the investor and the manager and the required and desired rates of return and risk that the investor is willing to accept.

1.2. Types of funds

In the financial world, there exist an immense number of different funds. New ones are created everyday and some of the old ones cease their existence. For better orientation in the world of funds, many ways of categorization are created based on certain characteristics such as types of assets within the fund, their riskiness and return, countries into which the fund invests and so on. However, the most basic and easy to understand categorization is the one based on the assets or mix of assets into which the fund invests. Below, the most typical and popular funds are going to be explained.

1.2.1 Money market funds

A money market fund usually invests into securities issued by the state, central bank or a commercial bank, which interest rate is set and known in advance. The types of assets into which this type of funds invests are frequently short-term bonds, treasury bills, term deposits or certificates of deposit. Their maturity is commonly rather short, within one year, and they are highly creditworthy compared to other funds. The short maturity, high quality of the issuing party (states and central banks are considered to be the safest issuers) implies that the funds benefit from lower riskiness and higher liquidity, which

[11] BAIRD, R.W. 2012. Active vs. passive money management. In *Baird's Advisory Sevices Research,* [online]. June 2012 [retrieved October 17th 2013] Available at: <http://www.rwbaird.com/bolimages/Media/PDF/Whitepapers/active-vs-passive-money-mgrs.pdf>.

[12] PRATT, J. 2013. Study: Only 24% of active mutual fund managers outperform the market index. In *NerdWallet.com*. [online]. Web-only content [retrieved September 27th 2013] Available at: <http://www.nerdwallet.com/blog/investing/2013/active-mutual-fund-managers-beat-market-index/>.

makes them suitable for investors who do not possess any previous experience with investing or which are not willing to bear high risk. Additionally, also fees tied to the money market funds are generally lower.[13]

1.2.2 Bond funds

More conservative options for investment are the bond funds, which invest into securities or bonds, which have fixed income. Unlike money market funds, their maturity exceeds one year and a potential return is a bit higher, since it is not focused only on the bonds issued by the state, central bank or commercial bank, but it also invests into bonds of corporations. Some of the examples of bonds, which can be used when assembling a bond fund, are government bonds, bonds of corporations, municipal bonds or mortgage bonds. Their performance can be affected by the development of interest rates or volatility of the exchange rate of the reference currency of the fund. The fees are higher than in the case of money market funds, which means that appreciation becomes noteworthy after few years, but this type of fund can be an alternative to term deposit in a commercial bank. Term deposits, nowadays, offer very small appreciation, if any, given the fees paid to the bank. Unlike the equity funds, as will be explained below, bond funds' movement is much more smooth, even after dividends are paid out. This is largely due to the fact that after the payout a usually small, even marginal, amount of the dividend is reinvested into the fund, which ensures more stable development over time.

1.2.3 Equity funds

The equity funds rank among the riskier options for fund investment. This is due to their focus on investment into stocks as minimum of two thirds of invested capital is put into shares of companies. Because of higher volatility of these instruments and short-term declines in share value, they are more suitable for experienced investors, who are able to bear higher risk. The reward for the riskiness is generally higher potential return on the investment; however, this can usually materialise only after certain longer period of time, but at least 5 to 7 years so that the fluctuations in value even out and allow for increase in return. Obviously, the fees are quite high compared to the above-mentioned funds. [14] An

[13] CHOVANCOVÁ, B. - BAČIŠIN, V. 2005. *Kolektívne investovanie, podielové a penzijne fondy*. Bratislava : IURA EDITION, 2005. p. 53-54. ISBN 80-8078-062-5.
[14] TKÁČOVÁ, D. - BELÁS, J. - HORVÁTHOVÁ E., et al. 2009. *Finančné trhy a bankovníctvo*. Žilina : GEORG, 2009. p. 95-96. ISBN 978-80-89401-01-7.

equity fund can be oriented on a certain part of economy such as technology, telecommunication or pharmaceuticals. To diversify the risk, some of the funds are oriented in multiple sectors and some can be oriented on certain geographical location such as a single state or a region, place of residence of issuers, etc. With specialization and more narrow focus of the fund, the riskiness but also the return increases. Equity funds are also affected by the payout of dividends. If the company has a positive stockholders' equity, which means that assets are larger than liabilities, the company may decide to pay out dividends. However, distribution of dividends has an impact on assets, which decline, and subsequently also stockholders' equity declines.[15] This causes the share price of stocks to be more volatile than the one of bonds.

1.2.4 Hybrid funds

As the names suggests, these funds invest into different types of assets present on different markets around the globe. Usually the portfolio is assembled in a way, which balances itself and tries to provide the best of equity and bond funds. Thus, the aim is to provide investors with a rather safe investment in terms of riskiness while trying to generate above average returns, as equity funds do. The investor should for 3 to 5 years to get the optimal result.

1.2.5 Real estate funds

The aim is to invest into real estate properties, where there is a potential for appreciation of the value of the property. Examples of these can be hotels, shopping centres or estates, where the price is sensitive to and positively correlated with inflation, so as the inflation grows the price increases as well. [16]

1.2.6 Commodity funds

The subjects of investment in the case of commodity funds are commodities. Most likely investments are those into gold and other precious metals, which are good for long

[15] LEE, M.C. 2013. How does a stock dividend affect a stockholder's equity? In *Zacks*. [online] Web-only content [retrieved April 10th 2014] Available at <http://finance.zacks.com/stock-dividend-affect-stockholders-equity-3103.html >

[16] CHOVANCOVÁ, B. - BAČIŠIN, V. 2005. *Kolektívne investovanie, podielové a penzijne fondy*. Bratislava : IURA EDITION, 2005. p. 55. ISBN 80-8078-062-5.

term investing and store of value.[17] Investors who are not looking to earn above average returns, but rather those who want their money to not loose value over time, are satisfied with the returns that match or slightly surpass the inflation rate.

1.2.7 Umbrella funds

Umbrella funds employ different investment strategies as a part of a collective investment scheme. The sub-funds existing under an umbrella of a single legal entity are being invested into as separate funds; however with the additional benefit for the investor to move its investment or its parts from one sub-fund to another sub-fund based on the current strategy he or she wants to use without any additional fees.[18] Thus, for a change in strategy, an investor does not have to take the current investment out for a invest into a different fund for a fee, but only shift the money within one umbrella fund. This investment opportunity is suitable for investors who are experienced and understand the impact of different investment strategies or for those who like to adjust their investment according to current developments on the markets but consider an investment into shares to be riskier.

1.3 Benchmarks

When evaluating a performance of a portfolio, there always has to be something to measure this performance against. Simply, return data on its own means nothing to a portfolio manager and a bar needs to be set in order to establish what is a good and what is a bad performance. This is what benchmarks are used for. According to Allen the word benchmark means "a point of reference or something that servers as a standard by which others may be measured".[19] In investment terms, this could mean that a benchmark is a reference portfolio, similar to the one, which is held by the portfolio manager against which the performance is measure or compared in order to arrive at conclusions regarding the successfulness of the manager.

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[17] CHOVANCOVÁ, B. - BAČIŠIN, V. 2005. *Kolektívne investovanie, podielové a penzijne fondy*. Bratislava : IURA EDITION, 2005. p. 55. ISBN 80-8078-062-5.
[18] CHOVANCOVÁ, B. - BAČIŠIN, V. 2005. *Kolektívne investovanie, podielové a penzijne fondy*. Bratislava : IURA EDITION, 2005. p. 74. ISBN 80-8078-062-5
[19] ALLEN, R. 2003. *The Penguin English Dictionary*. 3rd edition. Bratislava : Ikar, a.s., 2005. p. 122. ISBN: 80-551-1011-5.

1.3.1 Characteristics of valid benchmarks

As stated in literature a valid benchmark needs to have certain characteristic, commonly seven of these are reported; the benchmark must be[20]:

- Unambiguous
- Investable
- Measureable
- Appropriate
- Reflective of current investment opinions
- Specified in advance
- Owned

Unambiguous means that the securities used within the benchmark must be clearly identified and weights must be assigned to them in advance in order for them to constitute an unambiguous benchmark. The performance should not be measured against more than one benchmark. Additionally, it is not good to change the benchmarks often or historically in order to re-calculate the past performance against the currently chosen benchmark.

The second characteristic is that the benchmark must be investable, which basically means that the investor or portfolio manager must be able to invest in the benchmark as an equivalent of the portfolio, which is measured against that benchmark. Holding the benchmark would represent passive portfolio management.

Measurable is yet another characteristic of a valid benchmark. The benchmark needs to be measurable for quite obvious reasons. If it was not than it would not be possible for portfolio managers or investors to compare their own portfolios and their return and other indicators against it.

The need for a valid benchmark to be appropriate means that the benchmark needs to be comparable to the portfolio in question in order to be usable. In order for the benchmark to serve as a good bar for measuring of performance, there needs to be a certain compatibility or coherence with the type of management of the portfolio manager.[21]

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[20] BAILEY, J.V. - RICHARDS, T.M. - TIERNEY, D.E. 2007. *Managing investment portfolios: A dynamic process*. 3rd edition. New York : John Wiley & Sons, 2007. p. 729. ISBN: 978-0-470-08014-6.

[21] BAILEY, J.V. - RICHARDS, T.M. - TIERNEY, D.E. 2007. *Managing investment portfolios: A dynamic process*. 3rd edition. New York: John Wiley & Sons, 2007. p. 729. ISBN: 978-0-470-08014-6.

In portfolio management, knowledge of the underlying principles is crucial for success that is why the portfolio manager needs to know the factor exposures within the chosen benchmark and be familiar with current investment opinions, regardless of his attitudes towards it.[22] A quite high degree of understanding of the benchmark is required for the manager in order to be able to properly use it and explain some of the atypical movements that may happen as a result of certain factors present within the benchmark and not within the portfolio.

The specification of the benchmark in advance is absolutely understandable, as for proper measurement the reference point needs to be known from the very beginning. This is especially true for active portfolio manager, which need and want to flexibly react to negative or positive deviations of the portfolio performance from the benchmark performance in order to review and attempt to correct the developments.

The very last characteristic, owned, means that the portfolio manager should be accountable for the performance of the benchmark, he/she constructed. Bailey advises that the choice of benchmark should be integral part of the investment process and process of investment management.

Actually, not many of the benchmarks used by portfolio managers really do satisfy all of these. Also literature differs on the number and types of characteristics of valid benchmarks. For example, in a book by Bacon (2008), there are only five characteristics[23]:

- Appropriate
- Investible
- Accessible
- Independent
- Unambiguous

The main difference between the two approaches is that according to Bacon, the benchmark should be independent, which means that its returns should not calculated or prepared by the manager but by a third party, independent from the portfolio manager to

[22] BAILEY, J.V. - RICHARDS, T.M. - TIERNEY, D.E. 2007. *Managing investment portfolios: A dynamic process*. 3rd edition. New York: John Wiley & Sons, 2007. p. 729. ISBN: 978-0-470-08014-6.

[23] BACON, C.R. 2008. *Practical portfolio performance measurement and attribution*. 2nd edition. West Sussex: John Wiley & Sons, 2008. p. 39. ISBN: 978-0-470-05928-9.

ensure that the comparison is fair and not skewed by any pressures. This component is certainly missing from the Bailey's characteristics and adds transparency into the process.

1.3.2 Types of benchmarks

Different types of indexes are commonly used as benchmarks for measurement of portfolio performance. These were created for different reasons and satisfy the benchmark characteristics to different extent. Indexes can have various effects on the market and on the investors, for example thy can promote investment in emerging markets, or increase investments or trading with certain instruments.[24] If they are well constructed and the securities selected promote one of such behaviours for instance by proving to generate higher return on investment, because of particular selection of assets.

Firstly a simple way of calculating an index will be shown, followed by several types of indexes.

1.3.3 Price-weighted index

According to Bacon, the aggregate price index is the simplest index; however, it is widely used even by well-known stock market indexes, such as the Dow Jones Industrial Average in the United States and Nikkei Stock Average in Japan.[25]
The formula for the index at a specific time *t* is defined as follows:

$$I_t = \frac{I_0 \times \sum_{i=1}^{n} P_{t,i}}{D_t} \qquad (1)$$

Where: I_0 = the basic index number, e.g. 100 or 1000

$P_{t,i}$ = the price of security *i* at time *t*

D_t = the value of the divisor at time t after adjusting for past capital and constituent changes

[24] BACON, C.R. 2008. *Practical portfolio performance measurement and attribution*. 2nd edition. West Sussex: John Wiley & Sons, 2008. p. 39. ISBN: 978-0-470-05928-9.
[25] BACON, C.R. 2008. *Practical portfolio performance measurement and attribution*. 2nd edition. West Sussex: John Wiley & Sons, 2008. p. 40. ISBN: 978-0-470-05928-9.

The basic index number is used to normalize the whole index. The base year is chosen and the value the index reached in that year is set to be 100, then following years are expressed as a percentage of that base index number.

As mentioned, Dow Jones Industrial Index is an example of a price-weighted index. When the index started, the divisor has been the number of companies, which were a part of this index. However, nowadays the divisor changes value in different situations: there is a stock split, large stock dividend is paid, and composition of the index is modified.[26]

1.3.4 Market capitalisation index

The index uses the market capitalization of a security in order to establish its weight within the benchmark.[27] The capitalisation of a security is calculated as a price for the security multiplied by the number of issued shares. Moreover, such index offers a possibility to adjust the market capitalization, as generally not all issued shares can become available for the public to invest in. For example, S&P 500 is an example of a market capitalisation index, which is widely used as a benchmark.

Laspeyeres index is one of the market capitalisation indexes and it serves as the basis for majority of the market capitalisation indexes. The index calculates returns for finite periods, in which the weights of securities are fixed from the very beginning.
The Laspeyeres index can be calculated as follows:

$$b = \sum_{i=1}^{i=n} Wi \times \frac{P_{t,i}}{P_{t-1,i}} \qquad (2)$$

Where: W_i = weight of security *i* at the beginning of the period

Unlike Laspeyeres index, the Paasche index uses the end of a period, which makes them not investible, because quantity is known only at the end of the period. That is why Laspeyeres index is used more.

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[26] SHOVEN, J.B. - SIALM, C. 2000. The Dow Jones industrial average: The impact of fixing its flaws. Research paper. [online] Stanford University and NBER [retrieved November 3rd 2013] Available at <http://www-stat.wharton.upenn.edu/~steele/Courses/434/434Context/Indices/DowFlaws.pdf>

[27] BACON, C.R. 2008. *Practical portfolio performance measurement and attribution*. 2nd edition. West Sussex: John Wiley & Sons, 2008. p. 41. ISBN: 978-0-470-05928-9.

1.3.5 Equal-weighted index

The name of the index gives away the way it is calculated. Each security within the benchmark is assigned with exactly the same weight as the other, regardless of the market capitalization of the underlying asset.[28] This principle seems simple and some argue it is also a fair approach. However, differences in securities must be accounted for as illiquid securities may be given the same weight as highly liquid securities, and thus this approach will not be consistent with the management style of the portfolio manager. Active manager would definitely give more weight to highly liquid assets and less weight for the illiquid ones and it would go vice versa for a passive manager. As stated by Bacon, having equal-weighted index can be very hard for passive managers to track. They would need to balance the weights and that would lead to buying of poor performing securities and selling of well performing securities, which would increase transaction costs and could become unattractive for clients, as low transaction costs are among the motivators for clients to choose a passive manager.

1.3.6 Fundamental index

Fundamental indexes are those, which focus on other characteristics of securities rather than market capitalization. Factors influencing the chosen weights of different securities in this case are for example dividends or book value, among others.

The factors used by the manager largely depend on what the requirements. The managers must focus on coverage and concentration, which may create risks that need to be accounted for and for which a simple market capitalisation would not be the right answer. Coverage tells the manager how much the securities included in the benchmark cover the market in terms of market capitalization.[29] So, the calculation would be to divide the market capitalisation of the securities in the index by the total market capitalisation of the market times 100, to get a percentage. On the other hand, concentration tells the manager how much of the weight of the index is assigned to the selected few securities. If too much, this can be risky for a client, as the successfulness would be dependent on only a few securities.

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[28] BURTON, J. 2013. The problem with all things being equal. In *Wall Street Journal*. [online]. Article. [retrieved April 9th 2014]. Available at <http://ww.wsj.com/news/articles/SB10001424127887324162304578304164051191422>

[29] BACON, C.R. 2008. *Practical portfolio performance measurement and attribution*. 2nd edition. West Sussex: John Wiley & Sons, 2008. p. 43. ISBN: 978-0-470-05928-9.

1.3.7 Customised index

All of the indexes mentioned above are usually quite standardised, but sometimes clients' requirements lead to a need of a specifically designed benchmark, as these standardised do not suffice. Customised indexes are used for portfolios, which have invested in securities with different currencies or which use hedging. Some of the asset categories within the index can be assigned fixed weights and some can have dynamic weights to better appropriate the index to the portfolio. Some even have limitations for the number of securities, or securities from certain industries and even countries – these are called capped indexes.[30] Customised indexes seem like a good idea, as they are designed on demand and thus can satisfy all the characteristics of a valid benchmark; however, one must also understand that a great level of work, skills and experience is required to provide a client with such an index, that is why they come at a price, which is significantly higher than using a standardised index.

1.3.8 Money-weighted benchmarks

All of the above-mentioned indexes could be described as commercial benchmarks, which are time-weighted rather than adjusted for cash flow, such as money-weighted benchmarks.[31] This makes this kind of benchmark unique, as it would reflect the portfolio's returns reaction to changing cash flows.

