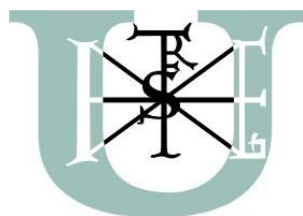


Szent István University
Gödöllő
Management and Business Administration PhD School



THESIS OF DOCTORAL (PhD) DISSERTATION

Analysing the impacts of financial crisis of 2007 on the investment funds in Hungary

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1. INTRODUCTION

1.1. Relevance of topic

Following the transition of Hungary to market economy, new products and innovations have been introduced on the financial market and opened new perspectives for the development of financial culture. During the last 24 years, Hungarian people have started to use these services only gradually, because previously they had no chance to use them. The new economic environment, liberalization of money and capital market requires, of course, considerable changes in attitude on behalf of the actors in the economy. This process, however, can be considered rather slow in Hungary. **The level of development in regard to money and capital market** has become the measure of economic development in our country, too.

The global financial and the consequent economic crisis - which started in the United States in 2007 due to the inappropriate legislation of mortgage market and have had a worldwide dimension from Autumn 2008 – have fundamentally changed the investors' way of thinking which was developed according to the expansion of financial innovation and insufficient regulation.

The explosion of the crisis – according to the references – could also be due to the poor financial culture, excess demand and the related over-production, excessive need for profit, uncontrolled financial innovations, over-liquidity and a number of other factors, the combined effect of which could lead to such a huge crisis.

The financial crisis hit Hungary for the first time in Autumn 2008. The consequent economic decline is still going on and has brought recession to the financial markets, too. The restriction of lending does not enhance economic development and it is true vice versa. The financial crisis and the uncertainties of economic environment does not encourage the enterprises to develop. The economic crisis and the decline of employment has also reduced savings, but lending without savings can be made only at increasing risks (external exposures of banking system) which is impossible in the current situation.

As regards the net financial assets of the population, their ratio has substantially declined compared to GDP which means that the savings have diminished to a greater extent than the economic decline. The conditions have further deteriorated the investment willingness in Hungary which had been rather moderate before, too. Due to the decreasing volume of invested assets, the realizable profit was lower, too, the real profit is even less owing to the high inflation rate. The re-investment of profit is also declining, which further worsens the chances of our country to go out from recession. It is especially important because savings make lending possible which increases investments and this leads to economic recovery.

Encouraging investments, properly managing the available capital in billions of forint can be of key importance for Hungary in the recovery from economic crisis.

1.1. Objective and scope of examination

The investment market, including especially the market of investment funds is evaluated in the thesis, because it properly reflects the Hungarian financial culture and its level of development. In addition to some factors, the development of the investment market can help our home country to find the way out of the crisis and to put us again on the track of economic growth.

The aim of the present doctoral dissertation is to explore the factors influencing the savings habits of Hungarian households, evaluation of changes, with special regard to investment funds. The crisis which started in 2007 makes the topic especially relevant and enables to evaluate the aspects of investment fund market separately before and after the crisis broke out. The analysis of the impacts of crisis is also possible this way.

Investors can place their assets in investment funds with predetermined investment policy, according to their risk tolerance and expectations concerning the returns. I highlight the investment funds because they cover almost the whole range of securities investment alternatives therefore the outcomes of the research give a general view of the Hungarian investment market, too.

The research deals with the net financial asset of people and the asset managed by investment funds. The factors affecting the asset managed by mutual funds are evaluated in a narrow range, in open-end funds because only the investment funds with similar arrangements can be compared with each other. In case of closed-end funds there is no redemption liability before maturity therefore the impact of economic crisis in regards to them can be followed only after a longer time.

1.2. Hypothesis of research

H1: The relation between net asset value and yield of public, open-end investment funds in Hungary was closer after the outburst of financial crisis. The financial crisis has modified the aspects of investors. They give more attention to the return, and – as a consequence – the restructuring among the groups of investment funds is more considerable than before.

H2: Following the economic crisis, the investors are more conscious of risks in Hungary, that is they know that higher return can be achieved only at higher risks and vice versa: if they take less risks, the return will be smaller. Due to the relatively low level of financial culture, the small-scale investors earlier gave more attention to the yield and reliability of fund manager (there are smaller or larger credit institutions behind the fund manager) and they were less aware of risk-yield relations. In my opinion, the crisis put this relation into the limelight and thus the impact of more deliberate risk-taking can be presumably confirmed in the changes of investment funds.

H3: When the investment funds are set up, the reliability of investment policies defined in advance by the portfolio experts is greater after the crisis than it was before. Prior to the economic crisis, most of the investors were not fully aware of the investment policy of funds. Each investment policy can be characterized by a level of risk-taking, which is not always clear for a so-called outsider small investor due to the level of financial culture. I presume that the crisis has changed the former attitude both on behalf of investment fund managers and investors.

H4: In case of investment funds with smaller net asset value, the risk of investment, that is the variation of return on investment fund is larger. Moreover, the investors can calculate with lower risks in case of investment funds with higher net asset value. The asset managed by investment funds restricts the diversification of investment due, on the one hand, to the compliance with legal regulations (compulsory government bond ratio due to the safe operation) and, on the other hand, to the investment policy of the fund (period and risk). Besides the above limits, it is still probable that the larger is the net asset value, the smaller is the risk due to the possible diversification in case of funds with the same investment policies.

2. MATERIAL AND METHOD

The present doctoral dissertation intends to examine the impact of economic crisis on savings with special regard to the market of investment funds.

2.1. Database used for the examination

Data, analyses and statistics connected with the topic of the dissertation are published about the Hungarian investment funds by the National Bank of Hungary, Hungarian Financial Supervisory Authority and other institutions dealing with economic analysis. Besides using the figures from these organizations, I also needed detailed daily data for the analysis of changes in the investment funds which I collected from the Association of Hungarian Investment Fund and Asset Management Companies (BAMOSZ).

Out of the investment funds the public, open-end securities investment funds were selected – which are currently available in Hungary – because only the similarly structured investment funds can be compared. The closed-end investment funds were not analysed because there is not any redemption liability before maturity for those fund shares, therefore the impact of economic crisis in their case can be examined only after a longer period of time.

My research consists of 5 main parts. In the **first part** I analysed the whole market of public, open-end investment funds and reviewed the main tendencies from their introduction in 1992 until December 2012. I have examined the ownership ratios of fund shares according to the sectors of the national economy, made comparisons with the market of other investment products, revealed the degree and reasons for the changes of total net asset value, the number of investment funds and their connection with the changes of net asset value.

Following this, I chose **stratified sampling** from the sampling processes based on random selection. In the **second part** I analysed the relation between net asset value and yield by using correlation calculation. Appropriate period of time is required for the analysis and – since I intended to examine the impacts of the economic crisis – the period before the economic crisis and after the outburst of the crisis should have been long enough. I have analysed the time series of 9 years before the crisis and the time series of 4 years after the outbreak of the crisis. The main criteria of selection was that the starting date of the investment fund involved in research must be before August 31, 1999 and the fund was still operating. The first examined period lasted from September 1, 1999 until August 31, 2008, the second period lasted from September 1, 2008 until September 1, 2012. Following the definition of time frame I have selected 33 investment funds which properly represent the whole range of funds from the least risky liquidity funds to the most risky equity funds. I made the calculations on the basis of daily published data within the periods of time.

In the **third part** I tried to find out whether the reliability of investment policies increased or not after the outburst of economic crisis. Since correlation calculation cannot answer this question I made cluster analysis for the selected 33 investment funds. I divided the time series into two parts at the same place and examined whether the funds with similar investment policies are arranged in similar clusters on the basis of return and data of annual and 5-year variation.

In the **fourth part** of research I expanded the group of examined funds in order to analyse the relations between net asset value and risk. The examined time horizon was reduced to two years in the period before the outbreak of crisis and left the period after the crisis unchanged, thus I could examine more investment funds. I selected 93 funds from all the public, open-end funds which are

available in Hungary and denominated in Hungarian forint. They were divided into 9 groups of investment funds thus appropriate number of elements was available within one group of funds. The market share of selected funds was large enough to make general conclusions from my results for the whole investment fund market and for the whole period.

In the **fifth part** I dealt with the real estate funds separately. I examined the direction and strength of relation between the yield and net asset value of real estate funds by using the trend calculation method. At present there are altogether 14 real estate investment funds in Hungary. I analysed the data of 8 years in total. By changing the time horizon those 5 real estate investment funds were selected which were founded the earliest and properly represented the changes in the given market segment. Out of trend calculation methods I chose linear trend calculation because data were given for this. Since in most of the cases I have found a function-like relation. I disregarded the use of other trend function varieties.

2.2. Analysing methods applied

The 33 selected investment funds required for the second and third part of analysis were different in terms of their investment policies. The relations between the yield and net asset value changes in regard to the 33 selected investment funds were examined by **correlation calculation** from 1999 to 2012.

The data were downloaded from the website of the Association of Hungarian Investment Fund and Asset Management Companies. The fund management companies are obliged to publish daily figures about all the public investment funds therefore I had access to thousands of data per each investment fund in regard to net asset value and daily return. I made correlation calculation between the daily published net asset value data and the annualised return.

„The absolute value of r correlation coefficient between $+1$ and -1 limits measures the closeness of linear relation between X and Y , its sign indicates the direction of relation.” (Hunyadi, 1996)

The second statistical method used for analysis was the **cluster analysis**. I made cluster analysis for the 33 funds involved in the detailed examination in order to explore how the investment policy is reflected in the clusters formed on the basis of yield and risk, before and after the economic crisis. Average was calculated from the available data of annual and 5-year return and – together with variation figures – clusters were formed with the help of SPSS program for the period before and after the crisis. The first examined period lasted from January 1, 1999 to August 31, 2008, while the period after the crisis lasted from September 1, 2008 until September 1, 2012.

„Cluster analysis is a collective name of methods and related algorithms which enable the ranking of any object into different classes (groups).” (Szűcs, 2002)

I used mathematical, statistical methods and the method of comparison for the research described in the third part.

Mathematical, statistical methods as well as trend calculation were applied in the examinations concerning real estate funds.

