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The Implications of the Financial Crisis on a Mutual Funds Investments
in the Czech Republic

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Prohlášení

Prohlašuji, že jsem diplomovou práci vypracoval samostatně a použil pouze uvedené prameny a literaturu.

Declaration

Hereby I declare that I compiled this diploma thesis independently, using only the listed literature and resources.

Prague, 30.6.2010

Jan Bartas

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Abstract

In this thesis we examined the implications of the financial crisis from the September 2008 for investments into mutual funds in the Czech Republic. We compared this implication for worldwide, European and Czech mutual funds market. Using the linear regression (ordinary least squares) with dummy variables we proved that crisis had implication not just for the whole level of invested financial resources but for the structure of mutual funds market as well. We showed that the crisis occurred at the world and European markets between 3rd quarter of 2007 and 1st quarter of 2009 meanwhile between 3rd quarter of 2008 and 2nd quarter of 2009 at the Czech mutual funds market. We tested these hypotheses as well: 1) influence of stock share index on the price of equity funds, 2) influence of the short interest rate on the price of money market funds, 3) influence of the long term interest rate on the price of bond funds under the conditions of the Czech mutual funds market.

Abstrakt

V této diplomové práci jsme zkoumali dopady světové finanční krize ze září roku 2008 na trh investičních fondů v ČR. Porovnali jsme dopad této krize na světový, evropský a Český trh kolektivního investování. Pomocí lineární regrese (metody nejmenších čtverců) se zavedenými umělými proměnnými jsme potvrdili, že krize zasáhla nejen celkový objem investovaných finančních prostředků do fondů, ale i zastoupení jednotlivých typů fondů. Prokázali jsme také, že tato finanční krize se na světovém a evropském trhu projevila mezi 3. čtvrtletím roku 2007 a 1. čtvrtletím roku 2009, zatímco na Českém trhu mezi 3. čtvrtletím roku 2008 a 2. čtvrtletím roku 2009. V práci jsou také testované tyto hypotézy: 1) vliv burzovního indexu na cenu akciových fondů, 2) vliv krátkodobé úrokové míry na cenu fondů peněžního trhu, 3) vliv dlouhodobé úrokové míry na cenu dluhopisových fondů v podmínkách Českého trhu s kolektivním investováním.

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1. Introduction

In this thesis we study the impact of the financial crisis from the September of 2008 on the mutual funds market. We are briefly presenting the mutual funds research and formulating first hypotheses. Lately we discuss the Czech mutual funds market and its legal framework. The development of the mutual funds market in the Czech Republic after 2002 is described in the third chapter together with the description of world and European mutual funds market during the crisis.

We were working with 5 hypotheses regarding collective investment and mutual funds market. Hypothesis 1 deals with the relationship between the price level of equity funds and the stock market price. In the econometrical part of this thesis we proved this hypothesis for the conditions of the Czech mutual funds market. Hypothesis 2 states that the demand for money market funds depends on the interest rate level. We could not support these hypothesis and we are explaining why lately. Hypothesis 3 focuses on the bond funds and declares that the demand for bond funds depends on the long-term interest rates. Our research implies that this hypothesis holds. The relationship between the long-term interest rates and the demand for bond funds is clearly negative. Hypothesis 4 and 5 are connected with the influence of the financial crisis on the mutual funds market. We proved that the financial crisis significantly changed the trend of the mutual funds market (hypothesis 4). We also proved that the change of the mutual funds market was not only at the level of the mutual funds net assets but also in the percentage shares of different types of funds. We confirmed these hypotheses for the Czech mutual market but also for the world and the European market.

This diploma is divided as follows. In the first chapter we introduce papers published on similar topic and bring first three hypotheses. Second part deals with the Czech mutual funds market and its legal framework. Third part is dedicated to the development of the Czech mutual funds market and the influence of the financial crisis. Third part brings the hypothesis 4 and 5. We analyze all previous findings in the chapter 4. Conclusion follows.

2. Mutual funds market

In this chapter we will introduce the papers that are important to understand mutual funds market. Firstly we will summarize the papers that are dealing with mutual funds in general. Then we will focus on the different types of funds individually. Rouwenhorst [2003] in his paper about the origins of mutual funds clarifies that the mutual funds became the most widespread investment vehicle for small investors in last two decades. When at the turn of the century “*the number of mutual funds in the United States exceeded the number of securities listed on the New York Stock Exchange*”¹. Nevertheless, his work is mainly about the origins of this kind of investments. First mutual funds were introduced in contemporary Netherlands in 1774 and they were brought to the Anglo-Saxon countries in 1868. Their advantage of liquidity and diversification at relatively low cost in comparison to direct investment in individual stocks was obvious since that time.

In the end of 20th century several papers about the evaluating of mutual fund performance were published. Jegadeesh and Titman [1993] wrote paper about evaluating stocks portfolios. They were examining whether or not the strategies of buying stock that have performed well in the past and selling stocks that have performed poorly in the past are bringing net positive returns in 3 to 12 month holding period. Their results were that these strategies brought significantly positive returns but on the other hand the part of these returns disappears in the following two years. Hendricks, Patel and Zeckhauser [1993] used this approach to examine the mutual funds performance. Their results were that firstly the performance of mutual funds persists in the near term (one year). Secondly portfolios of those funds with the recent low performance do significantly worse than standard benchmarks of mutual funds. On the other hand, portfolios of best performers do better, but not significantly. This result was rejected by Carhart [1997] who demonstrated that persistence in equity mutual funds' returns can be explained by common factors in stock returns and investment expenses. He also stated that individual funds do not earn higher returns from following the momentum strategy (i.e. buying winners and selling losers)

¹ ROUWENHORST (2003): „The Origins of Mutual Funds“, page 1

in stocks. He is also not supporting the idea of skilled or informed mutual funds portfolio manager.

The performance of mutual funds stayed in the focus of scientists in this century as well. Kothari and Warner [2001] were studying mutual funds performance measures. They found that performance measuring used in earlier research had small ability to detect economically large magnitudes of abnormal fund performance. They are recommending using event-study procedures that analyze a fund's stock trades. By these procedures it should be feasible using time-series data sets on mutual funds portfolio holdings. Carhart et al [2002] used the data of Carhart [1997] (which were diversified equity funds monthly from January 1962 to December 1993) to provide a comprehensive study of mutual fund survivorship. The theory behind their study is that when survival depends on multi-period performance, the survivorship bias in average performance typically increases with the sample length. This is proved for U.S. mutual funds in the paper. Additionally they said that this condition weakened evidence of performance persistence. Rao and Ravidran (2003) made the research about the performance evaluation of Indian mutual funds through relative performance index, risk-return analysis and other tools like Treynor's ratio, Sharp's ration, Sharp's measure, Jensen's measure and Fama's measure. Their results show why the mutual funds are so popular in last decades. They showed that most of mutual fund schemes in India were giving to investor's excess returns over expected returns.

For better understanding of different types of mutual funds we can find a large quantity of literature dealing with particular mutual fund type. We will start with equity funds. Paper that reveals the investment behavior of German equity fund managers was written by Arnswald [2001]. He made a questionnaire survey about German mutual fund companies. He was asking for the basic views and practices of fund managers as well as for insight into performance-measuring. He found out that managers of funds recognize underlying economic information and they can use it for additional value. Some destabilizing behavioral factors arose from the choice of information source and investment strategies and styles. On the same topic wrote paper Ljungqvist and Richardson [2003]. They were analyzing the investment behavior of private equity fund managers. Authors showed that existing funds

accelerate their investment flows and earn higher returns when investment opportunities improve and the demand for capital increases. On the other hand the increase in supply led to tougher competition for deal flow and cutting investment spending is the reaction of private equity managers. Xinge Zhao [2005] revealed the behavior of international equity fund investors. He declared that they flee from funds with poor raw returns and they chase risk-adjusted performance leaders instead of raw return leaders. Another investigation of the performance of global equity funds brought Huij and Derwall [2009]. They are describing relationship between performance and the portfolio concentration. Conclusion is that concentrated funds with higher levels of tracking error had better performance than more broadly diversified competitors. This paper also reveals that this relation between portfolio concentration and performance is driven by the breadth of the underlying fund strategies. According to the authors the investors' strategies to select the best performing funds should be accompanied with the consideration of the extent to which fund managers allocate their risk budget across multiple investment strategies. Marquez et al. [2010] explains why the equity funds deliver abnormal returns. They argue that the difference between equity funds and mutual funds is due to dependence of their success on their matching with high quality firms and vice versa the firms want to be linked with the managers that have higher estimated value adding ability. Additionally they presented model that is explaining why the managers limit fund size, fees or both and moreover they can predict fund performance, fees and size by this model. Most important paper for this thesis is the one written by Kuok-kun Chu [2010] about the short and long term price level linkages between the equity funds under the MPF and the benchmark indices over the period 2001-2008. Cointegration test identified the long run relationship between the price levels and the stock market index and he analyzed the short run relationship by the Granger causality test. He found that there is 57,28% of the equity funds that have their price levels cointegrated with stock market index. He suggests that when some equity funds have short run comovements with the stock market index but they do not have long run comovements with the index then this could indicate some equity managers have tried to make their portfolios to win the market. He also uses cointegration analysis to test the long run relationship between the price levels of non-Hong Kong (foreign) equity fund price levels and the local stock index to evaluate the existence

of benefit from global diversification by investing in the foreign equity funds. We will use his paper to state the first hypothesis of this diploma.

Hypothesis 1: Price level of equity funds depends on the stock market index.

This hypothesis will be tested in the econometrical part of this paper.

For closer look to money market funds we could not start with a better paper than the fresh work of Baklanova [2010]. This paper is an overview of the literature written about the money market fund industry. The more detailed look is given to funds' investment management practices. With further research of existing literature we can agree with Baklanova [2010] that there is lack of scientific literature about money market funds before 2007. The financial crisis followed by the various proposals of financial market restrictions brought an increased interest of scientists on this topic. Jank and Wedow [2009] wrote one of these papers. They investigated the returns and flows of German money market funds before and during the financial crisis. We can conclude their findings as following. In liquid times money market funds enhanced their returns by investing in less liquid papers. With this approach they achieve better performance than other funds as long as liquidity in the market is high. On the other hand, by doing so (investing in less liquid papers) they widen the narrow structure of money market funds and make them inclinable to runs. This exactly occurred during the financial crisis. There was shortening of liquidity during which illiquid funds experienced runs when more liquid funds functioned as a safer place in the same time. Kauko [2005] showed a model on the demand for money market funds. He declares that these funds are close substitute for M1 deposit but without possibility of immediate transaction requirements. Results of his research are that the demand for money market funds is stronger when the intended volume of transaction is low. Other results are connected with influence of interest rate level. When it is high it makes expensive to hold M1 deposits. Also high volatility of interest rate increase the risk of holding M1 deposits and makes it bigger than the risk of holding money market funds. All of these results were confirmed by Finnish data. We will use his results to state second hypothesis:

Hypothesis 2: The demand for money market funds depends on the interest rate level.

We will continue with literature review about the bond funds. Blake et al. [1993] published paper on the performance of bond mutual funds. They found that bond funds underperform relevant indexes post-expenses. On average the percentage point increase in expenses leads to the percentage decrease in performance. Additionally they did not find any evidence of predictability using past performance to predict future performance. Detzler [1999] studied the risk and return characteristics of global mutual funds between 1988 and 1995. She found returns on global funds sensitive to exchange rate movements. According to her studies these funds did not show superior performance against a wide range of benchmarks. This performance was negatively related to fund expenses also. Huij and Derwall [2005] took 3549 bond mutual funds and were investigating their relative performance in period 1990 to 2003. They say that funds with strong performance over the past continue to do so in future. Results of their investigation are that a strategy based on past fund returns earns an abnormal returns which are economically and statistically significant. Comer and Rodriguez [2006] compared the performance of corporate and government bond funds. They found differences in investment styles as well as in performance. According to their paper, corporate funds outperform government funds on a risk adjusted basis. Cici and Gibson [2010] study the performance of corporate bond mutual funds further. The relationship between the demand for bond funds and the long-term interest rate was suggested in the Quarterly Statistical Release No. 35 [EFAMA, December 2008] as “the mirror movements”. When interest rates fall we are expecting rising inflows into bond funds. When they were on a rising trend we were witnessing outflows from bond funds. We can use this to form our third hypothesis

Hypothesis 3: The demand for bond funds depends on the long-term interest rates.

Balanced mutual funds are the last group of mutual funds which we are going to examine. Firstly we will introduce written papers on the balanced funds topic. Pinto [1994] studied forecasts efficiency of balanced mutual fund managers between 1965 and 1985. He found that there is no private timing information. Success and failure in forecasting is randomly distributed over time and the net-of-expenses returns for the average fund do not offer a significant improvement over an investment in a matched benchmark. The performance of the balanced funds is examined by Rao [2006] as

well. He evaluated performance of funds in India in several terms, as performance of the fund for the current year or fund return over past month computed by net asset value. He found that all types of funds besides equity funds performed relatively better on a longer time frame of 3 years. Moreover, he compared the international and local variants of funds and according to him international balanced funds performed better related to local (Indian) balanced funds in terms of risk-adjusted return. In his following paper, Rao [2009], he is examining the effect of fund size on the performance of selected balanced funds. He divided balanced funds into 4 groups according to size and run several econometrical tests. In the end, he found that there is no conclusive evidence to suggest the fund size affects the performance of balanced funds in the Indian Context.

3. Czech mutual fund market

Collective investment is very widespread in Western European countries and is becoming very popular in the Czech Republic as well. Before we start looking at legal regulation of collective investment lets evaluate pros and cons of collective investment. We will use Liška & Gazda [2004] and Musílek [1999] to present pros and cons of collective investment.

Main advantage of collective investment is diversification of risk of financial resources of each investor. An individual small investor usually does not have enough financial resources to diversify them in order to decrease risk of investments. On the other hand, financial resources collected by many small investors can be sufficiently diversified and the risk of each investment can be decreased. In addition, management company runs collective investment with entrusted financial resources and strict legal regulation prohibits risk investments. Supervising over management companies is another contribution for lower risk of collective investments. Transaction costs are not fractional advantage. Investing thru management companies saves investors' money, because he or she has not to pay to brokerage firm for broker services. Collective investment is taxed more favourably then direct investment. Last but not least are also cost savings. Management companies usually have sophisticated information systems. Standard individual investors cannot afford systems like that. Information is the very important asset in the world of investments.

However this argument does not hold under the theory of effective markets. Presented by Veselá [2003] there is no reason to believe that professional investors are able to exceed performance of amateurs in the long run. Main advantages of collective investment are: diversification, lower operational costs, time saving, supporting services, liquidity and protection against unethical practice.

Disadvantage of collective investment is that investor can not influence strategy of investment company. He or she can only choose the investment company with the most attractive investment strategy. Investor loses his or her investment freedom. Despite of strict legal regulation, there are still some unfair companies and investors have to be careful. Collective investment is still investment and there could turn up almost everything on the financial markets.

3.1 Legal regulations of collective investment in the Czech Republic

In this section we briefly present what collective investment means under law regulation in the Czech Republic. We will show how the collective investment is interpreted, what legal forms exist and by what subjects these forms are performed. Short definition of subjects is needed, to consolidate terms and forms, which we are going to discuss in this work.

What does collective investment mean in the Czech Republic? Liška & Gazda [2004] claim that collective investment is a business activity primarily concentrated on collecting financial resources from previously unclear and unlimited range of natural persons and legal entities. This definition is also agreed by Musílek [1999]. Definition comes from the Act 189/2004 Col. and its amendments. Prior the publication of this Act, collective investment had been governed by the Act 248/1992 Col. about management companies and investment companies. This Act is still implemented within the management and investment companies². The Act 189/2004 Col. implements also directives of European Union. Namely directives UCITS³ I (directive 85/611/EHS) and UCITS III (directives 2001/107/ES and 2001/108/ES).

² Terms from UCITS management company (in Czech law known as investment company) and investment company (in Czech law known as investment fund).

³ Undertakings for Collective Investments in Transferable Securities.

Collective investment is a special business activity where only specific legal entities called management companies and investment companies are allowed to be engaged – Act 248/1992 Col. These subjects of collective investment are limited in their business activity. It is allowed to collect financial resources only for purposes specified by the Act 189/2004 Col. Its financial resources can be afterwards used only in the way allowed in the Act. If they are not used, they have to be stored at the special account of authorized depositary – necessarily a bank.

According to Liška & Gazda [2004], legal regulation of collective investment includes principles of protection of investors. Basic principles of the protection in the Czech Republic are:

- Only special capital companies with special permission and sufficient equity are allowed to engage in collective investment.
- Companies engaging in collective investment are not allowed to drive another business activity.
- Board members of these companies have must have no criminal record, be sufficiently skilled and must not be appointed in the civil office.
- Received financial resources can only be used to purchase assets specified by the Act.
- Investments have to respect principles of the risk diversification.
- Legal entities are not allowed to issue bonds in order not to decrease its liquidity in relation to its investors.
- Assets of the investors are managed separately from the assets of the founders of the company for collective investment. Investors must be informed about the economic development of the company.
- The activities of management and investment companies are controlled by the special state office, by authorized depositary and by special self-regulatory professional organizations.

There are few subjects on the market with collective investments. In this part, we will summarize them to avoid confusion in terminology. In the Czech Republic

there are three basic subjects on the mutual funds market: a management company, an investment company and a mutual fund.

The management company according to the Czech legislation – the Act 248/1992 Col. - is a business company having a collective investment as an exclusive business activity (only in the forms specified in the Act. All management companies are set up as joint-stock companies and their legal position is governed by the Commercial Code. The management companies control mutual funds and investment companies according to the Management Contract. Management companies earn their income in the form of the fees charged for the control of the mutual funds and investment companies. Foundation of the management company is regulated by the Act 248/1992 Col., which also sets conditions necessary to receive permission from the the Czech National Bank (which former management company needs). The management company uses financial resources collected from investors but these resources are still owned by the investors. The management company just uses them for purchasing bonds fitting into the portfolio strategy.

The investment company is regulated also by the Act 248/1992 Col. and by the Act 189/2004 Col. In the Czech Republic the investment company is a legal entity having a legal form of joint-stock company. It cannot provide other services then collective investments. Differences from other joint-stock companies are listed in the Act 248/1992 and refer mainly to business activities, the organization, and the foundation of the company. Main differences between he investment company and the management company lies in the manner of a collective investment and the legal form. As Liška & Gazda [2004] mention, financial resources from investors are owned by the investment company and the company is allowed use them within other safe methods of investing (not only to buy bonds). Investors are shareholders of the investment company.

According to Liška & Gazda [2004] and also Musílek [1999] mutual funds are not legal subjects. It is a part of the management company where the assets controlled by the management company are gathered. The foundation of the mutual fund by the investment company is governed by the Act 248/1992 Col. Investors into mutual funds are not shareholders but participants on the assets of the mutual fund. Investors are receiving share certificates in exchange for their investments. Each of

these share certificates has to be authorized by the Czech National Bank. Holder of these bonds does not have any right to intervene in the management of the mutual fund. As Liška & Gazda [2004] say, any collecting financial resources have to be deposit on the corresponding account in the bank which authorized depositary. Every mutual fund has to have its own account. This arrangement is to avoid the situation where the mutual fund gains interest from these financial resources. These financial resources should increase the value of assets of particular mutual fund. The authorized depositary has to be approved by the Czech National Bank.

As the Act 248/1992 Col. states, the management company can produce two types of mutual funds. There are open-end-funds and closed-end-funds. For understanding differences between them we use Musílek [1999].

The open-end-fund has unlimited possibility to issue new shares or share certificates. Number of shareholder (participants) is also not limited. The management company is driven only by the investors demand or by its strategy in issuing new shares (share certificates). The mutual funds have liability to repurchase shares (share certificates) from shareholders (participants) anytime they want, without needless delay (in the Czech Republic till 15 week days from shareholder request). Value of the shares of open-end-funds is quoted every day, but it is not determined by demand and supply on the financial markets. It is determined by the daily rates of bonds contained in the portfolio of the current mutual fund.

The close-end-fund has limited amount of shares (share certificates), which is defined by its foundation. There is no liability to repurchase shares (share certificates) by the fund. Shares (share certificates) are traded on the secondary markets.

3.1.1 Standard funds

Standard funds are those funds fulfilling conditions specified in the directive of the European Union UCITS. The Act 189/2004 Col. implementing these directives states that standard fund can be only an open-end-fund. These two legal regulations define possible instruments for investments of standard fund. These instruments are:

- various money market instruments that are traded on the regulated markets inside the European Union other countries (approved by the Czech National Bank),
- other various money market instruments that are not traded on the regulated markets inside the European Union nevertheless satisfy condition of liquidity and valuation,
- bank deposits of other banks (banks have to be under supervision of the central banks),
- collective investment funds satisfying conditions of regulation,
- individual instruments issued by individual legal entity (only to the limits sets by regulation),
- financial instruments of regulated markets as well as financial instruments that are not registered, only if and only if their underlying assets are instruments with direct investment possibility or interest rates, currencies, exchange rates and financial indexes.

