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The Evolution of Non-Banking Financial Markets in Hungary: The Case of Mutual Funds

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Abstract. *The non-banking sector has an important place in financial markets. Therefore, the performance of financial markets can be looked at in different countries by analyzing the evolution of mutual funds, in terms of their inflows and outflows. This is even more important in the recent period, due to the recent global financial distress. Numerous studies, most of them conducted in the US, illustrate that flows are highly dependent on the previous performance and that a common behavior of investors is rather to look for highly performing funds than to give up the poorly performing ones. This paper studies the flows of funds into and out of Hungarian mutual funds during the period 2007-2014. The evolution of the mutual funds market depends on investor's behavior and the paper analyzes the behavior of investors. The paper also tries to evaluate if and how the financial crisis affected the investing behavior of Hungarian investors. The main findings of the research illustrate that there are a number of factors that influence the way investors make their decisions. Among those fund flows in the previous month is the factor that influences the most the current flows, illustrating that Hungarians invest only in funds that attracted previously more new money. Other factors with a significant influence on the investors' behavior are the size of the fund (measured through the net assets) and the risk (measured through the standard deviations of returns). The factor that surprisingly seems to have less influence on Hungarian inv estors' decisions is the performance either measured as the evolution of the fund category or the rank and the square rank of the fund in its category. Another important finding was that data proved that the financial crisis had an impact on the capital market in Hungary, as investments decreased in that particular period and mutual funds performances were lower.*

Keywords: *mutual funds, Hungary, financial portfolio performance, emerging markets.*

Introduction

This paper provides a complex examination of the evolution of money flows in open-ended mutual funds in Hungary, as an emerging capital market from Central and Eastern Europe. The paper offers new insights in the emerging markets from this region enriching the literature in the field, both in terms of the geographical area studied but also in terms of extent of the study of mutual funds, as there is scarce existing literature that considers all funds categories as the present study does (most of the studies focus on equity funds). The analysis is used to characterize the investors' behavior in different mutual fund categories in Hungary. The period of the research 2007-2014 is also considered to identify influences on investors' behavior in a period of economic distress at the global level. The data collected is used to make a detailed and thorough analysis of the Hungarian mutual funds market in which each fund category is looked at globally from the overall performance perspective, but also structurally considering the most performing funds and the least performing funds in each category. Investors' behavior is characterized accordingly.

Literature review

Before looking at different studies conducted on mutual funds markets at international level, we would like to make a short presentation of the different categories of mutual funds. There are a number of different types of mutual funds, each bearing different levels of risks and potential returns. The major categories of mutual funds are money market funds, bond funds, equity funds and mixed funds. *Money market funds* are funds that invest the money in securities (such as certificates of deposit, treasury bills, fixed term deposits in banks) that are issued by the state or a bank and that have a predetermined interest rate. These funds have a short maturity, a low volatility, and a high liquidity and therefore, they are suitable for investors who do not want to take the risks. *Bond funds* are funds that invest the money in debt securities and in the bond market (government bonds, municipal bonds, corporate bonds). Bond funds are considered to be conservative investments as they are riskier than money market funds and offer higher returns than those, but at the same time, they yield fewer returns than equity funds. Bond yields come from two sources: interest income and the capital gain that results from the difference in price of the bond at the time of selling as compared to the one at the time of buying. The minimum period of investment is one year, but the recommended period is a long term investment of 3-5 years. *Equity funds* invest at least two-thirds of their assets in shares. They are the riskiest type of investment fund, but they usually bring higher returns than money market and bond funds and

they also have the highest growth potential. Equity funds invest in the stock market in the shares of companies and therefore the income of these funds come from capital gains, as investors receive dividends. These funds have long maturity (the recommended investment time is 5-7 years), have high volatility and high risk and therefore, they are suitable for investors willing to take risks. *Mixed funds* have a portfolio that is usually balanced and is formed of mixed funds (bonds and shares). These funds are less risky than equity funds and less profitable than bond funds. The time horizon of investment depends on the composition of the portfolio but is recommended to be of three years or more. The most balanced funds take a middle path between risky equity funds and the conservative bond funds, as with an acceptable risk they can bring average returns.

There is also another category of mutual funds, namely the *funds of funds*, that invest a part of their resources in shares of other investment funds and they have as an advantage the relatively low risk due to an increased distribution of investments. This could be considered as *other funds* category that would also include any other type of funds not included in the previous categories. The present study considers all these different types of mutual funds and their evolution over studied period of time in Hungary.

Looking at the literature, it can be noticed that different categories of mutual funds have been studied over time in different countries, with the equity funds receiving the highest attention. Some of these studies will be presented in this coming section.

The flow of capital that pours into mutual funds was a subject of interest for many authors who studied the capital markets (Ferreira, Keswani, Miguel & Ramos, 2012; Ivkovic & Weisbenner, 2009; Sapp & Tiwari, 2004). One of the main topics encountered in the literature is the flow-performance relationship. Numerous studies that looked at how flow depends on past performance focused on US market (Gruber, 1996; Ippolito, 1992) and most of them envisaged the US equity market alone (Fu, Navone, Pagani & Pantos, 2012; Kim, 2013; Ma, 2013). Others also looked at other countries as well, either developed countries (Ferreira et al. 2012) or developing countries (Varga & Wengert, 2010; Varga, 2011). Very few studies were found for emerging markets from Central and Eastern Europe (Tudorache, Nicolescu & Lupu, 2015a).