3. RESULTS

3.1. Impact of economic crisis on securities investment funds

Investment funds have a significant place on the financial market of Hungary. Their substantial volume is worth examining from 1995 because a few years were required from their outset in 1992 while they expanded on the financial market. Since it is a very popular product among individuals, their asset must be compared primarily to the **total financial asset of households** as it is described on Figure 1. The net asset value of investment funds was only 1,21% of the financial assets of households in 1995. This ratio increased to 4,06% by 1998, while it reached 8,89% by 2004 which clearly shows that this product had become very popular after a very short time. A really huge breakthrough was brought for these products by the year of 2005 when the net asset value of investment funds exceeded 13,86% compared to the financial assets of households. The peak was almost 20% reached in 2007. Following the economic crisis, this ratio decreased to 17,25%, which clearly shows the loss of trust. Some weak improvement could be seen in 2009 in regards to the ratio of investment funds within net financial assets. Greater recovery is indicated by the tendency from 2009 to 2010, when the ratio grew above 21% owing to the smaller increase of net financial assets and greater increase of assets managed by investment funds. By the first quarter of 2012, the ratio reduced again (to 18,65%) due to the uncertainties of the markets.

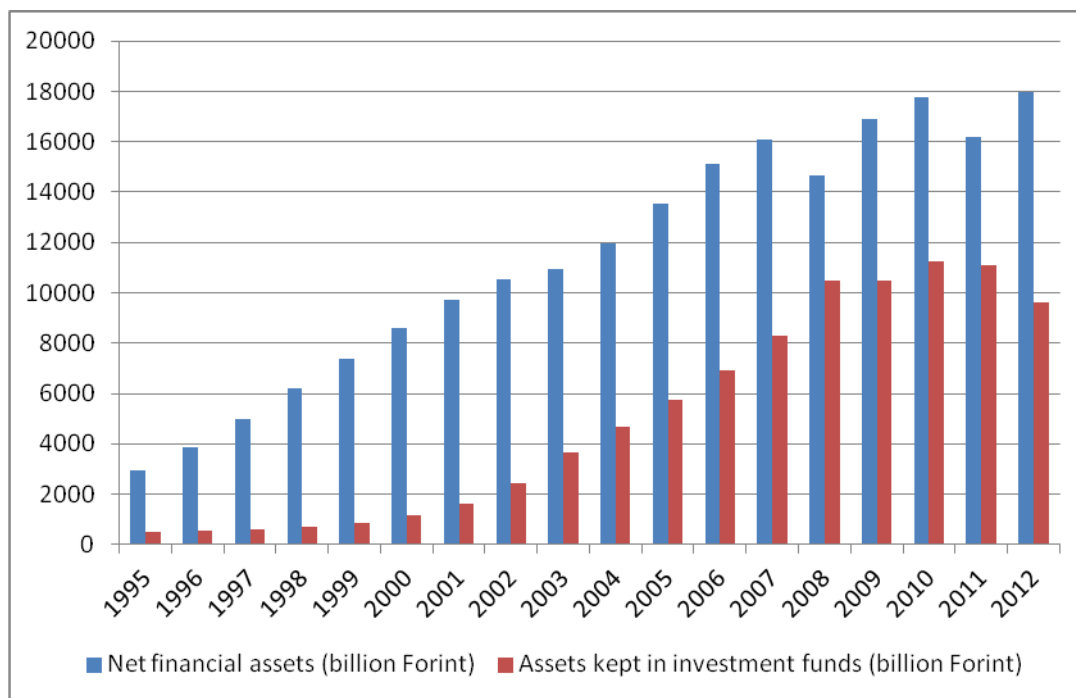


Figure 1: Net financial assets of Hungarian people and their assets kept in investment funds between 1995 and 2012

Source: www.mnb.hu; www.bamosz.hu

Investment funds can be distinguished not only in terms of investment policy but also according to the **open-end or closed-end** instruments. While in 1999 the ratio of closed-end investment funds did not reach 3% concerning the total net asset value of investment funds and it exceeded 18% by 2008. It was because the trade of real estate investment funds was suspended in order to ease the impacts of economic crisis and the open-end funds could be transformed into closed-end ones thus protecting the market of real estate funds.

Due to the investment funds, capital is flowing into the economy which would not entered it but to a lesser degree because of the small volumes of asset. By collecting the small volumes in investment funds, however, they represent substantial capital. The size of capital of individual investors can be compared to the savings in cash or in bank deposits. In 1995, not long after the introduction of investment funds, the ratio of the latter did not reach even 1% compared to cash and bank deposits. At the end of the year after the crisis this ratio diminished to 26,21% owing not to the growth of cash and bank deposits but to the huge loss of trust which encouraged the investors to withdraw their capital from investment funds quickly. Following the recovery in 2009, the net asset value of investment funds increased more than cash and bank deposits only in 2010. In 2011 growth could be typically seen rather for the capital kept in cash and bank deposit (they increased by 7%) while the net asset value of investment funds decreased by 14%. The two values in total resulted that the total net asset value of investment funds exceeded 30% compared to cash and bank deposit, but the rapidly growing tendency that had been seen in the pre-crisis period did not come back in 2011 either. The ratio did not actually change in 2012 either. **As regards the rapid expansion of investment fund market before the crisis it can be concluded that the crisis has caused a substantial break, even more substantial than in case of other widespread forms of savings, like, for example, bank deposit.**

The general review of investment funds revealed that the total net asset value of all the public, open-end securities investment fund available today in Hungary **increased** until 2008 then, following the outbreak of economic crisis, it started to **fall**. After the negative peak in 2008 it was slowly increasing, then decreasing again from November 2011. The total net asset value of public open-end funds moderately grew in 2012.

Basically the following three factors affect the changes of total net asset value of funds: the yield, new investments and the withdrawal of investment. Thus a more nuanced picture can be formed about the effects of crisis. The net sales (new sales-withdrawal) in the examined period reduced the net asset value by 5,925 billion HUF on average, while the returns increased the asset by 9,176 billion HUF per month on average. **Prior to the outbreak of crisis in Hungary**, the crisis on the mortgage market of the USA but mostly the losses on return resulted a decline in net asset value of investment funds by altogether 87 billion HUF from January 2008 until August 2008. The greatest asset withdrawal, in a value of approximately 272 billion HUF, was seen in **September 2008**. The net asset value decline due to yield was 114 billion HUF. By contrast, in September, a record level decline was seen in the history of Hungarian investment fund market. During ten months **between September 2008 and June 2009**, the net sales altogether amounted to 540 billion HUF and the net asset value decreased by 91 billion HUF due to the yield on the investment fund market in Hungary.

The investment fund market of Hungary has been dynamically growing in the last 20 years. The drive behind this market was clearly the increasing demand on behalf of population. The favourable developments, however, conceal the hidden tendencies. On the Hungarian investment fund market the popularity of investment funds with different investment policies changed from time to time. The Russian crisis in the late 1990s badly hit the **mixed funds**, while the exchange rate crisis of 2003 affected the **bond funds** which had been dominant until then. In the middle of the 2000s, the bond funds were replaced by **money market funds** and a lot of money went to the capital protected and **real estate funds**, too. The crisis in 2008 considerably decreased the asset value of money market and real estate funds, but in 2010, when the crisis subsided, the capital started to flow into these basic categories, too. At present the **funds with absolute return** show a very dynamic development.

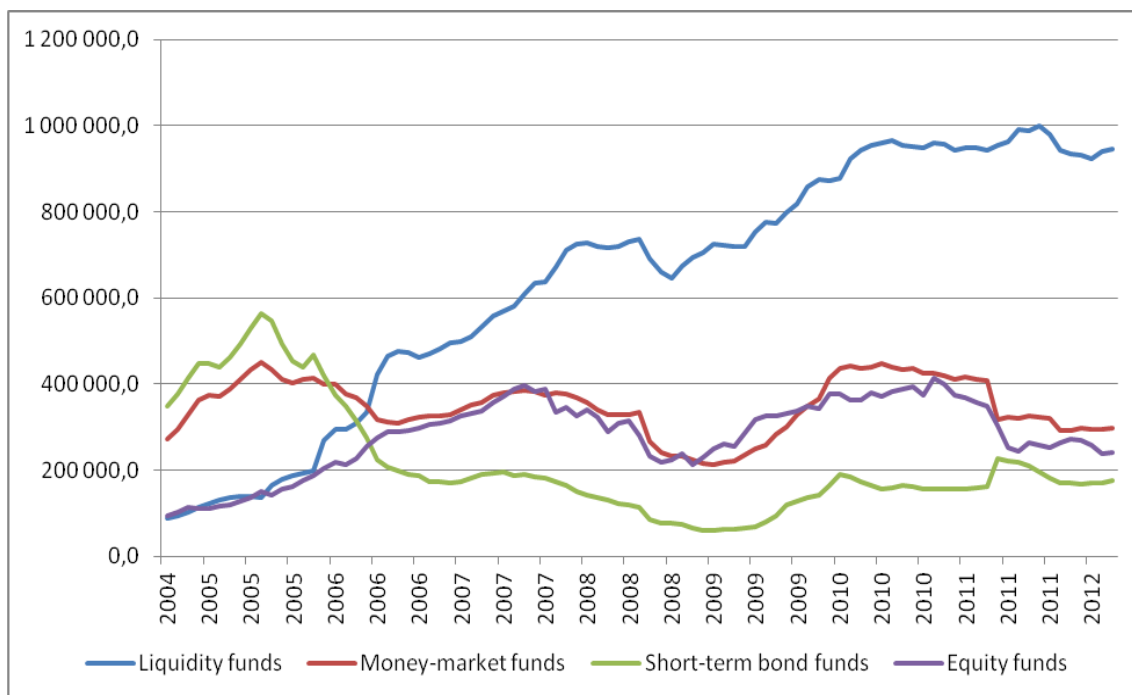


Figure 2: Net asset value of market leading types of investment funds between 2004 and 2012
Source: BAMOSZ, own edition

The members of BAMOSZ (Association of Hungarian Investment Fund and Asset Management Companies) managed more than 892 billion HUF assets at the end of 2004. This value was more than 2037 billion HUF in December 2007 before the economic crisis. At the beginning of the examined period, the long-term bond funds were the most popular, their ratio was above 39% from the total public, open-end funds. Money-market funds were the second in the rank, while the equity funds got the third place. This rank turned in the middle of 2006, when the money market funds were the most demanded, the liquidity funds were the second and the short-term bond funds slid back to the third place in the popularity scale. Since August 2006, money has been flowing mostly into the liquidity funds. This ratio was 27,5% within the public, open-end funds at that time, then it jumped to 48,2% by August 2012, which was almost twice as high as 6 years ago. This order has not actually changed since then but the money market funds and equity funds has been competing alternately for the second place.