The ultimate choice of a benchmark would be dependent on the client's requirements or the way the portfolio is constructed, in order to provide a good comparison bar for evaluation and monitoring of the returns and overall performance.

1.4 Return

Comparison of portfolios, but also individual securities, by investors is usually done by comparison of returns. Returns can be positive, and then we talk about a gain, or negative, which means a loss.

There are many different ways of calculating different types of returns. Returns can be calculated as a historical number or even as a predicted, or expected return, as one

[30] BACON, C.R. 2008. *Practical portfolio performance measurement and attribution*. 2nd edition. West Sussex: John Wiley & Sons, 2008. p. 44. ISBN: 978-0-470-05928-9.
[31] KENT BAKER, H. - FILBECK, G. 2013. *Portfolio theory and management.* New York: Oxford University Press, 2013. p. 568. ISBN: 978-0-19-982969-9.

cannot completely rely on historical data in order to make predictions about the future, as factors influencing the returns change over time.

1.4.1 Simple return

Simple return measures the return of a security as a change in price of that security over a certain period. Mathematically, the cumulative return during period *t* can be expressed as follows:

$$r = \frac{P_t - P_{t-1}}{P_{t-1}} \qquad (3)$$

Where: P_t = price of an asset at the end of a period

P_{t-1} = price at the beginning of the same period

Period t can be understood as a holding period of that particular asset or security and it can range from seconds to years.

When it comes to calculating return of a portfolio consisting of a set of selected securities, one can calculate the portfolio return as a return of each security present within a portfolio and a weight it carries within that portfolio in comparison to the total amount invested in it. The return of a portfolio is, thus, a weighted average of individual securities as shown in the equation below:

$$r_P = \sum_{i=1}^{i=n} w_i r_i \qquad (4)$$

Where: w_i = weight of an asset *i* in a portfolio

r_i = return on an asset *i*

Based on this, expected return can be calculated by substituting the simple return by an average/expected return. The sum of the expected returns of each individual security would then establish the expected return for the whole portfolio as follows:

$$E(r_P) = \sum_{i=1}^{i=n} w_i \bar{r}_i \qquad (5)$$

Because the development of price and expected return can be understood as random variables, it is highly improbable for any investor, broker, or portfolio manager to

predict the tomorrow price with certainty. The results from historical values can give a little help in assessing, whether the movement was steady or rather chaotic. Especially comparing the portfolio with a benchmark based on historical data needs to be done on a longer time scale, rather than just a few months in order to more clearly see the developing trends. While during a short time period, one can assume that the absolute return of a portfolio was higher than the one of the benchmark, comparison on a longer time scale may show that the higher portfolio return was just a one-off event and the benchmark steadily beats the portfolio in terms of returns. Additionally, longer holding periods are preferred as they usually smooth out any one-off events, which can cause temporary drops in value.

1.4.2 Sharpe ratio

The Sharpe ratio, also called reward-to-variability ratio, measures the return in excess of the risk-free return (such as the one of treasury bonds) per unit of risk.[32] The formula for calculating the ratio goes as follows:

$$SR_P = \frac{E(r_P) - r_F}{\sigma(r_P)} \qquad (6)$$

Where: $\sigma(r_P)$ = standard deviation of the portfolio excess return

r_f = risk free rate

It is best to calculate the ratio for both the portfolio held by the investor and the selected benchmark, to be able to compare the results and arrive at a conclusion regarding the returns and performance of the portfolio. If the ratio for a portfolio is higher than the one of a benchmark, then the portfolio is said to be performing better than the benchmark, thus, providing higher returns. The Sharpe ratio is believed to provide a better picture, if it is used on a whole portfolio, rather than each individual security or fund within that portfolio. The portfolio manager is interested in knowing the performance of the whole portfolio and the volatility or risk of it, rather than the one of the underlying assets. If it

[32] ARAGON, G.O. - FERSON, W.E. 2007. Portfolio performance evaluation. In *Foundations and Trends in Finance.* [online]. 2006, vol. 2, no.2 [retrieved December 12th 2013]. Available at: <http://www-bcf.usc.edu/~ferson/papers/REV3-1.PDF>. ISSN: 1567-2409.

would be applied to single assets within the portfolio, the correlation between the one asset and the others present would be ignored, skewing the overall picture.

As a downfall of the ratio, many mention that it is not appropriate for portfolios, which returns are highly different from what is to be considered non-normal; additionally, if the distribution of returns is skewed, such as when the portfolio includes traded options, the results can be deceptive.[33]

Overall, it can be said that the Sharpe ratio is used to measure the performance of a portfolio and it provides a retrospective view.

1.4.3 Treynor ratio

The Treynor ratio measures the returns in excess of the risk-free return per unit of systematic risk.[34] Unlike the Sharpe ratio is takes into consideration the market risk, or beta, and not the total volatility in terms of standard deviation. The formula goes as follows:

$$T_P = \frac{E(r_P) - r_F}{\beta_P} \qquad (7)$$

Where: β_P = beta of a portfolio

The way to read the results of a Treynor ratio is the very same as in the previous case of Sharpe ratio. If calculations are done for both the portfolio and the benchmark, than the one with higher Treynor ratio is the one, which is believed to be performing better.

However, the problem with both of these measures is that they only tell the investor or portfolio manager, which is performing better, whether the portfolio or the benchmark, but not by how much. To arrive at the quantification of returns, one must use other measures such as the ones suggested under simple return or the one, which will follow in the next paragraph.

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[33] ARAGON, G.O. - FERSON, W.E. 2007. Portfolio performance evaluation. In *Foundations and Trends in Finance.* [online]. 2006, vol. 2, no.2 [retrieved December 12th 2013]. Available at: <http://www-bcf.usc.edu/~ferson/papers/REV3-1.PDF>. ISSN: 1567-2409.

[34] ARAGON, G.O. - FERSON, W.E. 2007. Portfolio performance evaluation. In *Foundations and Trends in Finance.* [online]. 2006, vol. 2, no.2 [retrieved December 12th 2013]. Available at <http://www-bcf.usc.edu/~ferson/papers/REV3-1.PDF>. ISSN: 1567-2409.

1.4.4 Compound annual growth rate

The compounded annual growth rate is used to calculate rate of return, or more precisely a return that the investment yields on an annually compounded basis. [35]
The formula for calculation of the compounded annual growth rate is as follow:

$$CAGR= \left(\frac{V_n}{V_0}\right)^{\frac{1}{n}} -1 \qquad (8)$$

Where: V_n = value of a portfolio at the end of the period

V_0 = value of a portfolio at the beginning of the period

n = number of periods

This type of calculation of rate of return is widely used; however there are also some advantages and disadvantages of it.

On the positive side, it allows portfolio managers to compare and present historical returns of their portfolios. Moreover, it allows to calculate the rate of return for different holding periods, not necessarily full years, but monthly, weekly, daily basis is allowed, all depending on the investor who is conducting the calculation and his or her own definition of *n*. What can be considered as a drawback is that for this comparison to be useful, the same time periods must be used for calculations. And as the formula suggests, there is no risk involved in the calculation, which means it can provide higher results than there, in reality, are.

However, there is a possibility to adjust the compounded annual growth rate for risk. The subsequent formula would than look like this:

$$\text{risk-adjusted CAGR}=CAGR \times \left(1-\sigma_P\right) \qquad (9)$$

Additionally, it is advised to compare different measures of risk and return to arrive at the most objective picture of what returns is the portfolio providing compared to other similar portfolios or benchmarks.

[35] WAYMAN, R. 2010. Compound annual growth rate: What you should know. In *Investopedia.com*. [online] Web-only content [retrieved December 14th 2013] Available at <http://www.investopedia.com/articles/analyst/041502.asp>.

1.5 Risk

According to Allen, risk can be defined as "a dangerous element or factor, a hazard".[36] In the case of portfolios of different assets and securities, this danger can be anything from unexpected changes in exchange rates, changes in market conditions and demand, economic crisis or bankruptcy of a company issuing the securities, among others. Based on these, one can divide risks into different categories: compliance, operational, credit, and portfolio.[37] In the case of portfolio management, portfolio risk is obviously of biggest concern and it deals with the portfolio manager being or not being able to meet the expectations of the client.

One has to also distinguish between risk management and risk control in order to understand risk, why it has to be present and play an important role in portfolio management, and why it affects the returns of a portfolio.

Portfolio managers have to undertake a certain level of risk, to be able to provide the client with higher return – they are risk takers. On the other hand, risk control involves monitoring and in many cases also mitigating or reducing risk – risk controllers are risk avoiders.[38] Thus, it can be clearly seen that there is a major difference between risk management and risk control and the objectives of both are the exact opposites.

Two types of risk affect each portfolio. The first one is the risk of the individual security, which can be expressed by standard deviation of expected returns. The second one is the risk of the market, which can be expressed as a beta of a portfolio.[39] In the following section, all these terms will be explained in more depth and associated terms – variance, covariance, and correlation – will also be introduced.

1.5.1 Variance

The variance of a security tells the portfolio manager or the investor how volatile a security is compared to an average amount, or mean. In investment terms, this indicates the risk an investor takes on when purchasing a certain security. The higher the variance the

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[36] ALLEN, R. 2003. *The Penguin English Dictionary*. 3rd edition. Bratislava : Ikar, 2005. p. 1206. ISBN: 80-551-1011-5.
[37] BACON, C.R. 2008. *Practical portfolio performance measurement and attribution*. 2nd edition. West Sussex: John Wiley & Sons, 2008. p. 61. ISBN: 978-0-470-05928-9.
[38] BACON, C.R. 2008. *Practical portfolio performance measurement and attribution*. 2nd edition. West Sussex: John Wiley & Sons, 2008. p. 61. ISBN: 978-0-470-05928-9.
[39] MOFFETT, M. - STONEHILL, A. - EITEMAN, D. 2006. *Fundamentals of multinational finance.* 2nd edition. Boston: Pearson Education, Inc., 2006. p.392. ISBN: 0-321-28031-9.

higher the risk, as the security moves further from the mean and thus can behave more unexpectedly. The formula for variance is as follows:

$$\sigma^2 = \frac{\sum_{i=1}^{i=n}(r_i - \bar{r})^2}{n} \qquad (10)$$

Where: n = number of observations

r_i = return in *i* months

$\bar{r}$ = average/mean return

1.5.2 Standard deviation

The standard deviation of a security is a square root of its variance. Again, this is a measure of volatility of a fund in relation to average, or mean results. Thus, one can deduct that the larger the standard deviation the larger the volatility of the results and subsequently the higher the risk. The formula for standard deviation is as follows:

$$\sigma = \sqrt{\sigma^2} = \sqrt{\frac{\sum_{i=1}^{i=n}(r_i - \bar{r})^2}{n}} \qquad (11)$$

By analysing the risk and volatility, a portfolio manager is able to establish rails, in which the appreciation or depreciation of asset move with a certain level of probability. With almost 100% of probability, the returns of an asset will move in a range $<\bar{r} - 3\sigma, \bar{r} + 3\sigma>$.

1.5.3 Beta

The beta coefficient is measuring the systematic risk, or the third risk mentioned to affect the portfolio's returns. It can be calculated by multiplying the correlation between the security and the market by the standard deviation of the security. Then this number is divided by the standard deviation of the market. The values of beta tell investors how volatile are the returns of a security compared to the returns of the market. Numbers higher than 1.00 suggest that the security is more volatile than the market, while numbers below

1.00 suggest lower volatility.[40] Since volatility can be understood as risk than beta, in plain words, expresses the historical riskiness of holding a security.

Beta is most frequently used as a part of the capital asset pricing model (CAPM), which helps to calculate a cost of equity, or return of a security to be added to a portfolio.[41] The formula for β is as follows:

$$\beta = \frac{\text{Covariance } (r_P, r_F)}{\text{Variance } (r_F)} \quad (12)$$

Where: r_P = return of the portfolio

r_F = risk-free rate

The formula says that β of a security can be calculated by dividing the covariance of the security and the market by the variance of the market.
The formula for the capital asset pricing model is as follows:

$$E(r_P) = r_F + \beta_P \times (E(r_M) - r_F) \quad (13)$$

Where: $E(r_P)$ = expected return of a portfolio

r_F = risk-free rate

$E(r_M)$ = expected market return

It takes into consideration not only systematic risk – beta, but also the risk free-rate (the interest on risk-free bonds, such as treasury bonds) and market returns. The part in the brackets, where we subtract the risk-free rate from the expected market return is called a market premium.

1.5.4 Covariance

Calculating the covariance will tell the portfolio manager how is the portfolio's return moving in comparison with the return of a selected benchmark portfolio.[42] Thus,

[40] MOFFETT, M. - STONEHILL, A. - EITEMAN, D. 2006. *Fundamentals of multinational finance.* 2nd edition. Boston : Pearson Education, Inc., 2006. p. 292. ISBN: 0-321-28031-9.
[41] MOFFETT, M. - STONEHILL, A. - EITEMAN, D. 2006. *Fundamentals of multinational finance.* 2nd edition. Boston : Pearson Education, Inc., 2006. p. 291. ISBN: 0-321-28031-9.

covariance will indicate whether the portfolio will move the same way as a benchmark – positive covariance, or whether they do not move together – negative covariance. Additionally, if the covariance result is closer to zero or equal to zero, we can predict that there is no relation between the portfolio and the benchmark. However, the result will tell us nothing about the strength of the relationship, just if there is one or not. The formula for covariance is as follows:

$$\text{Covariance}_{i,P} = \frac{\sum_{i=1}^{i=n}(r_{Pi}-\bar{r_P})\times(b_i-\bar{b})}{n} \qquad (14)$$

Where: r_P = portfolio return in the month i

$\bar{r_p}$ = average portfolio return

b_i = benchmark return in the month i

$\bar{b}$ =average benchmark return

1.4.5 Correlation

As mentioned in the previous paragraph, the covariance does not indicate the strength of the relationship between a portfolio held by an investor and a selected benchmark. It is correlation that measures and establishes the strength of the relationship. So when a portfolio manager calculates the existence of a relationship, he or she should proceed with calculation of the correlation to make the most of it. The range of correlation coefficient can be between -1 and 1. The result can suggest a positive correlation, negative correlation or no correlation at all. The result equal or close to -1 will mean negative correlation, results equal or close to 1 will mean positive correlation, with zero representing no linear relationship, or dependency between the portfolio and the benchmark.[43] Results, which are at the extremes, so exactly -1 or 1, show that the two variables are perfectly correlated. That means that there is a perfect linear relationship and that change in one variable will result in the exactly same change in the other variable. The only difference will be that with positive correlation both changes will be in the same direction and with negative correlation the changes will be in the exact opposite directions.

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[42] BACON, C.R. 2008. *Practical portfolio performance measurement and attribution*. 2nd edition. West Sussex: John Wiley & Sons, 2008. p. 73. ISBN: 978-0-470-05928-9.

[43] CHUNG, M.K. 2007. *Correlation coefficient*. [online]. Background theory [retrieved November 2nd 2013] Available at <http://www.stat.wisc.edu/~mchung/teaching/MIA/theories/correlation.linearmodel.feb.20.pdf>.

The formula for correlation is as follows:

$$\rho_{P,M} = \frac{\text{covariance}}{\sigma_P \times \sigma_M} \qquad (15)$$

Where: σ_P = portfolio standard deviation

σ_M = benchmark standard deviation

By calculating and knowing the correlation, the portfolio manager can better construct the actual portfolio, assess and actually reduce the risk it bears. For diversification purposes, it would be unwise to have a portfolio consisting of purely positively correlated securities. Such a portfolio would face a risk of failing as if one security fails, the others will follow the suit, which would drag the portfolio returns effectively down. Vice versa, having a portfolio, which consists of purely negatively correlated securities will effectively minimize all the returns resulting from undertaking a certain level of risk. The returns of the securities will cancel each other out, preventing any excess returns. The best case would be to have a well thought through combination of positively, negatively and non-correlated securities, which would allow for certain level of risk to be undertaken to achieve higher than average returns but not as much as to make the portfolio too exposed and not as little as to make it uncompetitive and unattractive for an investor as opposed to investing in the benchmark or the market.

One can definitely see that risk plays an important role in portfolio creation, in assessing its relationship to the benchmark and the level of returns, which can be expected from the portfolio. In the following part, ways of calculating return of a portfolio will be presented and explained.

2 The goal of the thesis

The prime question of every beginner and potential investor usually is: “To which fund should I invest?” This is in most cases closely followed by another question: “Based on what criteria?” As has been mentioned previously, different types of asset managers could most probably provide the investor with different answers. Many of them also use different criteria and methods to arrive at the answers. Some may focus on the measures of return, some may focus on the levels of riskiness and some may take into consideration different combinations of the two.

There are many methods of calculating and aggregating historical data as well as predicting the future performance. So, for each investor, it is important to first of all understand, which measure have been used in calculating past or future performance for better understanding of the results. The investor should also keep in mind the fees associated with the investment as they may significantly affect the final return on the investment.

The main goal of the thesis is to choose the best mutual fund, from the selected number of funds. All of the chosen funds will be evaluated by the means of using various methods measuring portfolio performance. The results of the analysis will help us to arrive at the result. The data for calculation will be obtained from the Slovak association of asset management companies in the form of weekly reports over three years, since January 2011 until December 2013.

The first minor goal to help us reach the main goal is to research and present the theoretical knowledge regarding portfolio performance measurement, to acquaint the reader with the different types of funds offered to general investor and with different types of portfolio managers an investor may come across and the impact of passive and active management on a portfolio.