3.1.2 Special funds

This type of funds is also connected with the European legal regulation. Special funds are funds of collective investment which are not consistent with UCITS. These funds can operate in the current country of the EU only with permission of the current financial market regulator. In the Czech Republic, special funds are regulated by the Act 189/2004 Col. but not by UCITS directives. Special fund can be an investment company, an open-end-fund or a closed-end-fund. The Act 189/2004 Col. divides special funds into 4 groups:

- Special fund of bonds – these funds are investing their financial resources into bonds and other instruments that can be traded in the public markets of the EU or other officially certified markets. Further, they can invest into mortgage debenture, government bonds, bank bonds and open-ended-funds (there is a limit of 20% from value of assets of the fund for one person).

- Special real estate fund – has to be open-ended-fund. Invests its financial resources into real estates or into a capital participation in the real estates companies. These companies can invest at most into 3 real estates in the country where the business takes place. Further, these companies can not have a capital participation in other company. Value of the real estate in the fund portfolio is limited by 20% of the total value of assets.
- Special fund of funds – invests financial resources mainly into other funds. These other funds have to be funds that are open for public. Also funds investing minimum of 10% of their assets into other funds are excluded. Limit is the same like in the special funds mentioned above – maximum 20%.
- Special fund of qualified investors – are mainly for institutional investors, such as savings syndicates, banks, pension funds, management companies, insurance companies, brokers and also government and the Czech National Bank. This fund has to have 100 participants with minimum investment of 1 000 000 CZK (the Czech National bank can change this condition).

In this work we will use classification of UNIS ČR (based on FEFSI⁴). This classification is similar as used before, but still there are some differences. UNIS ČR divides funds in the following groups according to the rate of risk of current assets:

- Equity funds – invest on the equity market. Invests at least 66% of all assets on this market (into shares and instruments with risk rate of shares). These types of funds include also index funds, guaranteed funds, shared index blocked funds.
- Bond funds – are similar as we mentioned before. Fund of bonds can invest also into shares, but proportion of investments into shares cannot exceed 10% of total value of fund assets.
- Money market funds – invest on the market of bonds or on the money market. Total modified duration of this fund cannot exceed 1 (or is classified as fund of bonds).
- Balanced funds.

⁴European Federation of Investment funds and Companies

- Fund of funds – invest at least 66% of total assets into share certificates and shares of funds.

4. The development of the mutual funds markets

In this chapter we will describe the history of the collective investment in the Czech Republic before the crisis. Firstly we will introduce development of the Czech mutual funds market from 2002 to the beginning of the financial crisis. Then we will summarize the influence of the crisis to the worldwide market, European market and lately to the Czech market. At the end of this subchapter there is summary and comparison of these mutual funds markets during the crisis.

4.1 The mutual funds market between 2002 and the financial crisis

The development of the Czech mutual funds in 90s could be characterized as the early period where all required institutions were founded. The foundation of the Czech mutual funds was one of the results of the voucher privatization. The voucher privatization was started by the publication of the Act 92/1991 Col. with the first wave on the 1st November 1991. In the period of the first wave the Act 248/1992 Col. was passed which governed management companies and investment companies. Second wave of the voucher privatization happened between 11th of April and 3rd of December 1994. In the end of the second wave there were 195 investment companies in the Czech Republic according to Liška & Gazda [2004]. There were founded three very important institutions as a result of the second wave of the voucher privatization in the Czech Republic. Firstly, the Bureau for Commercial Papers was found at the 1st of January 1997 as a part of Ministry of Finance. The Committee for Commercial Papers was founded by the Act 15/1998 Col. at the 1st of April 1998. Its existence was limited till the 31st of March 2006. Besides these two official authorities of supervision over the capital market, one professional association was found as well. The Union of Investment Companies of the Czech Republic (UNIS ČR) was found at the 12th of Jun 1996 and was accepted as a member of the European Federation of Investment Funds and Companies one week later. For detailed overview about the mutual funds in the Czech Republic between 2002 we can recommend Liška & Gazda [2004] or the annual press releases of the UNIS ČR.

We can say that year 2002 was very successful for the market with collective investment. Property owned by the open-end funds had risen for more than 60% which was the biggest growth in the Europe. This was natural because of the continuing decrease in the interest rates (Repo rate decreased from 4.50% at 22.1.2002 to 2.75% at 1.11.2002). Another reason was that the prevailing part (65%) of the household savings was still in the form of banks deposits. The increasing popularity of the collective investment in 2002 can be read that the distrust of the small investors to this type of investment was slowly decreasing. We can find continuing trend in consolidation of this market. The number of the management companies is decreasing but on the contrary the number of the open-end mutual funds is increasing. The most popular are money market funds with over 50% share of the whole amount invested in funds. Second are the bond funds with more than 23%. There was still significant size of financial resources invested in balance funds, but this could be because of the origin of these funds in the voucher privatization. We can suspect that the trend of these funds, the number of these funds but also the amount of the financial resources managing by these funds, has been decreasing. Last two types of funds, the equity funds and the funds of funds, had less than 2% share on the collective investment market with minor importance [Annual report of the AKAT ČR 2002/2003]. We can introduce the most important members of the Czech Capital Market Association. In 2002 the Investiční společnost České spořitelny, a.s. was the management company with biggest share of total assets managed by the Czech Capital Market Association members with more than 37%. Second was Investiční kapitálová společnost KB, a.s. with more than 22% (unfortunately, data of it's mutual funds are not available). Next one was ČSOB Investiční společnost, a.s. (7,31%), ČP INVEST investiční společnost, a.s. (4,60%), Pioneer česká investiční společnost, a.s. (2,67%) smallest from these 6 companies was J+T ASSET MANAGEMENT, INVESTIČNÍ SPOLEČNOST, a.s. with 1,72% share. There were some management companies with bigger share, as První investiční společnost, a.s. with more than 17% but it ended in 2003, that is why we had to exclude it from sample for our examination [Annual report of the AKAT ČR 2002/2003]. From this list of management companies we have chosen

- ČSOB Investiční společnost, a.s., člen skupiny ČSOB

- Pioneer investiční společnost, a.s.
- ČP INVEST investiční společnost, a.s.

for the availability of the needed data. There were problems with receiving data from the rest of management companies. The selected management companies are operating funds with characteristics that are closer to the stated definitions of different types of the funds.

In 2002 and also 2003 the transformation of the investment companies and close-end funds (as a heritage of the voucher privatization) into the open-end funds continued. Due to the legal changes, all funds founded in the voucher privatization had to change into open-end funds till the end of 2003 [Annual report of the AKAT ČR 2002/2003].

There were two main legal events which had influence on the mutual market investments in 2003. First was the amendment of the Act 588/1992 Col. Code VAT, second the amendment of the Act 248/1992 Col. about management and investment companies. Act 588/1992 had been amended in 1.10.2003 (before its end in 1.5.2004 – entrance of the Czech Republic into European Union). This amendment decreased the value of equity of the open-end funds by 8,5 billion CZK (from 114,4 to 105,9 billion CZK) in the third quarter of 2003. Consequences of this amendment could be seen also in the statistics of the September 2003. During this month the property of the open-end funds decreased by 10,3 billion CZK, from 116,2 to 105,9 billion CZK. The total net sales in September 2003 were -9,9 billion CZK [Press Release AKAT ČR, 14.10.2003]. Second legal change which had influence on the market with mutual funds was amendment of the Act. 248/1992 Col. It prohibited paying dividends more then one time per year. Nevertheless, the property managed by the management companies in the Czech Republic increased from 99,9 to 105,2 billion CZK as a whole in 2003. Highest net sales were made with the bond funds (6,5 billion CZK), followed by the money market funds (2,3 billion CZK). We can say that in 2003 the distrust of the retail investors to the investments into the mutual funds finally disappeared. New trend at the mutual fund market was increasing interest for the money market funds and decreasing interest for the bond funds in 2003 [Annual report of the AKAT ČR 2003/2004]. The Czech Securities Commission agreed for the first time with the technical break during the turn over of the years

2003 and 2004. Management companies had the opportunity to interrupt their activities between 31.12.2003 and 6.1.2004 (including) – 4 working days. The management company could decide the duration of this break but the break should be as short as possible and of course announced to clients. This break was introduced because of the operations connected with closing accounting books.

In the beginning of 2004 the Act 168/1999 Col. was passed by the legislature. This Act amended the Act 588/1992 Col. Code VAT. This amendment changed, with effect from 1.1.2004, the rate of VAT for domestic funds from 15% to 5%. During 2004 the property managed by management companies increased from 105.2 to 109,2 billion CZK. Again, the money markets funds made the highest contribution of 11.1 billion CZK, followed by the equity funds with 1,1 billion CZK of net sales. On the contrary the mixed funds and bond funds faced the negative net sales of 7.7 respectively 6.6 billion CZK. Total sales in 2004 were 33,3 billion CZK and redemptions were 35.2 billion CZK which makes total net sales for 2004 almost -2 billion CZK [Annual report of the AKAT ČR 2004/2005]. In the end of 2004 the Czech Securities Commission⁵ made agreement with the board of directors of the Union of Investment Companies of the Czech Republic and allowed the technical break during the turn of the years 2004 and 2005. Management companies had opportunity to interrupt the shares (share certificates) rate announcing and their sales and redemptions between 31 December 2004 and 6 January 2005 (5 working days). This technical break was allowed because of the change of the accounting standards from assets/liability accounting to accounting based on income statements that year. This change has started on 1st January 2005 [Press Release AKAT ČR, 14.12.2004].

The beginning of 2005 brought statistics which we use for clarification, that explains why it is sufficient to work with the numbers from AKAT CR. Due to the reporting duty of the AKAT CR members we can read that 42 members and partners of AKAT CR are representing: 95% of the stock market on the Prague Stock Exchange, 95% of the market with the foreign funds in the Czech Republic, all market-makers on the Czech market with bonds and all market-makers of the stock market on the Prague Stock Exchange [Press Release AKAT ČR, 24.2.2005]. In

⁵ The Czech Securities Commission ceased to exist from 1 April 2006. As of 1 April 2006, the activities of the Czech Securities Commission were taken over by the Czech National Bank.

2005 the Czech Capital Market Association finished preparation of the amendment of the Act about collective investment in the Czech Republic. This amendment should also help to develop the market with mutual funds. Let us summarize the total increases in property of management companies in 2005 and also the trend of sales and redemptions. Property managed by management companies in the Czech Republic rose from the 109,2 to the 135,2 billion CZK. This increase was mainly due inflow of finance resources to the money markets funds, where the net sales were 10,7 billion CZK. Second were bond funds with 3,6 billion CZK, followed by the fund of funds with 2,6 billion CZK, the equity funds with 1,7 billion CZK. On the other hand, the mixed funds faced the negative net sales of 0,5 billion CZK. Total sales were 52.4 billion CZK, total redemptions 34.2 billion CZK what made total net sales of 18.2 billion CZK. We can say that in 2005 the mutual funds market was continually growing as a whole [Annual report of the AKAT ČR 2005/2006]. There was again the technical break during the turn over of 2005 and 2006, concretely between 30.12.2005 and 6.1.2006 included [Press Release AKAT ČR, 20.12.2005].

This trend is obvious also in 2006. There were made some changes in the structure of the Czech Capital Market Association which broadened its scope to the field of asset management. The new name was introduced: Association of Funds and Asset Management of the Czech Republic (AFAM CR). This institution has been representative body of collective investment and asset management industry in the Czech Republic since that time. In the beginning of June 2006 the Act. 189/2004 Col. about the collective investment was amended. This amendment brought new type of funds, the real estate funds into the mutual fund market. As we said the increasing trend is continuous as the numbers can prove. The property of the management companies (associated in the AFAM CR) increase to 147,5 from 135,2 billion CZK (growth of 12,3 billion CZK). Sales of all types of funds together were 46,6 when redemptions were 38.2 billion CZK, which meant the total net sales of 8,4 billion CZK [Annual report of the AKAT ČR 2006/2007]. As it became regular, there was a technical break during the turn over of 2006 and 2007. Management companies could stop to sell or to repurchase shares certificates in this period [Press Release AKAT ČR, 18.12.2006] In the end of 2006 there were all reasons for optimistic prediction of the industry of collective investments. The total net sales were rising as

well as the total level of property managed by management companies in the Czech Republic. Experts were anticipating that investors were ready to move towards the more risky funds as the collective investment became more popular. This trend was apparent in 2006 already. That was situation one year before the crisis came in 2008.

The property in the management funds increased in 2007 by almost 44 billion CZK (it meant 16,19%) from 271 to 315 billion CZK. The five major management companies in 2007 were ČSOB, Česká spořitelna, PPF Asset Management, ING Group, Komerční Banka. We can see that 4 of these we have chosen earlier. ING Group is of course foreign management companies. We will discuss foreign management companies later. The most significant increase of the property was in the equity funds, followed by the equity funds, funds of funds, balanced funds, money market funds and real estates funds. Bond funds were the only group with decrease in the total amount of their assets. As became regular, there was the technical break over the turn over of the year 2007 and 2008, concretely between 31.12.2007 and 4.1.2008 [Press Release AKAT ČR, 17.12.2007].

We can summarize the trend between 2002 and 2007. Total net sales were continuously growing, except 2004 when the amendment of the Act 588/1992 Col. was passed. There were significant changes between the types of funds, but this will be examined later in this work. We can get better insight in the basic trend of the collective investment by summarizing the total value of the property managed by the management companies in the Czech Republic. This value had been significantly growing since 2002 until the beginning of the financial crisis in 2008.

4.2 The mutual funds market during the financial crisis

The last financial crisis came in 2008. In this chapter we will summarize the main events related to the crisis. We will need the exact time sequence of the crisis to make later statistical analysis of the development on the Czech mutual funds market. We will point out just the main and most important events that took place in the financial world. We will also follow the time sequence of the consequences of the financial crisis in the Czech Republic.

4.2.1 Time definition of the financial crisis

The first significant signals of the upcoming crisis could be seen in the beginning of 2007, precisely in February 2007, when the Federal Home Loan Mortgage Corporation⁶ announced that it is no longer willing to buy the most risky subprime mortgages-related securities [Freddie Mac Press Release, 27.2.2007]. This was followed by the bankruptcy protection for New Century Financial Corporation, a leading subprime mortgage lender, on April 2nd 2007 [New Century Financial Corporation Press Release, 2.4.2007]. The fact that not everything is all right became obvious to rating agencies as well. Standard and Poor's and Moody's Investor Services decreased grades to over 133 bonds backed by second-lien subprime mortgages [testimony of Vickie A. Tillman, Executive Vice President, Standard and Poor's, page 24, paragraph 4, 27.9.2007]. Next month, July 2007, Standard and Poor's placed 612 securities backed by subprime mortgages on a credit watch [Standard and Poor's Rating Direct, 11.7.2007]. In August 2007, American Home Mortgage Investment Corporation filled for Chapter 11 bankruptcy protection⁷, as one of the indications of more serious upcoming troubles [U.S. Securities and Exchange Commission Press Release, 6.8.2007]. The same was the emergence need of liquidity of Northern Rock, the United Kingdom's fifth-largest mortgage lender in September 2007. This liquidity was provided by the Bank of England [United Kingdom Treasury Department Press Release, 14.9.2007]. These all are indicators of the beginning of the crisis. For further analysis in the second part of this diploma we will be working with the third quarter of 2007 as the beginning of the financial crisis on the world and the European mutual fund market. For the Czech Republic we will suppose that the crisis came later. According to the AKAT ČR, the financial crisis reached the Czech mutual funds market in the 3rd quarter of 2008 and this is date which we will use for the analysis of the implication on the Czech mutual funds market [Press Release AKAT ČR, 29.9.2008].

The end of the crisis could be signalized by the EFAMA Statistical Release about the first quarter of 2009. We can see that UCITS posted net inflows of 22

⁶ Freddie Mac.

⁷ The chapter of the Bankruptcy Code providing (generally) for reorganization, usually involving a corporation or partnership. A chapter 11 debtor usually proposes a plan of reorganization to keep its business alive and pay creditors over time. Business owners and individuals can also seek relief in chapter 11. - definition from Federal Reserve Bank of St. Louis (www.stlouisfed.org)

billion EUR in this period. This is very contrasting with the net outflows recorded by UCITS during six consecutive quarters following the crisis in the summer of 2007 [EFAMA, Quarterly Statistical Release, No. 37]. In the Czech Republic we will work with different date according to the statement of the AKAT ČR. In the press release from the August 2009 we can read that the trend returned to the trend which was before crisis [Press Release AKAT ČR, 10.8.2009]. For the Czech mutual funds market we will use the 2nd quarter of 2009 as the end of the crisis implication. It is clear that this end of the crisis is meant as the end of the direct implications of the crisis on the mutual funds market.

4.2.2 Crisis and the mutual funds market in the World

We will introduce the effects of the crisis on the trend of the World mutual funds market in subsequent paragraph. The brief history of the end of 2007 and later development would be enough. We will use the press releases and the statistics published by the European Fund and Asset Management Association (EFAMA).

In the last quarter of the 2007 we could see the year-to-year increase in investment companies assets worldwide by 7,9% to 17,8 trillion EUR. Decrease in the last quarter of the year by 2,2%. Net cash flow was 299 billion EUR in the last quarter (compared to 261 billion EUR in the third quarter). Quarter-to-quarter development of asset levels was decreasing for all funds types but for the money market funds. Assets of equity funds decreased by 4,1%, bond funds by 2,1%, balanced funds by 2,6%. Money market funds grew by 2,3%. The funds types among the different world regions were as follows. Equity funds flows were 60 billion EUR worldwide in the fourth quarter (23 billion in third). Main contribution was made by the Asia/Pacific region with 39 billion of equity flows and by the United States with 35 billion EUR. Europe was facing net outflow of 25 billion EUR (22 billion in the third quarter) [EFAMA, International Statistical Release, 16.4.2008].

Bond funds were continuing in the trend of net outflows with 19 billion EUR in fourth quarter of 2007 (37 billion EUR in third). Net inflows were just in the United States 23 billion EUR (15 billion EUR in third). In other regions were net outflows as following: the Asia/Pacific 2,4 billion EUR (compared to 1,2 billion EUR), Europe 32

billion EUR (46 billion EUR in third quarter). Balanced funds were experiencing net inflows of 31 billion EUR [EFAMA, International Statistical Release, 16.4.2008].

The second biggest part of mutual market was still in money market funds. In the last quarter of 2007 the net inflows into them were 168 billion EUR, which was decrease to the previous quarter (205 billion EUR). Net inflows were just in the United States at 184 billion EUR (to 227 billion EUR in third quarter). The rest of the world was facing net outflow: Europe 13 billion EUR (to 20 billion in the third quarter) [EFAMA, International Statistical Release, 16.4.2008].

Worldwide investment companies' assets were divided as follows at the end of December 2007. Assets of equity funds were 48% (41% by the number of funds), money market funds 19% (5%), bond funds 16% (20%) and balanced funds represented 10% (21%). The total amount of investment funds at the end of 2007 was 66350 [EFAMA, International Statistical Release, 16.4.2008].

In the first quarter of 2008 investment funds assets worldwide decreased by 11,7% (to 15,7 trillion EUR). The main reason of this decrease was in depreciation of the U.S. dollar which mostly influenced equity and bond markets. Net cash flows were 285 billion EUR in the first quarter 2008 (302 billion EUR in the fourth quarter of 2007). The main significant change in trend could be seen in bond funds with a net inflow of 8 billion EUR (21 billion EUR net outflows last quarter). There was also change in combined outflows of equity and balanced funds of 97 billion EUR (compare to 87 billion EUR inflows last quarter). Significant increase of net flows was in money market funds with 326 billion EUR (last quarter: 173 billion EUR) [EFAMA, International Statistical Release, 26.8.2008].

The level of asset decreased at all funds types except at money market funds. The decrease was: of equity funds by 20,7% (to 6,7 trillion EUR), of bond funds by 8,1% and of balanced fund by 11,8%. Money market funds had assets increase by 5,4% to 3,6 trillion EUR. Equity funds were facing worldwide outflows of 87 billion EUR in the first quarter. Outflows were in the United States and in Europe of 24 respectively 75 billion EUR. The inflows to equity funds in the Asia/Pacific region were lower than quarter before, at 21 billion EUR. Bond funds were facing net inflows of 8 billion EUR. Mainly due to inflows of 40 billion EUR to bond funds in the United States because European bond funds were facing outflow of 40 billion EUR. Flows

into balanced funds changed from inflows (29 billion EUR) into outflows (10 billion EUR) in the first quarter of 2008. European balanced funds faced 11 billion EUR net outflows. In the United States remain positive but lower than last quarter at 3 billion EUR. In the Asia/Pacific region were 1 billion EUR inflows. The net inflows into money market funds nearly doubled in the first quarter to 326 billion EUR. In the United States were 225 billion EUR and in Europe inflows were at 83 billion EUR (in contrary to net outflows last quarter). At the end of the first quarter of 2008 the assets of equity funds were representing 43% (41% by the number of investment funds worldwide) of all investment companies' assets, bond fund were representing 17% (20%), money market fund 23% (5%) and balanced fund represented 10% (21%) of the total. The total number of investment funds at the end of first quarter of 2008 was 67180 [EFAMA, International Statistical Release, 26.8.2008].