The analysis of the total net asset value of open-end investment funds points out that stock was the highest in October 2007 before the crisis because it was more than 2044 billion HUF. By comparison, the bottom was reached in December 2008 when the total net asset value of public open-end investment funds was 1044 billion HUF which was a decline by 48,9%. Then a slow rise could be observed.

Before the economic crisis, in the second quarter of 2008, the members of BAMOSZ managed altogether 368 funds, out of which 244 were public and open-end, while only 124 funds could be listed in other category. The asset of funds by the end of the quarter was 3.010 billion HUF, out of this the ratio of public open-end securities funds was 60,1%. By the end of 2008, the amount managed by BAMOSZ decreased to 2.526 billion HUF due to the economic crisis. It was a 55,5% ratio of public, open-end investment funds. By the last quarter of 2009, the value of total managed asset slightly increased but did not exceeded the level before the crisis broke out.

Following the outbreak of the crisis, on June 30, 2011 the investors could have access to 239 public, open-end funds and 266 other investment funds, according to their yield expectations and risk tolerance. Out of public, open-end investment funds there were 56 money market funds, 43 bond funds, 56 mixed funds, 80 equity funds and 4 other funds. The category of other investment funds included 6 commodity funds, 48 absolute return funds, 148 capital protected funds, 1 derivative fund, 18 real estate funds, 45 special investor funds and 106 funds of funds.

According to the quarterly report of BAMOSZ published on June 30, 2012, the total asset of funds managed by BAMOSZ members in the second quarter of 2012 was 3.118,0615 billion HUF, and its 61,77% belonged to the public, open-end category.

In 2004, at the beginning of the examined period there were altogether 97 public, open-end investment funds available in Hungary, while this figure reached 240 in August 2012. In spite of the fact that the number of investment funds has doubled since 2004, the total net asset value has been rapidly declining, which means that **following the crisis those people tend to withdraw their money from the investment funds who are less conscious of their money, while those who are financially literate utilize the possibilities offered by investment funds.**

3.2. Analysis of selected investment funds before and after the economic crisis

The total net asset value of the 33 selected investment funds was 641 billion HUF at the beginning of the research, then right after the outbreak of the crisis it fell back to 592 billion HUF and reached 510 billion HUF by December 2012. Obviously due to the economic crisis, the investors withdrew part of their money from the examined investment funds because the central bank base rate increased the expected return on fixed term deposit and it was more attractive for the investors. When the deposit interest rates started to decline, the investors did not necessarily return their money to the same fund. The selected funds changed the most in regard to the average **annual yields**. Before the crisis the average annual yield of an investment fund exceeded 13% which was regarded exceptionally good even at that time. Examining the annual average yield values weighted by net asset value, the values in case of less risky investment fund categories increased compared to the unweighted average which refers to the fact that the funds with higher yield manage larger capital within the given group. In case of two groups of the highest risk (balanced mixed funds and equity funds) the funds with larger capital reached the lowest yield.

Table 1: Average annual yields unweighted and weighted with net asset value before and after the crisis in case of 6 investment funds

	Unweighted average return before the crisis	Return values weighted with asset value before the crisis	Unweighted average return after the crisis	Return values weighted with asset value after the crisis
Money market liquidity funds	5,59%	6,17%	4,90%	6,17%
Other money market	7,99%	8,54%	6,01%	5,90%
Short bond	8,84%	9,07%	7,28%	7,74%
Long bond	8,73%	9,12%	6,40%	6,63%
Open maturity bond	7,23%	7,23%	4,83%	7,23%
Conservative mixed	6,65%	6,65%	4,46%	6,65%
Balanced mixed	13,71%	13,00%	5,30%	5,25%
Equity	12,52%	8,88%	-0,68%	-1,30%

Source: BAMOSZ, own calculation

In contrary to this, the unweighted average annual yields were between -0,68%- 6,01% after the crisis, therefore the yields considerably declined in each group. After the crisis, the average annual yields weighted with net asset value increased compared to unweighted average yields in case of liquidity, short bond, long bond, open maturity bond and conservative mixed funds, while they decreased in case of other money market funds and the two groups of the highest-risk.

3.2.1. Analysing the relations between the net asset value and the yield of the selected 33 investment funds with the help of correlation calculation

I examined the correlation between the return and net asset value changes in case of the selected 33 investment funds in two periods: from January 1, 1999 until August 31, 2008 and from September 1, 2008 until September 1, 2012.

On the basis of the data before the crisis there was a positive relation between net asset value and yield in case of half of the 8 groups while the relation was negative (opposite) in case of the other half. The highest correlation value did not indicate close connection either. There is no significant relation in case of four groups (which include altogether 20 funds). After the crisis, the relation was opposite and very loose in case of one group. There was, however, close relation in case of 2 groups which did not indicate significant relations before the crisis (equity funds and conservative mixed funds). **It requires greater attention from investors in regard to yields.**

Table 2: Correlation per groups between the yield and net asset value of the selected 33 investment funds, before and after the crisis

	Correlation value before the economic crisis	Correlation value after the economic crisis
Money market/liquidity funds	-0,169525	0,167616
Other money market	-0,348620	-0,276355
Short bond	-0,338339	0,070142
Long bond	0,025089	0,141485
Open maturity bond	0,317291	0,413699
Conservative mixed	0,127470	0,608415
Balanced mixed	-0,277036	0,251139
Equity	0,037659	0,578786

Source: BAMOSZ, own calculation

The correlation coefficient between net asset value and the yield was positive **before the crisis** in case of 14 investment funds out of the 33 funds, but it was negative in case of 19 investment funds. **Following the crisis** the correlation values indicate a clear rise, there were 22 positive and only 12 negative correlations among them. The average correlation value was -0, 117 before the economic crisis, while this average value was 0,197 after the crisis. The examined investment funds were ranked in three different categories on the basis of correlation coefficients. **In the first category** the correlation coefficient was negative both before and after the crisis, but the value declined after the crisis. 7 investment funds belong to this group: 5 money market and 2 bond funds, all from the less risky category. It means that their net asset value decreased in spite of the increasing return, but this tendency was stopped/backed by the economic crisis, therefore in case of the less risky categories it was seen that the inverse movement of yield and net asset value permanently weakened.

The second category included those investment funds where the correlation coefficient was negative before the crisis between yield and net present value, but it went to the positive range after

the economic crisis so the inverse movement switched to a change in straight direction. The larger was the return, the more people purchased from the fund shares. 3 bond funds, 2 mixed and 4 equity investment funds belonged to this group, so the economic crisis affected the moderately risky and extremely risky funds this way.

The third category collected those investment funds where the relation between yield and net asset value was positive before and after the crisis and the relation was stronger between the two variables after the crisis. 1 money market fund, 2 bond, 1 mixed and 6 equity investment funds were ranked here. 7 investment funds could not be ranked in the three categories on the basis of their correlation values. The total net asset value of these 7 investment funds was 9,2% of the net asset value of all the examined 33 investment funds which indicates that these were not the most significant investment funds.

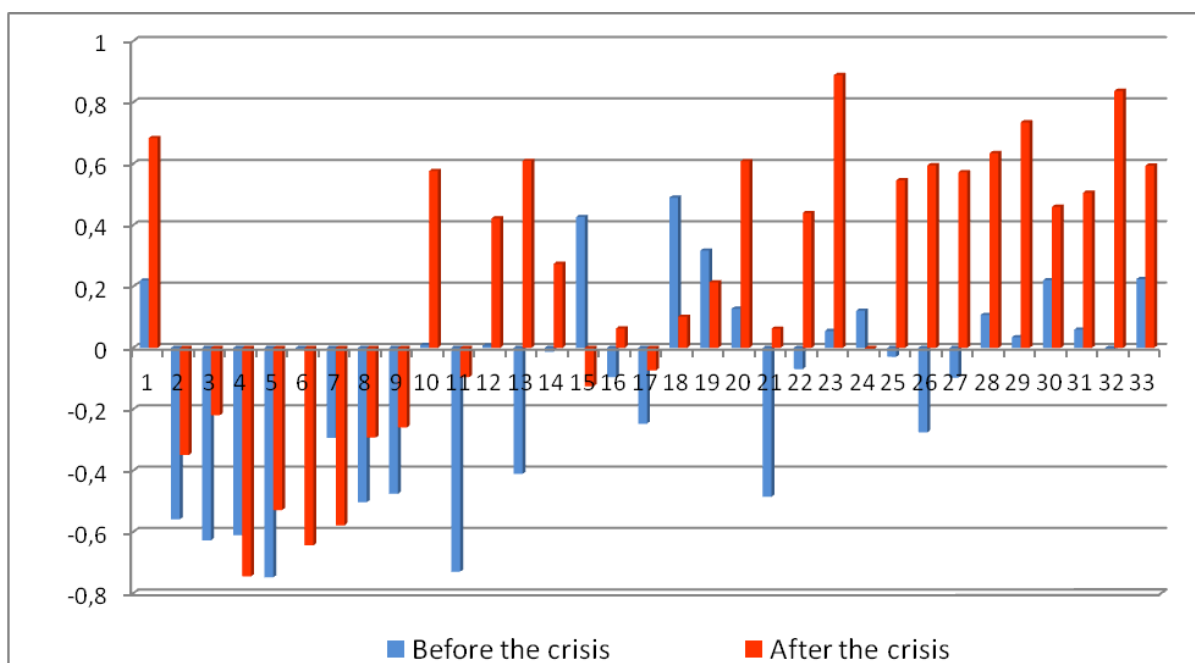


Figure 3: Correlation values between net asset value and yield of the selected 33 investment funds, before and after the economic crisis, between 1999 and 2012

Source: BAMOSZ, own calculation

Examining the absolute value of correlations, which indicates the strenght of relation, it can be concluded that the value of correlation coefficients was significant (yet negative) before the crisis in case of 1 liquidity, 4 other money market and 1 short bond fund, while it was not significant in case of the others. Following the crisis, this relation between net asset value and yield was close in case of 17 funds (it was positive in 13 funds out of them) and it was loose in case of 7 funds. It is obvious that only the low risk investment funds include funds where the change of net asset value is inversely proportional to the changes of return. It can be due to the fact that they belong to more demanded products therefore the change of return affects asset value to a lesser degree. Thus it can be concluded that the crisis has strongly affected the correlation between the asset value and yield of investment funds. The correlation coefficient between the two values increased significantly due to the crisis. This fact confirms that investors have become more deliberate.