The second minor goal is to, based on pre-selected criteria, choose three funds that satisfy these criteria and which are offered by the members of the Slovak association of asset management companies to the investing public in the Slovak republic.

3 Methodology

The thesis is based on the data of three equity funds and the weekly reports over the past three years. The results for the selected performance measures were based on the data, which can be found in the Appendix I. Some of the data are inconsistent, as for example for the ČSOB fund a measure of volatility has not been reported since the end of December 2011 until the end of December 2012 for unknown reasons. Vast majority of the data used for calculations in this thesis has been drawn from the Slovak Association of asset management companies. Out of the data, the relevant and needed information has been extracted, in order to be used in further calculation and for assessment, with the aim to arrive at the conclusion, which will satisfy the goal of the thesis.

Firstly, the funds are to be selected based on pre-determined criteria from the choice offered by the Association. It is imperative that the fund has been available for investment throughout the period of this study. The selection criteria for the choice of the final three funds were as follows:

- Currency
- Type of fund
- Geographical location
- Types of companies within the fund

The final choice has been made keeping in mind that the denomination currency of the fund must be the euro (EUR), it also should be an equity fund (two third of the capital must be invested into shares of companies), location of the share issuers should be global (not focused only on the European Union or the U.S. or emerging markets) and the companies to be present in the fund should be mostly the major players in their respective markets without the fund to be specialised on a certain part of the economy, e.g. technology.

The three funds that satisfied these results were selected from the choice of open-end funds offered by the Slovak association of asset management companies. These are the funds; each one of them will be described and evaluated later on:

- SPORO Global Equity Fund (SPORO Globálny akciový fond)
- ESPA Stock Global

- ČSOB Global Equities (ČSOB Svetový akciový o.p.f)

The performance of the selected funds will be measured based on methods of comparison, aggregation of data and other formulas used for performance measurement. Basically the comparison will take place based on these three criteria: risk, return and fees. To reach the required results and to be able to interpret them, various empirical and theoretical methods are used.

First of all, the weekly changes in performance will be plotted on the graph to see or look for general trend and any extremes. Then the yearly performance over the three years will be calculated with the total results to be annualized to show evened out per annum growth rate. For this purpose, the following formula will be used:

$$ATR=[(1+R_1)\times(1+R_2)\times\ldots\times(1+R_n)]^{\left(\frac{1}{n}\right)} - 1 \quad (16)$$

Where: R_n= return for year *n*

n = number of years

Subsequently, the weekly reported volatility would be plotted on a graph to better see the prevailing trend and the percentage of volatility each fund had over the period. This will also show us the riskiness of the funds, as the higher the volatility the more risky the underlying assets. The data for volatility will be supplied from the website of the Slovak association of asset management companies.

For us to be able to rank the funds, two ratios will be used – the Sharpe ratio and the Treynor ratio. The Sharpe ratio will be calculated based on the formula (6) and it will provide us with a measure of risk-adjusted performance according to which the funds can be ranked. For the risk-free rate, we chose the rate valid for the Eurozone, which is 3M EURIBOR; the data can be found in Appendix II. The aggregated yearly average 3M EURIBOR rates were as follows.

Table no.1: Yearly average 3M EURIBOR rates (% p.a.)

Year	**Yearly average 3M EURIBOR**
2011	1,39%
2012	0,57%
2013	0,22%

Source: own processing from www.euribor-ebf.eu

That means that we will compare the degree to which the fund, which is more risky than the risk-free investment, capitalized on the riskiness in terms of better performance than the riskless asset. If the number will be negative, then the risk-free investment is a better choice for the investor. EURIBOR has been used as a risk-free rate, because we assume a Slovak investor interested in these funds, who wants to know whether it is better for him to invest into these types of equity funds in terms or risk/return ratio or if it is more advantageous to invest in a risk-free asset within the Eurozone. The general truth is that majority of the equity funds have a negative Sharpe ratio when there is a bear market. It does not have to mean that they are badly managed and an investor should not invest in them, it can just mean that the market itself is down and the fund's Sharpe ratio is reflecting that.

The second ratio is the Treynor ratio, which provides the investor with another ranking opportunity based on reward-to-volatility. It uses beta instead of volatility and will be calculated based on formula (7). For the purpose of calculating this ratio, we need to calculate beta, according to formula (12). Beta requires us to calculate covariance of the return of the portfolio and a certain benchmark. For the purpose of this thesis, we used MSCI World Index. It was launched on March 21st 1986 and it is a widely used substitute for the popular S&P 500 Index, as it takes into consideration worldwide equities. It largely represents large and middle capitalization companies and it has 1,611 constituents. It covers securities across the developed, emerging, and also frontier markets and targets approx.85% of each market's market capitalization after adjusting for free float.[44] It is managed by Morgan Stanley Capital International, which manages also other similar funds. The returns of the benchmark fund for the observed period and the subsequently calculated beta were as follows.

Table no.2: Yearly returns of MSCI World Index

Year	Return
2011	-2,38%
2012	14,05%
2013	21,20%

Source: own processing from www.msci.com

[44] MSCI Inc. 2014. MSCI World Index. [online] Web-only content [retrieved April 10th 2014] Available at <http://www.msci.com/resources/factsheets/index_fact_sheet/msci-world-index-eur-net.pdf>

Table no.3: Beta for each fund for the three-year period

Fund	Beta
SPORO Global Equity Fund	0,95
ESPA Stock Global	0,73
ČSOB Global Equities	0,90

Source: own processing from available data

The beta indicator tells us how the fund is moving in relation to its benchmark or the market as a whole. Since all of the funds have a beta lower than that of the benchmark, it means that they are all less volatile than the benchmark to a certain degree. After beta is calculated, we will proceed to the calculation of Treynor measure itself. As a risk-free rate, the same figures will be used as in the case of Sharpe ratio – 3M EURIBOR.

After each fund will be assessed based on these criteria, they will be put into comparison with one another. From the comparison, we will be able to determine, which fund would we recommend to a general investor and why. At this point, also the fees associated with each fund will come into the mix as they can significantly affect the decision of an investor.

4 Interpreting results and discussion

For the purpose of this thesis, three funds have been selected to serve the purpose of showing their performance and differences, and to show on what basis can an investor make a decision of selecting one to invest in. To make such decision, one has to take into consideration several factors, most notably the return, volatility, risk category of the investment and also the fees tied to investing into the fund. Additionally, decision can be based on geographical locations into which the fund invests, if there are some major economic variables that can affect the performance of the fund in a foreseeable future. In the following subchapters the criteria used to choose the final three funds will be discussed as well as the role of asset management companies and the Slovak association of asset management companies. In the subsequent subchapters, the funds will be introduced and evaluated based on their performance over the past three years, since the beginning of January 2011 until the end of December 2013. They will be compared to one another based on their returns, volatility and fees associated with them. While the comparison is based on historical data, it is important to keep in mind the warning of the asset management companies that the current or potential future investors cannot consider the past results as a reasonable indicator of future performance or future riskiness of each of the funds, respectively.

4.1 Asset management companies

These are the companies that represent the investors. They are responsible for allocation, management and control of the financial instruments of the fund in accordance with the investment strategy of the fund. The official and legal definition of an asset management company can be found is Slovak law, specifically in the Act on Collective Investment no. 594/2003 (§3 Art.1). It is defined as follows: "a joint stock company, established with the purpose of doing business on the territory of the Slovak republic, which scope of business is a creation and management of mutual funds on the basis of authorization to establish and operate an asset management company granted by the National Bank of Slovakia."[45] The minimum required initial capital for the National Bank to grant the authorization is 1 million EUR and the law further dictates the capital structure of the asset management company. The authorization is granted indefinitely.

[45] Act no. 594/2003 Coll. on Collective Investment, Art. 3 §1

4.2 Slovak association of asset management companies

The Slovak association of asset management companies, from which majority of the data is obtained, was established in the year 1998 and it serves as an umbrella for asset management companies operating on the territory of Slovak republic. The main aim for its creation was dealing with problems tied to collective investments, such as harmonization of legislation, accounting principles and providing of information. Especially after the recent financial crisis the one of the additional goals has been to restore the trust of investors into collective investing and investing in general. They also contributed to the Slovak Act on Collective Investment. The Association also accumulates and published data about the funds of the member asset management companies. It provides data about all types of funds, from bond funds to equity fund and real estate funds, all of which are available in the Slovak republic regardless of the currency in which they are or regardless of whether the asset management company is Slovak or foreign. They provide weekly reports of each of the fund, while adding or removing funds as they enter or leave the offer of the members. Quarterly summaries are also available. The asset management companies responsible for each of the selected funds are all members of the Association.

4.3 SPORO Global Equity Fund

The fund was created on 31st July 2007 by Asset Management Slovenskej sporiteľne, správ. spol., a.s., which is the asset management company of a Slovak commercial bank. Based on the factsheet offered by the asset management company, the fund invests into different types of instruments. Investments into shares represent majority of the fund, followed by debt instruments and alternative investments. The amount of alternative investments cannot exceed 10% of the overall assets within the fund. The fund is not specialized in any industry or territory. Represented are mostly well-known industries based on their market capitalisation. The fund can contain assets from regions of North America, Western Europe, Japan, Pacific, Eastern Europe, Latin America and Asia, including emerging markets. The denomination as well as reference currency of the fund is EUR and derivatives may be used to a limited extend as a way of mitigating currency risks. The asset management company marks the fund as more suitable for an experienced investor. This can be tied to the risk level of the fund, which based on its historical performance is set at number 5 on a 1 to 7 scale, which means higher risk but also higher return. The capital of the fund is invested into assets based on the judgement of the asset

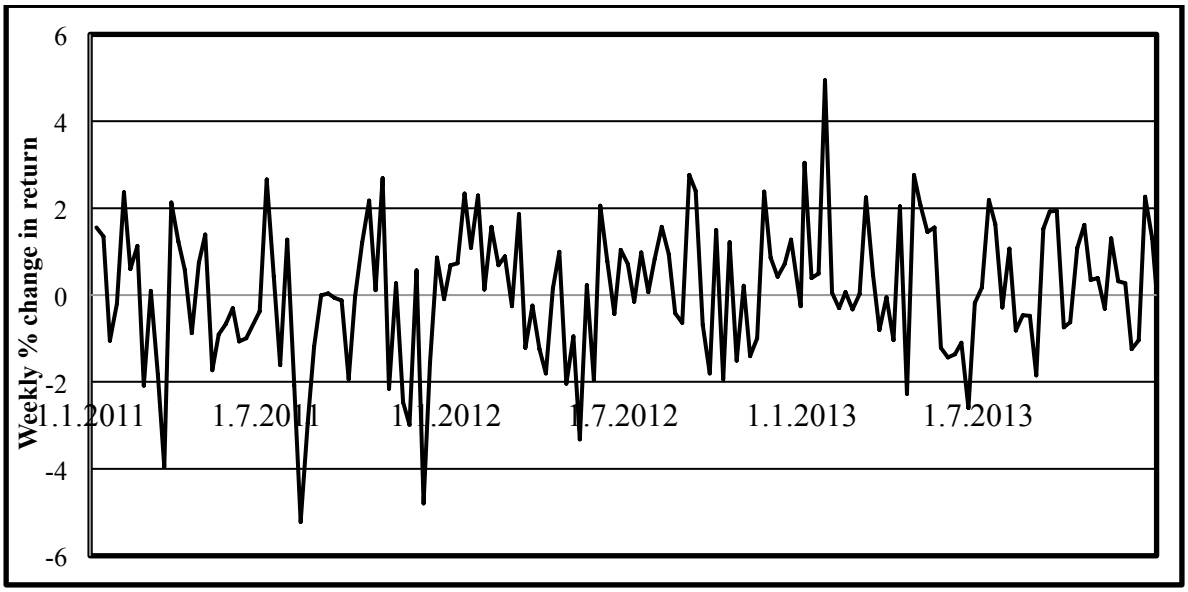
management company; there is no benchmark that the fund would follow. Recommended is to invest in the fund for a time horizon of at least 5 years, preferably more.

The minimum investment into fund is 500 EUR. The initial, maximum entry fee is set at 3,00% of the invested sum. The investor is also expected to pay an exit fee of maximum 1,80% of the amount, which is taken out of the fund. There is also a management and depository fee of 1,48% to be paid on annual basis, as a fee for the services of the asset management company and the depository; it is calculated out of the expenditures of the fund for the previous year. Of course the fees can change over time based on the decision of the asset management company.

4.3.1 Performance

The chart below shows the development of the fund over past three years, since 1st January 2011 until 31st December 2013, in a form of weekly percentage changes in returns. From the graph an investor might detect that the week-to-week changes oscillate up and down very frequently and without any predictable pattern. Especially the year 2011 seems to be dipping into the negative area quite often, while the year 2013 seems to be doing quite well in keeping itself in the growth numbers. However, as the prospect for potential investors warns, the past performance cannot be taken as a guarantee for future performance, but can provide an overview of what the fund has experienced, how low or high has it been.

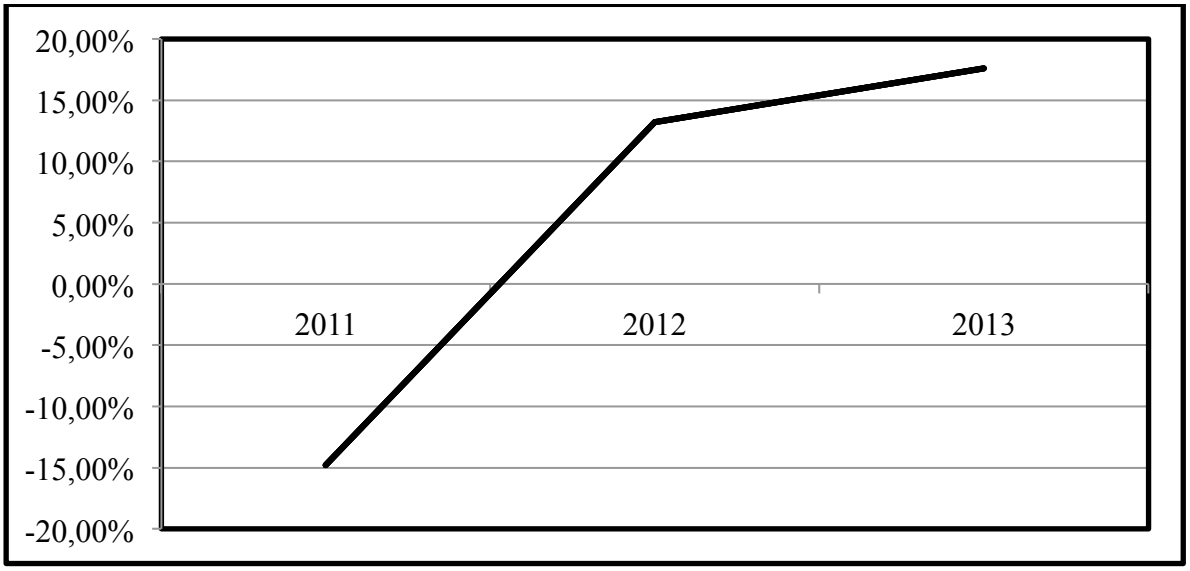
Graph no.1: Weekly performance of SPORO Global Equity Fund



Source: own processing from www.ass.sk

Now, we will look at the aggregated yearly performance of the SPORO Global Equity Fund.

Graph no.2: Yearly performance of SPORO Global Equity Fund



Source: own processing from www.amslsp.sk

Above is the yearly performance of the fund. In the year 2011 the annual return was negative at -14,80%; however a year after that, in 2012 it managed to get into black numbers and reach a return of 13,20%. Last year, in 2013 the fund even overcame the 2012 performance to reach an amazing return of 17,60%. Here is clearly illustrated the reason why majority of equity funds have higher levels of riskiness, as easily as the fund can out beat its own performance over a short period of time, it can also slip to the red numbers. This is also the reason why longer investment horizon is recommended. To show what was the average amount earned each year on the investment over the given period, three year, annualized total return has been calculated. It is a snapshot of the performance of the fund and it evens out the fluctuations to show how much on average (geometric average) has been earned annually.

$$ATR = [(1-0{,}148) \times (1+0{,}132) \times (1+0{,}176)]^{(1/3)} - 1$$

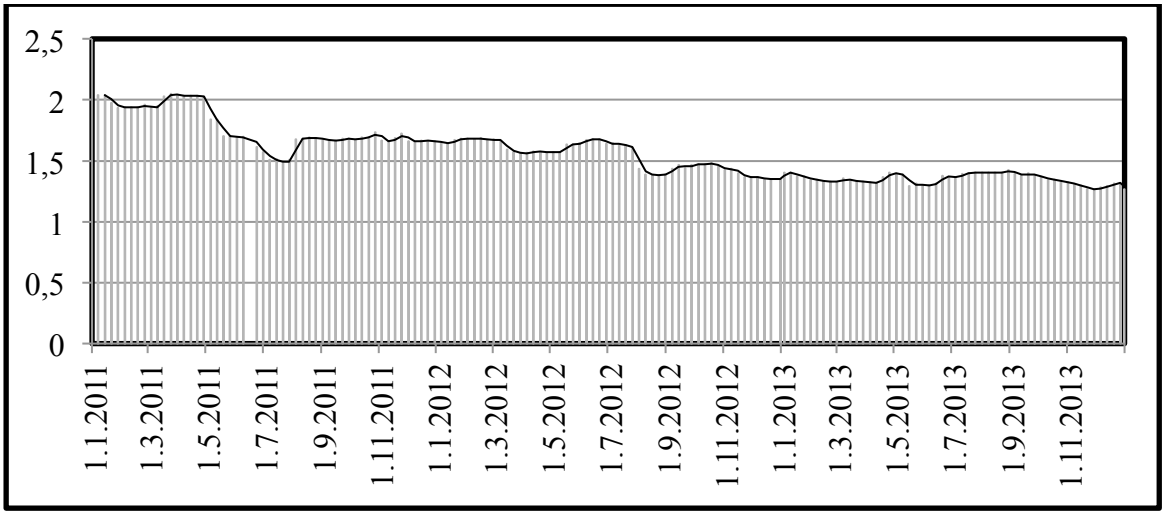
$$ATR = 4{,}29\% \text{ p.a.}$$

So if the fund would have the same return every year over the past three years, rather than fluctuating, the return would be 4,29% p.a.