The second quarter of the 2008 was the last one without the influence of the "official" start of the crisis. The numbers are following. Investment companies assets worldwide decreased by 0,4% to 15,6 trillion EUR. Net cash flow to all funds together was positive at 17,5 billion EUR. Changes in assets of the fund types were very low. Assets of equity funds fell by 1,3% (6,6 trillion EUR at the end of the second quarter of 2008, balanced funds fell by 0,4%, bond assets declined by 0,5% and money markets funds fell by 0,1% (3,5 trillion EUR). [EFAMA, International Statistical Release, 27.10.2008].

In the second quarter of 2008 investment funds were facing net inflow of 18 billion EUR. Net flow into equity funds was 18 billion EUR. The inflow in the United States was 22 billion EUR and 15 billion EUR in Europe. In the Asia/Pacific region was facing slowdown to 10 billion EUR. Bond funds had almost the same inflow like in the first quarter, 9 billion EUR compared to 8 billion EUR. In the United States the net inflow to bond funds was 35 billion EUR, which was little bit less then in the first quarter. In Europe there were net outflows of 25 billion EUR. Balanced funds experienced the same size of net inflows as in the previous quarter outflows, 10 billion EUR. Increase of inflows was in the United States, to 7 billion EUR and also Europe turned from net outflows into net inflows of 11 billion EUR. Money market funds experienced net outflows after 12 consecutive quarters of net inflows (the first quarter of 2005). Net outflows were 45 billion EUR. In the United States were

outflows 41 billion EUR compared to 225 billion EUR of inflow in the first quarter. European money market funds were facing net outflow of 18 billion EUR. The percentual parts of each fund types were almost the same: 42% (40% from the all funds) of worldwide mutual fund assets were held in equity funds, 23% (5%) in money market funds, 17% (18%) in bond funds, and 10% (21%) in balanced funds. The number of funds increased to 68469 [EFAMA, International Statistical Release, 27.10.2008].

As we know, the financial crisis has “officially” started in the September 2008. Now we will provide excursion through the third period of 2008 in which the crisis influence should be most apparent.

There was still continual decreasing trend in investment companies' assets development. In third quarter it decreased by 3,1% to 15,1 trillion EUR what is not such a dramatic decrease which we would expected. Investment funds were facing net cash outflow of 149 billion EUR. Net outflows into equity funds were 100 billion EUR. In the United States the outflows were at 62 billion EUR and in Europe outflow was almost three times higher than the quarter before, at 43 billion EUR. In the Asia/Pacific region were net inflows of 6 billion EUR. Bond funds experienced 44 billion EUR in net outflows (change from the net inflow from previous quarter). In the United States were net inflows of 16 billion EUR. Contrary to Europe where there was a continuous trend of net outflows, with 40 billion EUR in the third quarter. Bond funds turned into negative also in the Asia/Pacific region, to 14 billion EUR of net cash outflow. Outflows were also from the balanced funds. In the United States at 3 billion EUR and European balanced funds were facing net outflows of 6 billion EUR. Money market funds turned back to inflows. Net flows into them were 19 billion EUR. Both in the United States and in Europe there were net inflows into money market funds, together at 31 billion EUR. As it became clear Asia/Pacific money market funds were facing outflow of 12 billion EUR [EFAMA, International Statistical Release, 9.2.2009].

At the end of third quarter of 2008 the proportional distribution of worldwide assets was as follows: equity fund 40% (40% from the amount of all funds), money market fund 25% (5%), bond fund 18% (18%), and balanced fund 10% (21%). The

number of mutual funds worldwide increased to 69477 [EFAMA, International Statistical Release, 9.2.2009].

We can say that the implication of the crisis could be seen in the fourth quarter of 2008. In this quarter, investment companies assets decreased by 10% to 13,63 trillion EUR. Outflows from the previous quarter were reversed into inflows of 82 billion EUR. This paragraph states how different fund types were participating on this inflow. The money market funds experienced 337 billion net cash inflow. In the United States it was the major part, the 297 billion EUR. Asia/Pacific region contributed with net inflows of 44 billion EUR. And European money market funds were facing net outflow of 2 billion EUR. Equity funds experienced 92 billion EUR of net cash outflow in the fourth quarter. The United States' part was 56 billion EUR outflow and as well as Europe showed slowdown in outflow of 27 billion EUR. The Asia/Pacific region demonstrated reversion of cash flows into 7 billion EUR of net outflow. The bond funds as a whole experienced net outflows of 119 billion EUR with 33 billion EUR participation of the United States. Outflows in Europe accelerated to 70 billion EUR. The Asia/Pacific region showed the reversion again and had 1 billion EUR of net inflows. Balanced funds were facing outflows of 42 billion EUR in the fourth quarter. There were 26 billion EUR of net outflows in Europe and 12 billion EUR in the United States. [EFAMA, International Statistical Release, 11.5.2009].

Composition of worldwide investment companies' asset started showing the change in the trend. There were still majority of 35% (41% of total number of funds) in equity funds, followed by 18% (18%) of bond funds, 9% (21%) of balanced funds and 31% (5%) of money market funds. The total amount of mutual funds worldwide decreased to 68574 [EFAMA, International Statistical Release, 11.5.2009].

Assets of worldwide investment companies decreased to 13,64 trillion EUR at the end of the first quarter of 2009. Net cash flows were 44 billion EUR which was almost medium of the last quarter of 2008. Divided by the type of funds the changes were as follows. Net outflows from equity funds were 31 billion EUR (one third of the level the quarter before). Outflow slowed in the United States to 28 billion EUR as well as in Europe, where the net cash outflow was 4 billion EUR. The Asia/Pacific region was facing small net inflows of 630 million EUR. Balanced funds continued in outflows but also slower than a quarter before. Outflows were 17 billion EUR. The

level of outflow was 10 and 5 billion EUR in Europe, respectively in the United States. Bond funds had different trend than two mentioned types of funds and then the last quarter as well. There were experienced net inflows of 45 billion EUR. In Europe were net outflows of 4 billion EUR. The U.S. bonds had net inflows of 51 billion EUR. The Asia/Pacific region experienced change from net inflows into 5 billion EUR of net outflows. Money market funds faced significant change in the pace of inflows. In the first quarter of 2009 there were net inflows of 49 billion EUR (337 in the previous quarter). In the United States the change was obvious, from 297 billion EUR of inflows to 14 billion EUR of net outflows. European money market funds strengthened to 52 billion EUR of net inflows. The opposite trend was in the Asia/Pacific region with slowdown to 2 billion EUR inflows. Composition of worldwide investment company asset in percent was: equity funds 33% (39% of the total number of funds), money market funds 32% (5%), and bond funds 19% (18%) and balanced funds 9% (22%). The total number of funds was 66988 [EFAMA, International Statistical Release, 29.7.2009].

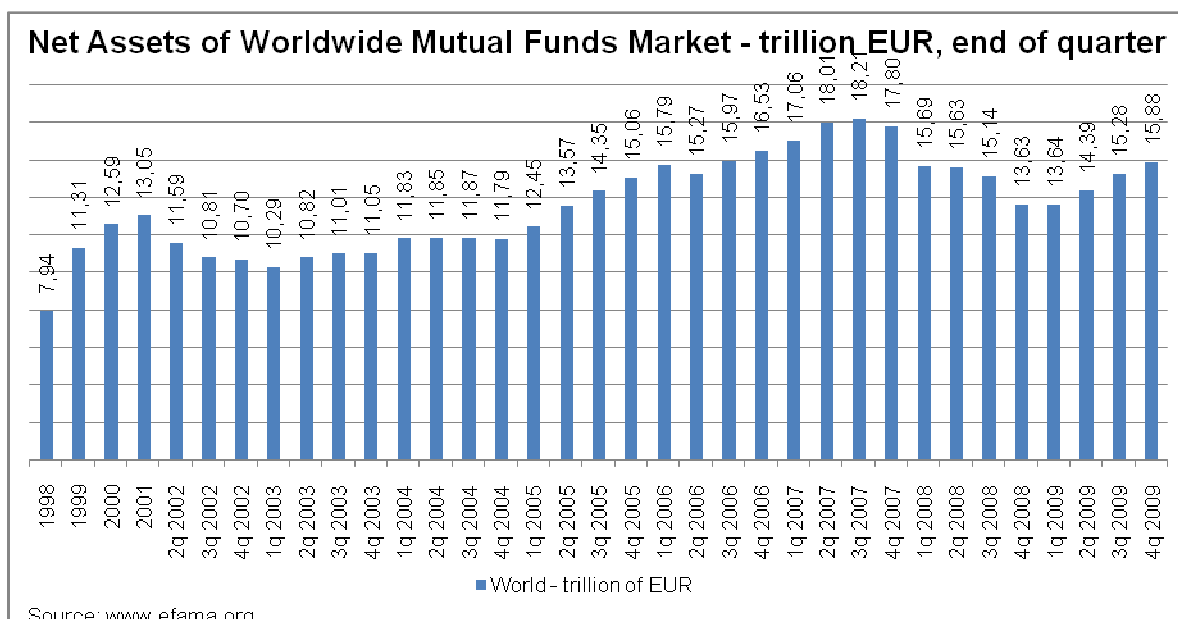
Investment companies' asset increased worldwide by 5,45% to 14,39 trillion EUR. Net cash flow was positive at 84 billion EUR. We will demonstrate concrete changes by funds types in following paragraph. Equity funds turned into inflows of 68 billion EUR. American and European equity funds inflows were 39 and 23 billion EUR. The significant increase of inflow was also in the Asia/Pacific region with 6,3 billion EUR. Change into net inflow was in balanced funds also. It was at 26 billion EUR with 17 billion EUR of inflows in Europe and 8 billion EUR in the United States. Bond funds accelerated to the net inflows of 121 billion EUR. The United States experienced 78 billion EUR net inflows. In the Asia/Pacific region as well as in Europe, the trend was turned into positive with 20 billion EUR each. Money market fund turned negative in this period with 156 billion EUR outflows as a whole. American money market funds faced net outflows of 118 billion EUR. European money market funds were at 25 billion EUR outflows. At the end of the second quarter of 2009 percentual allocation of funds asset was: 36% (39% of the total number of funds) were held in equity funds, 19% (18%) in bond funds, 10% (22%) in balanced funds and 28% (5%) in money market funds. The total number of funds decreased to 66472 [EFAMA, International Statistical Release, 29.10.2009].

Assets of investment companies continued to grow. In the third quarter of 2009 by 6,2% to 15,28 trillion EUR. Net cash flow to all funds was 73 billion EUR which meant the fourth consecutive quarter with positive net flows. Equity funds experienced 47 billion EUR net inflows. Increase of net inflows was in Europe and Asia/Pacific region with 26 and 13 billion EUR, respectively. The United States slowed to 8 billion EUR. Balanced funds more than doubled net inflows to 46 billion EUR. The United States registered net inflows 13 billion EUR into balanced funds. Net inflows into balanced funds were 19 billion EUR in Europe. Inflows into bond funds were still increasing to 153 billion EUR. Mainly due to increase of inflows in the United States and Europe with 99 and 34 billion EUR net inflows, respectively. The Asia/Pacific region faced 9 billion EUR of net inflows. Money market funds registered opposite trend. Strong net outflows were at 190 billion EUR. This was mainly caused by the significant increase to 159 billion EUR of outflows in the United States. In the third quarter of 2009 still the biggest part of assets were held in equity assets. It was 38% (39% of the total amount of funds) in equity funds, 19% (18%) in bond funds, 10% (22%) in balanced funds and 25% (5%) in money market funds. The number of mutual funds decreased to 66110 [EFAMA, International Statistical Release, 27.1.2010].

The trend of the investment companies' development stayed the same on the last quarter of 2009. Worldwide assets of investment companies increased to 15,93 trillion EUR, which was increase by 4,3%. Equity funds held net inflows at 42 billion EUR. Inflows into equity funds declined in Europe to 22 billion EUR. On contrary, inflows increased in the United States to 14 billion EUR. In 2009 equity funds faced inflows of 127 billion EUR when more than half was collected in Europe. Inflows into balanced funds were 31 billion EUR, which meant slowdown. In the United States inflows were 10 billion EUR and Europe experienced 19 billion EUR net inflows. In total, net inflows into balanced funds were 86 billion EUR per 2009. Total amount collected by the European and United States balanced funds was 81% together. Bond funds were facing slowdown of inflows at 121 billion EUR. Net inflows in the United States were 87 billion EUR. In Europe the slowdown was more obvious with 23 billion EUR inflows. For 2009, bond funds registered 440 billion EUR inflows mainly due to the United States funds with 72% of total. Money market funds

decelerated to 139 billion EUR outflows. Outflows in the United States were almost at half of the previous quarter, 81 billion EUR. On the other hand, outflows of European funds accelerated to 61 billion EUR. Money market funds experienced net outflows of 444 billion EUR in 2009 (in 2008 it was 636 billion EUR inflows). In the United States the outflows were 372 billion EUR. In the end of 2009, 39% (40% of the total number of funds) of worldwide investment companies' assets were held in equity funds, followed by 20% (19%) in bond funds, 10% (22%) in balanced funds and 23% (5%) in money market funds. [EFAMA, International Statistical Release, 28.4.2010].

Graph 1: Net Assets of Worldwide Mutual Funds Market, from 1998 to 4th quarter 2009



To get a better overview about the development of worldwide mutual funds market, we put collected data into the showed graphs (Graph 1 and Graph 2). We can see an increasing trend of net asset (Graph 1) operated by management companies on the world mutual fund market from the end of 2002 to the first half of 2007. To timeline of the crisis corresponds the decrease of net assets from the second half of 2007 to the first quarter of 2009. This led us to formulate the Hypothesis 4.

Hypothesis 4: The financial crisis influenced the level of net assets of the mutual funds industry.

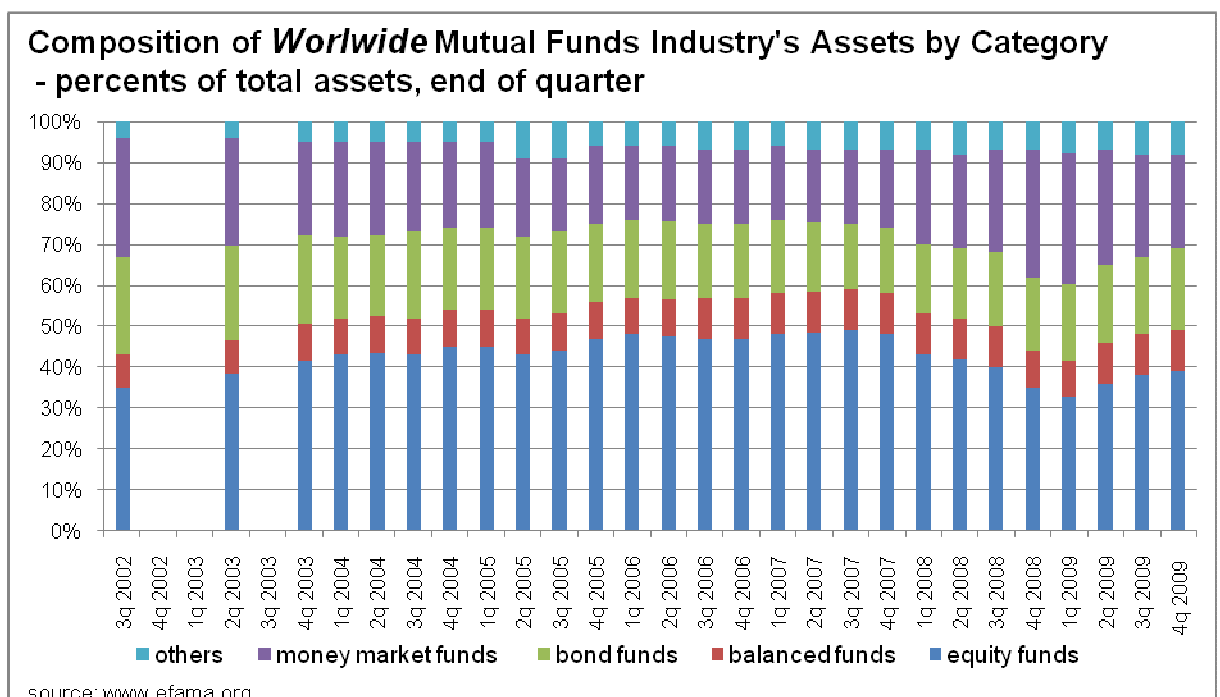
Graph 2 shows the change of distribution of the different types of funds during the crisis. It is clear that there had been almost constant shares of particular types of

funds during the period from 2002 to the beginning of the crisis at the first half of 2007. From this graph we could estimate, that the biggest change was related to the share of equity funds and money market funds. We can formulate another hypothesis

Hypothesis 5: The financial crisis had influence on the percentage composition of mutual funds market.

Analysis of this hypothesis with standard econometrical tools is presented in the second part of this diploma.

Graph 2: Composition of worldwide investment assets – from the 3rd quarter 2002 to 4th quarter 2009.



4.2.3 Crisis and the mutual funds market in Europe

We would like to examine, whether the trend in Europe was the same as globally or not. We will start one year before the “official” start of the crisis, it means we will go from the fourth quarter of 2007 to the first quarter of 2010. We will try to point out the main trends and the main events that occurred after the financial crisis appeared. This analysis will help us to set the main causes of trends in the Europe market with mutual funds which have had the main influence to the Czech mutual funds market. Some information will be in the same style like in the previous chapter, but we will try to point out the main causes of changes in trend also. We will use

mainly the press release (Quarterly Statistical Releases) published by EFAMA. There is one important fact about the data of collective investments in Europe. Undertaking for Collective investment in Transferable Securities (UCITS) is a tool which should allow collective investments companies to operate freely through EU. UCITS is set of European Union directives and the first UCITS I was adopted in 1985 and the last one (UCITS IV) has been approved on 13 January 2009 and will be implemented in 2011. In the following chapter we will distinguish between the funds with the UCITS status and without.

Assets of the European investment companies grew to 7925 billion EUR at the end of 2007 (increase of the fourth quarter of 2007 was 400 billion EUR). From that amount the UCITS had total net assets of 6203 billion EUR and raised by 4,2% when non-UCITS assets grew by 5,3% to 1723 billion EUR. In the third and fourth quarter there were significant net outflows from UCITS caused by increased risk aversion of investors in Europe. Money market funds were most affected because of their exposure to asset backed securities. Balanced funds remains the most demanded throughout Europe [EFAMA, Quarterly Statistical Release, No. 32].

In the fourth quarter of 2007 UCITS faced net outflows of 40 billion EUR (61 billion EUR outflows during the previous quarter). The cause of this could be in financial market conditions. Continuing stock market volatility together with rising interest rates accelerated the demand for safety portfolios during the second half of 2007. This year was excellent for Central Europe, which experienced increase of UCITS funds by 34% on average. The good performance of balanced and money market funds in terms of net sales could be seen also as positive trends in 2007. Highest level of net outflows in the last quarter was in bond funds (32 billion EUR), followed by equity (25 billion EUR) and money market funds (13 billion EUR). For whole year the net outflows were 58 billion EUR in equity funds and 60 billion EUR in bond funds. Balanced funds continued growing with net inflows as well as money market funds [EFAMA, Quarterly Statistical Release, No. 32].

Closer look at change in trend of investments in 2007 will help us to set the regression in the following part of this paper. Significant change was the shift of investor demand away from equity and bond funds. Demand for equity funds was decreased by the rise in stock marker volatility. The bond funds were influenced by

rising interest rates in 2006 and 2007. Bond funds suffered from other development as well. Market interest rates passed to interest rates on short-term bank deposits, which made bank deposits more attractive. The investors demand for equity funds showed the similar development as in 2002. The trend was that following a period of rising stock prices connected with inflows into equity funds. Later investors reacted to downward market correction by decrease of their net purchases of equity funds. The trend was supposed to show strongly in 2007. Bond funds are connected with the financial market development and showed similarities with 2000. In these years, rising of short and long-term interest rates caused outflows from the bond funds. In 2007 was this trend supported by rising spread due to concerns about credit and liquidity risks [EFAMA, Quarterly Statistical Release, No. 32].