By performing correlation examinations and listing investment funds in order of increasing risks, it can be seen on the figure that the relation between the return and net asset value of less risky liquidity, money market and short bond funds is mostly negative both before and after the economic

crisis, while in case of the others the relation changed to positive. In regards to mixed funds with median risk this tendency cannot be observed. The correlation in case of investment funds belonging to the most risky category was negative before the crisis for some funds, while following the economic crisis all the funds gave high and positive values without exception.

My first hypothesis, according to which the relation between the net asset value and yield of public, open-end investment funds in Hungary has become closer after the outbreak of financial crisis (as it was measured by the increase of correlation coefficients before and after the crisis) was confirmed by correlation analysis because the correlation value was higher after the crisis in the investment fund categories.

3.2.2. Cluster analysis of the selected 33 investment funds

For the research I collected the closing specific net asset values of the last 13 years of the selected 33 funds, formed annual interest yield, calculated average yield and the featuring yield variance. I have examined from the available data of the 13 years whether the high yield could always be achieved at high risk (measured by variance), while the low yield could really be paired with low risk within the two periods. With this examination I wanted to confirm H2 and H3 hypotheses. In the course of cluster analysis I received the following results by running the basic data in SPSS computer system. The clusters that were formed before the crisis have changed as follows: cluster I included the riskiest equity funds and one mixed balanced fund according to the program. Cluster II covered all the other equity funds. Nine long bond funds, one conservative mixed and one balanced mixed fund were put in cluster III. This cluster contained the less risky and less yielding funds. Finally, the cluster IV with the least risky investment funds included 2 liquidity, 5 other money market and 5 short bond investment funds. I compared the results from the data after the crisis with the results calculated from the data before the crisis and examined the ratio of re-classification of examined investment funds to different clusters. The result confirmed the hypothesis, because only one mixed balanced fund was transferred from cluster I to cluster II, which is not a significant difference due to the features of the fund. On the basis of similarity levels the following clusters were formed before the crisis: one **balanced mixed fund and three other equity** investment funds were transferred to **cluster I**.

The following figure describes the data of annual average yield and standard deviation of funds belonging to each cluster.

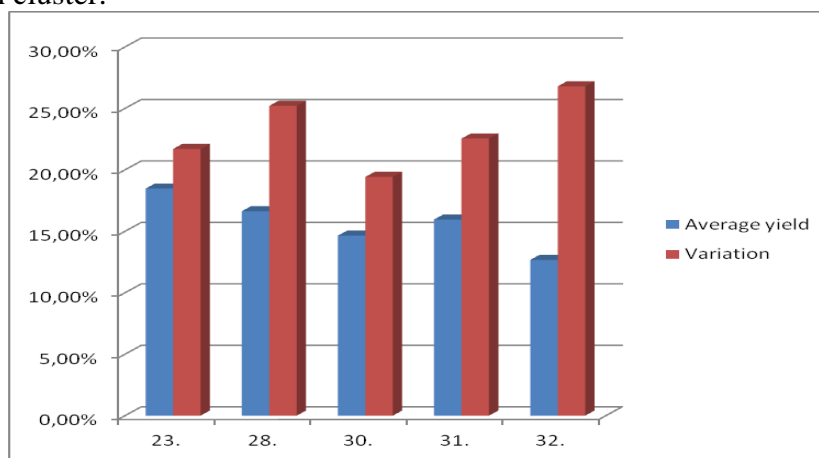


Figure 4: Average yield and variation of investment funds in cluster I before the crisis, from January 1, 1999 until August 31, 2008

Source: own calculation

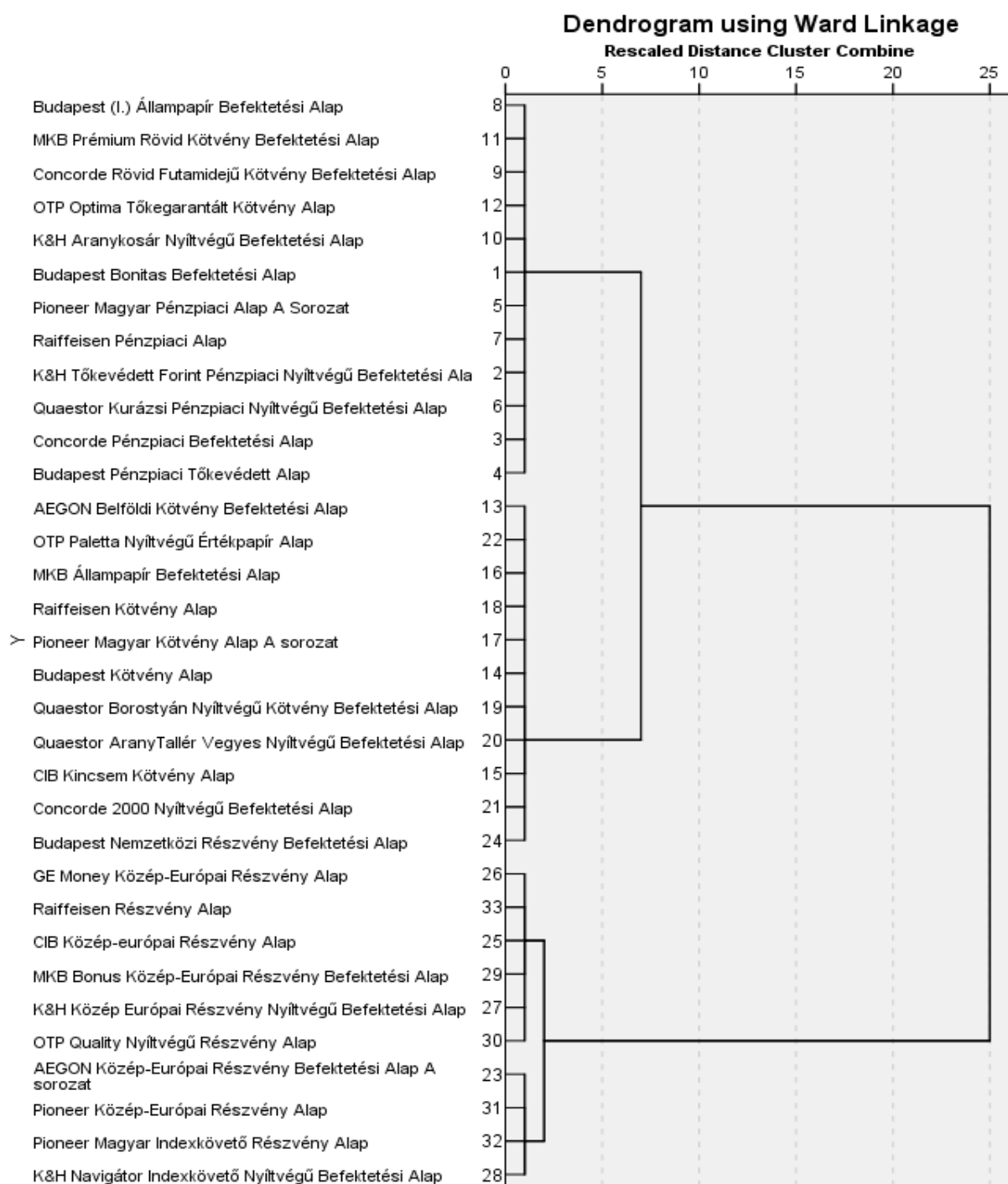


Figure 5: Clusters formed from the selected 33 investment funds before the crisis

Source: BAMOSZ, own calculation

Cluster II included: 25. AEGON Central-European Equity Investmen Fund, A series, 26. CIB Central-European Equity Fund, 27. GE Money Central-European Equity Fund, 29. K&H Navigátor Index-following Open-end Investment Fund, 30. MKB Bonus Central-European Equity Investment Fund, 33. Pioneer Hungarian Index Equity Fund. Only equity funds were ranged in this cluster on the basis of available yield and variance data. As regards the type of funds, only **equity funds** could be found here.

Cluster III contained: **13.** Aberdeen Hungarian Bond Fund, **14.** AEGON Domestic Bond Investment Fund, **15.** Budapest Bond Fund, **16.** CIB Kincsem Bond Fund, **17.** Concorde Bond Fund, **18.** MKB Government Securities Investment Fund, **19.** Pioneer Hungarian Bond Fund, A series, **20.** Raiffeisen Bond Fund, **21.** K&H Bond Open-ended Investment Fund, **22.** Quaestor Arany Tallér Mixed Open-ended Investment Fund, and finally **24.** OTP Paletta Open-ended Securities Fund. As regards the types of funds, all the examined **long bond** funds and **mixed conservative** funds were listed here, as well as one **mixed balanced** fund.

Cluster IV got the following funds: **1.** Budapest Bonitas Investment Fund, **2.** K&H Capital Protected Forint Money Market Open-ended Investment Fund, **3.** Concorde Money Market Fund, **4.** Budapest Money Market Capital Protected Fund, **5.** Pioneer Hungarian Money Market Fund A series, **6.** Quaestor Kurázsi Money Market Open-ended Investment Fund, **7.** Raiffeisen Money Market Fund, **8.** Budapest (I) Government Securities Investment Fund, **9.** Concorde Short Term Bond Investment Fund, **10.** K&H Aranykosár Open-ended Investment Fund, **11.** MKB Prémium Short Bond Investment Fund, and finally **12.** OTP Optima Capital Guaranteed Bond Fund. As regards the types of funds, all the examined **liquidity, money market and short bond** funds were ranked here, without exception.