4.3.2 Volatility

Now that the rates of return have been examined, one has to look at the risk of the investment into the fund in the form of volatility, for the purpose of the thesis. The volatility will be plotted on a column graph to show how the week-to-week volatility changes.

Graph no.3: Volatility of SPORO Global Equity Fund in %



Source: own processing from www.ass.sk

The graph shows how the volatility peaked during the year 2011, reaching more than 2% at some points, but then slowly decreasing to levels below 1,5% by the end of the year 2013. This measure of risk corresponds to the week-to-week performance graph above, as during the year 2011 the performance was oscillating from positive to negative much more and to a greater extent than during the other years, where there might have been a oscillation; however, not as extreme as during the first examined year. Overall the volatility is still quite high, which is in line with the level of risk tied to this fund and the nature of the fund, as equity funds tend to suffer from increased volatility and thus higher inborn risk. If it was by the work of the asset manager responsible for the stocks and other asset represented in the fund, or it was the work of the market movements, it is obvious that the volatility is getting lower and quite steady; however, as mentioned earlier the past performance is not enough to predict the future performance as economic predictions may as well swing the volatility into higher numbers in the years to come.

4.3.3 Sharpe ratio

To understand the interconnection between the performance and the levels of risk and to arrive at a conclusion whether the investor is properly compensated for the increased riskiness of the fund, Sharpe ratio has been calculated for each year separately and then overall for the whole period examined.

Table no.4: Sharpe ratio for SPORO Global Equity Fund

Year	**Sharpe ratio**
2011	-1,037
2012	-0,190
2013	0,117

Source: own processing from www.ass.sk

Obviously, it holds that the greater the number the better for the fund, as the increased riskiness is better compensated. In the case of SPORO Global Equity Fund, in the years 2011 and 2012 the Sharpe ratio was negative, which means that an investor holding this fund was basically doing worse than the investor holding a risk-free asset. Thus, the Sharpe ratio for the first two years can indicate that the high risk of the fund did not translate into higher returns and better performance, as a risk-free asset outperformed it. From the performance perspective, these results are understandable. The year 2011 had been disappointing for investors who invested into this fund and while the following year had been much better, it could not erase the immense loss; however, still managing to improve the Sharpe ratio to a number, while still negative, at least closer to zero. The year 2013, which was the most successful year out of the examined period for this fund, ended with a Sharpe ratio of 0,12. That represents a significant improvement over the three years and the only year in which it can be assumed that the fund did outperform risk-free assets and provided the investors with a compensation for the riskiness of the fund.

The average Sharpe ratio over the three years is -0,363. This means that over the three years, the investor have not been compensated for the level of risk by improved performance. However, this is only a snapshot of the performance of the fund; additionally, this supports the reason why the recommended period of holding the investment is at least five years. It takes some time for the oscillation in performance to even out and provide the investor with the promised benefits of better performance.

4.3.4 Treynor ratio

Another ranking ratio that was calculated for the three years was the Treynor ratio. It is similar to Sharpe ratio; however instead of total risk it takes into consideration beta of the portfolio. It compares the returns expected, or in this case already made, with the returns on riskless investment per unit of market risk and shows how the investor is compensated for volatility. The results were as follows.

Table no.5: Treynor ratio for SPORO Global Equity Fund

Year	Treynor ratio
2011	-0,17
2012	0,13
2013	0,18

Source: own processing from www.ass.sk

As was the case with the Sharpe ratio, the higher the Treynor ratio the better risk-adjusted returns a fund has. In the case of SPORO Global Equity Fund, the ratio was negative only in the year 2011. The fund recorded the best risk-adjusted performance in the year 2013, when the ratio got very close to 0,2. This means that in while in the year 2011 the fund was unable to perform better than the risk free investment, in the following years it managed to get in the positive reward-to-volatility numbers, so the investors were at least to some extent compensated for the volatility of the fund.

The average Treynor ratio for this fund was 0,047, which is positive and that means that overall the fund manager did a good job at rewarding the investor for volatility to at least some extent; however this result needs to be put into perspective by comparing it to the other funds and only then a judgment about the performance of the fund and the fund manager can be made.

4.4 ESPA Stock Global

The fund has been created on 16th September 1996 by ERSTE-SPARINVEST Kapitalnlagegesellschaft m.b.H., an Austrian management company that operates on Slovak market and it is a daughter company of ERSTE Group Bank AG. Majority of the assets are shares of companies as the name of the fund suggests. There is no geographical limitation so there can be shares of companies from developed countries as well as from emerging markets. There is also no limitation on the industry into which the capital is

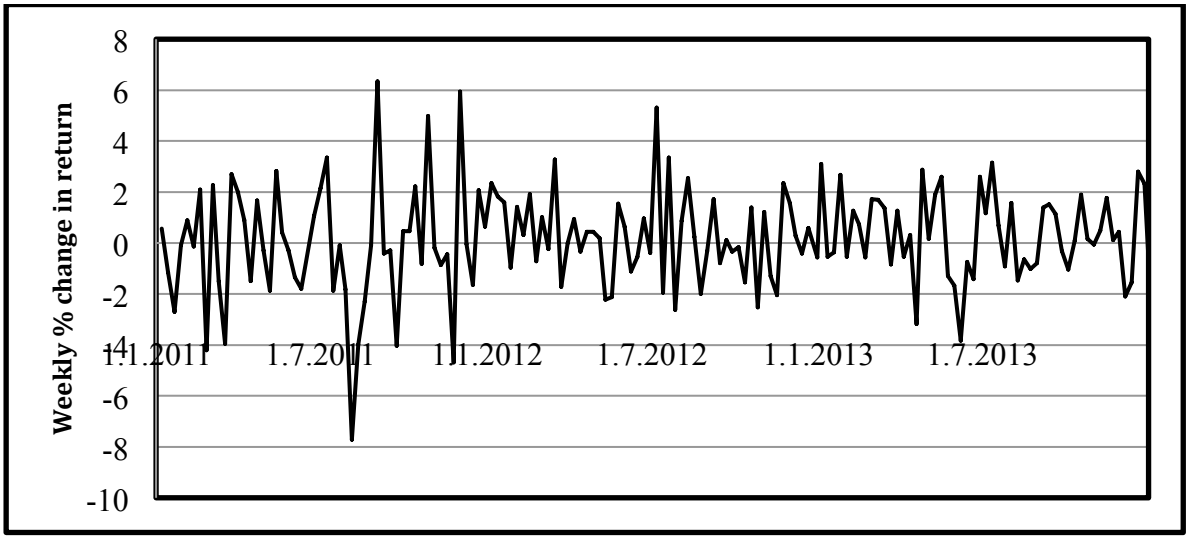
invested. The fund is said to contain between 80 to 150 stocks that are selected based on fundamental and technical analysis. The level of risk is slightly higher than that of the previous fund, scoring 6 on a scale 1 to 7. However, this is not untypical for equity funds, as shares are known to bear much higher level of risk than, for example, bonds. They are also more sensitive to market movements, but allow for higher potential returns for investors. The minimum period of time for which the investor is advised to keep the capital in the fund is 7 years due to higher risk.

The minimum investment is 500 EUR for new investor; for already existing customers of the asset management company the minimum value of a single investment is decreased to 150 EUR. Currently, the entry fee is 5,00% of the invested sum, while the exit fee is 0,00% at the moment. The non-existence of the exist fee can be justified by quite high entry fee; however even if the investor pays more to enter the fund, when leaving they have already forgotten about the initial fee and will feel like having benefit over other funds that do have the exit fee. The management and depository fee annually paid to the asset management company and the securities depository currently stands at 2,09% of the fund expenditure.

4.4.1 Performance

The weekly percentage changes in return are shown in the graph below. The time period being the same as in the case of previous fund, since 1st January 2011 until 31st December 2013.

Graph no. 4: Weekly performance of ESPA Stock Global

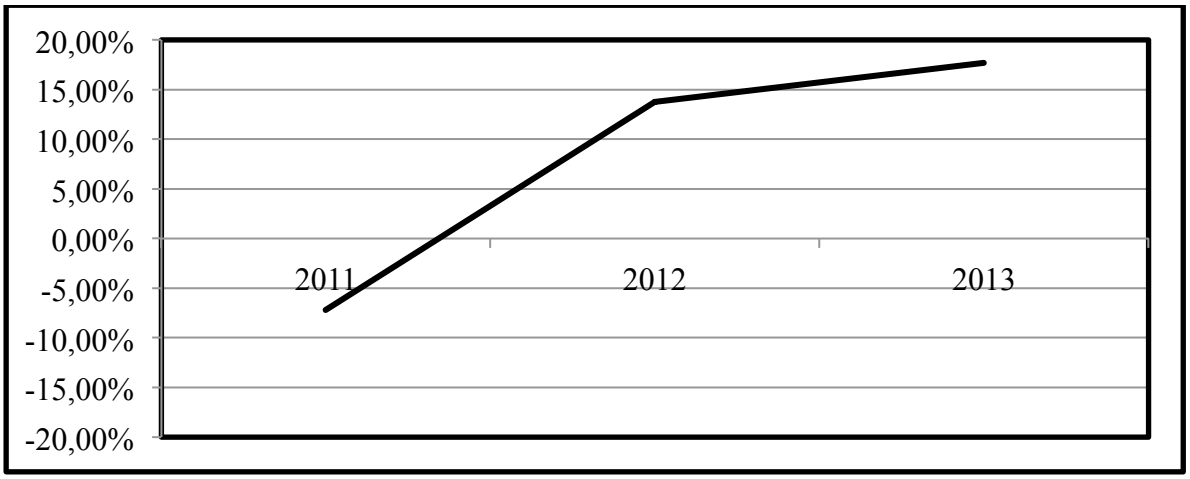


Source: own processing from www.ass.sk

As one can observe the frequent oscillation between increases and decreases of return is present as well, however it seems that it occurred more often as the graph seems thicker. Year 2011 seems to be a bad year so far for equity funds, as ESPA Stock Global was more often in the negative numbers than in positive that year. Over the two following year, the fund seem to be performing better.

Let us look at the graph of the yearly performance to confirm this hypothesis.

Graph no. 5: Yearly performance of ESPA Stock Global



Source: own processing from www.erste-am.sk

Yet again, the marking for the years is the same as in the previous graph. During the year 2011, the fund dropped to -7,21%; however in the subsequent year it shot to 13,75% and the trend continued during the year 2013, when the performance of the fund reached 17,69%. So far, the data is insinuating that the year 2011 has been disappointing for all equity funds.

The annualized total return has also been calculated for the data obtained from this fund, with following results.

$$ATR = [(1-0{,}0721) \times (1+0{,}1375) \times (1+0{,}1769)]^{(1/3)} - 1$$

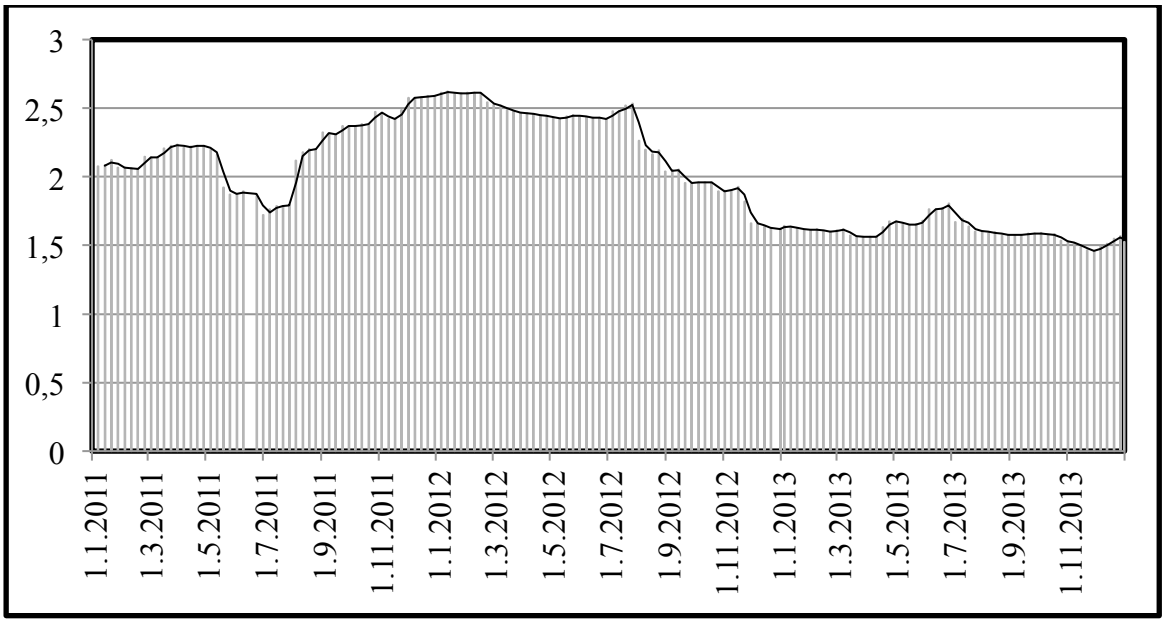
$$ATR = 7{,}50\% \text{ p.a.}$$

Thus, if the returns had been even over the three-year period, the fund's returns would have grown by 7,50% each year.

4.4.2 Volatility

After looking at the performance, the investor must look at the riskiness expressed in the form of volatility or standard deviation to see how much he can expect the rate of return to move from the average.

Graph no. 6: Volatility of ESPA Stock Global in %



Source: own processing from www.ass.sk

Unlike in the case of the first fund, here volatility seems to be higher in the second examined year, the year 2012. Since then, it seems to be slightly decreasing and keeping a steady level at around 1,5%. By looking at the performance during the year 2012, one can examine that while volatility has been higher the performance was also better. This suggests that while there may have been higher deviations from the average rate of return, they have been in the positive rather than negative direction. This is, of course, positive for the investor; however, it should not be considered to be a guarantee that if the volatility increases in the future the development will be similar.

4.4.3 Sharpe ratio

The ESPA Stock Global reached the levels of Sharpe ratio during each year of the examined period.

Table no.6: Sharpe ratio for ESPA Stock Global

Year	Sharpe ratio
2011	-0,708
2012	-0,133
2013	0,087

Source: own processing from www.ass.sk

A closer look at the Sharpe ratios shows that the fund struggled to compensate the investors for the natural risk associated with equity funds. In the case of the years 2011 and 2012, one can observe that if these were the only years in which the investor would hold the position in the fund, he or she would do better investing into risk-free assets for that period of time. Even though the rate of return for the year 2012 was in the positive numbers, it still could not outperform the risk-free rate because of the high volatility during that year, which brought the Sharpe ratio into negative numbers. The only year, out of the chosen period of time, which had the Sharpe ratio in the positive numbers, was the year 2013, when it reached a weak 0,087. It is a weak number, because the set riskiness of the fund is high and the investor would expect a higher compensation for this level of risk in terms of performance.

The average Sharpe ratio for this three-year period is -0,25. The number is negative due to the negative Sharpe ratio in two out of three years and a very low positive number in the third year. The asset managers definitely did think of the nature of the fund, as this is the reason why the recommended holding period for an investor is at least seven years. During that period the fund has a chance to make up for the bad performance and the asset managers have a chance to change the structure of the fund in a way, which would at the end bring more positive results for the investors.

4.4.4 Treynor ratio

As well as for the previous fund, the Sharpe ratio was also calculated for ESPA Stock Global. As will the table below show, the development of the ratio was very similar to the previous fund and it also corresponded with the overall yearly performance of the fund. Where the fund was deeply in negative numbers, the Treynor ratio was also negative and as the fund picked up its performance, the Treynor ratio improved as well.

Table no.7: Treynor ratio for ESPA Stock Global

Year	Treynor ratio
2011	-0,12
2012	0,18
2013	0,24

Source: own processing from www.ass.sk

Generally, the Treynor ratio of this fund is higher than the ratio of SPORO Global Equity Fund. The numbers by themselves do not tell investor anything, one has to compare them to other funds and use this ratio as well as Sharpe ratio as methods for establishing ranking among different funds. It holds that the higher the number the less risky and better managed a fund should be. In this case, the average for the three years is 0,1. It is a positive number, which is a good indicator, telling that the fund performed better than risk-free investment and it rewarded the investor for the increased volatility compared to the risk-free investment.