The first quarter of 2008 was the third consecutive quarter when UCITS experienced net redemptions in value of 31 billion EUR. Equity funds were facing the highest outflow (77 billion EUR) due to the large stock market declines reflected by investors. Bank savings products with good deposit rates and guarantees were another cause of this outflow. Balanced funds suffered outflows of 9 billion EUR for the first time in recent years mainly due to the huge outflows from money market funds in France. Money market funds registered total inflows of 82 billion EUR, which was a change in trend of two last quarters. This significant inflow could be caused by the traditional trend of strong performance in the first quarter of the year but it could also mean the return of the investors' confidence in money market funds after two very rough quarters [EFAMA, Quarterly Statistical Release, No. 33].

Net assets of UCITS members fell by 8% to 5704 billion EUR at the end of March 2008. Divided by the fund types, all registered fall in assets except money market funds. This fall started in March 2007. Since that time total assets of UCITS fell by 7,8%. Main cause of this development could be seen in the fall in stock prices – as well as net outflows from equity and bond funds together. This had to show in the share of equity fund assets in total UCITS. It fell from 40% at the end 2007 to 36%. Money market funds increased their share to 20% from 16% [EFAMA, Quarterly Statistical Release, No. 33].

In the second quarter of 2008 trend in outflow from UCITS continued with 59 billion EUR. This trend was supported by the reverse in the flows to money market

funds. The changed from net inflows into net outflows of 18 billion EUR. On the other hand outflows from equity funds slowed to 16 billion EUR. This development was surprising due to continuing losses and uncertainty at stock markets. Outflows from bond funds also decreased and flows into balanced funds turned to inflows of 1 billion EUR [EFAMA, Quarterly Statistical Release, No. 34].

Total net assets of UCITS decreased by 1,3% in the second quarter and stopped at 5584 billion EUR. Fall in assets were facing all fund types, except funds of funds. In the first half of the year total assets of UCITS fell by 9,4% mainly because of development in the first quarter. For illustration the Dow Jones STOXX lost 16,1% between end of 2007 and end of March 2008. The share of equity funds in total UCITS reflected this development and fell to 35% at end of June 2008. Money market funds increased their share to 21% compared to 16,5% at the end of 2007 [EFAMA, Quarterly Statistical Release, No. 34].

We stated that the decline in stock prices combined with the chaos on the credit markets had started in 2007 and led to loss of investor confidence. This trend was supported by the bankruptcy of Lehman Brothers. The “official” beginning of the crisis led to higher competition from banks and caused a substitution from investment companies to bank deposits. The most suffered equity funds with net outflows of 134 billion EUR in September. In the same situation were bond funds and balanced funds with outflows of 105 and 16 billion EUR, respectively. The different direction had flows to money market funds. New cash inflows were 72 billion EUR [EFAMA, Quarterly Statistical Release, No. 35].

In the third quarter net outflows grew to 92 billion EUR. It was the higher quarterly outflow ever in the UCITS industry. This was caused by the unprecedented volatility in bond and credit markets and of course because of unpredictable consequences of the events in the real economy. The third quarter was witnessing net redemptions from all categories of long-term UCITS⁸. Compared to the second quarter outflows were higher. Money market funds stayed the only type with net inflows [EFAMA, Quarterly Statistical Release, No. 35].

⁸ Long-term UCITS are: equity, bond and balanced funds.

We need to take a closer look at the significant decrease in net sales of equity funds caused by the evolution of stock prices. During the first half of 2007 there were offered high yields by bank deposits which led to withdrawing money from equity funds. The investor had been on alert from the start of the crisis and that was why they could react in such a way. [EFAMA, Quarterly Statistical Release, No. 35].

The financial crisis in money markets together with credit markets brought more pressure on bond funds. Money market funds are reflecting short-term interest rates and that is why money market funds assets were rising in 2006. Rising trend was continuous during the 2007 and also (but little bit slower) in 2008. Slowdown was caused by few factors, higher competition from banks with new debt securities with higher rates than the money market funds. These actions of banks were mainly to cope with liquidity crisis, drying-up of liquidity in money markets and influence from the difficulties of U.S. money market funds caused by Lehman Brothers default [EFAMA, Quarterly Statistical Release, No. 35].

Net assets of UCITS fell by 6,4% to 5181 billion EUR. Decrease of equity funds assets accounted for over 77% of this change. Losses in stock prices caused 82% of decrease of equity fund assets. The share of equity fund assets had to reflect this development and it turned to fall to 33%. Money market funds on the other hand increased their share to 23% at the end of September [EFAMA, Quarterly Statistical Release, No. 35].

Although it was not so obvious from the development of the world mutual fund market, 2008 was a very hard year for European investors. Crisis in financial markets which officially started in September 2008 was influencing financial markets much earlier, since summer 2007. In collective investment it could be seen as a decline in stock prices and equity funds assets. Next to this trend bond funds outflows were influenced by the liquidity crisis and the bankruptcy of Lehman Brothers. Further difficulties were caused by increased competition from structured products and bank deposits (mainly in countries where the banks are prevailing channel for saving products). Decision of European governments to provide guarantees for all bank deposits make the competition for deposits even higher. Recession which threatened Europe in the second half of 2008 decreased investors' demand for mutual funds. This result is in line with the theory of importance of stable economic conditions for

household demand for mutual funds. The European fund industry in 2008 can be characterized as follows: investment companies' assets fell by 22% to 1768 billion EUR, UCITS experienced net outflows of 335 billion EUR. Almost 40% of these outflows were recorded in October as a result of investors that tried to protect their investments by aggregating cash. This run on funds was stopped in November by proclaimed bailout plans and others stimulations from governments and central banks. The trend changed into net inflows into equity and bond funds during December 2008 [EFAMA, Quarterly Statistical Release, No. 36].

Outflows from UCITS increased to 142 billion EUR in the fourth quarter, which was the biggest outflow of the industry during single quarter. Strongest outflows were from bond funds, 69 billion EUR. Bond funds had the highest outflows as total during the whole year. Money market crisis demonstrated itself in flows into money market funds as well. Equity funds registered slowdown of outflows in the fourth quarter. Total assets of UCITS reached 4593 billion EUR at the end of 2008, i.e., decrease by 11,3% in the fourth quarter. In total, assets in UCITS fell by 25,4% during 2008. Almost 70% of the fall was caused by decrease of equity funds' assets. Stock prices losses caused 58% of the total decline of UCITS assets. Share of equity funds assets was 30% at the end of 2008. Money market funds on the other hand, raised their share to 25% which meant that money market funds had second largest share at market [EFAMA, Quarterly Statistical Release, No. 36].

Trend of outflows from last 6 quarters was changed in the beginning of 2009. Net inflows were 22 billion EUR. This development was caused by high net inflows into money market funds at 52 billion EUR and slowdown to 31 billion EUR of outflows from long-term UCITS, mainly bond and equity funds. We can suppose that all this was mainly because of the high effort of governments and central banks. Recovering of money markets from the shock waves from the bankruptcy of Lehman Brothers led to recapture of the status of safe investment by money market funds [EFAMA, Quarterly Statistical Release, No. 37].

Investors' fear about financial assets investment decreased almost immediately after October 2008 which led to net inflows into equity and bond funds in January 2009. In the beginning of 2009 new events led to market turbulences in February and March 2009. These events were the uncertainty of Obama's rescue

plan and the uncertainty of the depth of the recession. This caused net outflows from all UCITS types except money market funds. However, these outflows were small suggesting that the negative dynamics from crisis had lost momentum [EFAMA, Quarterly Statistical Release, No. 37].

Total net assets of UCITS decreased by 1,4% to 4494 billion EUR. Equity funds, funds of funds and balanced funds were facing the highest decrease. Money market funds experienced increase in the beginning of 2009 by 6,3%. There was a change in shares between equity funds and money market funds. Equity funds held just 28% of total UCITS assets when money market funds reached 31.5% [EFAMA, Quarterly Statistical Release, No. 37].

Net inflows into UCITS during the second quarter were 30 billion EUR. It meant second quarter of net inflows in the row after 6 quarters of net outflows. Equity funds registered net inflows of 60 billion EUR. This development followed the grater investor confidence cause by pacification of the stock market and financial market. Investors were looking for more stocks and fixed-income securities oriented investments. This behavior was confirmed by net outflows from money market funds [EFAMA, Quarterly Statistical Release, No. 38].

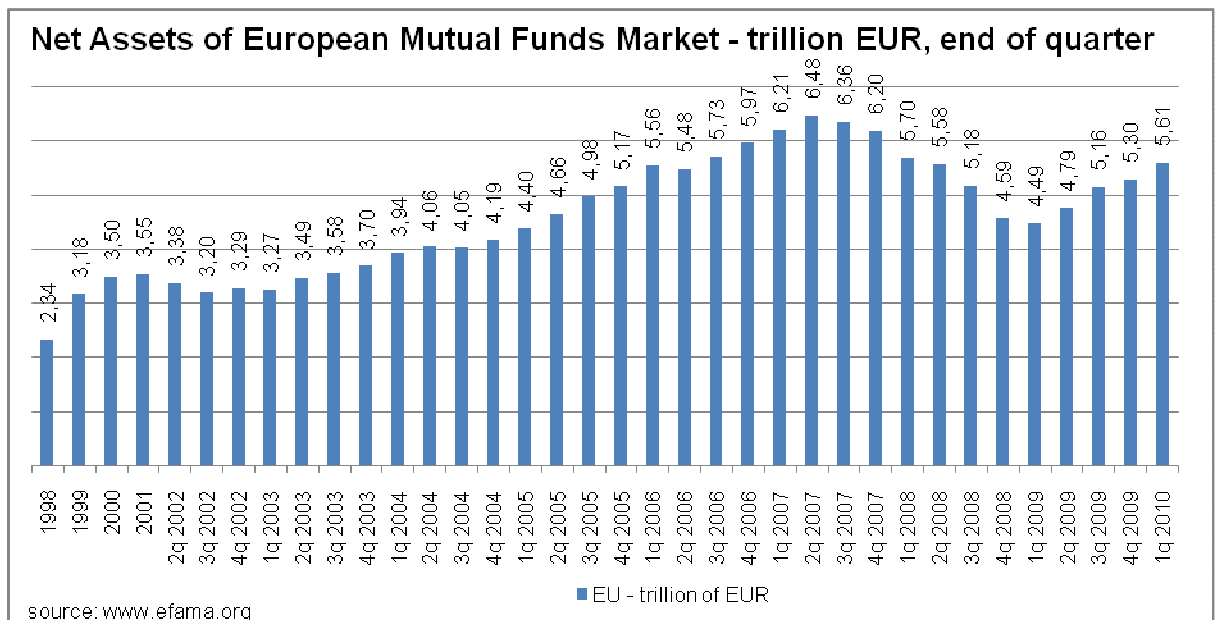
Since April 2009 we could see that equity, balanced and bond funds were facing positive cash flows. Money market funds recorded outflow in June. This is confirmation that the optimism about stock markets returned. Total asset of UCITS members were 4783 billion EUR which was increase of 7,3%. Equity funds experienced the highest increase by 19% (204 billion EUR). Bond funds, together with balanced were also increasing rapidly. Money market funds were acting in opposite way, their assets declined by 4% (outflows of 25 billion EUR). Growth of the stock prices and net inflows into equity funds raised their share over 28% of UCITS assets [EFAMA, Quarterly Statistical Release, No. 38].

The third quarter of 2009 was again connected with total positive UCITS net inflows. Net inflows increased to 70 billion EUR (two times more then previous quarter). Stable demand for equity, bond and balanced funds was pulling up the recovery from the crisis. Money market funds were still facing outflow of cash because short-term interest rates were low and the liquidity of fixed-income market

improved. Long-term UCITS (all types of funds except money market funds) recorded net inflows of 79 billion EUR [EFAMA, Quarterly Statistical Release, No. 39].

Equity, bond and balanced fund had been enjoying inflows for a six month in a row. Inflows into money market funds declined together with the rebound of investor confidence in equity and medium and long-term bond investment. Total net assets of UCITS raised to 5157 billion EUR (increase of 7,7%) at the end of the third quarter of 2008. The strongest assets increase was of equity funds to 197 billion EUR (15%). Balanced funds, together with bond funds reported decline in their assets by 1% in the third quarter. Continually rising stock prices and net inflows into equity funds raised their share in UCITS assets to 33% [EFAMA, Quarterly Statistical Release, No. 38].

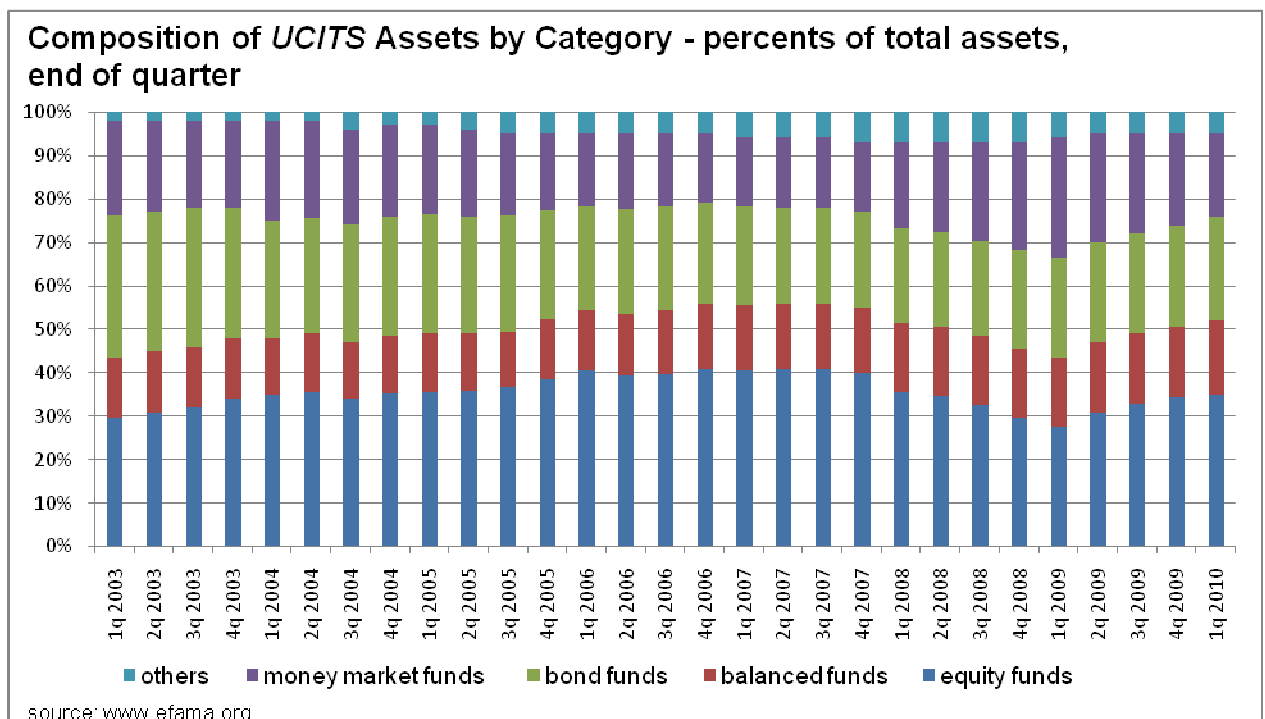
Graph 3: Net Assets of European Mutual Market Funds, from 1998 to 1st quarter 2010.



Overview of discussed facts is shown in the graphs (Graph 3 and Graph 4). The Graph 3 shows the development of the European market with mutual funds (UCITS members). The trend of net assets managed by management companies was increasing since the first half of 2003. This graph is important because it shows the trend before crisis whereas we have been summarizing detailed development of the mutual funds industry during the crisis in this subchapter. We will test this as a part of testing the Hypothesis 4.

Following graph (Graph 4) has big importance for the later econometric analysis. We can see the similar trend in changes of the composition between different kinds of mutual funds as we saw in the world wide market. That is, the main change was due to money market funds and equity funds. It is obvious that during the crisis the percentage share of money market funds was increasing meanwhile the percentage share of equity funds were decreasing in the same time. We will use European data to support testing of the Hypothesis 5 in the following part of this diploma.

Graph 4: Composition of UCITS Assets by category, from 1st quarter of 2003 to 1st quarter 2010.



4.2.4 Crisis and the mutual market funds in the Czech Republic

Let us discuss the impact of the crisis on the mutual market in the Czech Republic. There was over 296 billion CZK in the assets of the mutual funds (both domestic and foreign) offered at the market in the first quarter of 2008. In meant decrease by almost 6% (19 billion CZK) in the first quarter. From this amount was 5,19 billion CZK of foreign mutual funds (decrease of 3,65%) and decrease of 13,58 billion CZK of domestic (-7,85%). Biggest outflow was in the equity funds (-19,95%), the bond funds (-11,10%), the balanced fund (-8,58%), the money market funds and

the funds of funds (in this particular order). On the other hand, the real estates funds showed inflow of 17% [Press Release AKAT ČR, 5.5.2008].

In the second quarter the mutual funds market was still shrinking. This reduction of the mutual funds' assets was just 0,09% which is more like the stagnation of the market. The structure of the market was almost same as in the end of the first quarter. The assets of mutual funds offered by foreign management companies increased by 1,38% (1,89 billion CZK) and the assets of domestic management companies decreased by 1,35% (2,15 billion CZK). Outflow of capital was not as significant as was in the first quarter of 2008. Main decrease was in the bond funds (-6,68%) followed by the balanced funds (-3,66%). The real estates funds are the only part of the market with continuous growth. In the second quarter it was 14,15% [Press Release AKAT ČR, 1.8.2008].

The financial crisis showed its biggest impact in the third quarter of 2008. First reaction of AKAT CR took place in 29.9.2008 regarding the consequences of the crisis on the collective investing in the Czech Republic [Press Release AKAT ČR, 29.9.2008]. This release states that there was no domestic fund (member of AKAT CR) exposed to the problematic assets which could be threat for it. The Czech mutual funds market was affected just partially throw the secondary effect on the equity funds. The main part of investments in the mutual funds is in the money market funds which were not significantly affected. The low level of redemptions in the week before (22.-26.9.2008) could indicate the stability of the sector. On 6th October the AKAT CR made announcement in opposition to mainstream media news. The media came with the theory that the management companies were far away from the safe strategies and were trying achieve higher gains with facing higher risk. AKAT CR as one of the market regulators was quick to attack such statements and demonstrated that the members of AKAT CR were acting within the legal boundaries. The standard instruments of the money market funds are government bonds, corporate bonds (issued by financial companies but also from other industries), but all of this instruments have investment rating. There is also obligatory institution of the fund depositary that is controlling the management company. There are possibilities that some money market funds overvalued some items in their portfolios and that may lead to temporal decrease of the fund performance. On the

other hand, higher volatility of these funds is not usual and if it happens then only in a short timeframe. The money market funds are used for investing in horizon of months that is why the temporal decrease of their performance will not have influence on their long-term valuation [Press Release AKAT ČR, 6.10.2008].

Although the AKAT CR was announcing that there were no troubles with the mutual funds market it assembled an extraordinary general meeting on 7th October 2008. On this meeting AKAT CR accepted the Ethic Code for management companies. This Code took inspiration from the European Fund and Asset Management Association (EFAMA) and brought high principles of self regulation into this industry. This meeting also accepted Methodology for Information obligations which has been obligatory for all management companies. Information obligations are over the legal duties and makes very transparent environment at the mutual funds market. In the time of crisis this step was very important because the transparency and the sufficiency of information are necessary for the investment decisions and valuation of risk [Press Release AKAT ČR, 10.10.2008].

We should take closer look at the number of the third quarter of 2008 to examine the real impact of the crisis on the market. The very first reaction of the market to the crisis was not so dramatic. During the third quarter the assets of the mutual funds decrease by 1,90% (5,639 billion CZK). The value of the foreign funds assets increased by 710 million CZK (by 0,51%) and the domestic funds decreased by 6,349 billion CZK (-4,04%). Outflow of financial sources was at these types of funds: the biggest was at the equity funds (-16,48%), followed by the balanced funds (-7,48%), the funds of funds (-5,63%) and the bonds funds (-1,03%). The only types with inflow of assets were: the real estate funds (+11,40%) and the money market funds (+3,98%)[Press Release AKAT ČR, 10.11.2008].

How was 2008 judged by the numbers? In the foreign and domestic mutual funds there was invested 243,88 billion CZK by the households and institutional investors. This meant decrease of the assets value by 71,35 billion CZK (-22,63%). The property of foreign management companies decreased by 19,23 billion CZK (-13,52%) and domestic management companies faced the decrease of 52,12 billion CZK [Annual report of the AKAT ČR 2008/2009]. Main decreased of assets were facing the equity funds (-51,16%) , followed by the balanced funds (-32,34%), the

funds of funds (-30,88%), the bonds funds (-26,77%) and the money market funds (-18,34%). Assets increased in the real estates funds (45,20%)[Press Release AKAT ČR, 10.2.2009]. The huge outflow was made mainly by the financial crisis and was result of the second half of the year.