Since I analyse the data of the past, it could be concluded that the investment policies fixed at the introduction of investment funds were correctly defined because the funds with similar risk-yield composition produced similar data according to their investment targets. The reliability of investment policies and the risk-yield ratio can be regarded appropriate during the period before the economic crisis.

The least risky cluster IV, which represents the highest net asset value ratio and the succeeding clusters indicate an increasingly lower ratio.

On the basis of similarity levels the data could be arranged in four clusters by the program, considering the data collected after the crisis.

Cluster I included **28.** K&H Central European Equity Open-ended Investment Fund, **31.** OTP Quality Open-ended Equity Fund, **32.** Pioneer Central-European Equity Fund. As regards the type of funds, all the examined equity investment funds.

Cluster II included **23.** Concorde 2000 Open-ended Investment Fund, **25.** AEGON Central-European Equity Investment Fund, A series, **26.** CIB Central-European Equity Fund, **27.** GE Money Central European Equity Fund **29.** K&H Navigátor Index-following Open-ended Investment Fund, **30.** MKB Bonus Central European Equity Investment Fund, and **33.** Pioneer Hungarian Index Equity Fund. As regards the types of funds, there is one **balanced mixed fund** and all the others are **equity funds**.

The following funds were ranked in **cluster III**: **13.** Aberdeen Hungarian Bond Fund, **14.** AEGON Domestic Bond Investment Fund, **15.** Budapest Bond Fund, **16.** CIB Kincsem Bond Fund, **17.** Concorde Bond Fund, **18.** MKB Government Securities Investment Fund, **19.** Pioneer Hungarian Bond Fund, A series, **20.** Raiffeisen Bond Fund, **21.** K&H Bond Open-ended Investment Fund, **22.** Quaestor Arany Tallér Mixed Open-ended Investment Fund, and **24.** OTP Paletta Open-ended Securities Fund. As regards the types of funds, all the examined **long bond** funds were listed here, plus one **mixed conservative** fund and a **mixed balanced** fund. The members of this cluster are fully identical with the members of cluster III that was set up in the examination of the time series before the crisis.

Cluster IV included the following funds: **1.** Budapest Bonitas Investment Fund, **2.** K&H Capital Protected Forint Money Market Open-ended Investment Fund, **3.** Concorde Money Market Fund, **4.** Budapest Money Market Capital Protected Fund, **5.** Pioneer Hungarian Money Market Fund, A series, **6.** Quaestor Kurázsi Money Market Open-ended Investment Fund, **7.** Raiffeisen Money Market Fund, **8.** Budapest (I) Government Securities Investment Fund, **9.** Concorde Short-term Bond Investment Fund, **10.** K&H Aranykosár Open-ended Investment Fund, **11.** MKB Prémium Short Bond Investment Fund, and finally **12.** OTP Optima Capital Guaranteed Bond Fund. As regards the types of funds, all the examined **liquidity, money market and short bond** funds were ranked here, without exception. It should be noted here that – as the previous cluster is similar to the cluster which analyses the first time interval of research - this cluster is also fully identical with cluster IV which was set up on the basis of data from the pre-crisis period.

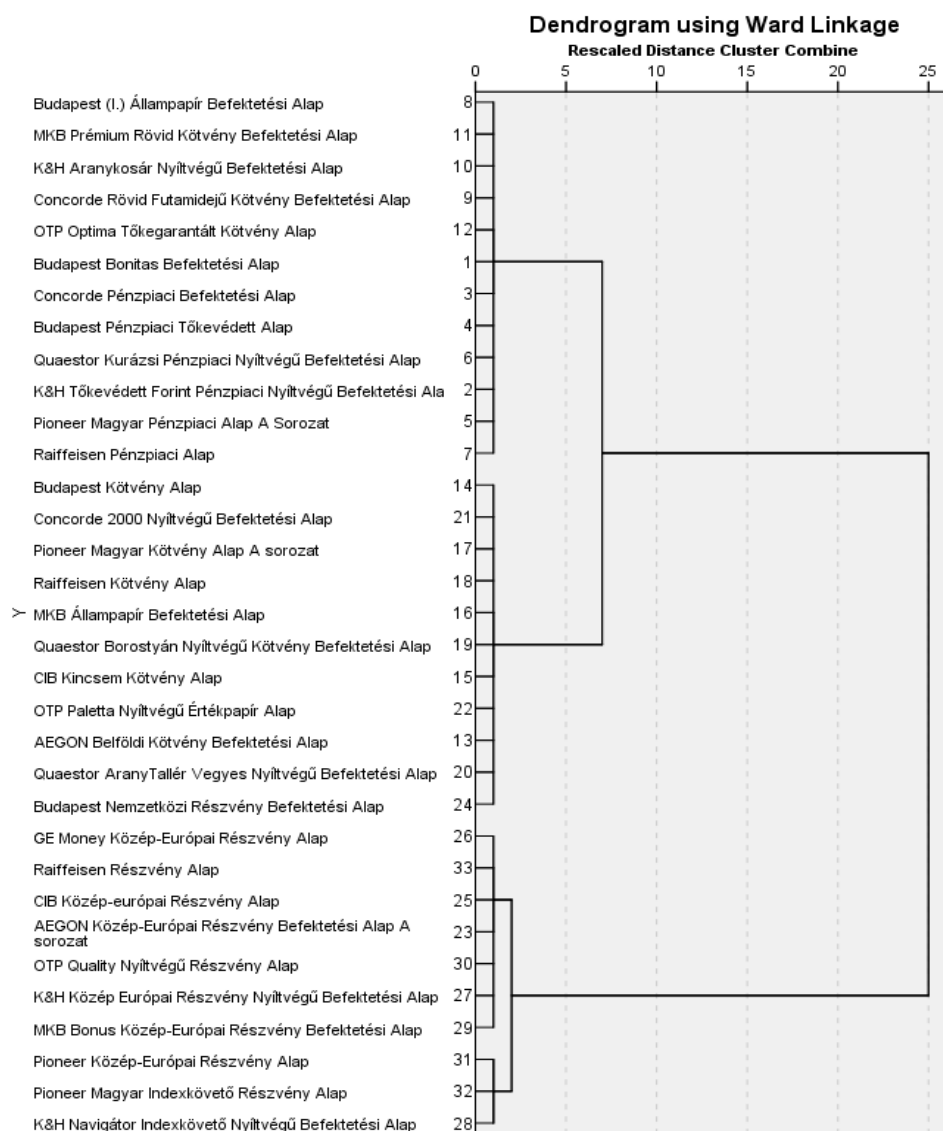


Figure 6: Clusters made of the selected 33 investment funds after the crisis

Source: BAMOSZ, own calculation

The ratio of the total examined clusters compared to each other has not significantly changed after the economic crisis.

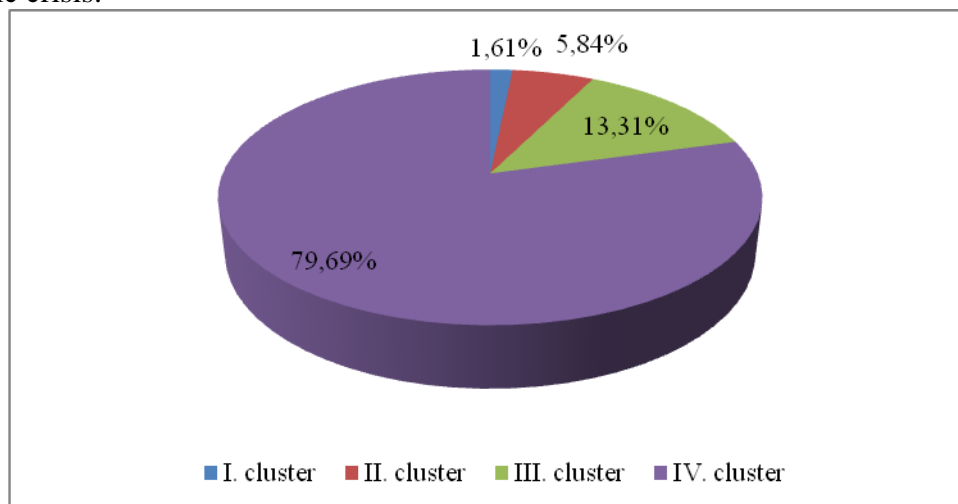


Figure 7: Ratio of net asset value of 4 clusters after the crisis

Source: BAMOSZ, own calculation

Cluster IV – where the least risky investment funds were ranked – had the highest ratio between 1999 and 2012. Considering the average of values between 1999 and 2007 – the period before the crisis – and comparing this to the average value of post-crisis period, it can be concluded that the funds of this cluster have not declined significantly. The ratio of funds in cluster II increased, while the investment funds of clusters II and I slightly grew in proportion. It was due, however, not to new investments but to profits on yield.

On the basis of the cluster analysis of the data after the crisis it can be declared that the investment funds could be arranged into similar clusters before and after the economic crisis, their available yields and risks did not change that much that they should have been transferred to a different cluster. Therefore the effects of crisis have supported the investment policies of the selected funds, proved their reliability and relevance.

Thus my second hypothesis, according to which the investors take risk more deliberately after the economic crisis, that is they are more aware that higher yields can be reached at higher risk, while smaller yields at smaller risks in case of investment funds, I regard confirmed.

In my third hypothesis I presumed that the investment policies defined before the introduction of investment fund by experts charged with portfolio development are more reliable after the economic crisis than before. It means that **the selected investment fund achieves a yield according to its type, at a fixed risk level**, thus the hypothesis can be regarded confirmed.

3.3. Analysing the relations between net asset value and risk of investment funds

In this chapter of dissertation I analyse the closeness of relation between risk and invested capital. I want to confirm or disprove my fourth hypothesis by this analysis. I presume that investment funds of smaller net asset value have higher risks, that is higher variance. The risk is lower in case of investment funds with higher net asset value which can be described with smaller yield variation.