4.5 ČSOB Global Equities

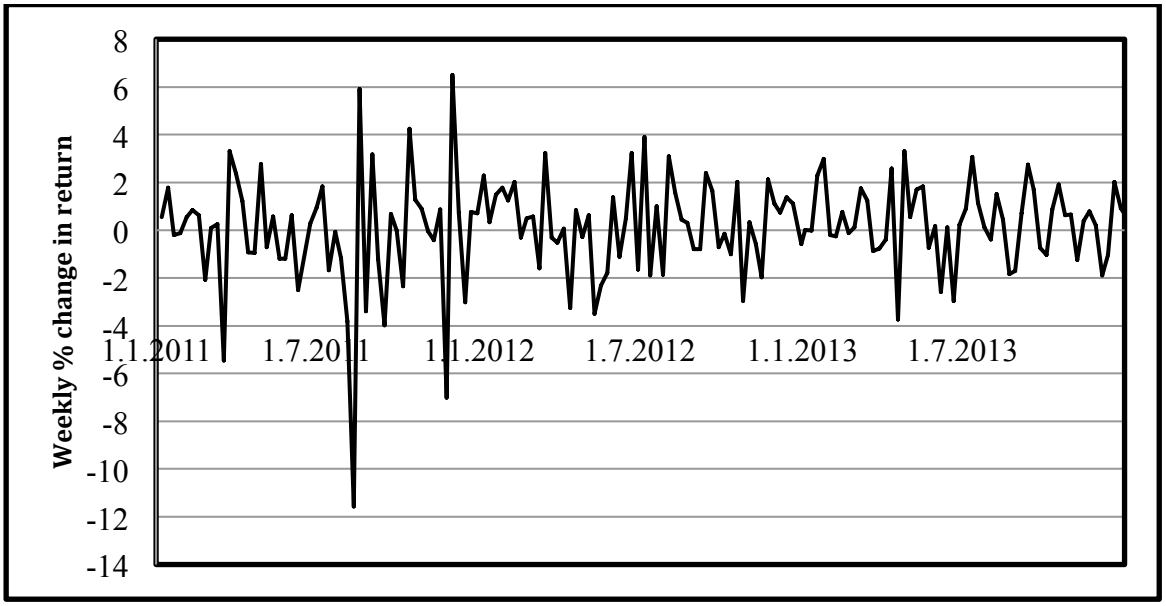
Since 1st October 2008, this equity fund is managed by ČSOB Asset Management, a.s., a Slovak asset management company. It is an equity fund, which invest in countries all around the world, including the United States, Europe, Japan and also emerging markets. The denomination as well as reference currency is EUR and the asset management company uses a certain portion of financial derivatives to manage foreign currency exposure. Real estate sector is also represented within the fund; however, the investment into it should not exceed 20% of the stock investment. The reason why the investment into real estate is quite high compared to the other funds, where real estate investments represent just minor per cent, is that at the end of October 2013 a ČSOB Real Estate fund ceased to exist and was integrated within the ČSOB Global Equities fund. This transfer of assets from one fund to another caused the equity fund to have a relatively large representation of real estate sector. The recommended investment horizon is at least 8 years, due to higher volatility of equity funds and the asset management company recommends this type of fund to more experienced investors who are looking for higher returns and not a mere store of value. Due to the equity nature of the fund, the risk level is currently set at 6 on a 1 to 7 scale, which means that the investor should expect higher risk tied to the investment into this fund.

The minimum investment is 150 EUR, so less than the one required for SPORO Global Equity Fund. The entry fee is maximum 3,00% of the sum invested and there is no exit fee. The fee for management services and depository, which is paid every year, is currently 2,43% and is calculated out of the expenditures of the fund for the previous year. This fund seems to have an advantage, when it comes to fees, compared to the other funds as there is no exit fee unlike in the case of SPORO Global Equity Fund, while the entry fee is at the same level as SPORO and lower by 2% than in case of ESPA Stock Global. The management fee is a bit higher, though.

4.5.1 Performance

Performance during a three-year period, since 1st January 2011 until 31st December 2013 is shown below; the y-axis has a wider spread since the changes were more extreme.

Graph no.7: Weekly performance of ČSOB Global Equities

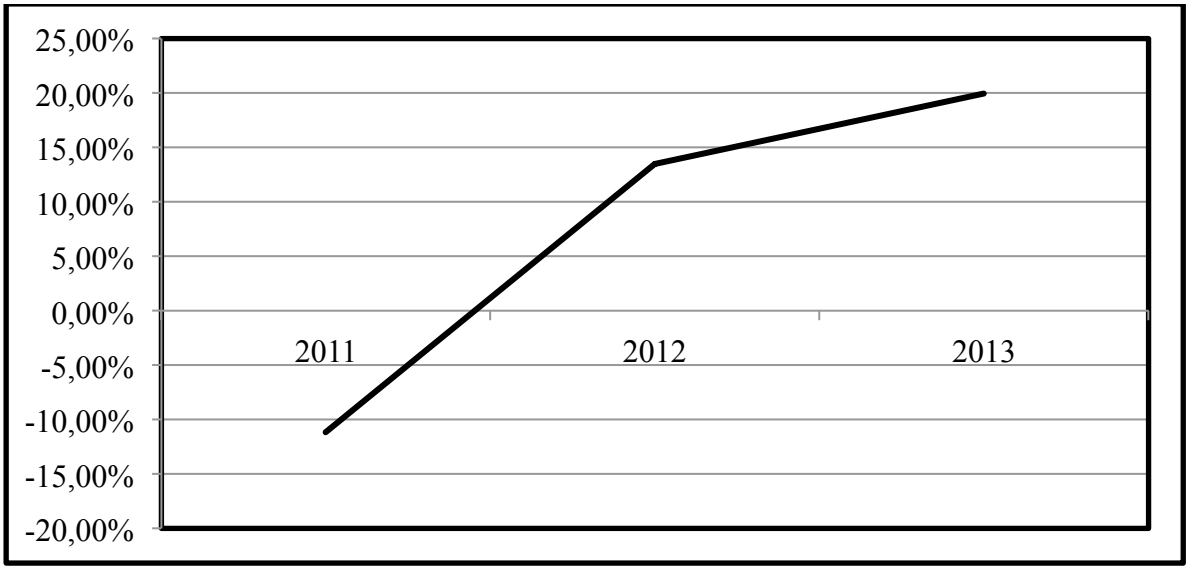


Source: own processing from www.ass.sk

The graph, as in the case of the two previous funds, depicts the weekly percentage changes in performance of the fund. Yet again, the data from the year 2011 are much more volatile than later on and go deeper to the negative change than has been the case before. The large fluctuations seem to stabilize as the fund move to the years 2012 and 2013.

To support the observations a yearly performance has been plotted on a graph, which is shown below.

Graph no.8: Yearly performance of ČSOB Global Equities



Source: own processing from www.csobinvesticie.sk

In the year 2011, the fund's performance had been at the lowest from the three years observed as it reached -11,19%. Very similarly to the other two funds, its performance than significantly improved and the performance reached 13,50% and 19,95% in the years 2012 and 2013 respectively.

The annualized total return has been calculated and the results are as follows:

$$ATR = [(1-0{,}1119) \times (1+0{,}135) \times (1+0{,}1995)]^{(1/3)} - 1$$

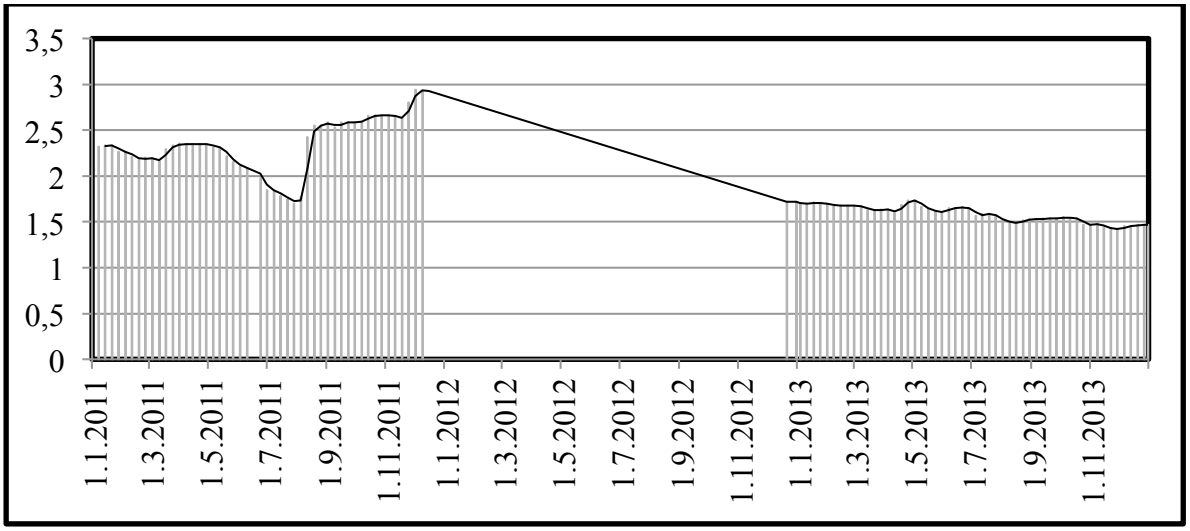
$$ATR = 6{,}53\% \text{ p.a.}$$

Thus, if the investor were to get the same performance in percentage a year over the three years, the amount would equal to 6,53% p.a.

4.5.2 Volatility

Once the performance has been evaluated and examined, the investor needs to look at the other side and examine the riskiness in the form of volatility. That will give the investor a better overview of the extremes, into which the fund went during the monitored period. This is how the fund's volatility developed over the three-year period.

Graph no. 9: Volatility of ČSOB Global Equities in %



Source: own processing from www.ass.sk

The above graph shows the week-to-week development of volatility of the fund. The problem is that since the end of the year 2011 until the end of the year 2012, the fund's asset management company did not provide the Slovak association of asset management companies with the percentage changes in volatility. According to the rules of delivery and publication of information on mutual funds and assets of individual portfolios and the rules for calculating and reporting performance of funds, the asset management company is not required to supply the Association with the weekly volatility data. Additionally, the latter rules also do not specify the method for calculation of volatility that is why we cannot reliably calculate the potential volatility for the missing year. That is why we cannot assume how the volatility developed during that year. It is clearly visible that during the year 2011 the volatility managed to jump from approximately 2, 25% to almost 3% at the end of the year, when the data stopped to be provided. It can be assumed that the reason could be that the asset managers were making some changes to the structure of the fund in order to bring the volatility down. Whatever had been done to the fund clearly worked as the year 2013 was characterised by slightly decreasing volatility at the levels comparable to the other two funds – around 1,5%. The year 2011 had the worst performance out of the three years and the results for volatility show that the oscillation around the mean had been ever-changing while reaching quite high numbers, as mentioned previously. The year 2013 provided the best performance and the fund also managed to tame the volatility; however it is unknown whether this was due to more stable and

improved performance of the assets or due to the work of asset managers regarding the fund's structure.

4.5.3 Sharpe ratio

To compare the returns to the levels of risk, Sharpe ratio has been calculated to provide overview over the period as well as to show the average ratio over the period. Unfortunately, due to the lack of data for the year 2012, the Sharpe ratio was calculated only for the years 2011 and 2013 as only two pieces of data were reported for 2012.

Table no.8: Sharpe ratio for ČSOB Global Equities

Year	**Sharpe ratio**
2011	-0,710
2012	-
2013	0,078

Source: own processing from www.ass.sk

As was the case for the other two funds, the Sharpe ratio for the year 2011 is negative, which indicates better return/risk performance of investment into risk-free assets. This is consistent with the rate of return for that year as well as with the volatility rates. We are not able to compare the results for the year 2012 because of the aforementioned reasons. However if we look at the year 2013, which reached positive Sharpe ratio, even though quite low, it can be assumed that the development of the Sharpe ratio during the year 2012 was very similar to the other funds; thus that the number is negative and closer to zero. The average, calculated from the available data is -0,315. Yet again, the movements of the Sharpe ratio indicate that if the investment period of an investor was three years, he or she should have invested into risk-free assets, as the high-risk level of this fund did not materialize into correspondingly higher rate of return. The recommended holding period for this fund is the highest out of the three funds examined, at least eight years. That shows that the asset managers are aware of the directions the fund's performance and volatility may take it and that it takes at least that number of years for the investor to arrive at a substantially higher benefits than those offered by risk-free assets, such as government bonds for example.

4.5.4 Treynor ratio

The Treynor ratio was also calculated for this fund, in order to then rank and compares them. As in the case of the previous two funds, the movement of the ratio corresponds with the movement of return, as it dips to negative numbers as the return goes down and then improves as the return improves as well. Because in this case, the ratio is calculated using beta, rather than standard deviation or volatility, we were able to calculate the Treynor ratio even for the year 2012.

Table no.9: Treynor ratio for ČSOB Global Equities

Year	**Treynor ratio**
2011	-0,14
2012	0,14
2013	0,22

Source: own processing from www.ass.sk

The average Treynor ratio for this fund is 0,073. It is a positive number, which as has been explained is a good sign on its own, but further comparison to other funds is necessary. The performance of the fund according to this ratio seems to be somewhere in the middle of the other two funds.

4.6 Limitations of the research

The first limitation of this research is dealing with statistical data provided to the Slovak association of asset management companies by third parties, the asset management companies themselves. We are not able to, in any way, confirm the validity of the provided information. In the case of ČSOB Global Equities, the data for volatility were missing for one year, which also put a constraint on the research.

The previous case of missing data is linked to another limitation of this particular research. The Slovak association of asset management companies provides its members with a set of rules on how to dispatch the data they require for their weekly reports. However, volatility is not on the list of required information. The Association also fails to provide the asset management companies with the formulas required to report the data. That means that some of the results and information provided to investors by the Association may be skewed, as the asset management companies were using different formulas, which take into consideration different factors. This can lead to negative

impacts, as the data from different management companies would be incomparable. The only formula for calculations that the Association dictates for its members is the one for return of the fund.

Additionally, even the methods used in the practical part, during the evaluation of the performance of the funds have their limitations. Some of the limitations of the use of the Sharpe ratio include the fact that it deals with volatility in the same manner and the assets with high volatility are automatically considered to be inferior to the ones, which have lower volatility and thus higher Sharpe ratio. However, some investors may be looking for exactly those assets that have high volatility and thus can potentially be more rewarding for them. Additional limitation is that the Sharpe ratio of a fund on its own does not say anything, it has to be compared to other funds' Sharpe ratios and can be used for ranking.

The second ratio used, which also has its limitation, is the Treynor ratio. Unlike Sharpe ratio, it does not measure total risk, but only systematic risk (expressed by beta). The total risk includes systematic risk but also adds unsystematic risk, which can be diversified or mitigated. Additionally, the compared portfolios must be similar in terms of composition and types of assets, as if not it can lead to skewed results. As mentioned in Sharpe ratio limitation, the Treynor ratio also suffers from the fact that its informative value is limited on its own. It has to be put into perspective with Treynor ratios of other funds in order to tell us, which are better than the others.

One also has to consider the validity of the past results in terms of guarantees of future performance. The research shows, how the funds developed over the past three years in the economic and political conditions affecting the performance, which were valid only for that time. That is why investors cannot consider the historical data and past performance to be an indicator of future performance. The investor needs to consider the current economic and political conditions and factors, which have the potential of influencing the performance of the fund in the future. The historical performance should not be neglected, as it allows the investor to get insight into the fund, how it reacts to different factors and events, how it moves in relation to the market and it provides a starting point for future predictions (while keeping in mind the current and potential future economic conditions).

4.7 Comparison of the funds

Firstly, the funds' annualized total return will be compared. SPORO Global Equity Fund reached ATR of 4,29% p.a., the ESPA Stock Global had 7,50% p.a., while ČSOB Global Equities stands at 6,53% p.a.. Thus, over the observed period of three years, ESPA Stock Global managed to have the highest annualized total return. It means that even though the fund started in the negative number, because the holding period was three years the investor gained 7,50% yearly over that period. In terms of annualized total return, the fund with the second highest value is the ČSOB Global Equities and the third highest value is that of SPORO Global Equity Fund.

Because the annualized total return does not take into consideration the volatility of the funds, we have to compare it separately. All of the funds' volatilities seem to have a decreasing tendency over the three years, while staying somewhat steady in the last year, the year 2013. The values at the end of the last year were all around 1,5%, which is an understandable value for equity funds that tend to have a higher volatility because of the fact that majority of the underlying assets is invested into stocks. We cannot conclude, which fund performed best according to volatility as it depends on several factors. It depends on the investor and his or her willingness to bear higher volatility if he or she requires higher returns, which is tied to the increased riskiness of the fund. As the returns could potentially be higher than for funds with lower volatility, it also means that the losses can be greater.

The third factor, based on which the funds are compared is the Sharpe ratio. It allows us to rank the funds based on the values of this ratio. For all three funds the average Sharpe ratio has been negative for the observed period of three years. As mentioned, the risk-free rate used has been 3M EURIBOR. The results basically mean that an investment into risk-free asset would have a better performance than the three funds. If we compare them between one another, the best performing was the ESPA Stocks Global fund with Sharpe ratio equal to -0,25. The second best performing was the ČSOB Global Equities fund, which Sharpe ratio is equal to -0,315. The last of these three funds, SPORO Global Equity Fund, managed to reach Sharpe ratio of -0,366.

Another ratio, which we use for comparison purposes, is the Treynor ratio, which allows us to rank the funds based on their performance as well. It holds that the higher the ratio the better. Out of the three funds, the ESPA Stock Global has had the highest Treynor ratio equal to 0,1. The second highest value, out of these funds, is belonging to the ČSOB

Global Equities fund – 0,073, and the third and lowest value belongs to SPORO Global Equity Fund as it reached 0,047. It seems, so far, that the best performing fund has been the ESPA Stock Global; however, the fees associated to the investment need to be considered as well.