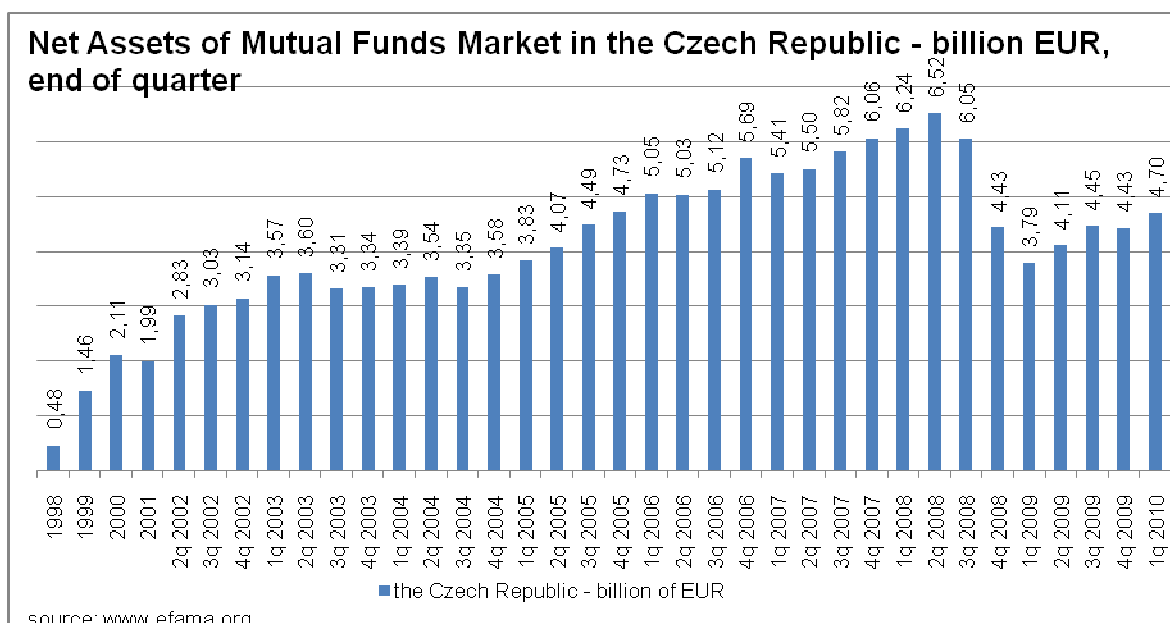
The decreasing trend was continuing during last year. In the first quarter there were 212,99 billion CZK, which meant decrease by 30, 89 billion CZK (12,66%) from the end of the 2008. This amount was almost precisely divided between domestic and foreign management companies. Assets in the foreign funds decreased by 15,51 billion CZK (-12,61%) and the decrease in the domestic funds was 15,38 billion CZK (-12,72%). In contrary to the year before the assets decreased at all types of funds. The bonds funds were again facing the biggest loss (-29,05), followed by the money market funds (-17,35%, but the money market funds decreased by absolutely highest amount, 88 billion CZK), the equity funds (-10,80%), the funds of funds (-9,24%). The real estates funds were facing the recession also (-7,08%)[Press Release AKAT ČR, 11.5.2009].

The second quarter of 2009 was characterized by slow change in the trend. The total assets of the management companies increased by 3,62 billion CZK (1,70%). The value of the assets at the foreign funds increased by 1,36 billion CZK (1,27%) and by 2,26 billion CZK (2,14%) at the domestic funds. When we consider the types of funds, the increase was most significant at the equity funds (18,7%), followed by the funds of funds (3,28%) and balanced funds (2,78%). The other types were still in recession: most the real estates funds (-16,77%)[Press Release AKAT ČR, 10.8.2009].

The third quarter of 2009 was continuously optimistic that the industry was recovering from the crisis. The total value of assets of the management companies raised by 9,98 billion CZK (4,61%). This increase was mainly due to the domestic funds which rose by 5,64 billion CZK (5,24%). The foreign funds rose by 4,34 billion (3,99%). The equity funds were still the fastest growing: the equity funds rose by 19,81%, followed by the funds of funds (12,38% - very significant increase compared to the previous quarter), the balanced funds (5,57%), the money market funds (3,51%) and bonds funds (2,75%). The real estates funds were still in decreasing trend (-1,94%)[Press Release AKAT ČR, 3.11.2009].

The increasing trend in last three quarters did not break the trend of 2009. The households and the institutional investors were holding 234,52 billion CZK in the domestic and foreign management companies. It meant decrease by 9,36 billion CZK (-3,84%) from 243,88 billion CZK in the end of 2008. To this decrease mainly contributed decrease of the assets in the foreign funds (5,64 billion CZK, -4,59%). The assets of domestic funds decreased by 3,71 billion (-3,07%). The equity funds were raising whole year, which meant total increased by 10 billion CZK (42,74%), followed by the balanced funds that rose by 667 million CZK (2,56%). Last type which faced increase was the funds of funds with increase of 109 million CZK (0,85%). The biggest relative decrease was connected with the real estates funds with fall by 422 million (-24,14%) followed by the bonds funds with 5,983 billion CZK (-22,55%). The biggest fall in absolute figures of 10,291 billion CZK was at the money market funds (-11,69%)[Press Release AKAT ČR, 9.2.2010].

Graph 5: Net Assets of Mutual Funds Market of the Czech Republic, from 1998 to 1st quarter 2010.

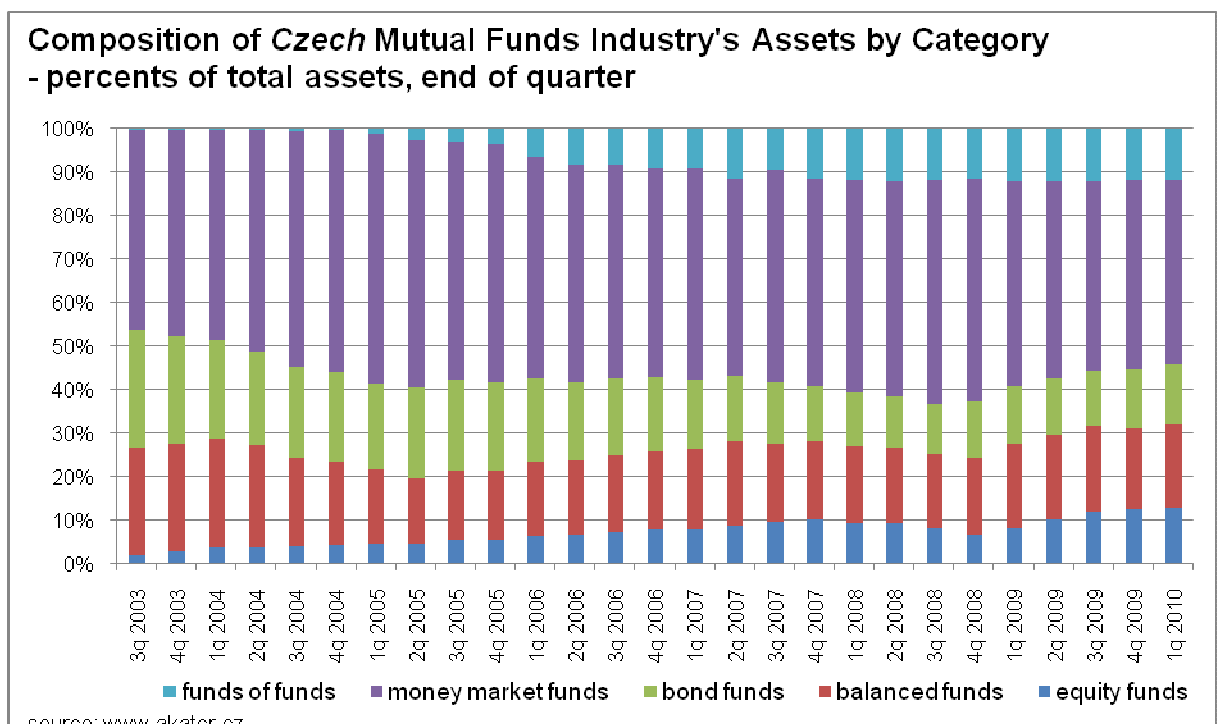


The development of mutual funds market in the Czech Republic is closing this summarizing chapter. The graphs (Graph 5 and Graph 6) are showing the main trends we examined. At the Graph 5 we can see the development of the net assets operated by the Czech management companies. We can say that net assets had been increasing before the end of the first half of 2008. Just as in the previous chapter this graph is covering not just period of crisis, but even the years before to

get better overview of the trend. Monthly data would be better for comments and for econometrical analysis as well, but quarterly data are the only available to the public. These data will be used to test the Hypothesis 4 in the following chapter.

Graph 6 shows the composition of each type of funds on the Czech mutual funds industry. We can see the share of money market funds as the biggest, followed by balanced funds. The biggest change seems to be on the share of money market funds and on the share of equity funds during the crisis. Changes in the composition of the Czech mutual funds industry will be tested together with Hypothesis 5.

Graph 6: Composition of Czech Mutual Funds Industry's Assets by category, from 1st quarter of 2003 to 1st quarter 2010.



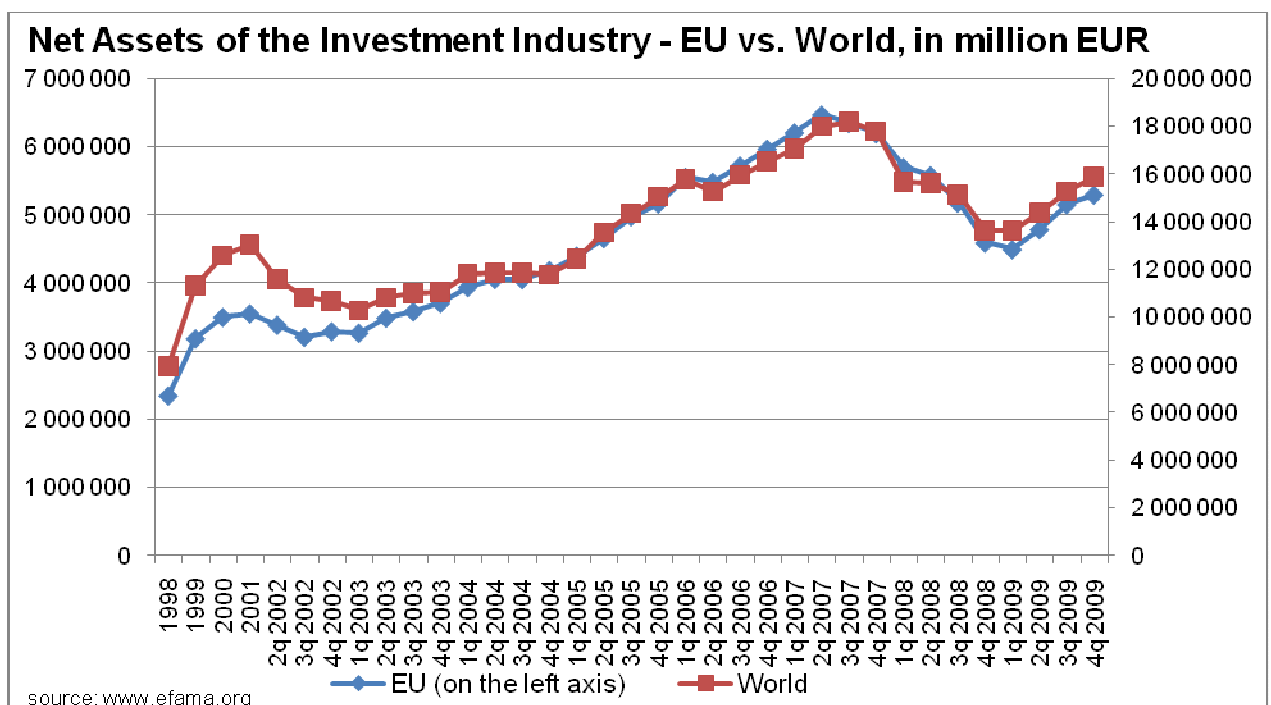
4.2.5 Comparison of crisis' influence

Firstly we will compare the influence of crisis on the shares of different mutual funds types. Then we take a look at the change in net assets of worldwide, European and Czech mutual funds market.

When we take a look at the graphs (see Graph 2, Graph 4, Graph 6) which show the composition of different types of funds we can see difference between the Czech Republic on one hand and the Europe and global economy on the other. The main part of mutual market funds at the worldwide market belongs to equity funds.

Same fact is obvious from the graph with European numbers. The share of equity funds oscillated between 30% and 40% at the European market and between 35% and 50% worldwide. On the other hand equity funds had increasing trend from 2% to 9% at the Czech Republic. The most popular funds at the Czech market were money market funds with share between 39% and 55%. When we take a look at the beginning of the crisis in the first half of 2007 the change of composition appears similar at all three markets. We can see the main change at money market funds and equity funds. The significance of this change will be examined in the following part of diploma.

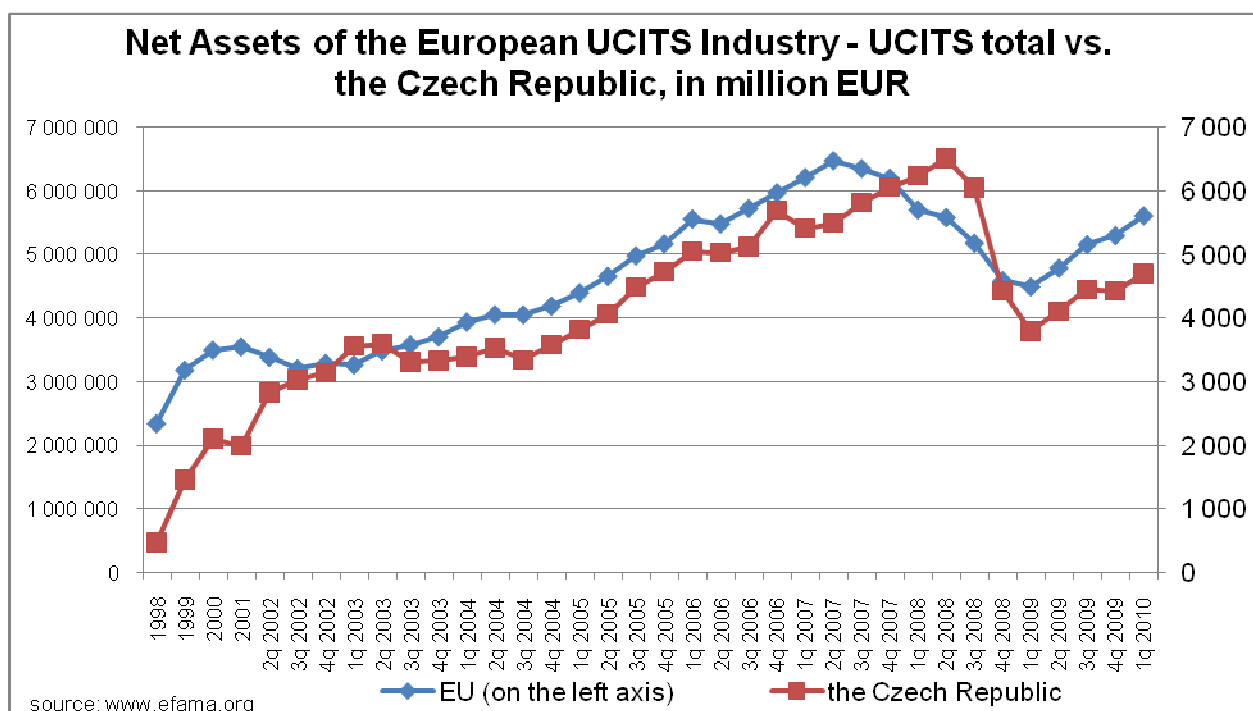
Graph 7: the comparison of mutual fund industry's net assets – Europe vs. World.



The Graph 7 shows the obvious fact. Developments of the European market and the worldwide market are very close together, even though the world market is three times bigger. This trend is not surprising as it is clear from the chapters about the crisis at world and the European mutual funds market. It is because the European market is strongly connected to the worldwide and makes one third of it. Many management companies, which operate at the European market usually operate world widely as well. Following graph (Graph 8) shows the same comparison but between the Czech mutual funds market and the European. We can see the change in development at the Czech market one year later than at the European market.

The European market followed the timeline of crisis which we mentioned early. On the other hand, there is no note about the financial crisis around any press releases posted by the Czech Capital Market Association in 2007 or even in the first half of 2008. We stated before that the very first note about the financial crisis at the money market from the Czech Capital Market Association was published on 29.9.2008 [Press Release AKAT ČR, 29.9.2008]. If we take a look at the development at mutual funds market the reduction of net assets in the Czech mutual funds is biggest in the third quarter of 2008. For further econometrical analysis, we will be working with the beginning of the financial crisis in the first quarter of 2007 as it is suggested in the beginning of this chapter 4.3.

Graph 8: the comparison of mutual fund industry's net assets – Europe vs. the Czech rep.



5. Implication of financial crisis on the mutual funds market

We will use econometrical tools to prove or reject hypothesis we made in the first part of diploma. Firstly we will briefly introduce econometrical method we are about to use. Then we analyze Hypothesis 4 and Hypothesis 5. These hypotheses will be tested with the data for the world wide mutual funds market and the European mutual funds market. Lately in this chapter, we will compare it with the results for Czech Republic as well. In the second part of this chapter we will focus on the analysis of Hypothesis 1, Hypothesis 2 and Hypothesis 3 but just for the Czech market. For all econometrical and statistical verifications the statistical software R was used⁹.

5.1 Linear regression

Linear regression is a method which enables to quantify parameters of the econometrical model. Where Y_i is a dependent (also explained, regressand) variable and $X_{1i}...X_{ki}$ is at least one independent (also explanatory, regressor) variable then Formula 1 shows a linear relationship between them.

Formula 1:

$$Y_i = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_k X_{ki} + u_i, \quad i = 1, 2, \dots, n.$$

Where Y_i stands for observation i of dependent variable and X_{1i}, \dots, X_{ki} denotes observation i of independent variables X_1, \dots, X_k . Parameters β_1, \dots, β_k are called regression coefficients. These coefficients measure the change of Y_i that matches to unit change of any explanatory variable whereas others explanatory variables remain constant in other word the slope of this linear relationship. Parameter α is called intercept and measures the intercept point of this linear formula with the vertical axis. Last parameter u_i is known as random variable [Hušek 1999, p. 29].

⁹ Available at <http://www.r-project.org/>

With the given data Y_i and X_{1i}, \dots, X_{ki} we still need the parameters α and β_1, \dots, β_k . We can estimate these parameters by any adequate procedures and get the Formula 2.

Formula 2:

$$\check{Y}_i = a + b_1X_{1i} + b_2X_{2i} + b_3X_{3i} + \dots + b_kX_{ki}, i = 1, 2, \dots, n.$$

Magnitude \check{Y}_i is estimated value of Y_i . The difference between the real values Y_i and the estimated values \check{Y}_i ($Y_i - \check{Y}_i = e_i, i = 1, 2, \dots, n$) is called residuum. This measurable residuum can be understood as estimation of the unknown value of the random variable u_i . Then we can rewrite Formula 1 as

Formula 3:

$$Y_i = \check{Y}_i + e_i = a + b_1X_{1i} + b_2X_{2i} + b_3X_{3i} + \dots + b_kX_{ki}, i = 1, 2, \dots, n.$$

As we said e_i is just estimation of u_i then $e_i \neq u_i$. This is obvious because of the fact that u_i is the difference between the real values and their expected or average values. When e_i is a deviation between real values of Y_i and \check{Y}_i and depends on the chosen regressive equation [Hušek 1999, p. 30].

The most common and used procedure of estimation of parameters α and β_1, \dots, β_k is called the method of *ordinary least squares estimation*. This method is looking for the estimations of parameters with regard to minimize the sum of squares given by Formula 4.

Formula 4:

$$S = \sum (Y_i - (a + b_1X_{1i} + b_2X_{2i} + b_3X_{3i} + \dots + b_kX_{ki}))^2 = \sum (e_i)^2, i = 1, 2, \dots, n$$

[Cipra 2008, p.35]. The main advantages of this method are the estimation with optimal characteristics even for small numbers of observations and its simplicity.

For our verifications we have used linear regression with dummy variables for tests of the crisis influence. Linear regression model with dummy variables can be written as:

Formula 5:

$$Y_i = \alpha + \beta_1X_{1i} + \beta_2X_{2i} + u_i, i = 1, 2, \dots, n.$$

Where Y_i is dependent variable, α intercept, β_1 and β_2 are regression coefficients, X_{1i} independent variable. The difference is with X_{2i} that is called dummy variable. It can be 0 or 1 depends on the qualitative factors. In the time series analysis it is used for quantification or measurement of intensity short-term influences (such the financial crisis was) [Hušek 1999, p. 53-55]. In our case we have used dummy variables as:

Formula 6:

$$X_{2i} = \begin{cases} 0 & \text{for } i \leq m, \text{ when } m < n \\ i - m & \text{for } i > m. \end{cases}$$

When the m is theoretically given point in time series. This means the beginning of the financial crisis in our case.