The presumption comes from the theory of risk pulverization. The higher is the net asset value of investment fund, that is the more money can be diversified by the investment fund manager, the

more safely can it be done. It can be measured by the standard deviation of yield of investment fund.

I have reviewed more than 500 investment funds which were available on the domestic investment market. I chose the **public, open-ended** investment funds which are denominated in Hungarian forint. The funds of funds were filtered out due to the duplication. I used the data of the last 6 years for the examination, thus the funds introduced before September 1, 2007 were involved in examination. It meant a lot more investment funds than those used in correlation calculation and cluster analysis. The investment funds were examined by groups divided according to the new classification of funds. Altogether **93 funds** were examined, out of them 10 liquidity, 12 money market, 6 short bond, 12 long bond, 4 mixed-balanced, 16 equity, 8 capital protected, 10 absolute yield and 5 real estate funds. All met the above listed criteria.

Out of the new classification, the mixed-conservative, mixed-dynamic and indirect real estate fund groups started after January 1, 2007 and all of them were introduced in funds of funds arrangement. Thus these 3 categories were not analysed in the present work.

In order to explore the relations between net asset value and risk, I examined the annual and 5-year data of standard deviation from the introduction of the given fund until January 2008, in the order of net asset values of December, 2007. Following this, I performed the same for the period after the financial crisis, so I examined the annual and 5-year standard deviation data of the period between January 2008 and December 2012, in the order of net asset value data of December 2012.

I started the research with the analysis of 10 **liquidity funds**, the most important feature of which is that they are regarded the least risky investment funds, thus the lowest annual and 5-year yield variations can be expected in this group.

Analysing the net asset value it can be concluded that the examined 10 liquidity funds present a growth of more than 124 billion HUF from 2007 until 2012, which is 21,645%. It also indicates the popularity of liquidity funds and thus the low risk tolerance of public investors in Hungary.

The asset value increased in case of four liquidity funds out of the 5 funds with the highest asset value, while it substantially declined in case of one fund (Budapest Bonitas). The asset value decreased in case of four funds out of the 5 liquidity funds with the lowest asset value and it grew with only one fund (Budapest Bonitas Plus). The common value of the two Budapest Bonitas also fell considerably, in spite of the probable re-allocation.

The volume of annual yield before the economic crisis was between 0,16% and 0,36%, while after the crisis it was between 0,20% and 0,31%.

The values of 5-year variance data are higher compared to the annual variation data: the minimum value was 0,29% and the maximum value was 4,61%. As regards 5-year variation, there is not any significant difference between variation data in case of funds in the first five places with the highest net asset value. All have low values. The highest standard deviation is presented by the Concorde Money Market Fund, where the asset value was halved due to the crisis. The value of variation in case of fund with the lowest asset value was high: 2% and 3,60%. By analysing the variation values of the two periods in case of 10 liquidity funds, it can be concluded that the highest standard deviation in the 5-year variation data can be seen at funds with the lowest net asset value, **therefore the hypothesis is confirmed in the long run.**

I ranked 12 **other money market investment funds** in the second group, also in decreasing order of net asset value. The net asset value of 12 other money market funds declined by 7 billion HUF from 2007 till 2012. Growth was seen in case of five funds, all the others decreased. The first placed fund with the highest asset value grew minimally. The yield variation before and after the

crisis was similar, but substantially higher than in case of the previous group. The 4th hypothesis is only partly confirmed in this group .

Six **short-bond funds** were put in the third group, where the **asset withdrawal is rather significant** due to the economic crisis. The degree of asset withdrawal exceeded 95 billion HUF in case of the six examined short bond funds, which means that the net asset value declined by approximately 35% owing to the crisis. All the six funds diminished.

Within this group of investment funds the variation data are likely to be higher than in the group of money market funds because the investment in bonds is regarded more risky. This expectation is met. Before the economic crisis the range of annual variation was 2,26-3,2, the 5-year variation was 1,88-8,66. Following the economic crisis, it was 1,91-3,5 and 1,9-8,66.

The values of annual and five-year yield variation were not really changed between the two periods. Following the crisis, the annual variation has a bit declined, the five-year yield variation has practically not changed. MKB Prémium Fund was an exception because the yield variation increased there. It can be stated that two funds with the highest yield variation (risk) suffered the greatest asset withdrawal. The asset value of MKB Prémium Fund declined by 79%, and that of Erste Short Bond Fund by 57%. It confirms my 4th hypothesis.

12 **long bond funds** were listed in the fourth group. The net asset value of some investment funds in this group considerably increased, for example at OTP Maxima Investment Fund. The value of some other funds considerably decreased, for example at MKB Government Securities Fund. Therefore not any great differences could be observed within the group in regard to net asset value changes before and after the economic crisis. The standard deviation was substantially higher than in the groups of investment funds examined earlier.

Before the economic crisis, the lowest value of annual variation data was 4,82% in case of ING Bond Fund which had the lowest net asset value, while the maximum value was higher than 10% in case of AEGON Domestic Bond Fund with median net asset value. In regards to five-year variation, the minimum value was 7,28% at the Generali Domestic Bond Fund of smaller net asset value, while the maximum value exceeded 12% at OTP Maxima Fund which had the highest asset value.

There is not any significant changes in the figures of annual and five-year variation after the economic crisis. Out of 12 funds, the net asset value of 4 funds increased, the others declined. The OTP Maxima reduced the most (by 70%), while the asset value of AEGON Domestic Bond Fund more than quadrupled. The five-year yield variation of the two funds is similar, the annual yield variation (although slightly decreased) was the highest at the fund with increasing asset value.

It can be noted about the variation data of investment funds in this group that no relation can be tracked between the size of net asset value and variation.

I examined 4 **balanced mixed funds** in the 5th group. As regards the change of net asset value, this group has suffered proportionally the second largest asset withdrawal among all the examined investment fund groups. The net asset value of four investment funds fell to its third from 2007 until 2012. The annual yield variation decreased at two funds with the highest asset value and the 5-year yield variation was the lowest at them before as well as after the crisis.

The 6th group included 16 **equity investment funds**. The net asset value decline was the greatest in this group. The figures indicate an asset withdrawal by 76,3% which means that the investors have lost their trust the most in this category on the market of investment funds. As regards larger funds,

growth was observed in case of funds which had had the lowest asset value before the crisis. In case of all the other funds the asset withdrawal was substantial, but there was not any significant difference between yield variation. Thus no relation can be confirmed between risk and net asset value within the group.

These forms of investment are regarded the riskiest therefore the highest variation values are expected here within the total examined groups. The value of annual variation before the economic crisis was between 8,7% and 26,8%. The former was seen at Concorde Equity Fund with median net asset value, the latter was at Pioneer Hungarian Index Equity Fund. This was the highest variation data during the whole examination, therefore in spite of the fact that the net asset value of this investment fund was medium, the risk is by far the highest. In regards to 5-year variation, the values range from 15,41% to 21,34%. The former was observed at Generali Mustang Fund which had the lowest net asset value, while the latter was at AEGON Central-European Equity Fund with relatively high net asset value. The net asset value increased only at the latter.

Group 6 is formed of capital protected funds. In case of these investment funds, the decline of net asset value was more than 30% in spite of the fact that these are mostly attractive arrangements which protect the capital, but there is no yield guarantee.

Out of the 8 funds belonging to the group, 6 are managed by K&H. Yield variation at some funds has not significantly changed after the crisis, either. The range of variation was between 1,64 and 7,34%, in case of 5-year yields it was between 3 and 8,02%. The average yield variation of 5-year variation was at the funds with the lowest and highest asset value. Such clear correlation could not be revealed in case of other funds.

Out of equity funds **10 funds with absolute yield** were ranked in group 8. Their total net asset value had tripled from 2007 till 2012, thus the growth of net asset value was the highest in this group out of the examined investment fund groups. Another important factor is that the asset value of all the 10 funds grew. The standard deviation of yields has not significantly changed after the crisis. The asset value of Raiffeisen Yield Premium Fund grew by the greatest amount and the yield variation was the smallest in this case. The variation of fund with the highest asset value is low but there is smaller variation than small asset value before and after the crisis (e.g. Platinum Béta) as well as higher variation than that of high asset value (e.g. OTP Absolute Yield A A series).

Finally the real estate funds were also examined: 5 investment funds were analysed. The net asset value of five investment funds had decreased altogether by 29,1% from 2007 until 2012. It was a drastic asset reduction but it could have been even worse if the trade of real estate investment funds had not been suspended on November 8, 2008.

By and large the annual variation data of funds before and after the crisis were between 0,31% and 2,49%, as well as 2,19%. The five-year variation was between 0,39% and 12,48% in both periods.

The Erste Real Estate Fund – with a net asset value exceeding 170 billion HUF – had the lowest one-year and 5-year variation. The second largest real estate investment fund has higher variation, thus higher risk, than the first one. In case of other real estate funds, the yield variation clearly increases by the decline of net asset value.

In total it can be concluded that the 4th hypothesis can only partly be confirmed in regards to annual and five-year variation in the two periods, in the examined 9 investment fund groups

Table 3: Variation interval of funds in the examined 9 investment fund groups before and after the crisis

	Annual variation interval before the crisis	5-year variation interval before the crisis	Annual variation interval after the crisis	5-year variation interval after the crisis
Liquidity funds	0,16 -0,32	0,29 -5,63	0,20 -0,31	0,29 -4,61
Other money market	0,15 -8,89	0,31-10,97	0,19 -8,96	0,31-10,94
Short bond	2,26 -3,24	1,88 -8,66	1,91 -3,50	1,90 -8,66
Long bond	4,82-10,35	7,28-12,57	5,14 -8,87	7,28-12,59
Balanced mixed	5,06-12,63	9,26-15,05	3,49-12,99	9,23-15,04
Equity	8,70-26,80	16,01-22,25	8,27-20,65	15,46-22,24
Capital protected	1,64 -7,34	3,00 -8,02	1,64 -7,22	3,03 -8,02
Absolute yield	2,58-27,29	1,81-25,31	2,69-27,11	1,80-25,14
Real estate	0,31 -2,49	0,39-12,50	0,31 -2,19	0,39-12,48

Source: BAMOSZ, own calculation

It can be concluded that the risk of the given investment funds is determined by the investment policy which is set up by qualified portfolio managers who try to reduce the risk of the investment fund to the lowest possible level on the basis of available information and possibilities. There is not always any close relation between risk and net asset value. The choice of investors is primarily determined by the volume of yield with a certain risk group. The data after the crisis, however, support yield variation - in addition to yield – as an aspect of investment. It is also supported by the restructuring of funds belonging to the same risk category.