In the table below, there is a comparison of the three funds based on their entry and exit fees, and the fees for management and depository services, which are paid annually and are subtracted from the investment account of the investor. The management and depository fee is the trickiest one as it is hidden, because the investor does not directly pay it and the return the investor receives is already cleaned of this fee. This fee is calculated out of the expenditures of the fund and thus it is not tied to the amount of investment itself.

Table no.10: Comparison of fees

Fees	**SPORO Global Equity Fund**	**ESPA Stock Global**	**ČSOB Global Equities**
Entry	Max. 3%	Max. 5%	Max. 3%
Management and depository	1,48%	2,09%	2,43%
Exit	Max. 1,8%	0%	0%

Source: own processing from www.amslsp.sk, www.erste-am.sk, www.csobinvesticie.sk

Based on these numbers, and assuming that the expenditures from which the management and depository fees were calculated were the same for the three funds, it is obvious that the fund, which performed the best in terms of returns and ratios, seems to have the highest fee burden on the investor. On the other hand, the ČSOB Global Equities fund seems to burden the investor with the fees the least. It is also a plus point from the investor that there is no exit fee for that fund. Because the management and depository fee is, in a way, hidden and there is no exit fee, the investor may feel as though there is only the entry fee, which he has to pay. To compare it with the SPORO Global Equity Fund, there the investor can be discouraged from investing as he may feel that he will pay more to the asset management company because of the exit fee. The problem with the exit fee is that the investor will remember that he had to pay an extra just to exit the fund and will in the future probably choose a different asset management company, which does not have this fee, even though the management and depository fee of the other asset management company might be higher. That is why the clear winner in terms of fees is the ČSOB

Global Equities fund. It is challenging to decide, which fund should occupy the second and third place. Even though the SPORO Global Equity Fund will present a lower fee burden on the investor than ESPA Stock Global, in the case of the same expenditures from which management and depository fee is calculated, the existence of the exit fee may place it on the third place based on a subjective opinion of an investor.

The choice of the best fund would largely depend on the type of investor, who is seeking and investment into equity funds. It is undeniable that the ESPA Stock Global performed the best out of the three funds; however, the structure and amount of fees tied to that fund may discourage and investor from investing into this fund. A risk-averse investor would probably not choose equity funds for investment, because these types of funds are more volatile than, for example, bond funds, which is due to them containing high portion of volatile instruments such as stocks. Bonds have much lower volatility and are generally more stable, so they may be a good option for a risk-averse investor. However, if the investor decides to invest into equity funds, he or she is most likely willing to bear a certain amount of risk. It is up to an asset manager of that particular investor to find out how much is the investor willing to risk and to spot the difference between the risk an investor claims he or she can bear and the risk he or she really can bear. The difference is important because claiming to be able to bear a 10% loss is not the same as actually bearing a 10% loss. The choice of the best fund out of the selection is between ESPA Global Stocks and ČSOB Global Equities funds. The performance of the ČSOB fund comes second in all measured factors; however it has the benefit of the best fee structure that may attract an investor. The best fund in terms of performance is definitely the ESPA Stock Global; however the investor must consider not only the entry and exit fees but also the management and depository fees.

Conclusion

The main aim of this thesis was to analyse the weekly data obtained from the Slovak association of asset management companies and acquaint a potential investor with ways how to compare different funds and be able to make decisions for him or herself. Firstly, theoretical background has been presented to understand the underlying principles of portfolio performance measurement and the many ways in which the factors such as risk or return can be calculated. The practical part simulated a decision-making process between three funds selected based on pre-determined criteria based on a number of factors and ratios. However, it is impossible to give a clear advice of the fund to invest in, because of the necessity to know the investment profile of the potential investor who wants to commit his financial resources.

The ability of an investor to be able to distinguish between the good and the bad fund and to be able to understand the measures of performance is inestimable. These are the profound skills that will enable an investor to understand investment decisions and will enable him or her to be a partner in discussion with an asset manager or bank worker rather than just a listener. Especially beginners to the investment process need to acquaint themselves with at least basics of performance measuring and evaluation, as they cannot rely on asset managers or workers in a bank, who are in many cases pushed by unrealistically set sales objectives. It is not uncommon that a bank has an objective to sell a certain amount of a single type of fund in a month, because the fund is not selling well. That means that the employee of the bank will offer the same type of fund regardless of the person sitting across from him or her just to fulfil the pre-set quota, as bonuses are handed out based on the fulfilment. However, professional asset managers, as those working for asset management companies overseeing the funds introduced in the thesis, are more likely to be able and capable of tailoring the choice of fund based on the investment profile of the potential investor. The investment profile includes the attitude of the investor towards risk, required rate of return, investment horizon, as well as personal details about the investor. However, the investor should be able to understand why the asset manager suggests a certain fund and should be able, for his or her own benefit, to analyse and decide whether it is a good choice or not. The reason for this is simple, the invested money belong to the investor not the asset manager, and even though the manager should invest the money responsibly, one should always know whether it is a good decision or not.

As mentioned during the comparison of funds, not all funds are suitable for all investors. If the investor wants the invested money back in less than five years, equity funds are not a good option, as they usually recommend at least a five-year holding period for the fund to fulfil promised higher returns. It is understandable as higher volatility of these types of funds causes them to require longer holding period for the fluctuations to balance out. Additionally, equity funds may not be suitable for risk-averse investors, as was already mentioned, and for beginner investors as well. Beginner investors are usually just starting to test the market and are unwilling to commit to higher amount of risk, even though it could potentially bring higher returns, for a long period of time. They are willing to gain less in return for lower level of risk of that particular investment. However, it is important to note that even though equity funds belong to the riskier type of funds, because of their composition and professional management they are less risky than if the investor decided to invest in stocks on his or her own.

There is an immense offer of funds on the market and with the increasingly globalized world the investors do not have to only invest in their own country but are able to invest also abroad. There is a fund or investment opportunity for every type of investor and investing becomes more popular among the general public as well. People realize that storing their money in the bank is not going to provide them with any significant return and that term deposits are struggling to sustain the value of deposited money, as their returns in some cases do not even match the inflation rate, depending on the number of months an interest is fixed for. Investing can prove to be a great tool for people to appreciate their money and save for the future. Mutual fund investment is, for example, used in the third pillar of the pension scheme in Slovakia, where people are given the opportunity to save for their pensions outside of the state system. The supplementary pension companies usually offer a range of funds that suit people in different stages of their working life – from growth fund, which invests mainly in stocks, to conservative fund, which invests into government bonds to secure the value of the amount already made.

Resume

Investovanie zdrojov, akýmkoľvek spôsobom, automaticky vyvoláva otázky ohľadom potenciálnych výnosov. Ľudia sú zväčša neochotní investovať do niečoho, z čoho nebudú benefitovať. Preto je potrebné možné potenciálne výnosy vopred zvážiť. Pri investovaní do inštrumentov finančných trhov je preto potrebná analýza výkonnosti ešte pred samotnou investíciou. Je logické, že preferované budú investície alebo inštrumenty, kde nákladovosť investície bude nižšia ako výnos. Z tohto dôvodu investori používajú rôzne metódy hodnotenia výkonnosti portfólii, ktoré merajú prospešnosť a benefity v porovnaní s nákladmi spojenými s investovaním. Dôležité je nielen meranie výkonnosti ale aj schopnosť týmto výsledkom porozumieť a rozlíšiť, kedy sa jedná o dobrý výkon fondu a kedy nie, pretože iba výnosy možnosť reálneho zhodnotenia neumožňujú.

V dnešnej dobe sa investovanie stáva populárne aj medzi bežnými ľuďmi, najmä investovanie do podielových fondov sa stáva populárnym aj medzi tými, ktorí nemajú žiadnu skúsenosť. Informácie sú ľahko dostupné a prístupnosť sa vďaka globalizácii ešte zvyšuje. Preto sa ustupuje od vkladania peňazí do bánk, kde napríklad výnosy termínovaných vkladov rapídne klesajú a často majú problém udržať krok s infláciou, teda s udržaním hodnoty vkladu.

Napriek tomu, že investori do podielových fondov investujú cez správcovské spoločnosti, ktoré zamestnávajú vyškolených manažérov schopných poradiť každému typu investora, aj amatérski investori by mali byť schopní zvážiť a zhodnotiť úspešnosť portfólia aspoň na základnej úrovni.

Trh je považovaný za efektívny pokiaľ odzrkadľuje všetky informácie dostupné investorom. To znamená, že by nebolo možné dosiahnuť nadpriemerné výnosy a aj náhodne zostavené portfólio by dosiahlo podobné výnosy ako portfólio pozostávajúce zo starostlivo vybraných aktív. Cenové pohyby dnes závisia len od informácii dostupných dnes a to isté platí pre zajtrajšie ceny, preto je možné tvrdiť, že vývoj cien nezávislý. Úlohou manažérov je vytvoriť diverzifikované portfólio s úrovňou rizika atraktívnou pre potenciálnych investorov.

Pasívni manažéri porfólii sa snažia za každú cenu prispôsobiť porovnávaciemu portfóliu - benchmarku, ktoré je vybrané predom. Úspešnosť tohto typu manažéra je meraná podľa schopnosti kopírovať vývoj benchmarku, pretože veria, že nie je možné dosiahnuť nadpriemerné výnosy, lebo trh je efektívny. Veľký dôraz je kladený na výber aktív za použitia techniky indexovania. Aktíva nie sú často obchodované a vymieňané,

manažéri veria že dlhodobá nestálosť (volatilita) trhových cien vyrovná výnosy so stratami a portfólio dospeje k férovému výsledku.

Na druhej strane, aktívni manažéri nebudú spokojní s priemernými, trhovými výsledkami. Neustála snaha poraziť trh vedie k výberu rizikovejších aktív, ktoré majú zároveň aj vysokú likviditu, aby sa s nimi dalo obchodovať v prípadoch, že bude potrené zloženie portfólia upraviť. Na rozdiel od pasívnych manažérov, aktívni manažéri veria, že trhy efektívne nie sú a preto je možné dosiahnuť nadpriemerné výnosy.

Najväčšou výhodou pasívnych manažérov je nákladovosť investovania, ktorá je nízka, pretože sa počas doby investície portfólio zväčša nemení. Riziko takejto investície je takisto nižšie, pretože časté obchodovanie a menenie zloženia portfólia vystavuje investora omnoho väčšiemu riziku. Hrozí zlý výber aktív, ktorý je pri pasívnych manažéroch eliminovaný ich snahou odzrkadľovať benchmark. Je potrebné dodať, že trh podlieha istým anomáliám, ktoré redukujú efektívnosť trhu a ponúkajú investorom možnosti poraziť trh. Na trhu sú potrebné oba typy manažérov, pretože vytvárajú rovnovážne prostredie, ktoré ponúka možnosti a výzvy pre oboch.

Táto diplomová práca sa zameriava predovšetkým na akciové fondy. Patria medzi riskantnejšie možnosti investovania, hlavne vďaka ich zameraniu na akcie, ktoré tvoria vždy minimálne dve tretiny investovaného kapitálu. Kvôli vysokej volatilite and krátkodobým výkyvom sú vhodné skôr pre skúsenejších investorov ochotných akceptovať vyššie riziko. Toto riziko je kompenzované potenciálne vyšším výnosom, avšak iba pri dlhšej dobe investície, odporúčaných je aspoň päť až sedem rokov. Ako nástroj diverzifikácie používajú investície do rôznych odvetví, prípadne geografických lokalít. Čím špecializovanejší a užšie zameraný fond, tým vyššie riziko ale aj potenciálny výnos. Akciové fondy sú ovplyvnené aj vyplácaním dividend, ktoré má vplyv na hodnotu majetku. Vyplácanie dividend znižuje hodnotu majetku čím sa znižuje aj imanie. To spôsobuje, že cena akcií je volatilnejšia ako cena dlhopisov. Okrem akciových fondov existujú aj fondy dlhopisové, zmiešané, realitné, komoditné a zastrešujúce, medzi inými.

Pri hodnotení výkonnosti je potrebné výsledky s niečím porovnať. Výnosy ako také neprezradia či sa fondu darí alebo nie. Pre tento účel sa používajú už spomínané benchmarky. Existuje veľa spôsobov na výpočet výnosu, prípadne na výpočet pomerov, ktoré zohľadňujú výnos. Výnosy sa môžu vypočítať spätne, dajú sa predpovedať ako očakávané výnosy. Faktory, ktoré vplývajú na výnosy sa menia, preto historické dáta musia byť zvážené ale nesmie sa na ne spoliehať pri predpovedi do budúcna.

Jedným z pomerov, ktorý zohľadňuje výnos, je Sharpov pomer. Ide o mieru nadvýnosu v prepočte na jednotku rizika, vyjadreného volatilitou. Počíta sa nasledovne:

$$SR_P = \frac{E(r_P) - r_F}{\sigma(r_P)}$$

Kde: $E(r_P)$ = očakávaný výnos

$\sigma(r_P)$ = štandardná odchýlka

r_F = bezriziková sadzba

Pokiaľ je Sharpov pomer portfólia vyšší ako benchmarku, portfólio má lepšiu výkonnosť. Ponúka retrospektívny pohľad na výkonnosť portfólia a umožňuje, pri hodnotení viacerých portfólii, ich zoradenie podľa výsledkov.

Druhým používaným pomerom je Treynorov pomer, ktorý meria výnosy presahujúce bezrizikovú výnosnosť na jednotku systémového rizika. Narozdiel od Sharpovho pomeru, ktoré zohľadňuje celkové riziko, Treynorov pomer zohľadňuje len trhové riziko. Počíta sa nasledovne:

$$T_P = \frac{E(r_P) - r_F}{\beta_P}$$

Kde: β_P = beta portfólia

Čítanie výsledkov Treynorovho pomeru je veľmi podobné ako pri Sharpovom pomere, čím vyšší výsledok, tým lepšia výkonnosť.

Riziko pri aktívach a cenných papieroch môže spočívať v nečakaných zmenách výmenných kurzov, zmenách trhových podmienok a dopytu, ekonomickej kríze alebo v bankrote spoločnosti emitujúcej cenné papiere, okrem iného. Manažéri portfólii musia prijať určitú úroveň rizika, aby boli schopní naplniť očakávania klientov ohľadom výnosov. Riziko môže byť vyjadrené štandardnou odchýlkou očakávaných výnosov ale aj ako beta koeficient portfólia.

Štandardná odchýlka sa počíta nasledovne:

$$\sigma = \sqrt{\sigma^2} = \sqrt{\frac{\sum_{i=1}^{i=n} (r_i - \bar{r})^2}{n}}$$

Kde: r_i = výnos za i mesiacov

$\bar{r}$ = priemerný výnos

n = obdobie

Pričom platí, že čím vyššia štandardná odchýlka tým vyššia volatilita a tým pádom aj vyššie riziko.

Beta meria systematické riziko a počíta sa nasledovne:

$$\beta = \frac{\text{Covariance } (r_{P,} r_F)}{\text{Variance } (r_F)}$$

Kde: r_P = výnos portfólia

Hlavným cieľom diplomovej práce je vybrať najlepší podielový fond vybraných fondov. Všetky vybrané fondy budú hodnotené na základe rôznych metód meranie výkonnosti portfólia. Výsledky takejto analýzy nám pomôžu sa dostať k výsledku. Dáta použité na výpočty sú získané zo Slovenskej asociácie správcovských spoločností vo forme týždenných výkazov od 1. Januára 2011 do 31. Decembra 2013. Výpočty sa zakladajú na výsledkoch troch akciových fondov a boli spracované z údajov uvedených v Prílohe I.

Niektoré zo získaných dát sú nekonzistentné. Napríklad fond ČSOB nevykazoval hodnoty volatility od konca decembra 2011 až do konca Decembra 2012, pre nezistené dôvody. Na výpočty boli použité týždenné a ročné výnosy, ročný celkový výnos, volatilita, Sharpov pomer, ktorý používa 3-mesašný EURIBOR ako bezrizikovú sadzbu a volatilitu a Treynorov pomer, ktorý na výpočet, okrem 3-mesačného EURIBORu, používa beta koeficient.

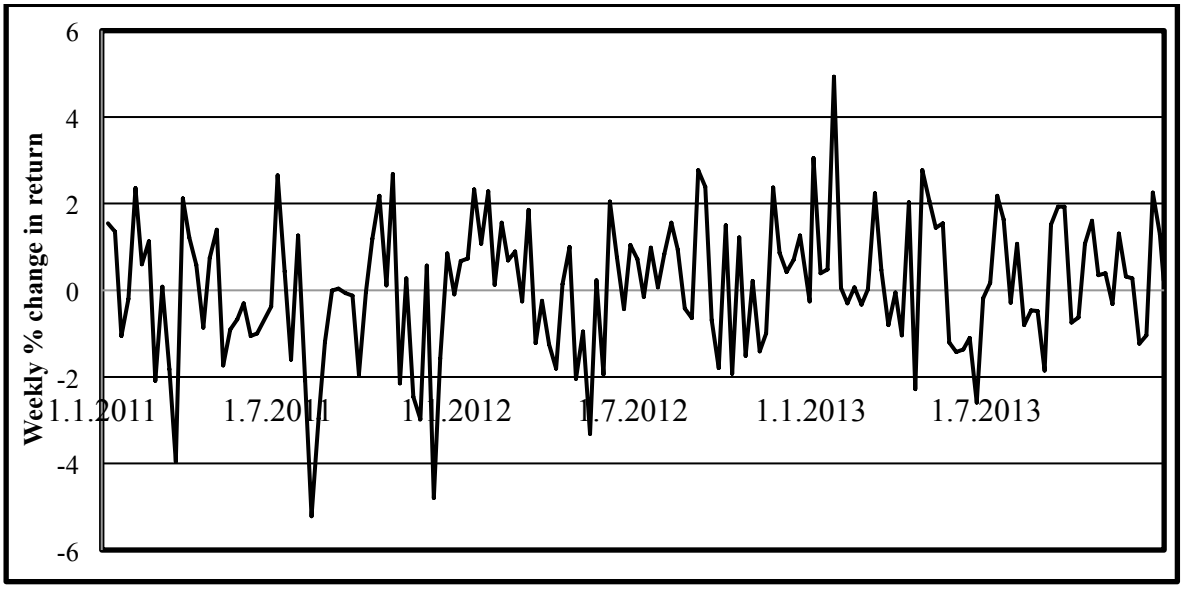
Kritéria výberu fondov boli nasledovné:

- Mena
- Typ fondu
- Geografická lokalita
- Typy spoločností vo fonde

Finálna voľba berie do úvahy euro ako denominačnú menu fondu, akciový fond ako typ fondu, globálne zameranie a fond nezameraný na niektoré z odvetví. Vybrané fondy, ktoré spĺňajú tieto kritéria sú:

- SPORO Globálny akciový fond
- ESPA Stock Global
- ČSOB Svetová akciový o.p.f.