There are assumptions for the residuals of the classical linear regression model that should be fulfilled for proper use of the OLS method. We will be testing the homoscedasticity and the autocorrelation of the residuals. When these assumptions are not fulfilled we do not have to refuse all results but we should work with them more carefully.

Assumption 1: The all random variables have the same variance (homoscedasticity).

$$\text{var}(u_i) = \sigma^2 \text{ for all } i = 1, 2, \dots, n.$$

[Hušek 1999, p. 31]. This assumption will be tested with the Breusch-Pagan test (in further analysis signed as BP test). According to Breusch and Pagan [1979] it is simple regression of the squared residuals on the independent variables. If this regression is significant we can reject hypothesis of no heteroscedasticity. There are p-values for this BP test regressions in every following econometric results. Where this p-value is lower the critical value of 1% we can assume that the Assumption 1 is not fulfilled.

Assumption 2: The random variables are not correlated.

$$\text{cov}(u_i, u_j) = 0 \text{ for } i \neq j, \text{ and } i, j = 1, 2, \dots, n.$$

[Cipra 2008, p. 40]. We will test this assumption with the *Pearson's product moment correlation coefficient* (in further analysis signed as *Pearson's corr.*) of residuals. In every following econometrical result is stated Pearson's corr. with the proper p-value. As Rodgers and Nicewander [1988] showed if the p-value is lower than the critical value of 0,01, we accept the null hypothesis that there is a correlation between residuals and Assumption 2 is not fully satisfied.

5.2. Impacts on the mutual funds market

We will test the Hypothesis 4 and Hypothesis 5 in this chapter. First we will introduce data, then test and finally results. We wanted to test the hypothesis regarding the influence of the financial crisis on the mutual funds market in the Czech Republic. These hypotheses are:

Hypothesis 4: The financial crisis influenced the level of net assets of the mutual funds industry.

Hypothesis 5: The financial crisis had influence on the percentage composition of mutual funds market.

There was one problem with data collection. We could only get quarterly published data even though monthly would be better. The Czech Capital Market Association refused to provide monthly data for our research that is another reason why we had to work with the quarterly. Data were collected from the quarterly press releases published by the European Fund and Asset Management Association (for world data and the European) (EFAMA) and by the Czech Capital Market Association (AKAT CR). For testing the hypothesis 4 we chose the total amount of net assets managed by the mutual funds industry in particular territory. For testing the hypothesis 5 we used the composition of the total amount of net assets by the categories we mentioned in the chapter 3: equity funds, balanced funds, bond funds, money market funds and "others" – for all the missing types of funds (for analysis of world market and European market). For the Czech Republic we took funds of funds instead of category "others". We did not take into account new types of funds, as the real estate funds, because the time series about them are not long enough.

We are going to locate the beginning of the crisis at the time point that we mentioned in chapter 4.3 about the mutual funds market during the crisis, which is the third quarter of 2007 (respectively 3rd quarter of 2008 for the Czech Republic). The end of the crisis with which we are working is the fourth quarter of 2008 (respectively 2nd quarter of 2009 for the Czech Republic). We are examining the time series from the 3rd quarter of 2002 to the 1st quarter of 2010 (in case of the European and the Czech mutual funds market data), respectively to the 4th quarter of 2009 in case of the world mutual funds data (because data for 1st quarter of 2010 for the world mutual funds are not available yet).

5.2.1 Analysis of the Hypothesis 4

To prove or disprove this hypothesis we chose the linear regression with dummy variables. We are going to use two dummy variables, X_1 and X_2 , to prove the impact of the financial crisis. First dummy variable X_1 will be equal to 0 to the beginning of the crisis (last 0 for the 2nd quarter of 2007), since that date it is acting as a linear sequence (m for X_1 is the observation from 2nd quarter of 2007). Second dummy variable X_2 stands for the end of the crisis and is equal to 0 till the end of the crisis (last 0 for the 4th quarter of 2008), since that date it is acting as a linear sequence (m for X_2 is the observation from 4th quarter of 2008). For the Reg3 – regression for the Czech mutual funds market – we have X_1 equals to 0 till the 2nd quarter of 2008 and X_2 equals to 0 till the 1st quarter of 2009. If the dummy variables X_1 and X_2 are significant, then the crisis had statistically significant influence on the level of the mutual funds market. Statistical software R uses the special signs to declare significance of each variable. There are shown on the Picture 1.

Picture 1: Significance codes used by R statistical software.

Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

The linear regression we used for estimation is

Formula 7: $Net\ Assets = a + b \cdot time + X_1 + X_2 + u_i$.

Table 1 shows the results of the first regression. We can see that both dummy variables are significant. Adjusted R-squared coefficient is 0,9077 and we can see at the graph that the black line (our estimated linear regression) is following red dots

that are the real observation of the net assets level of the world mutual funds market in every observed quarter. We can say that the financial crisis had the statistically significant influence on the level of net assets of the world mutual funds market. The significance of the dummy variable X_2 suggests that the financial crisis influence of the mutual funds market ended at the end of 2008.

Table 1: The influence of the crisis on the level of net assets of the world mutual funds market.

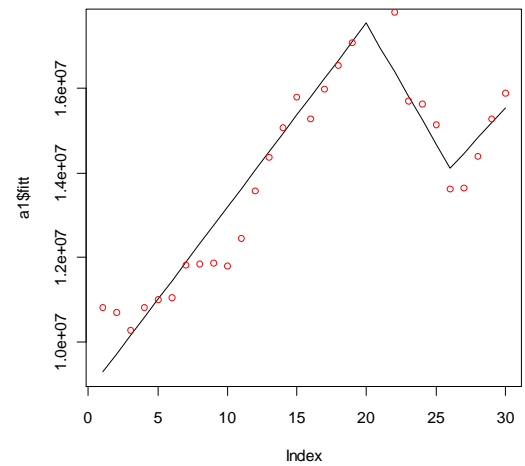
Reg1 **world level of net assets**
 lm(formula = dataASSETSW[, 2] ~ dataASSETSW[, 1] + x1 + x2)
 Residuals:

	Min	1Q	Median	3Q	Max
	-1401549	-461013	-47343	378002	1519746

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-3,46E+09	2,13E+08	-16,27	3,81E-15 ***
dataASSETSW[, 1]	1,73E+06	1,06E+05	16,331	3,47E-15 ***
x1	-1,01E+06	1,10E+05	-9,161	1,27E-09 ***
x2	9,32E+05	2,62E+05	3,551	0,00149 **

Residual standard error: 736100 on 26 degrees of freedom
 Multiple R-squared: 0,9172 **Adjusted R-squared: 0,9077**
 F-statistic: 96,02 on 3 and 26 DF p-value: 3,448e-14
BP test p-value: 0,7426; Pearson's corr.: R = 0,66, p-value < 0,01



Following Table 2 shows results for the European mutual funds market. Both dummy variables, X_1 and X_2 , are significant. The adjusted R-squared coefficient with 0,954 implies that this estimated regression function fits well for observed data. This fact can be seen from the graph on the right side of the Table 2. According to these results we are able to say that the financial crisis had the statistically significant influence on the level of net assets level of the European (UCITS members) mutual funds market. The significance of dummy variable X_2 implies the end of the crisis of the mutual funds market at the end of 2008.

Table 2: The influence of the crisis on the level of net assets of the UCITS mutual funds market.

Reg2 UCITS level of net assets
 $\text{lm}(\text{formula} = \text{dataASSETS[, 2]} \sim \text{dataASSETS[, 1]} + x1 + x2)$
Residuals:

	Min	1Q	Median	3Q	Max
	-383075	-114397	-1434	134403	376804

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-1,49E+09	6,12E+07	-24,29	< 2e-16 ***
dataASSETS[, 1]	7,44E+05	3,05E+04	24,362	< 2e-16 ***
x1	-4,58E+05	3,09E+04	-14,84	1,67E-14 ***
x2	4,13E+05	6,26E+04	6,602	4,40E-07 ***

Residual standard error: 212000 on 27 degrees of freedom
Multiple R-squared: 0,9586 **Adjusted R-squared: 0,954**
F-statistic: 208,5 on 3 and 27 DF p-value: < 2,2e-16
BP test p-value: 0,3656; Pearson's corr.: R = 0,71, p-value < 0,01

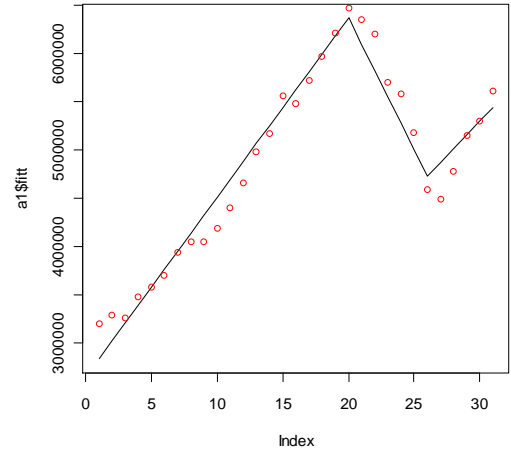


Table 3 shows the results of the econometrical analysis of the crisis influence in the Czech Republic. We can see, that both dummy variables are significant. Adjusted R-squared coefficient is 0,9149 which suggests that the estimated equation fits the real data. The significance of dummy variables proved our hypothesis that the financial crisis influenced the level of net assets of the Czech mutual funds market. The significance of X_1 implies that the beginning of the crisis was delayed in the Czech Republic relatively to the rest of the world. The significance of X_2 suggests that the end of the crisis was delayed in the Czech Republic relatively to the rest of the world. It is interesting to observe that the beginning of the crisis was delayed by one year but the end just by half of the year.

Table 3: The influence of the crisis on the level of net assets of the Czech mutual funds market.

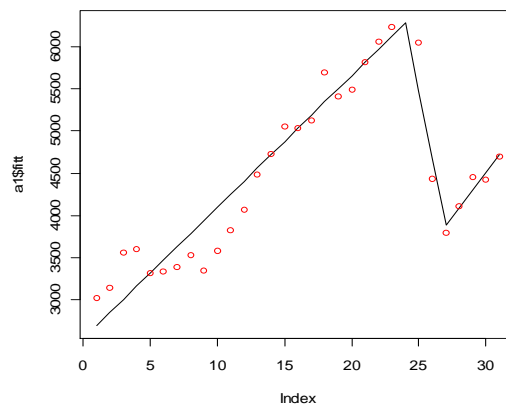
Reg3 CR level of net assets
 $\text{lm}(\text{formula} = \text{dataASSETS[, 3]} \sim \text{dataASSETS[, 1]} + x1 + x2)$
Residuals:

	Min	1Q	Median	3Q	Max
	-594,799	-148,68	-4,418	164,73	566,013

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-1,25E+06	6,95E+04	-17,93	< 2e-16 ***
dataASSETS[, 1]	6,23E+02	3,47E+01	17,99	< 2e-16 ***
x1	-9,54E+02	8,61E+01	-11,08	1,50E-11 ***
x2	1,01E+03	1,55E+02	6,491	5,87E-07 ***

Residual standard error: 301,4 on 27 degrees of freedom
Multiple R-squared: 0,9234 **Adjusted R-squared: 0,9149**
F-statistic: 108.5 on 3 and 27 DF p-value: 3.558e-15
BP test p-value: 0,2495; Pearson's corr.: R = 0,60, p-value < 0,01



Although the first three regressions did not fulfill the Assumptions 2 we can say that the financial crisis had significant influence on the world wide mutual funds market. We also proved that the crisis came in different period into the Czech Republic then to the rest of the world.

5.2.2 Analysis of the Hypothesis 5

We will use the similar technique as in the previous case. This hypothesis will be tested at three different markets, the World market, the European and the Czech market. There are differences in the length of examined time series. For the world mutual fund market we have data from the 4th quarter of 2004 to the 4th quarter of 2009. For the European mutual funds market we got data from the 1st quarter of 2003 to the 1st quarter of 2010. For the Czech mutual funds market we have data from the 3rd quarter of 2003 to the 1st quarter of 2010. We will examine time dependency of shares of 4 (5 for the Czech Republic) types of mutual funds at each market. Then we will use two dummy variables X_1 and X_2 with same qualities as in the case above. The X_1 is equal to 0 till the 2nd quarter of 2007 (resp. 2nd quarter of 2008 for the Czech Republic) then it is acting as the linear sequence as we stated in Formula 6. For X_1 the m stands for the 2nd quarter of 2007 (resp. 2nd quarter of 2008 for the Czech Republic). If it is significant we can declare that the financial crisis had influence on the examined type of mutual fund. The X_2 is equal to 0 till the 4th quarter of 2008 (1st quarter of 2009 for the Czech Republic) then is equal to linear sequence

as shown in Formula 6. If X_2 is significant, we can assume that the share of examined type of fund is heading to before crisis level. Significance codes remain the same as in the previous case. We used a following linear regression

$$\text{Formula 8: Percent share} = a + b \cdot \text{time} + X_1 + X_2 + u_i.$$

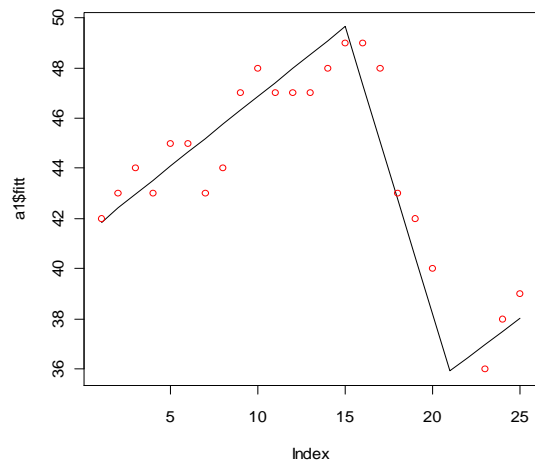
Percent share states for currently examining type of fund, which is clearly stated in the table.

World mutual funds market

We can find results for the first examining data set in Table 4. The significance of the variable X_1 proves the financial crisis had the significant influence for the world equity funds market. The significance of the variable X_2 suggests that the crisis was gone in the 4th quarter of 2008. High adjusted R-squared coefficient is suggesting that estimated linear function is fitting well with the real observed data set as is shown in the graph of the right side of the table.

Table 4: The influence of the financial crisis on the percent share of EQUITY funds at the WORLD mutual funds market.

Reg4		percent share of equity funds			
lm(formula = dataWORLD[, 2] ~ dataWORLD[, 1] + x1 + x2)					
Residuals:					
	Min	1Q	Median	3Q	Max
	-3,4453	-0,9726	0,2205	0,9726	2,9333
Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	-4414,8745	669,4439	-6,595	1,57E-06	***
dataWORLD[, 1]	2,2239	0,3337	6,664	1,35E-06	***
x1	-2,8432	0,2597	-10,948	3,87E-10	***
x2	2,8146	0,5524	5,095	4,79E-05	***
Residual standard error: 1,529 on 21 degrees of freedom					
Multiple R-squared: 0,8982		Adjusted R-squared: 0,8836			
F-statistic: 61,73 on 3 and 21 DF		p-value: 1,381e-10			
BP test p-value: 0,2922; Pearson's corr.: R = 0,39, p-value: 0,063					



In Table 5 there are results of the econometrical analysis of the world balanced funds market. Values of the balanced funds vary from 9% to 10%. We can see the change of the percent share of balanced funds changed before the declared beginning of the crisis. The dummy variables are still significant even though less than in the case of equity funds. We can still say that the financial crisis influenced the percent share of balanced funds at the world mutual funds market. The low

adjusted R-squared value is given by the character of the observed data set. The influence of the crisis is in the same direction as we shown with equity funds. The beginning of the crisis meant decrease in the share of equity funds as well as balanced funds.

Table 5: The influence of the financial crisis on the percent share of BALANCED funds at the WORLD mutual funds market.

Reg5 percent share of balanced funds
 lm(formula = dataWORLD[, 3] ~ dataWORLD[, 1] + x1 + x2)

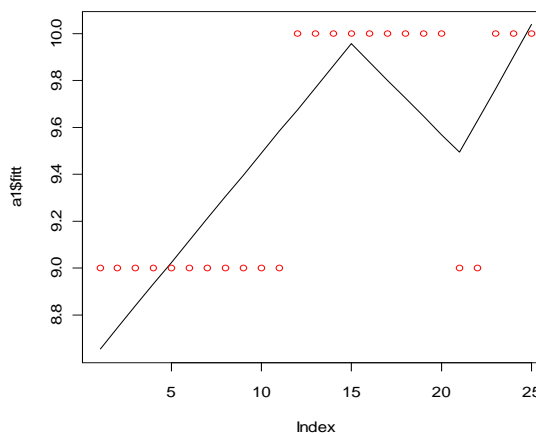
Residuals:

	Min	1Q	Median	3Q	Max
	-0,6283	-0,2116	0,1	0,2358	0,4307

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-734,38185	148,9215	-4,931	7,05E-05 ***
dataWORLD[, 1]	0,37078	0,07424	4,994	6,08E-05 ***
x1	-0,16947	0,05777	-2,934	0,00794 **
x2	0,21261	0,12288	1,73	0,09825 .

Residual standard error: 0,3401 on 21 degrees of freedom
 Multiple R-squared: 0,6107 **Adjusted R-squared: 0,5551**
 F-statistic: 10,98 on 3 and 21 DF p-value: 0,0001515
BP test p-value: 0,1097; Pearson's corr.: R = 0,45, p-value: 0,028



Main difference between the Table 6 and previous two tables is in the vector of change during the financial crisis. The trend of the bond funds was decreasing before crisis and by the beginning of the crisis it changed to positive. This trend did not change back with the end of the crisis but continues further. We can see the significance of the dummy variables and it proves the significant implication of the crisis on the percent share of bond funds at the world mutual funds market.

Table 6: The influence of the financial crisis on the percent share of BOND funds at the WORLD mutual funds market.

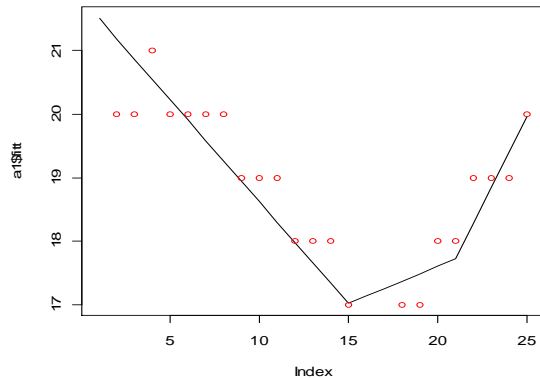
Reg6 percent share of bond funds
 lm(formula = dataWORLD[, 4] ~ dataWORLD[, 1] + x1 + x2
 Residuals:

	Min	1Q	Median	3Q	Max
	-1,25705	-0,37357	0,09884	0,41852	0,7382

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	2584,0831	282,5384	9,146	9,03E-09 ***
dataWORLD[, 1]	-1,2787	0,1409	-9,078	1,02E-08 ***
x1	0,4362	0,1096	3,98	0,000682 ***
x2	0,4424	0,2331	1,898	0,071547 .

Residual standard error: 0,6453 on 21 degrees of freedom
 Multiple R-squared: 0,8381 **Adjusted R-squared: 0,8149**
 F-statistic: 36,23 on 3 and 21 DF p-value: 1,742e-08
BP test p-value: 0,7895; Pearson's corr.: R = 0,36, p-value: 0,087



Money market funds were acting in the similar way as bond funds. The trend before the financial crisis was decreasing in the percentage share. This was significantly change by the crisis into the positive trend. The difference between money market funds and bond funds is that bond funds have been continuing in the increasing trend since the end of the crisis. The end of the crisis had significant influence on the money market funds trend. We can confirm the hypothesis that the financial crisis had influence on money market funds at the world mutual funds market. This influence had opposite results that in the case of equity and balanced funds. The high adjusted R-squared suggest that the model fits the real values well.

Table 7: The influence of the financial crisis on the percent share of MONEY MARKET funds at the WORLD mutual funds market.