3.4. Impact of economic crisis on real estate investment funds

I deal with real estate development funds separately, because the first two investment funds the operation of which was suspended in the United States in 2007 - due to credit market crisis - were real estate funds. The problem was the same in Hungary, too, in 2008, because definite intervention was needed also on the market of real estate investment funds.

It was true of all the real estate development funds that their net asset value had an increasing tendency until the outbreak of the crisis and the suspension of their trading. The asset managed in all the real estate investment funds amounted to 547 billion HUF on September 30, 2008, while a quarter later, on December 31, 2008, the total net asset value was only 383 billion HUF. It meant an unprecedented asset withdrawal on the market of domestic investment funds. This value was 359 billion HUF in December 2012, therefore it can be concluded that the trust in real estate investment funds has not recovered during the time since the economic crisis.

Five real estate funds have the data series required for analysis. The daily data are divided into two parts. On **November 7, 2008**, the trade with real estate fund tickets was temporarily suspended (as it was mentioned above) thus the dataset before and after this action should be evaluated separately because this measure had caused different changes in the operation of real estate funds than in case

of other investment funds. I made trend calculation for the selected investment funds on the basis of daily net asset value and return calculated for one year.

Prior to the 90-day suspension of trading with real estate funds, there was a considerable volume of redemption. Since the tickets of real estate funds are special, these are clearly considered long-term investment and their quick redemption may result losses. **The suspension was explained as follows:** if the money ensuring the liquidity of funds is not enough and the capital withdrawal from funds is going on, the funds should sell property to ensure their liquidity, but this process is time-consuming. Therefore these funds do not meet the obligations concerning open-ended funds. They could not be able to pay off their investors, although it was included in their obligations.

This situation has proved again that the development of Hungarian financial culture is in need very much.

The total net asset value of the examined 5 real estate investment funds hardly reached 10 billion HUF in 2005. Before the economic crisis, by early 2008, this value increased by 38-fold and exceeded 369 billion HUF. Due to the economic crisis the total net asset value of the examined 5 real estate investment funds declined to 66% of the level measured in the first half of 2008, and the value of total net asset value was 243 billion HUF.

I have examined the correlation between the daily available net asset value and the annual calculated yields in regards to the examined investment funds. The two pairs of data were represented in a coordinate system, a trend function was fit on it. The independent variable was the annual yield and the dependent variable was the net asset value.

The question to answer was **how the yields affected the turnover of fund shares**, and what other impacts may have contributed to it.

Out of the 5 funds I introduce **Access Real Estate Open-ended Investment Fund** as an illustration.

In case of Access Real Estate Open-ended Investment Fund, there was an **inverse, medium strong** relation between the yield and net asset value before the economic crisis. The measure of closeness of relation was the linear correlation coefficient, the value of which: -0,5745. It can be observed from the trend function fit on the set of points that 1% growth of annual average yield goes together with the decline of net asset value by 3,988,014,000 HUF on average. The change of yield determines the change of net asset value in 33,01%.

At the Access Real Estate Open-ended Investment Fund there is a **strong, direct** relation between yield and net asset value after the economic crisis. The value of linear correlation coefficient between the two data sets is 0,6430. It can be concluded from the trend function fit on the set of points that 1% increase of annual average yield results the growth of net asset value by 1,372,955,000 HUF on average. The change of yield determines the change of net asset value in 41,35%.

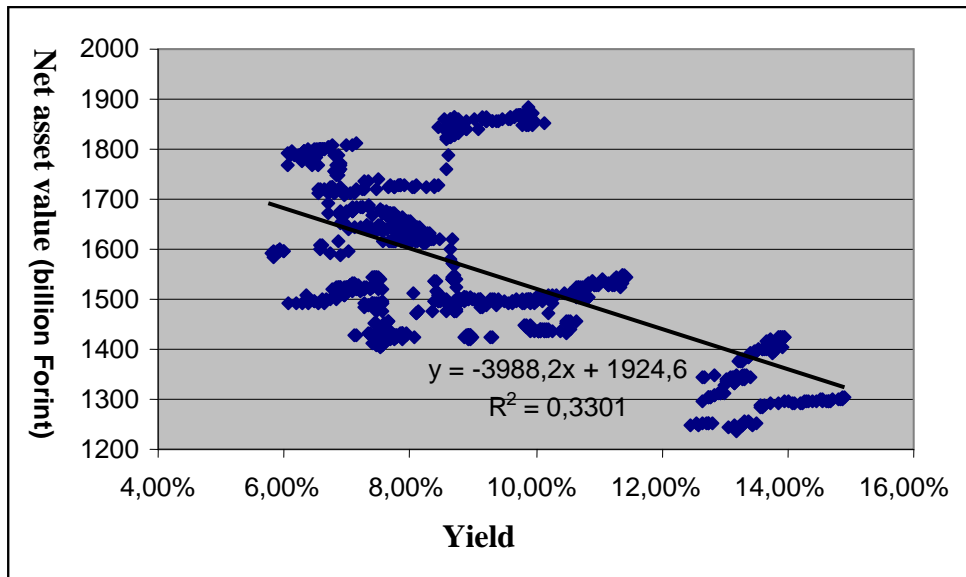


Figure 8: Yield and net asset value of Access Real Estate Open-ended Investment Fund before the crisis

Source: BAMOSZ, own calculation

In case of Access Real Estate Open-ended Investment Fund before the crisis, there is an **inverse, medium strong** relation between yield and net asset value. The measure of the closeness of relation is the linear correlation coefficient, the value of which: -0,5745. It can be read from the trend function fit on the set of points that 1% growth of annual average yield goes together with the decrease of net asset value by 3 988 014 000 HUF. The change of yield determines the change of net asset value in 33,01%.

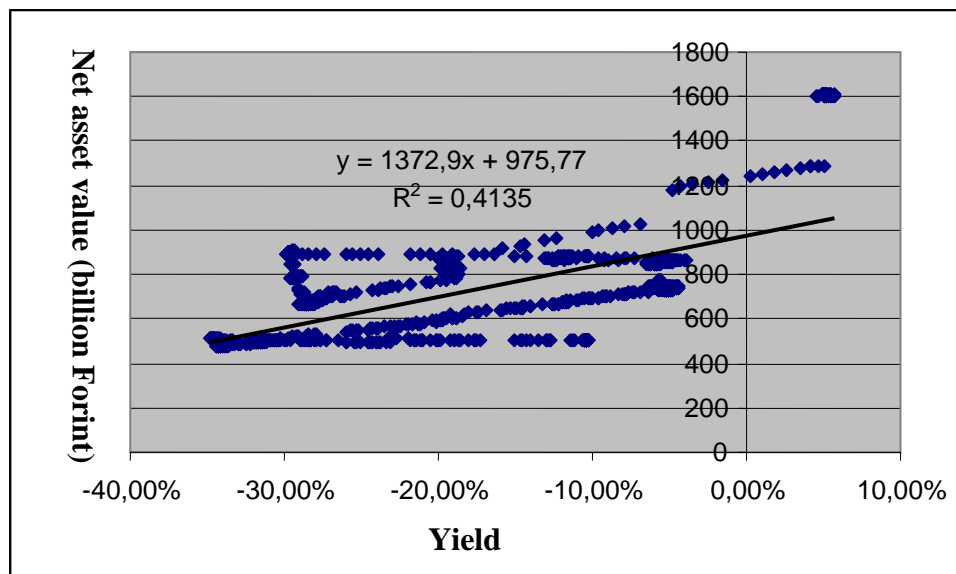


Figure 9: Yield and net asset value of Access Real Estate Open-ended Investment Fund after the economic crisis

Source: BAMOSZ, own calculation

In case of Access Real Estate Open-ended Investment Fund after the crisis, there is a **direct, strong** relation between yield and net asset value. The value of the linear correlation coefficient is 0,6430.

It can be read from the trend function fit on the set of points that 1% growth of annual average yield goes together with the increase of net asset value by 1 372 955 000 HUF. The change of yield determines the change of net asset value in 41,35%.

The data of research outputs are summarized in Table 4.

Table 4: Results of the examined real estate funds before and after the economic crisis

Title of Fund	Direction of correlation before the crisis	Strength of correlation before the crisis	Direction of correlation after the crisis	Strength of correlation after the crisis
1. Access Real Estate Open-ended Investment Fund – Access Investment Management Company (HUF)	Inversely proportional	Medium	Directly proportional	Strong
2. ERSTE Open-ended Real Estate Investment Fund - ERSTE Fund Management Co (HUF)	Inversely proportional	Medium	Inversely proportional	Medium
3. OTP Real Estate Investment Fund – OTP Investment Fund Management Co (HUF)	Inversely proportional	Strong	No relation	No relation
4. Quaestor First Domestic Real Estate Open-ended Investment Fund - QUAESTOR Investment Fund Management Co. (HUF)	No relation	No relation	Directly proportional	Weak
5. Raiffeisen Open-ended Real Estate Fund - (HUF)	Inversely proportional	Strong	Directly proportional	Weak

Source: own calculation

On the basis of the examination it can be concluded that there was negative linear relation between yield and net total asset value before the economic crisis, except for the Quaestor First Domestic Residence Fund Open-ended Real Estate Investment Fund, where the yield did not affect the investment in the fund. It means that the value of capital (net asset) invested in the given fund is independent or inversely proportional to the growth of yield.

Following the economic crisis, the direction of relation has changed. I have found directly proportional correlations in three cases and inverse proportion only in one case. There was another case when no function-like relation could be observed.

The explanation for the above can be that the asset value of real estate funds increased substantially **before the crisis**, those with savings regarded them as new investment possibilities. **The investment was induced not by the actual yield, but the related long-term expectations. The economic crisis, however, made the investors more cautious**, they paid more attention to the yield, that may have resulted **direct proportion** between yield and asset value. The analysis have proved that the crisis have significantly influenced the operation of the selected investment funds.