SPORO Globálny akciový fond je ponúkaný správcovskou spoločnosťou Slovenskej sporiteľne. Týždenná výkonnosť počas sledovanej periódy sa nachádza na nasledujúcom grafe.



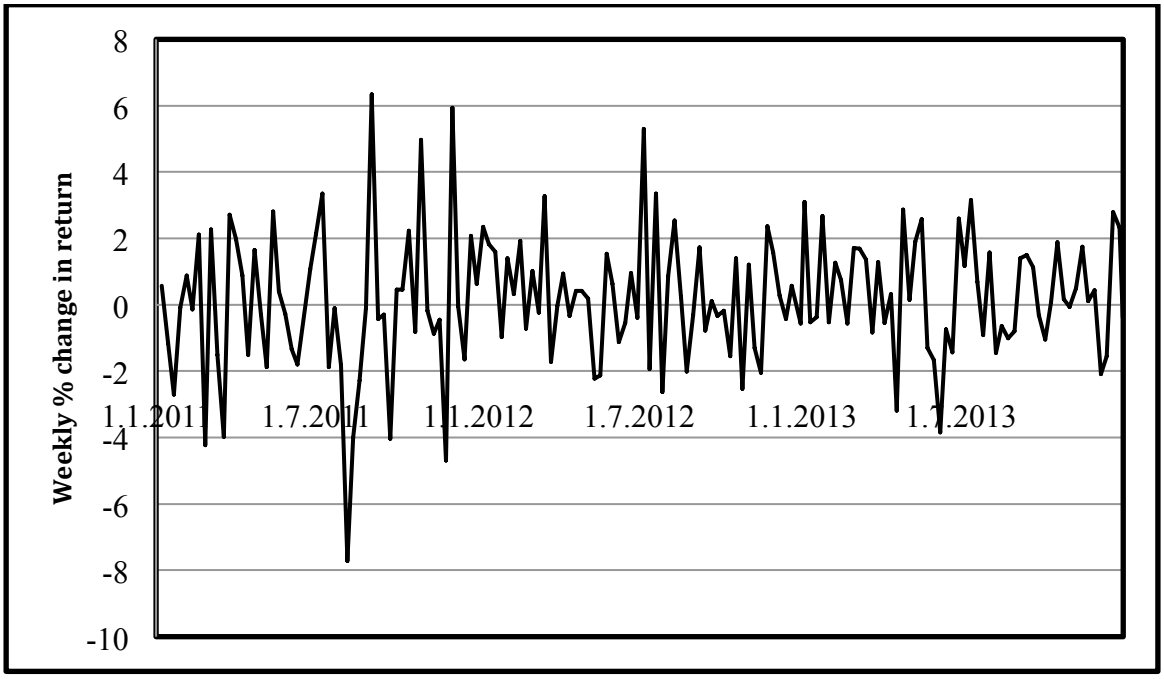
Zdroj: vlastné spracovanie z www.ass.sk

V roku 2011 bol ročný výnos -14,80%, rok po tom, v 2012 sa výnos dostal naspäť do čiernych čísel na úroveň 13,20% a v roku 2013 prekonal predošlý rok a dosiahol 17,60%. Toto dokazuje, že akciové fondy sú ovplyvnené vyššou volatilitou, pretože je jednoduché sa dostať zo straty do dvojciferného výnosu. Ročný celkový výnos dosiahol 4,29% p.a.

Volatilita bola najvyššia v roku 2011, na niektorých miestach presahovala 2%, ale potom postupne klesala na úroveň pod 1,5% na konci roku 2013. Toto korešponduje s týždennými údajmi výkonnosti, keď v roku 2011 bola na vrchole nielen volatilita ale aj rozsah oscilácie výkonnosti.

Priemerný Sharpov pomer za sledované tri roky dosiahol -0,363. To znamená, že fond nedokázal za túto dobu kompenzovať vysoké riziko adekvátnym výnosom, pretože bezriziková investícia mala lepšiu výkonnosť. Priemerný Treynorov pomer dosiahol 0,047, čo je pozitívny cýsledok a znamená to, že manažér fondu odviedol dobrú prácu pri odmeňovaní invesotra za vyššiu úroveň volatility. Oba výsledky však treba porovnať s ostatnými fondami, aby sme pochopili do akej miery bola táto snaha úspešná.

ESPA Stock Global je fond spravovaný ERSTE-SPARINVEST, dcérskou spoločnosťou ERSTE Group Bank AG. Týždenné údaje o výkonnosti tohto fondu sú zosumarizované v nasledovnom grafe.



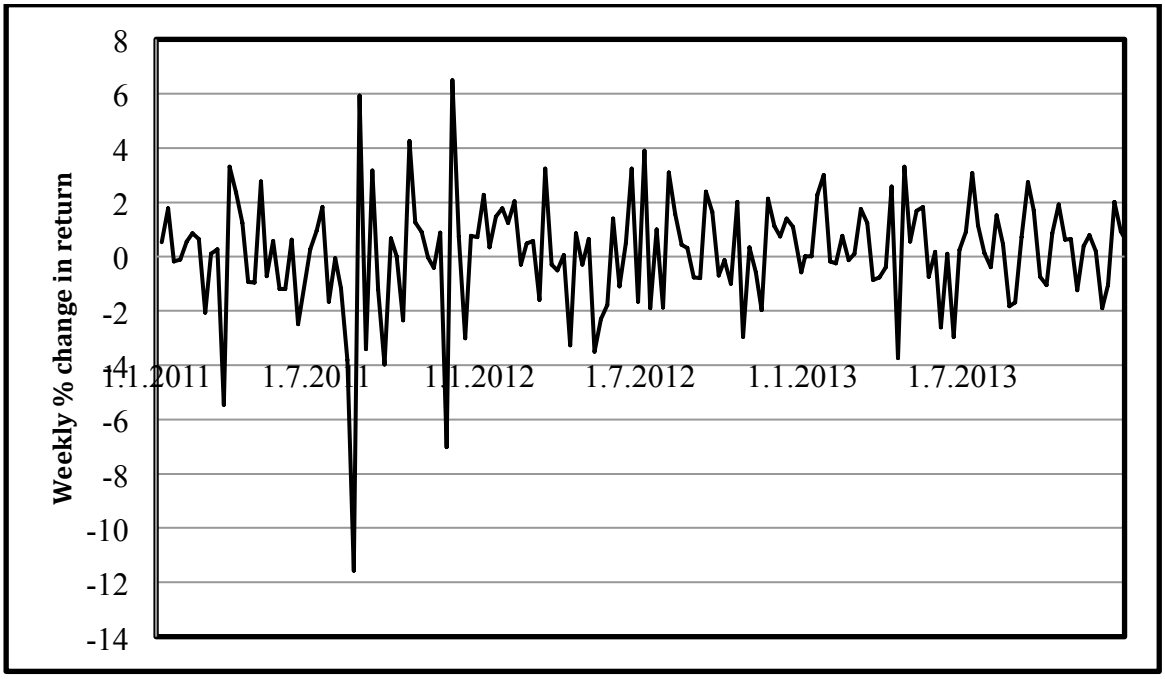
Zdroj: vlastné spracovanie z www.ass.sk

Počas roka 2011, výnos fondu klesol na -7,21%, avšak už nasledujúci rok sa dostal na 13, 75%. Rasový trend pokračoval aj počas roka 2013, kedy fond dosiahol 17,69% výnos. Zatiaľ dáta naznačujú, že rok 2011 bol sklamaním pre všetky akciové fondy. Celkový ročný výnos za sledované obdobie bol 7,50% p.a., teda vyšší ako pri predchádzajúcom fonde.

Pri tomto fonde volatilita dosiahla najvyšších hodnôt v druhom sledovanom roku, ale skúmané obdobie ukončila na podobnej úrovni ako SPORO fond a to približne 1,5%. V roku 2012, keď bola volatilita najvyššia, bola lepšia aj výkonnosť. To naznačuje, že odchýlky od priemernej miery návratnosti boli pozitívne viac ako negatívne.

Priemerný Sharpov pomer počas troch rokov dosiahol -0,25. Manažéri správcovskej spoločnosti brali do úvahy podstatu fondu a preto odporúčajú dobu investície minimálne sedem rokov, počas ktorých má fond šancu vyvážiť negatívnu výkonnosť pozitívnou. Treynorov pomer dosiahol 0,1, pozitívny výsledok vyšší ako v prípade predchádzajúceho fondu.

ČSOB Svetový akciový o.p.f. (otvorený podielový fond) je manažovaný správcovskou spoločnosťou ČSOB. Údaje o týždennej výkonnosti sa dajú vyčítať z nasledovného grafu.



Zdroj: vlastné spracovanie z www.ass.sk

V roku 2011 bola výkonnosť fondu najnižšia -11,19%, čo opäť potvrdzuje, že negatívny vývoj počas roka 2011 bol celoplošným javom pri akciových fondoch. Výkonnosť sa výrazne zlepšila v roku 2012, ako to bolo pri ostatných dvoch fondoch, keď dosiahla 13,50%. V nasledujúcom roku dokázal fond poraziť vlastný výsledok z predchádzajúceho roka o viac ako 6%, keď výkonnosť dosiahla 19,95%. Výborné výsledky v rokoch 2012 a 2013 zabezpečili, že celkový ročný výnos za sledované obdobie dosiahol 6,53% p.a.

Ako už bolo spomenuté, údaje o volatilite od konca roka 2011 do konca roka 2012 chýbajú. Podľa pravidiel Pravidiel pre výpočet a prezentáciu výkonnosti fondov, zverejnených Slovenskou asociáciou správcovských spoločností, správcovská spoločnosť nie je povinná dodať Asociácii týždenné údaje o volatilite. Asociácia zároveň nešpecifikuje pravidlá metódy výpočtu volatility a preto sa nedá spoľahlivo vypočítať potenciálna volatilita počas chýbajúcej doby. Tým pádom nevieme určiť, ako sa počas toho roku volatilita vyvíjala. Je zjavné, že počas roka 2011 sa volatilita dostala na úroveň až 3%, odkedy boli dáta opäť dodávané sa postupne znižovala na úroveň porovnateľnú s predošlými fondmi – približne 1,5%.

Priemerný Sharpov pomer z dostupných dát je -0,315. To opäť znamená, že pokiaľ by investor investoval do tohto fondu len tri roky, nebol by dostatočne odmenený za riziko, ktoré touto investíciou podstúpil v porovnaní s bezrizikovou investíciou v rámci Eurozóny.

Priemerný Treynorov pomer dosiahol 0,073, čo je dobré znamenie, avšak je potrebné porovnanie s ostatnými fondmi.

Každý výskum má svoje obmedzenia. Prvým obmedzením v tomto prípade sú samotné štatistické údaje získané od Slovenskej asociácie správcovských spoločností, ktorá ich získava od tretích strán – samotných správcovských spoločností. Nie sme schopní potvrdiť pravosť poskytnutých informácii. V prípade ČSOB, chýbajúce dáta o volatilite takisto obmedzujú výskum. Asociácia, až na jeden prípad, neposkytuje správcovským spoločnostiam vzorce a metodológiu výpočtu údajov, ktoré vykazujú. To znamená, že niektoré výsledky a informácie poskytnuté investorom Asociáciou môžu byť skreslené pri komparácii, pretože správcovské spoločnosti môžu používať rôzne vzorce, ktoré berú do úvahy rozdielne faktory. Takisto vypočítané pomery majú svoje obmedzenia. Pri Sharpovom pomere sú aktíva s vysokou volatilitou automaticky považované za menejcenné, pretože majú nižší Sharpov pomer. Avšak niektorí investori môžu vyhľadávať presne takéto aktíva, pretože chcú investovať do rizikovejších aktív, ktoré poskytujú možnosť vyššieho výnosu. Dodatočným obmedzením použitia Sharpovho pomeru je fakt, že sám o sebe nemá žiadnu podstatnú výpovednú hodnotu, musí byť použitý na porovnanie s inými fondmi a ako hodnotiaci mechanizmus. Druhý použitý pomer je Treynorov pomer. Jedným z obmedzení je fakt, že na výpočet nepoužíva celkové riziko ako Sharpov pomer ale len systematické riziko vyjadrené beta koeficientom. Celkové riziko zahŕňa systematické riziko ale zároveň aj nesystematické riziko, ktoré môže byť diverzifikované alebo zmiernené. Porovnávané portfóliá takisto musia byť podobné čo sa týka kompozície a typu aktív, príliš veľké rozdiely by skreslili výsledky. Tak ako pri Sharpovom pomere je výpovedná hodnota Treynorovho pomeru limitovaná, pretože musí byť vypočítaný a porovnaný s údajmi pre iné fondy. Posledným obmedzením je fakt, že investori sa nemôžu spoliehať na historické údaje ako ukazovateľa budúcej výkonnosti. Investori musí zvážiť súčasné ekonomické a politické podmienky a faktory, ktoré majú potenciál ovplyvniť výkonnosť fondu v budúcnosti.

ESPA Stock Global, čo sa týka vypočítaných ukazovateľov, dosahuje najlepšie výsledky. Avšak treba zvážiť aj poplatky, menovite vstupný a výstupný poplatok a poplatok za správu a depozitár. Tieto poplatky sú zhrnuté a zaznamenané v nasledujúcej tabuľke, ktorá umožňuje ich porovnanie.

Poplatky	SPORO Globálny Akciový Fond	ESPA Stock Global	ČSOB Svetový Akciový o.p.f.
Vstupný	Max. 3%	Max. 5%	Max. 3%
Správa a depozitár	1,48%	2,09%	2,43%
Výstupný	Max. 1,8%	0%	0%

Zdroj: vlastné spracovanie z www.amslsp.sk, www.erste-am.sk, www.csobinvesticie.sk

Neprítomnosť výstupného poplatku môže mať pozitívny vplyv na investora, pretože má pocit, že výber výnosov z fondu nie je spoplatnený. Pri bližšom pohľade na tabuľku je ale zjavne, že absencia výstupného poplatku je kompenzovaná vyšším vstupným poplatkom, prípadne aj vyšším poplatkom za správu a depozitár. Poplatok za správu a depozitár sa počíta z výdavkov fondu, preto môže byť pre rôzne fondy rozdielny. Pokiaľ by sa ale počítal z tej istej hodnoty, bol by najvyšší pri fonde ČSOB. Tento poplatok je strhávaný z investičného účtu ročne a preto je do istej miery skrytý a neovplyvňuje investora natoľko ako vstupný alebo výstupný poplatok, ktoré sú viditeľnejšie. Pre absenciu výstupného poplatku budú preto fondy ESPA a ČSOB považované investormi za výhodnejšie, napriek vyšším poplatkom za správu a depozitár.

Výber najlepšieho fondu závisí od typu investora, ktorý zvažuje investíciu do akciového fondu a jeho očakávaní od výkonnosti fondu. Nedá sa poprieť, že ESPA Stock Global preukázal najlepšiu výkonnosť z daných troch fondov, ale štruktúra a výška poplatkov môžu odradiť investorov.

Úlohou manažéra je poznať investora a jeho ochotu znášať riziko a spozorovať rozdiel medzi rizikom investor tvrdí, že je schopný zniesť a rizikom, ktoré je naozaj schopný zniesť. Tento rozdiel je veľmi dôležitý, pretože prejavovať ochotu zniesť 10% stratu nie je to isté ako keď tá situácia naozaj nastane a fond utrpí 10% stratu. Výber najlepšieho fondu je medzi ESPA Stock Global a ČSOB Svetovým Akciovým o.p.f. Výkonnosť ČSOB fondu je síce na druhom mieste, ale má benefit lepšej štruktúry poplatkov, ktorá môže prilákať investorov. Investor teda musí zvážiť nielen výkonnosť ale aj poplatky a rozhodnúť sa na základe toho čo mu lepšie vyhovuje.

Schopnosť investorov rozlíšiť medzi dobrým a zlým fondom a pochopiť meranie výkonnosti portfólia je neoceniteľná. Jedná sa o dôležité zručnosti, ktoré umožnia investorovi pochopiť investičné rozhodnutia a návrhy predkladané manažérom správcovskej spoločnosti a dovolia mu stať sa partnerom pri týchto rozhodnutiach a nie len pasívnym hráčom.