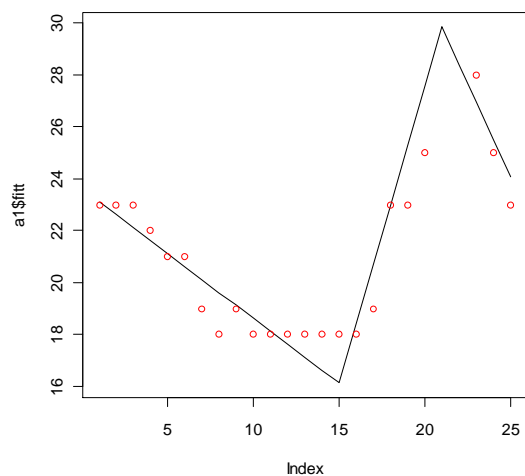
Reg7 percent share of money market funds
 lm(formula = dataWORLD[, 5] ~ dataWORLD[, 1] + x1 + x2
 Residuals:

	Min	1Q	Median	3Q	Max
	-2,5537	-0,6258	-0,1128	0,8699	3,6081

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	4019,5495	629,4533	6,386	2,49E-06 ***
dataWORLD[, 1]	-1,9942	0,3138	-6,355	2,67E-06 ***
x1	2,7827	0,2442	11,396	1,88E-10 ***
x2	-3,7301	0,5194	-7,182	4,44E-07 ***

Residual standard error: 1,438 on 21 degrees of freedom
 Multiple R-squared: 0,8906 **Adjusted R-squared: 0,8749**
 F-statistic: 56,96 on 3 and 21 DF p-value: 2,927e-10
BP test p-value: 0,02604; Pearson's corr.: R = 0,40, p-value: 0,055



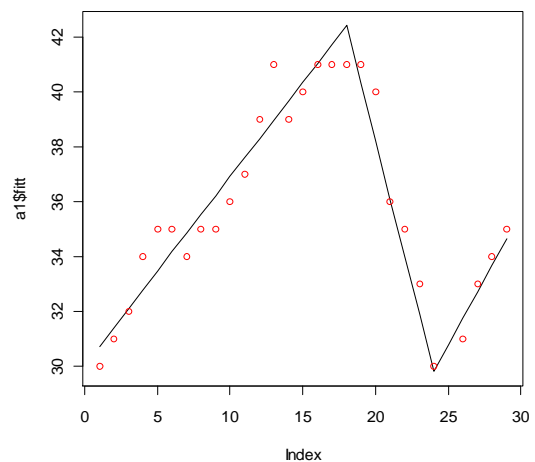
We can clearly see that regressions 4 to 7 (table 4, 5, 6, 7) satisfy both Assumption 1 and Assumption 2 of homoscedasticity and non correlated residuals.

European mutual funds market

Next four tables are examining the changes in the percent share of the different types of funds at the European mutual funds market. In Table 8 there is tested the influence of the financial crisis on the share of equity funds. The significance of the dummy variables is proved. We can see that the coefficients of both dummy variables are very close to the coefficients from the Table 7. The adjusted R-squared is high which indicates quality of the estimated linear regression. Table 8 shows clearly that the influence of the beginning of the crisis on the percent share of European equity funds was statistically significant as well as the end of the crisis was.

Table 8: The influence of the financial crisis on the percent share of EQUITY funds at the EUROPEAN mutual funds market.

Reg8		percent share of equity funds			
lm(formula = dataUCITS[, 2] ~ dataUCITS[,1] + x1 + x2					
Residuals:					
	Min	1Q	Median	3Q	Max
	-2,75751	-0,71043	-0,08862	0,70948	2,02038
Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	-5491,041	374,8076	-14,65	8,93E-14	***
dataUCITS[, 1]	2,7564	0,1869	14,749	7,68E-14	***
x1	-2,7947	0,17	-16,441	6,49E-15	***
x2	3,0715	0,3309	9,282	1,41E-09	***
Residual standard error: 1,115 on 25 degrees of freedom					
Multiple R-squared: 0,9241		Adjusted R-squared: 0,915			
F-statistic: 101,4 on 3 and 25 DF		p-value: 4,01e-14			
BP test p-value: 0,5526; Pearson's corr.: R = 0,30, p-value: 0,12					



The European balanced funds have been acting differently compared to the world balanced funds. There is no significance for the dummy variable X_2 which indicates that there was no change of the trend in the date of declared end of crisis. Low significance of the dummy variable X_1 supports that the financial crisis did not influenced the percent share of balanced funds at the European mutual funds market.

Table 9: The influence of the financial crisis on the percent share of BALANCED funds at the EUROPEAN mutual funds market.

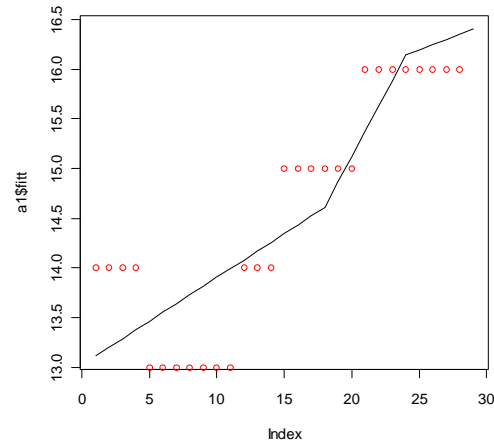
Reg9 percent share of balanced funds
 $lm(formula = dataUCITS[, 3] \sim dataUCITS[, 1] + x1 + x2$
Residuals:

	Min	1Q	Median	3Q	Max
	-0,9924	-0,3507	-0,1198	0,5675	0,8877

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-692,15416	198,9236	-3,479	0,00186 **
dataUCITS[, 1]	0,35206	0,09919	3,549	0,00156 **
x1	0,16762	0,09022	1,858	0,075 .
x2	-0,20354	0,17564	-1,159	0,25746

Residual standard error: 0,5916 on 25 degrees of freedom
Multiple R-squared: 0,7957 **Adjusted R-squared: 0,7712**
F-statistic: 32,46 on 3 and 25 DF p-value: 8,828e-09
BP test p-value < 0,01; Pearson's corr.: R = 0,71, p-value < 0,01



The percent share of the European bond funds was following the trend of the world market. Before the crisis, the percent share was decreasing. High significance level of the dummy variable X_1 supports the hypothesis that the beginning of the crisis influenced the percent share. No significance of the second dummy variables indicates that the financial crisis brought the long-run change in trend and that it was not just the impact of the crisis. High adjusted R-square suggest the estimated model apposite the real data well.

Table 10: The influence of the financial crisis on the percent share of BOND funds at the EUROPEAN mutual funds market.

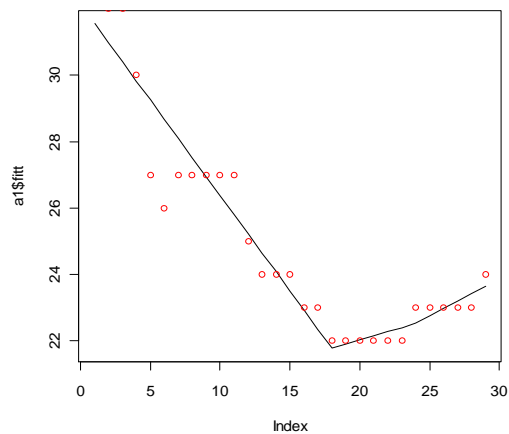
Reg10 percent share of bond funds
 $lm(formula = dataUCITS[, 4] \sim dataUCITS[, 1] + x1 + x2$
Residuals:

	Min	1Q	Median	3Q	Max
	-2,6757	-0,2652	0,0529	0,4828	1,5956

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	4648,72142	325,2301	14,294	1,55E-13 ***
dataUCITS[, 1]	-2,30484	0,16217	-14,213	1,76E-13 ***
x1	0,70221	0,1475	4,761	6,93E-05 ***
x2	0,09658	0,28715	0,336	0,74

Residual standard error: 0,9672 on 25 degrees of freedom
Multiple R-squared: 0,9214 **Adjusted R-squared: 0,9119**
F-statistic: 97,66 on 3 and 25 DF p-value: 6,187e-14
BP test p-value: 0.019; Pearson's corr.: R = 0,61, p-value < 0,01



In Table 11 there are shown the results of data testing for European money market funds. The estimated coefficients indicate the same relationship as the Table

7 did. The trend of money market fund was decreasing before crisis. This changed when the crisis occurred, as is proved by the high significance of the first dummy variable. The end of the crisis changed the trend once again, back to decreasing slope. This is supported by the significance of the dummy variable X_2 . Further the new trend which has occurred after the crisis is more decreasing as was before crisis. This is same fact as was shown at the Table 7. We can clearly say that the financial crisis had the statistically significant impact on the percent share of European money market funds.

Table 11: The influence of the financial crisis on the percent share of MONEY MARKET funds at the EUROPEAN mutual funds market.

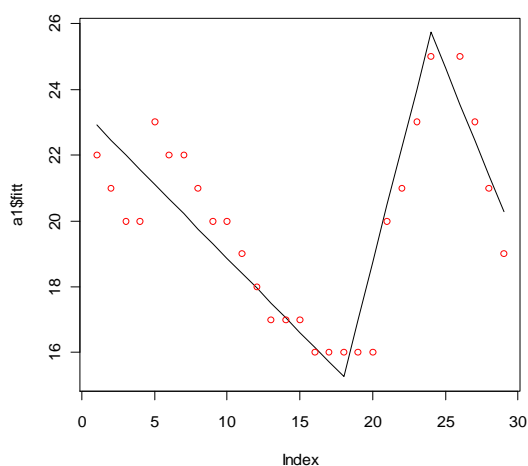
Reg11 percent share of money market funds
 lm(formula = dataUCITS[, 5] ~ dataUCITS[, 1] + x1 + x2
 Residuals:

	Min	1Q	Median	3Q	Max
	-2,74718	-0,98301	-0,05772	0,74337	3,36125

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	3630,9392	475,8299	7,631	5,50E-08 ***
dataUCITS[, 1]	-1,8011	0,2373	-7,591	6,03E-08 ***
x1	2,1955	0,2158	10,174	2,26E-10 ***
x2	-2,8348	0,4201	-6,748	4,52E-07 ***

Residual standard error: 1,415 on 25 degrees of freedom
 Multiple R-squared: 0,8142 **Adjusted R-squared: 0,7919**
 F-statistic: 36,52 on 3 and 25 DF p-value: 2,723e-09
 BP test p-value: 0,2555; Pearson's corr.: R = 0,48, p-value: 0,01



In the case of regressions 8, 9, 10 and 11 (table 8, 9, 10 and 11) the Assumption 1 is fulfilled in all cases. The Assumption 2 is violated in the case of balanced funds and bond funds. For further analysis we would have to work with this fact.

Czech mutual funds market

Five following tables are dealing with influence of the crisis on the percent share at the Czech mutual funds market. In Table 12 there is clearly shown that both dummy variables are significant. The adjusted R-squared is high and supports our hypothesis as well. We have proved that the financial crisis influenced the percent share of equity funds at the Czech mutual funds market. The trend was in the same direction as at the world and the European market. The increasing trend is faster

after the crisis then before which is same for the world mutual funds market and the European.

Table 12: The influence of the financial crisis on the percent share of EQUITY funds at the CZECH mutual funds market.

Reg12 percent share of equity funds
 $lm(formula = dataCZECH[, 2] \sim dataCZECH[, 1] + x1 + x2)$

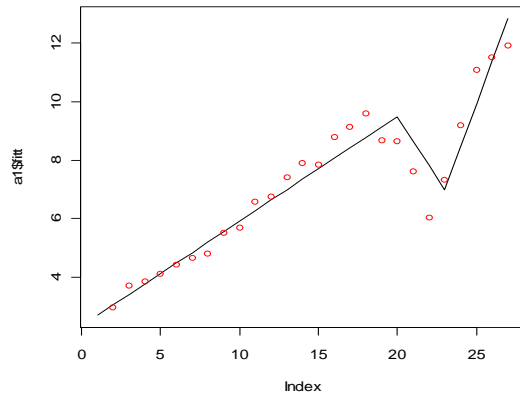
Residuals:

	Min	1Q	Median	3Q	Max
	-1,77141	-0,30424	0,08886	0,38035	1,1898

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-2855,5951	209,2037	-13,65	1,62E-12 **
dataCZECH[, 1]	1,4265	1,04E-01	13,679	1,55E-12 **
x1	-1,19E+00	2,07E-01	-5,746	7,48E-06 **
x2	2,2886	3,60E-01	6,351	1,76E-06 **

Residual standard error: 0,6928 on 23 degrees of freedom
 Multiple R-squared: 0,9381 **Adjusted R-squared: 0,9301**
 F-statistic: 116,3 on 3 and 23 DF p-value: 4,836e-14
BP test p-value: 0,02864; Pearson's corr.: R = 0,47, p-value: 0,015



The examination of the balanced funds at the Czech mutual market brought the results that do not support the hypothesis. The low significance of the estimated linear regression showed in Table 13 makes us refuse the hypothesis. We can not say that the percentage changes of the balanced funds net assets were significantly influenced by the crisis.

Table 13: The influence of the financial crisis on the percent share of BALANCED funds at the CZECH mutual funds market.

Reg13 percent share of balanced funds
 $lm(formula = dataCZECH[, 3] \sim dataCZECH[, 1] + x1 + x2)$

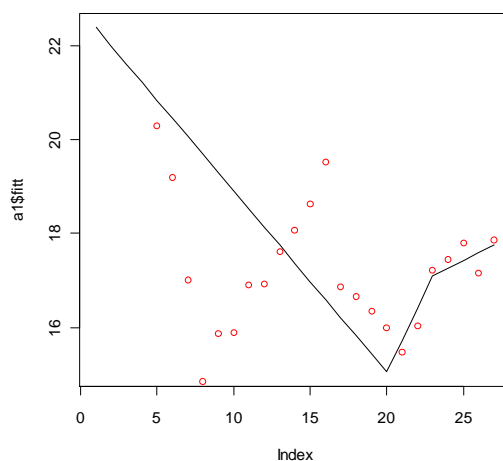
Residuals:

	Min	1Q	Median	3Q	Max
	-4,8298	-0,8767	0,1202	0,9311	3,5893

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	3117,5498	645,433	4,83	7,11E-05 ***
dataCZECH[, 1]	-1,5447	0,3217	-4,801	7,64E-05 ***
x1	1,0709	0,6386	1,677	0,107
x2	-0,521	1,1117	-0,469	0,644

Residual standard error: 2,137 on 23 degrees of freedom
 Multiple R-squared: 0,5265 **Adjusted R-squared: 0,4647**
 F-statistic: 8,525 on 3 and 23 DF p-value: 0,0005475
BP test p-value: 0,03570; Pearson's corr.: R = 0,83, p-value < 0,01



In Table 14 there are shown the results of statistical testing for bond funds. The significance of the first dummy variable is still very high. This supports our

hypothesis that the beginning of the financial crisis had statistically significant influence on the percent share of bond funds at the Czech mutual funds market. The trend before crisis was decreasing and during the crisis it was changed into slow increasing. This development is very similar to which we proved in Table 10 about the changes at the European mutual funds market. The second dummy variable is not significant which suggests that the end of the crisis did not mean the change in trend to that before crisis or that the crisis has not ended yet. High adjusted R-squared supports our results.

Table 14: The influence of the financial crisis on the percent share of BOND funds at the CZECH mutual funds market.

Reg14 percent share of bond funds
 lm(formula = dataCZECH[, 4] ~ dataCZECH[, 1] + x1 + x2)

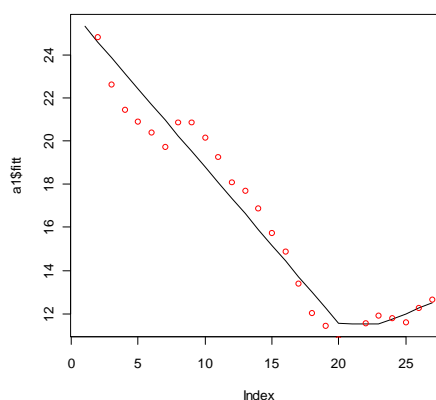
Residuals:

	Min	1Q	Median	3Q	Max
	-1,69375	-0,83808	0,05102	0,68206	1,78335

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	5830,5968	315,7536	18,466	2,73E-15 ***
dataCZECH[, 1]	-2,8972	0,1574	-18,408	2,93E-15 ***
x1	0,7063	0,3124	2,261	0,0335 *
x2	0,2663	0,5439	0,49	0,629

Residual standard error: 1,046 on 23 degrees of freedom
 Multiple R-squared: 0,958 **Adjusted R-squared: 0,9525**
 F-statistic: 174,9 on 3 and 23 DF p-value: 5,67e-16
BP test p-value < 0,01; Pearson's corr.: R = 0,75, p-value < 0,01



The money market funds at the Czech mutual funds market showed the different results than the same funds at the European and world market. We can see that the estimated dummy variables are not significant. This implies that the percent share of money market funds did not be influenced neither by the beginning of the crisis nor the end of the crisis.

Table 15: The influence of the financial crisis on the percent share of MONEY MARKET funds at the CZECH mutual funds market.

Reg15 percent share of money market funds
 $\text{lm}(\text{formula} = \text{dataCZECH[, 5]} \sim \text{dataCZECH[, 1]} + x1 + x2)$

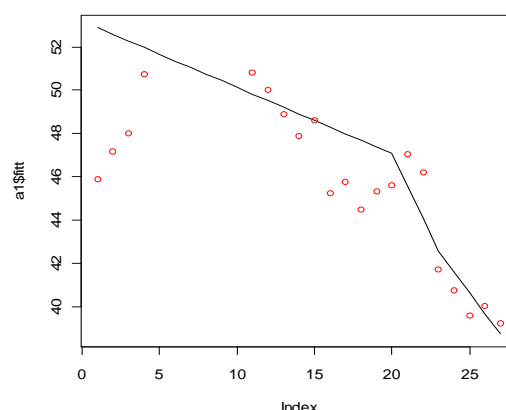
Residuals:

	Min	1Q	Median	3Q	Max
	-6,9898	-1,7548	-0,332	1,8074	6,2791

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	2509,4043	1056,6041	2,375	0,0263 *
dataCZECH[, 1]	-1,226	0,5267	-2,328	0,0291 *
x1	-1,1961	1,0455	-1,144	0,2643
x2	0,5434	1,8074	0,299	0,7679

Residual standard error: 3,499 on 23 degrees of freedom
 Multiple R-squared: 0,6107 **Adjusted R-squared: 0,5599**
 F-statistic: 12,03 on 3 and 23 DF p-value: 6,142e-05
BP test p-value < 0,01; Pearson's corr.: R = 0,84, p-value < 0,01



There are available data for one more type of funds at the Czech mutual funds market. The influence of the crisis on the percent share of funds of funds is proved at the Table 16. The first dummy variable X_1 is significant and supports this result. The second dummy variable is not significant which suggest the hypothesis that the trend was changed by the financial crisis and has not been changed back yet. Which could indicates that the crisis is longer than we supposed earlier or that the change of trend made by the crisis is at long-run basis. High adjusted R-squared supports our results.

Table 16: The influence of the financial crisis on the percent share of FUNDS OF FUNDS at the CZECH mutual funds market.

Reg16 percent share of funds of funds
 $\text{lm}(\text{formula} = \text{dataCZECH[, 6]} \sim \text{dataCZECH[, 1]} + x1 + x2)$

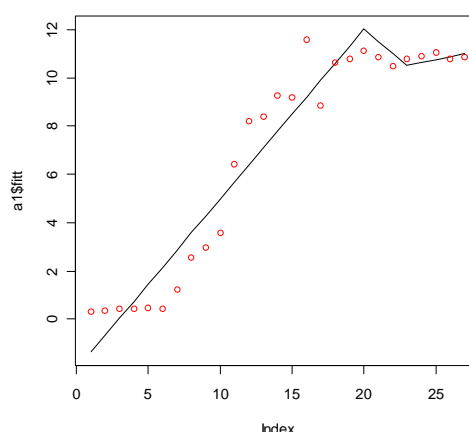
Residuals:

	Min	1Q	Median	3Q	Max
	-1.7229	-0.9566	-0.0810	0.7208	2,3653

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-5653.4432	357.9529	-15.794	7.73e-14 **
dataCZECH[, 1]	2,8207	0.1784	15.809	7.57e-14 **
x1	-1.2074	0.3542	-3.409	0.00241 **
x2	0.6229	0.6166	1.010	0.32288

Residual standard error: 1.185 on 23 degrees of freedom
 Multiple R-squared: 0.9385 **Adjusted R-squared: 0.9304**
 F-statistic: 116.9 on 3 and 23 DF p-value: 4.563e-14
BP test p-value: 0,1186; Pearson's corr.: R = 0,66, p-value < 0,01



The Assumption 1 is not fulfilled in the case of bond funds and money market funds for more detailed analysis we would have to choose more sophisticated

method then OLS. The Assumption 2 is fulfilled just in the regression 12 (table 12). In the rest of the regression we have to count that the estimation is not so solid.

5.3. Sources of the Czech mutual funds market changes

In this chapter we will test the first three hypotheses. We want to show that theory of the mutual funds holds even for the time of crisis. The hypotheses are:

Hypothesis 1: Price level of equity funds depends on the stock market index.

Hypothesis 2: The demand for money market funds depends on the interest rate level.