Therefore the economic crisis have definitely affected the correlation of annual yield and total net asset value of real estate investment funds which is also related to the increasing interest in financial skills.

4. NEW SCIENTIFIC RESULTS

1. Following the crisis, those financially illiterate tend to withdraw their money from investment funds, while the financially more educated investors utilize the possibilities offered by funds.

The market of investment funds significantly adapts to the needs of investors. Fund managers utilize international possibilities and set up more and more funds which are denominated in key currency. The growth of their market share can be explained primarily by the feature that they consciously avoid exchange rate risks and/or attracts investors who are financially more literate and/or have currency.

There is a restructuring on the market of investment funds. The share of investment funds at lower risk levels permanently increases while the share of riskier funds decreases. It allows the presumption that the buyers of fund shares attach greater and greater importance to the ratio of risk and yield.

The market tendencies can be clearly drawn from the examination of different types of investment funds. It can be concluded that product development was permanent. In 2004 there were 97 public, open-ended investment funds in Hungary. This figure was 180 in autumn 2008 and reached 240 by August 2012. In spite of the fact that the number of investment funds more than doubled since 2004, and the managed capital increased to a lesser extent, it can be declared that too many investment funds exist now in Hungary which leads to an increasing competition among investment fund managers. New investment funds try to attract investors and that is why the repeated categorization of funds was required in June 2011. It is also part of product development that the number of funds denominated in currency is permanently expanding. Out of all the open-ended investment funds the market share of funds denominated in currency was higher than 27% on the basis of their net asset value and 42% on the basis of their number.

2. The relation between the net asset value and yield of public, open-ended investment funds in Hungary is closer after the outbreak of financial crisis than before the crisis. Following the economic crisis, the investors more deliberately take the risk, that they can achieve higher yields by taking higher risks. However, if they take less risk, they have to be satisfied with lower yield.

In regards to the real estate investment funds in Hungary, the investment before the crisis was induced not by the actual yield but the related long-term expectations. The economic crisis, however, made investors more cautious, they expect more balanced yields in the short run, although it is an unrealistic expectation in regards to real estate funds.

The correlation coefficient between net asset value and yield increases significantly after the crisis. It proves that investors have become more conscious due to the crisis. The relation between yield and net asset value of less riskier liquidity, money market and short bond funds was mostly negative both before and after the economic crisis. In case of mixed funds with medium risk this tendency could not be observed. In regards to investment funds belonging to the riskiest category the correlation coefficient was negative at some funds before the crisis. Following the economic crisis, however, the correlation coefficients were high and positive in all cases without exception.

Considering real estate investment funds, the trend calculated from the data before and after the crisis have demonstrated direct proportion between net asset value and yield in case of some funds, which means that real estate funds with low asset value are not competitive. The economic crisis has definitely affected the mutual relation between annual yield of real estate investment funds and total net asset value. The improvement of financial education, however, enhanced the future growth of real estate funds. The basic condition of this, however, is the growth of economy.

3. Upon the introduction of investment funds, the reliability of preliminary defined investment policies is greater after the economic crisis, than before.

This output has been confirmed by the results of cluster analysis, because the funds with the same investment policy were classified in the same cluster calculated from the already available yield and risk data. It means that the selected investment fund achieves the yield according to its type, at a risk level specified.

Therefore the investment policies set up at the introduction of investment funds before the crisis were developed correctly because the funds with similar risk-yield composition according to the investment purposes produced similar data. The reliability and risk-yield ratio of investment policies can be regarded appropriate before and after the economic crisis. Following the crisis the level of portfolio management increased due partly to the intensifying competition of investment funds.

4. The investment funds of lower net asset value are riskier, the variation of yield of investment fund is higher. The risk is smaller in case of investment funds with higher net asset value which can be described with smaller yield variation.

According to the theory of risk pulverization, the larger is the net asset value of investment fund, in other words the more money can be diversified by the investment fund manager, the more safely can he do that. It can be measured by the variation of yield of investment fund.

My result is explained by the analysis of correlation between net asset value and the annual or five-year variation data concerning the period between and after the outbreak of the economic crisis. The statement can be generalized in spite of the fact that this correlation cannot always be detected in regards to annual and 5-year variation in 9 groups out of the 93 examined investment funds. The reason is that there is no significant difference between funds with lower net asset value and in these cases there is not any considerable deviation between net asset value and risk. The number of investment funds on this market is rather high and it does not enhance efficient portfolio development because the average net asset values decline. The capital cannot be treated with similar efficiency, therefore the risk grows more than the yield.

It can be declared that the risk of investment fund is determined by the **development policy**, which is developed by qualified portfolio managers who try to reduce the risk of investment fund to the lowest possible on the basis of the available information and possibilities. Before the crisis the investors' choice was determined primarily by the size of yield within the given risk group. The figures after the crisis, however, confirm that yield variation was added to yield in the considerations of investors. It has also been proved by the restructuring of funds belonging to the same risk category.

5. CONCLUSIONS, RECOMMENDATIONS

On the basis of processing the special references, the following conclusions and recommendations can be made:

In Hungary, the total financial asset of the population was slightly above 800 billion HUF in 1989. By 1999 this value grew tenfold, then it exceeded 25000 billion HUF by 2008. In 2009, in spite of the crisis, this value did not decline but increased – although slightly. Decline can be observed only from 2011 to 2012, due to the considerable economic stagnation. There were three declining periods in the net financial asset of households from the first quarter of 2008. The first, and greatest decline lasted from the second quarter of 2008 until the first quarter of 2009, then there were two smaller setbacks between the first and second quarter of 2010, as well as the fourth quarter of 2010 and third quarter of 2011.

Since my chosen topic is the analysis of the impacts of economic crisis, I considered inevitable to review the reasons and consequences of the crisis. Some write that overproduction can be blamed for crisis, which can also be defined as lack of demand. Others say that overdemand hides in the background. Again others blame human selfishness and the excessive desire for profits, loose budget and expansive monetary policy, as well as the introduction and expansion of uncontrollable financial innovations coming from the permanently increasing over-liquidity. According to some people, unlucky combination of deregulation and low interest rates are the reason for financial crisis. According to the references, the great exposure of Hungary to the crisis can be due to the high dependence on foreign capital which – in times of crisis - is associated with production decline at national economy level as well as budget, company and bank liquidity problems. Analysing the impacts and consequences of crisis, it can be concluded that the most important change induced by the global economic crisis is the re-evaluation of risks as well as restructuring of economic forces on the money and capital market.

Conclusions and recommendations belonging to the new scientific results:

I have declared that the year 2005 brought a definite break-through to investment funds, when the ratio of their net asset value compared to the net financial asset of population exceeded 13,86%, then at the peak in 2007 it reached almost 20%. Following the economic crisis, the above ratio declined to 17,2% which clearly shows the loss of trust. Then again slight recovery could be seen in 2009, but it was really insignificant.

While the ratio of investment funds in 2005 did not reach even 1% compared to GDP, 10 years later it was more than 10%. The economic crisis has ended the increasing tendency because the asset managed by funds reduced significantly. It can be declared that the negative impact of crisis was obvious in the net asset value of all the Hungarian investment funds at the outbreak of crisis (the 2nd and 4th quarter of 2008).

In 1998, the ratio of investment funds in households exceeded 80%, then in two years after the economic crisis (in 2009 and 2012), this ratio fell below 60%. This was due to the panic of the economic crisis because the retail investors were afraid for their investments and withdrew their money from the investment funds.

By the general evaluation of investment funds it can be concluded that the total net asset value of all the public open-ended securities investment funds available in Hungary increased dynamically from 2004 until 2008, then began to fall after the outbreak of the economic crisis. After the negative peak of total net asset value in December 2008, there was a slow rise, then again decline from November

2011. This latter could be related to the economic crisis. The crisis had caused a great break in the quick expansion of investment fund market which was seen before the crisis. The decline was even greater than in other, more popular forms of savings, like for example bank deposits.

By reviewing the funds in the increasing order of risks, I have declared that the relation between the yield and risk of low-risk liquidity, money market and short bond funds was mostly negative both before and after the economic crisis. In case of mixed funds with medium risk this tendency could not be observed. As regards investment funds in the riskiest category, the correlation was sometimes negative, but following the economic crisis, it was high positive without exception.

In the next part of examination I made cluster analysis on the same 33 investment funds concerning the periods before and after the economic crisis. The clusters before the crisis were formed as follows: cluster I included the riskiest securities funds and one mixed fund; cluster II collected all the other securities funds. Nine long bond funds, one conservative mixed and one balanced mixed fund were put in cluster III. Thus the funds with less risk and less yield could be found here. Finally the cluster IV contained the least risky investment funds: 2 liquidity, 5 other money market and 5 short bond investment funds. The result of research has confirmed the preliminary drafted hypothesis, because only one mixed balanced fund was reallocated from cluster I to cluster II which is not a significant difference according to the type of the fund. Therefore the existing yields and risks of funds have not changed that much that they should have been re-classified to a different cluster. Due to the crisis the investment policies in case of selected funds have been confirmed again, proved their reliability and pertinence.

In the examination of correlations between risk and net asset value of domestic investment funds, I could declare that the risk of investment funds is independent from the size of net asset value, it is determined by the investment policy.

I have proved for all the domestic real estate investment funds that there was a negative linear relation between yield and net total asset value before the crisis, except for Quaestor First Domestic Residence Fund Open-ended Real Estate Investment Fund, in case of which the yield did not affect the investment in the fund. After the economic crisis, the direction of relation has changed, in three cases I have revealed direct proportion, and only one case showed inverse proportion. In another case no function-like relation could be observed. The statements above can be explained by the fact that the asset value of real estate investment funds increased considerably before the crisis, those with savings regarded them as new investment possibilities and their willingness to invest was induced by not the actual yield but the related long-term expectations. Stimulation of investments, proper management of billions of forints available can be a key factor for Hungary in the recovery from economic crisis. Moreover, it would be definitely necessary to revive trust, to increase the predictability of economic environment and improve the stability of legislation.

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