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List of appendices

Appendix I

DATE	SPORO Returns in [%]	ESPA Returns in [%]	ČSOB Returns in [%]	SPORO Volatility in [%]	ESPA Volatility in [%]	ČSOB Volatility in [%]
7.1.2011	1,55	0,57	0,54	2,0384	2,078	2,3226
14.1.2011	1,35	-1,16	1,79	2,0374	2,087	2,3315
21.1.2011	-1,05	-2,71	-0,19	1,9763	2,1229	2,3317
28.1.2011	-0,2	-0,08	-0,11	1,9357	2,0689	2,2618
4.2.2011	2,36	0,89	0,55	1,941	2,067	2,2621
11.2.2011	0,6	-0,13	0,85	1,9407	2,0603	2,2088
18.2.2011	1,13	2,11	0,64	1,9368	2,0516	2,1759
25.2.2011	-2,09	-4,22	-2,07	1,9585	2,1442	2,2006
4.3.2011	0,09	2,28	0,1	1,9326	2,1422	2,1848
11.3.2011	-1,83	-1,5	0,26	1,9497	2,1433	2,1602
18.3.2011	-3,95	-3,97	-5,47	2,0303	2,2059	2,2933
25.3.2011	2,13	2,71	3,31	2,0465	2,2245	2,335
1.4.2011	1,23	1,99	2,36	2,036	2,2348	2,3518
8.4.2011	0,58	0,89	1,23	2,0323	2,2134	2,3501
15.4.2011	-0,87	-1,5	-0,93	2,032	2,2212	2,3459
22.4.2011	0,75	1,66	-0,95	2,0344	2,2273	2,3479
29.4.2011	1,4	-0,3	2,77	2,0196	2,2276	2,3491
6.5.2011	-1,73	-1,87	-0,71	1,8371	2,1999	2,3131
13.5.2011	-0,91	2,82	0,57	1,8365	2,1598	2,3084
20.5.2011	-0,67	0,41	-1,2	1,7011	1,9228	2,2169
27.5.2011	-0,3	-0,28	-1,2	1,7004	1,8726	2,151
3.6.2011	-1,06	-1,34	0,62	1,6934	1,8763	2,1051
10.6.2011	-0,99	-1,79	-2,5	1,6954	1,8946	2,08
24.6.2011	-0,37	1,08	0,27	1,6146	1,8609	1,9777
1.7.2011	2,66	2,14	0,95	1,5737	1,7201	1,8419
8.7.2011	0,44	3,35	1,83	1,5072	1,7631	1,8444
15.7.2011	-1,61	-1,88	-1,67	1,5122	1,7865	1,7822
22.7.2011	1,27	-0,1	-0,06	1,4775	1,7864	1,7491
29.7.2011	-2,09	-1,82	-1,16	1,5096	1,7985	1,6997
5.8.2011	-5,22	-7,72	-3,81	1,676	2,1205	1,7737
12.8.2011	-2,96	-3,99	-11,57	1,6822	2,1809	2,423
19.8.2011	-1,19	-2,29	5,92	1,6899	2,2015	2,549
26.8.2011	0	-0,1	-3,4	1,6885	2,1989	2,5525
2.9.2011	0,04	6,35	3,18	1,6701	2,3261	2,589
9.9.2011	-0,07	-0,42	-1,21	1,6668	2,3107	2,5288
16.9.2011	-0,12	-0,29	-3,98	1,6656	2,3043	2,5824
23.9.2011	-1,94	-4,03	0,68	1,6792	2,37	2,5847
30.9.2011	-0,04	0,46	0	1,6789	2,3687	2,5843
7.10.2011	1,2	0,46	-2,34	1,6692	2,3695	2,5948
14.10.2011	2,18	2,23	4,25	1,6913	2,3839	2,6543

21.10.2011	0,11	-0,81	1,27	1,6915	2,3858	2,6614
28.10.2011	2,69	4,98	0,9	1,7325	2,4753	2,665
4.11.2011	-2,15	-0,18	-0,04	1,6671	2,4591	2,6597
11.11.2011	0,28	-0,87	-0,41	1,6543	2,4226	2,6478
18.11.2011	-2,46	-0,45	0,88	1,6854	2,4202	2,626
25.11.2011	-2,98	-4,69	-7,02	1,7232	2,4851	2,7999
2.12.2011	0,57	5,94	6,5	1,6628	2,5756	2,9408
9.12.2011	-4,8	-0,04	0,73	1,6573	2,5761	2,9304
16.12.2011	-1,57	-1,65	-3,02	1,6652	2,5829	-
23.12.2011	0,86	2,08	0,77	1,6611	2,5887	-
30.12.2011	-0,09	0,64	0,71	1,6612	2,5913	-
6.1.2012	0,68	2,35	2,28	1,647	2,6121	-
13.1.2012	0,73	1,82	0,33	1,6373	2,6216	-
20.1.2012	2,33	1,6	1,48	1,6734	2,6047	-
27.1.2012	1,08	-0,96	1,78	1,6835	2,608	-
3.2.2012	2,29	1,41	1,24	1,6813	2,6125	-
10.2.2012	0,13	0,32	2,03	1,678	2,6128	-
17.2.2012	1,57	1,92	-0,3	1,6858	2,61	-
24.2.2012	0,69	-0,72	0,49	1,6702	2,5416	-
2.3.2012	0,9	1,02	0,58	1,6765	2,5267	-
9.3.2012	-0,25	-0,23	-1,6	1,6602	2,5177	-
16.3.2012	1,86	3,28	3,24	1,5909	2,4872	-
23.3.2012	-1,22	-1,72	-0,3	1,5703	2,4768	-
30.3.2012	-0,24	-0,02	-0,52	1,5594	2,4632	-
6.4.2012	-1,25	0,95	0,06	1,5637	2,4636	-
13.4.2012	-1,81	-0,33	-3,27	1,5776	2,4543	-
20.4.2012	0,15	0,43	0,85	1,5729	2,4453	-
27.4.2012	1	0,43	-0,29	1,5662	2,4452	-
4.5.2012	-2,04	0,19	0,64	1,5729	2,4294	-
11.5.2012	-0,95	-2,22	-3,5	1,5733	2,4221	-
18.5.2012	-3,32	-2,12	-2,31	1,6315	2,4399	-
25.5.2012	0,23	1,54	-1,79	1,6328	2,4487	-
1.6.2012	-1,95	0,64	1,39	1,6461	2,4425	-
8.6.2012	2,05	-1,13	-1,11	1,6725	2,4344	-
15.6.2012	0,77	-0,54	0,5	1,6778	2,4324	-
22.6.2012	-0,43	0,97	3,23	1,6779	2,4316	-
29.6.2012	1,04	-0,39	-1,66	1,6405	2,4155	-
6.7.2012	0,72	5,31	3,91	1,643	2,4772	-
13.7.2012	-0,15	-1,94	-1,9	1,6311	2,4782	-
20.7.2012	0,98	3,36	1,01	1,6265	2,5176	-
27.7.2012	0,07	-2,62	-1,87	1,6046	2,5324	-
3.8.2012	0,84	0,87	3,1	1,4344	2,2624	-
10.8.2012	1,57	2,55	1,57	1,3886	2,1983	-
17.8.2012	0,94	0,24	0,43	1,3825	2,1651	-
24.8.2012	-0,42	-2,01	0,31	1,3843	2,1908	-
31.8.2012	-0,64	-0,31	-0,78	1,3879	2,0405	-

7.9.2012	2,77	1,73	-0,79	1,4347	2,047	-
14.9.2012	2,39	-0,78	2,4	1,4665	2,051	-
21.9.2012	-0,69	0,12	1,64	1,4413	1,9546	-
28.9.2012	-1,8	-0,34	-0,7	1,4673	1,9573	-
5.10.2012	1,5	-0,17	-0,14	1,4718	1,9589	-
12.10.2012	-1,93	-1,55	-1	1,4734	1,9599	-
19.10.2012	1,22	1,4	2,02	1,4815	1,9588	-
26.10.2012	-1,51	-2,53	-2,96	1,4545	1,8946	-
2.11.2012	0,22	1,21	0,33	1,4214	1,8986	-
9.11.2012	-1,41	-1,3	-0,58	1,4358	1,9045	-
16.11.2012	-0,99	-2,04	-1,97	1,3991	1,9282	-
23.11.2012	2,38	2,36	2,13	1,3645	1,8177	-
30.11.2012	0,87	1,57	1,12	1,3667	1,6607	-
7.12.2012	0,42	0,28	0,73	1,3669	1,6568	-
14.12.2012	0,71	-0,42	1,39	1,3456	1,6374	-
21.12.2012	1,27	0,58	1,1	1,3503	1,6193	1,7166
31.12.2012	-0,26	-0,56	-0,58	1,3513	1,6224	1,7197
4.1.2013	3,05	3,11	0,01	1,4025	1,6438	1,6971
11.1.2013	0,39	-0,53	0	1,4012	1,6328	1,6973
18.1.2013	0,49	-0,37	2,28	1,3728	1,6232	1,7118
25.1.2013	4,94	2,68	3	1,3715	1,6158	1,6996
1.2.2013	0,06	-0,53	-0,19	1,3422	1,6099	1,6943
8.2.2013	-0,3	1,26	-0,26	1,344	1,6166	1,6757
15.2.2013	0,07	0,74	0,76	1,3304	1,6008	1,6766
22.2.2013	-0,33	-0,57	-0,13	1,3300	1,5993	1,6764
1.3.2013	0,02	1,72	0,11	1,326	1,6092	1,6753
8.3.2013	2,25	1,69	1,76	1,3558	1,6211	1,6713
15.3.2013	0,47	1,36	1,24	1,3362	1,5737	1,6252
22.3.2013	-0,8	-0,84	-0,87	1,3291	1,5574	1,6302
29.3.2013	-0,05	1,28	-0,77	1,3283	1,564	1,6325
5.4.2013	-1,04	-0,55	-0,4	1,3244	1,5641	1,6342
12.4.2013	2,04	0,32	2,58	1,3183	1,5624	1,5935
19.4.2013	-2,28	-3,19	-3,75	1,364	1,6322	1,686
26.4.2013	2,77	2,88	3,3	1,4039	1,6736	1,7368
3.5.2013	2,07	0,16	0,56	1,3885	1,6736	1,7365
10.5.2013	1,45	1,9	1,69	1,3856	1,6546	1,6643
17.5.2013	1,55	2,59	1,83	1,2925	1,6491	1,6337
24.5.2013	-1,21	-1,3	-0,74	1,3123	1,6561	1,6124
31.5.2013	-1,43	-1,66	0,17	1,2959	1,6773	1,6072
7.6.2013	-1,36	-3,84	-2,6	1,2992	1,7625	1,6478
14.6.2013	-1,1	-0,74	0,11	1,3134	1,7643	1,6481
21.6.2013	-2,6	-1,43	-2,96	1,3741	1,775	1,6639
28.6.2013	-0,18	2,6	0,24	1,3687	1,8039	1,642
5.7.2013	0,17	1,18	0,9	1,3672	1,6709	1,5679
12.7.2013	2,19	3,16	3,07	1,3909	1,6938	1,5843
19.7.2013	1,63	0,7	1,15	1,3998	1,6396	1,5855

26.7.2013	-0,28	-0,92	0,12	1,4018	1,5988	1,5554
2.8.2013	1,07	1,57	-0,39	1,4038	1,6071	1,5122
9.8.2013	-0,81	-1,46	1,51	1,4007	1,5909	1,4871
16.8.2013	-0,47	-0,65	0,45	1,401	1,5946	1,4871
23.8.2013	-0,48	-1,01	-1,83	1,4015	1,5742	1,5154
30.8.2013	-1,85	-0,8	-1,7	1,4262	1,5785	1,5328
6.9.2013	1,52	1,4	0,71	1,3942	1,573	1,5275
13.9.2013	1,93	1,51	2,75	1,3821	1,5787	1,5373
20.9.2013	1,94	1,14	1,7	1,3971	1,5841	1,5383
27.9.2013	-0,74	-0,31	-0,74	1,3747	1,5839	1,5388
4.10.2013	-0,63	-1,05	-1,04	1,3686	1,5924	1,5483
11.10.2013	1,08	0,08	0,87	1,3399	1,5738	1,5408
18.10.2013	1,61	1,89	1,91	1,3462	1,5821	1,5385
25.10.2013	0,35	0,17	0,63	1,3226	1,5336	1,4682
1.11.2013	0,39	-0,06	0,65	1,3226	1,5286	1,4688
8.11.2013	-0,32	0,5	-1,24	1,3035	1,5132	1,4796
15.11.2013	1,31	1,76	0,38	1,2968	1,49	1,4434
22.11.2013	0,32	0,12	0,79	1,267	1,4644	1,4244
29.11.2013	0,28	0,44	0,2	1,2648	1,4541	1,4205
6.12.2013	-1,24	-2,09	-1,89	1,2829	1,4913	1,4523
13.12.2013	-1,04	-1,55	-1,04	1,2946	1,5092	1,4553
20.12.2013	2,26	2,8	2,02	1,316	1,5483	1,4708
27.12.2013	1,3	2,33	0,93	1,3211	1,5687	1,4688
31.12.2013	0,23	-0,38	0,72	1,266	1,5235	1,4694

Appendix II

DATE	3M EURIBOR
7.1.2011	0,997
14.1.2011	1,006
21.1.2011	1,025
28.1.2011	1,063
4.2.2011	1,088
11.2.2011	1,093
18.2.2011	1,078
25.2.2011	1,092
4.3.2011	1,162
11.3.2011	1,173
18.3.2011	1,172
25.3.2011	1,203
1.4.2011	1,249
8.4.2011	1,294
15.4.2011	1,332
22.4.2011	1,356
29.4.2011	1,385
6.5.2011	1,419
13.5.2011	1,425
20.5.2011	1,435
27.5.2011	1,43
3.6.2011	1,436
10.6.2011	1,469
24.6.2011	1,528
1.7.2011	1,556
8.7.2011	1,593
15.7.2011	1,608
22.7.2011	1,611
29.7.2011	1,609
5.8.2011	1,564
12.8.2011	1,535
19.8.2011	1,533
26.8.2011	1,54
2.9.2011	1,541
9.9.2011	1,53
16.9.2011	1,535
23.9.2011	1,537
30.9.2011	1,554
7.10.2011	1,566
14.10.2011	1,574
21.10.2011	1,585
28.10.2011	1,592
4.11.2011	1,488

11.11.2011	1,462
18.11.2011	1,465
25.11.2011	1,475
2.12.2011	1,469
9.12.2011	1,437
16.12.2011	1,417
23.12.2011	1,404
30.12.2011	1,369
6.1.2012	1,288
13.1.2012	1,231
20.1.2012	1,182
27.1.2012	1,138
3.2.2012	1,102
10.2.2012	1,063
17.2.2012	1,036
24.2.2012	1,006
2.3.2012	0,948
9.3.2012	0,894
16.3.2012	0,853
23.3.2012	0,808
30.3.2012	0,777
6.4.2012	0,766
13.4.2012	0,753
20.4.2012	0,734
27.4.2012	0,715
4.5.2012	0,697
11.5.2012	0,69
18.5.2012	0,684
25.5.2012	0,675
1.6.2012	0,665
8.6.2012	0,663
15.6.2012	0,662
22.6.2012	0,654
29.6.2012	0,653
6.7.2012	0,549
13.7.2012	0,486
20.7.2012	0,451
27.7.2012	0,415
3.8.2012	0,375
10.8.2012	0,353
17.8.2012	0,334
24.8.2012	0,295
31.8.2012	0,278
7.9.2012	0,265
14.9.2012	0,25
21.9.2012	0,228

28.9.2012	0,22
5.10.2012	0,215
12.10.2012	0,21
19.10.2012	0,204
26.10.2012	0,199
2.11.2012	0,197
9.11.2012	0,193
16.11.2012	0,191
23.11.2012	0,19
30.11.2012	0,191
7.12.2012	0,187
14.12.2012	0,184
21.12.2012	0,184
31.12.2012	0,185
4.1.2013	0,191
11.1.2013	0,195
18.1.2013	0,209
25.1.2013	0,214
1.2.2013	0,234
8.2.2013	0,227
15.2.2013	0,225
22.2.2013	0,218
1.3.2013	0,206
8.3.2013	0,201
15.3.2013	0,204
22.3.2013	0,215
29.3.2013	0,211
5.4.2013	0,21
12.4.2013	0,21
19.4.2013	0,208
26.4.2013	0,207
3.5.2013	0,201
10.5.2013	0,203
17.5.2013	0,2
24.5.2013	0,2
31.5.2013	0,2
7.6.2013	0,203
14.6.2013	0,209
21.6.2013	0,216
28.6.2013	0,218
5.7.2013	0,217
12.7.2013	0,22
19.7.2013	0,22
26.7.2013	0,226
2.8.2013	0,228
9.8.2013	0,227

16.8.2013	0,226
23.8.2013	0,225
30.8.2013	0,224
6.9.2013	0,225
13.9.2013	0,223
20.9.2013	0,221
27.9.2013	0,224
4.10.2013	0,225
11.10.2013	0,227
18.10.2013	0,224
25.10.2013	0,228
1.11.2013	0,226
8.11.2013	0,217
15.11.2013	0,218
22.11.2013	0,223
29.11.2013	0,234
6.12.2013	0,248
13.12.2013	0,282
20.12.2013	0,292
27.12.2013	0,293
31.12.2013	0,287