Hypothesis 3: The demand for bond funds depends on the long-term interest rates.

The data with which we will be testing above stated hypothesis are selected from the official web pages of examined management companies.¹⁰ The independent variables were taken from the official government statistics organizations, which one will be clarify to each hypothesis. For all of the following regressions we have the monthly data sets from the January 2005 to the December 2009.

5.3.1 Analysis of the Hypothesis 1

In this subchapter we will discuss the relationship between the price level of equity funds and the stock market index that we stated in the theoretical part of this diploma. We are going to use simple linear regression model to prove or disprove this hypothesis.

Formula 9: $\% \Delta$ of examined equity fund price = $a + b * (\% \Delta$ of monthly level of PX50) + u_i .

Price of examined fund is the average month price of each fund. To receive the data series that fulfilled the condition of stationarity we have used the percentual change of all used variables. For testing this hypothesis we used these three funds:

¹⁰ ČP INVEST Investiční společnost, a.s. - <http://www.cp-invest.cz/>, ČSOB Investiční společnost, a.s., člen skupiny ČSOB - <http://www.csob.cz/cz/Lide/Sporeni-a-investovani/Stranky/Podilove-fondy.aspx>, Pioneer investiční společnost, a.s. - <http://www.pioneerinvestments.cz/>

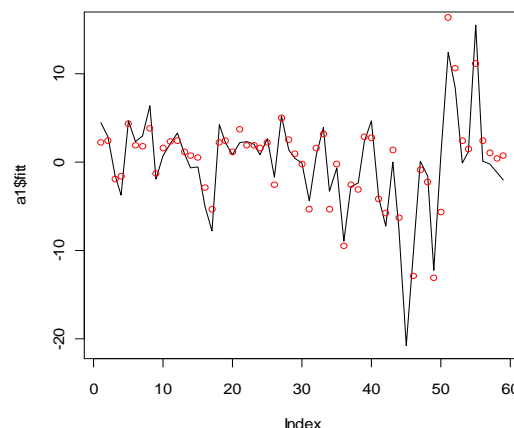
- ČSOB akciový mix from the management company ČSOB Investiční společnost, a.s.
- Fond nových ekonomik ČP INVEST managed by ČP INVEST Investiční společnost a.s.
- Pioneer - akciový fond from the Pioneer investiční společnost, a.s.

We have made monthly averages from their daily prices. Monthly numbers of PX50 are available at the web pages of the Prague Stock Exchange.

The results from the first analysis of the hypothesis 1 can be seen at the Table . We can see the direct relationship between the change in price of the fund and the PX50. This result is supported by the high adjusted R-square and low p-value. The development of the price of this fund supports the theoretical hypothesis.

Table 17: The econometric analysis of the relation between ČSOB akciový mix price and PX50.

```
reg17:      (csob ef perc) = a + b*(px perc)
lm(formula = dataEF[, 4] ~ dataEF[, 2])
Residuals:
      Min       1Q   Median       3Q      Max
-6,3669  -0,7847   0,1625   1,1882   3,8856
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   -0,3791    0,2332  -1,6260  0,1100
dataEF[, 2]    0,7579    0,0324  23,4180 <2e-16
Residual standard error: 1,789 on 57 degrees of freedom
Multiple R-squared: 0,9059      Adjusted R-squared: 0,9042
F-statistic: 548,4 on 1 and 57 DF  p-value: < 2,2e-16
BP test p-value: 0,3672; Pearson's corr.: R = 0,05, p-value: 0,71
```



We can take on another fund. The relationship between the stock market index and the price of equity fund is proved at the Table 18. The relationship is not so strong as was at the Table 17 but still very strong and positive according to theoretical assumptions.

Table 18: The econometric analysis of the relation between Fond nových ekonomik ČR INVEST price and PX50.

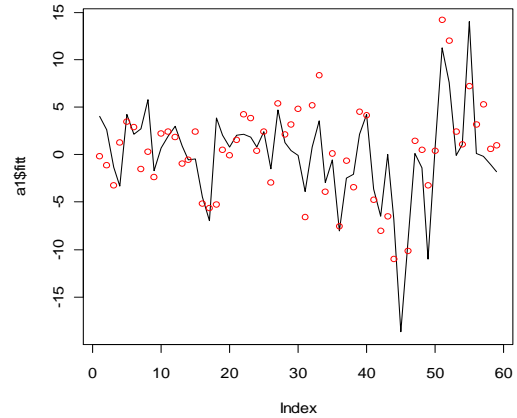
reg18: (cp ef perc) = a + b*(px perc)
 lm(formula = dataEF[, 6] ~ dataEF[, 2])
 Residuals:

	Min	1Q	Median	3Q	Max
	-9,1807	-1,3832	0,0516	2,0719	7,7790

 Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0,2986	0,4407	-0,6770	0,5010
dataEF[, 2]	0,6852	0,0612	11,2030	0,0000 ***

 Residual standard error: 3,381 on 57 degrees of freedom
 Multiple R-squared: 0,6877 **Adjusted R-squared: 0,6822**
 F-statistic: 125,5 on 1 and 57 DF p-value: 4,959e-16
BP test p-value:0,39; Pearson's corr.: R = 0,27, p-value: 0,043



The last test supports the hypothesis as we have shown in Table 19. We can see the high significance of the variable dataEF[, 2] stands for the percentage change of PX50. The adjusted R-squared coefficient is high as well as the p-value. The Hypothesis 1 has been proven by the development of the three different equity funds. We can say that the price of equity funds positively depends on the level of the stock market index. Further, the statistically significant change in the level of the equity funds level of net assets and statistically significant change in the level of the percentage share of the equity funds in the Czech Republic during the crisis could be caused by the change of the stock market index.

Table 19: The econometric analysis of the relation between Pioneer - akciový fond price and PX50.

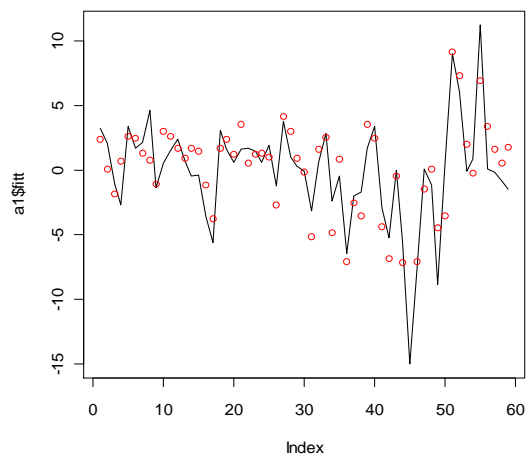
reg19: (pio ef perc) = a + b*(px perc)
 lm(formula = dataEF[, 8] ~ dataEF[, 2])
 Residuals:

	Min	1Q	Median	3Q	Max
	-6,8903	-1,0974	0,1634	1,3646	4,3809

 Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0,2737	0,2692	-1,0170	0,3140
dataEF[, 2]	0,5493	0,0374	14,7020	<2e-16 **

 Residual standard error: 2,066 on 57 degrees of freedom
 Multiple R-squared: 0,7913 **Adjusted R-squared: 0,7877**
 F-statistic: 216,1 on 1 and 57 DF p-value: < 2,2e-16
BP test p-value < 0,01; Pearson's corr.: R = 0,03, p-value: 0,842



In analysis of the hypothesis 1 there was a violation of the Assumption 1 in the last regression. The other regressions are sufficient for our analysis.

5.3.2 Analysis of the Hypothesis 2

In this subchapter we are going to test the relationship between the demand for the money market funds and the level of interest rate. We are going to use linear regression to prove or disprove this hypothesis. As an indicator of the demand for the money market funds we will use the price of the money market funds. The higher the price is the higher is the demand for particular money market fund. We are skeptical with the supporting of this hypothesis because we did not confirm the influence of the financial crisis at the mutual funds in the previous chapter.

Formula 10: $\% \Delta$ of examined money market fund price = a + b*($\% \Delta$ of monthly level of 1Y PRIBOR) + u_i .

We are using the percentual changes as in the previous case. We obtained monthly data of 1Y PRIBOR at the web page of the Czech National Bank. For statistical examination we have used following funds:

- CSOB KBC Multi Cash CSOB CZK from the management company ČSOB Investiční společnost, a.s.

- Fond peněžního trhu ČP INVEST managed by ČP INVEST Investiční společnost a.s.
- Pioneer – Sporokonto from the Pioneer investiční společnost, a.s.

Table 20 suggests that the confirmation of the hypothesis 2 will be difficult. The results received from the statistical software suggest that there is very low relationship between the price of the money market fund and *1Y PRIBOR*.

Table 20: The econometric analysis of the relation between the price of CSOB KBC Multi Cash CSOB CZK and 1Y PRIBOR.

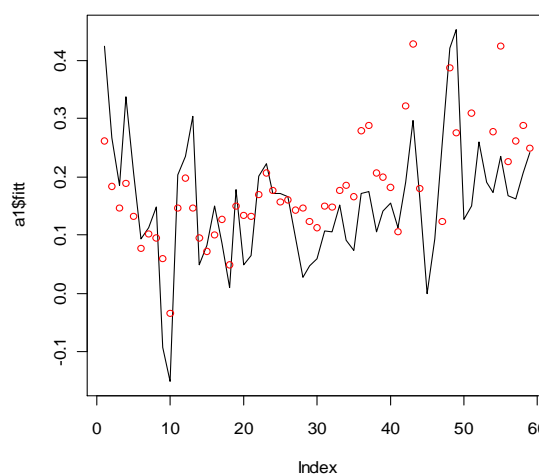
reg20: (csob mmf perc) = a + b*(pribor perc)
 lm(formula = dataMMF[, 4] ~ dataMMF[, 2])
 Residuals:

	Min	1Q	Median	3Q	Max
	-1,28403	-0,03595	0,0263	0,09303	0,52049

 Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0,15546	0,02878	5,402	1,34E-06 ***
dataMMF[, 2]	-0,015533	0,004126	-3,765	0,000396 ***

 Residual standard error: 0,221 on 57 degrees of freedom
 Multiple R-squared: 0,1991 **Adjusted R-squared: 0,1851**
 F-statistic: 14,17 on 1 and 57 DF p-value: 0,0003963
 BP test p-value: 0,2212; Pearson's corr.: R = 0,33, p-value: 0,012



The Table 21 and Table 22 confirm the results from Table 20. There is low relationship between the percentual change of the *1Y PRIBOR* and the percentual changes of the price of mentioned money market funds. Both adjusted R-squared coefficients are very low.

Table 21: The econometric analysis of the relation between the price of Fond peněžního trhu ČP INVEST and 1Y PRIBOR.

reg21: (cp mmf perc) = a + b*(pribor perc)
 lm(formula = dataMMF[, 6] ~ dataMMF[, 2])
 Residuals:

	Min	1Q	Median	3Q	Max
	-0,461087	-0,049028	-0,008301	0,06822	0,367576

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0,182557	0,01815	10,058	3,04E-14 **
dataMMF[, 2]	-0,015439	0,002602	-5,934	1,85E-07 **

Residual standard error: 0,1394 on 57 degrees of freedom
 Multiple R-squared: 0,3818 **Adjusted R-squared: 0,371**
 F-statistic: 35,21 on 1 and 57 DF p-value: 1,847e-07
BP test p-value: 0,3893; Pearson's corr.: R = 0,21, p-value: 0,12

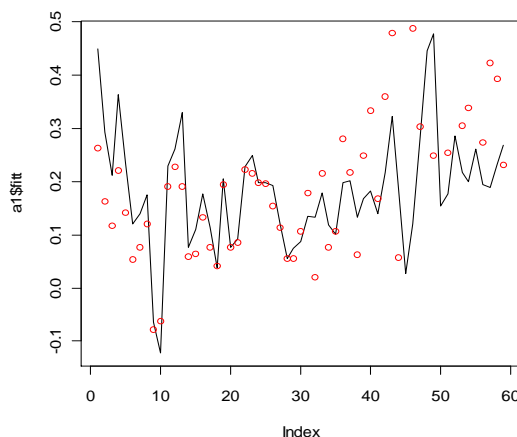


Table 22: The econometric analysis of the relation between the price of Pioneer – Sporokonto and 1Y PRIBOR.

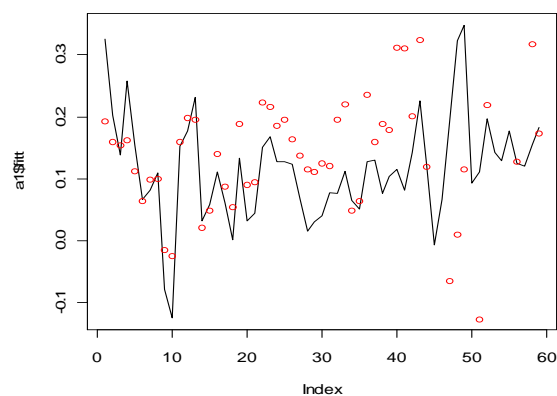
reg22: (pio mmf perc) = a + b*(pribor perc)
 lm(formula = dataMMF[, 8] ~ dataMMF[, 2])
 Residuals:

	Min	1Q	Median	3Q	Max
	-1,635012	-0,009225	0,039937	0,08202	0,448422

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0,115337	0,034466	3,346	0,00145 **
dataMMF[, 2]	-0,012147	0,004941	-2,459	0,01701 *

Residual standard error: 0,2647 on 57 degrees of freedom
 Multiple R-squared: 0,09588 **Adjusted R-squared: 0,08001**
 F-statistic: 6,044 on 1 and 57 DF p-value: 0,01701
BP test p-value: 0,1951 ; Pearson's corr.: R = 0,37, p-value < 0,01



In this chapter we were examining the Hypothesis 2. Based on the econometric results we are unable to support that this Hypothesis holds for the Czech money market funds. Nevertheless the Assumption 1 holds for all three regressions and the Assumption 2 is not fulfilled just in the last case.

5.3.3 Analysis of the Hypothesis 3

In this last analytical chapter we will examine the relationship between the demand for bond funds and the long term interest rates. We will use linear regression one more time to test this hypothesis. The price of the particular bond fund will be the indicator of the demand as we used before. As a long term interest rates we will use

the rate of 10 years government bond. Precisely its monthly average as is presented at the web page of the Czech National Bank. For examining this hypothesis we cannot use bond fund managed by the ČP INVEST Investiční společnost a.s., because it is focused on the shorter time period investments. As we stated before, the relationship which is expected is negative. That is that the government bonds and bond funds are competitors. We will use linear regression

Formula 11: $\% \Delta$ of examined bond fund price = $a + b * (\% \Delta$ of monthly level of 10Y Gov. bond) + u_i .

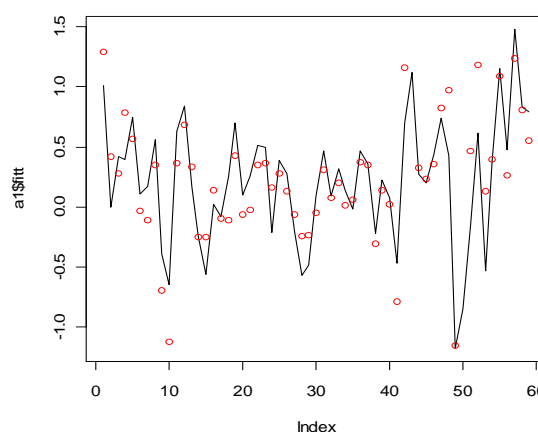
We are using the percentual changes as in both testing before. Gov. bond stands for government bond. The mentioned relationship will be tested on this bond funds:

- ČSOB bond mix from the management company ČSOB Investiční společnost, a.s.
- Pioneer - obliagační fond managed by the Pioneer investiční společnost, a.s.

Table 23 suggests that this hypothesis is right. The adjusted R-squared coefficient is high enough, p-value is low. The variable which stands for the government bond is significant and has a negative sign which indicates the negative relationship. From this table we could support the Hypothesis 3 that the bond funds are negatively related to the long interest rates.

Table 23: The econometric analysis of the relation between the price of ČSOB bond mix and the 10Y government bond.

```
reg23:      (csob bf perc) = a + b*(govb perc)
lm(formula = dataBF[, 4] ~ dataBF[, 2])
Residuals:
    Min       1Q   Median       3Q      Max
-0,6533  -0,16477  -0,07424   0,127   0,66224
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  0,226712   0,037479   6,049 1,20E-07 ***
dataBF[, 2] -0,100589   0,007415 -13,57 < 2e-16 ***
Residual standard error: 0,2879 on 57 degrees of freedom
Multiple R-squared:  0,7635    Adjusted R-squared:  0,7593
F-statistic: 184 on 1 and 57 DF  p-value: < 2,2e-16
BP test p-value: 0.2004; Pearson's corr.: R = 0,30, p-value: 0,02
```



Following analysis supports this proposition. In Table 24 we can see that the bond fund is acting in the similar way. The adjusted R-squared is even higher then in previous case and p-value is low. Coefficient sign is negative as we predicted.

Table 24: The econometric analysis of the relation between the price of Pioneer - obligační fond and the 10Y government bond.

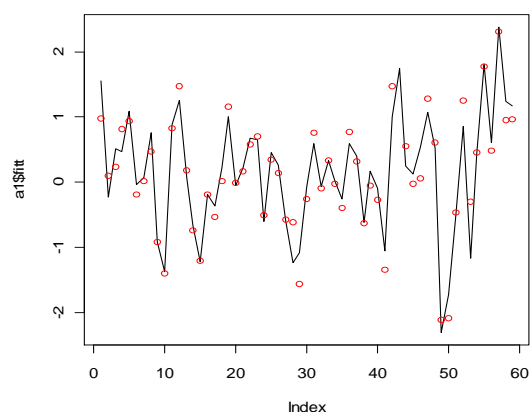
reg24: (pio bf perc) = a + b*(govb perc)
 lm(formula = dataBF[, 8] ~ dataBF[, 2])
 Residuals:

	Min	1Q	Median	3Q	Max
	-0,58641	-0,15744	-0,0325	0,103	0,94823

 Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0,17343	0,037	4,687	1,77E-05 ***
dataBF[, 2]	-0,17743	0,00732	-24,24	< 2e-16 ***

 Residual standard error: 0,2842 on 57 degrees of freedom
 Multiple R-squared: 0,9116 **Adjusted R-squared: 0,91**
 F-statistic: 587,5 on 1 and 57 DF p-value: < 2,2e-16
BP test p-value: 0,7088; Pearson's corr.: R = 0,092, p-value: 0,49



After the econometrical analysis of the relationship between the price of bond funds and the level of the 10Y government bonds we can support the Hypothesis 3 that the demand for the bond funds is negatively related to the long interest rates. The rates of the 10Y government bonds were decreasing during the crisis and it indicates that this could be channel of the percentage change of the bond funds share at the Czech mutual funds market. Both assumptions are fulfilled in the last two regressions, the OLS method is used properly.

6. Conclusion

In this diploma we examined and proved that the financial crisis from the autumn of 2008 had significant influence on the mutual funds market in the Czech Republic. This impact was significant in the third quarter of 2008 which is corresponding with the theoretical assumption given by the Czech Capital Market Association. This influence of the crisis ceased in the second quarter of 2009 as was assumed by the literature. The financial crisis did not affect just the total level of invested resources (hypothesis 4) but also the composition of the mutual funds market (hypothesis 5). We were testing the influence of the crisis with these two hypotheses on the world and European mutual funds markets as well.

Finally we can confirm that the crisis influenced Czech mutual funds market even before the it hit global and European economy. In chapter 4 we proved the crisis begun affecting the global and the European mutual funds markets in the first half of 2007 and that this impact ended in the 4th quarter of 2008. The impact of the financial crisis on the total amount of invested resources was significant at the world, European and Czech mutual funds market. The impact on the composition of these markets was similar at the global and European mutual funds market. The equity funds had been increasing their share before crisis. During the crisis their share was decreasing but after the crisis it has been coming back. This holds for both the global and the European market. The bond funds had been facing decreasing trend before crisis, which was change by the beginning of the crisis. The trend changed to increasing and since the end of the crisis it has been increasing its share even faster. Money market funds were acting in exactly opposite was as the equity funds. They had been decreasing their share before crisis. This changed into increasing share during crisis and has been following with decreasing trend since the end of the crisis. In the Czech Republic was not the impact so clear. Equity funds have been acting in the same way as the world and European ones (increasing share before the crisis, decreasing during and increasing after). Czech bond funds followed the same trend as the global and European bond funds, of course in different time constraints. The difference is in money market funds, which have been continually decreasing their

share since 2002 in the Czech Republic. On the other hand the Czech funds of funds have been acting in opposite way as money market funds.

By proving the hypothesis 1 and 3 we found possible channels through which the crisis influenced the Czech bond funds and equity funds. Bond funds in the Czech Republic are significantly correlated with the 10 years government bonds. Czech equity funds are connected with the index of the Prague Stock Exchange PX50.

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