One of the main findings of these studies relates to the convexity of the flow-performance relationship. A convex relationship exists when flows are highly dependent on past performance, but investors chase the most performing funds more intensively than they sell funds that perform poorly

(Fu et al., 2012). Even though this is a largely encountered phenomenon, there are differences in its intensity in different circumstances. For instance, Ferreira et al. (2012) found that convexity in less developed countries is much higher than in developed countries and this relates to the level of sophistication and financial knowledge of the investors. Kim (2013) found that the shape of the flow-performance relationship changes over time, according to market and industry conditions, possibly from being convex to being concave. He found that in the US the flow-performance relationship that was convex prior to 2000 is no longer convex after 2000, due to the market volatility on the one hand and to a higher level of information of the investors on the other hand.

The factors that affect inflows of mutual funds is another subject studied in the literature. Among the most frequently cited ones in the literature as synthesized by Tudorache, Nicolescu, and Lupu (2015b, 2016) are:
a) The performance of the fund. The vast literature found a strong relationship between past performance and future flows of mutual funds (Grinblatt & Titman, 1992; Ippolito, 1992; Patel, Zeckhauser & Hendricks, 1991; Smith, 1978).
b) Fees represent another element with influence on the inflows of mutual funds: the higher the fees, the slower the rhythm of growth of those funds.
c) Risks, as an increase in risk, determined a reduction in flows.
d) The cost of search is also seen as an influencing factor as getting information about performance, fees and other aspects come at a cost for consumers. Consumers have the tendency to buy those funds that they can access easier. At the same time, marketing activities to promote the fund can have an influence on flows. Generally, the search costs and the marketing fees are seen as influencers of the convexity of the flow-performance relationship, with the marketing fees being positively related to the convexity of the flow-performance relationship (Fu et al., 2012).
e) The media attention that mutual funds receive is seen as a positive influencer on the inflows, as funds receiving more media attention, are expected to grow faster (Sirri & Tufano, 1998).

Whatever the external factors and influencers on decision making when acquiring mutual funds, consumers are also influenced in their decisions by inner factors such as propensity towards risk and level of knowledge in the field.

Another aspect that appears frequently in the literature about flows in financial markets is the “smart money effect”. This term has been first introduced by Gruber (1996) and Zheng (1999) and it describes the situation in which funds that receive new money, also obtain abnormal returns. The “smart money effect” was encountered for equity funds (Ma,

2013), but was considered to be short lived. The smart money effect is present in the case of bond funds as well, as illustrated by Fulkerson, Jordan and Riley (2013) and Chen and Qin (2015), who found evidence that the persistence of fund performance combined with return-chasing behavior determines the predictability of fund flows.

Such aspects contribute to characterizing both the investing behavior of individual and institutional investors, as well as the evolution of mutual funds, and as it was presented they applied to different countries. The present paper conducts an analysis of some of these aspects for Hungary.

Data and methodology

This paper studies the evolution of the open-ended mutual funds from Hungary. Data collected included the unit value of the funds and their returns as a measurement of mutual funds' performance, as well as data about their net assets as a measurement of the size of the funds. The data on mutual funds was drawn from BAMOSZ (The Fund Managers' Association from Hungary). BAMOZ has 23 members (investment management companies) who administer collectively 581 mutual funds. The data collection period was January 2007 to December 2014. All the investment funds marketed in the Hungarian capital market were studied, with the exception of funds managed by foreign societies. A mutual fund was included in the study only if it had at least 12 monthly observations, that would allow the calculation of performance. There were collected monthly data for both the total net assets and the fund unit value. Data has been grouped into five categories according to the classification of the mutual funds on different types of funds: "monetary funds" (46)," bond funds" (52), "equity funds" (126), "mixed funds" (45) and "other funds" (125). The final sample for Hungary included 394 investment funds.

The characterization of the evolution of the five types of funds in Hungary, was done in two ways: a) based on the calculation and analysis of the four moments of the time series: the mean returns, standard deviation, skewness and kurtosis as presented by Tudorache et al. (2015b) and b) by studying the relationship between flows and performance through a regression (Tudorache & Nicolescu, 2016).

Normally, investors need to take into consideration all four moments of an investment's return distribution (the mean returns, standard deviation, skewness, and kurtosis) in order to evaluate performance. Log returns in local currencies are used to measure the mutual funds' performance.

The relationship between the fund flow and performance was further studied with the following regression:

$$FLOW_{i,t} = \alpha + \beta_1 LnTNA_{i,t-1} + \beta_2 STD_{i,t-1} + \beta_3 FLOW_{i,t-1} + \beta_4 FLOWCAT_{s,t-1} + \beta_5 RK_{i,t-1} + \beta_6 SQRK_{i,t-1}$$

where *i* counts the funds we analyzed and *t* stands for the moment in time for each observation.
The explanatory variables are:
$LnTNA_{i,t-1}$= logarithm of the net assets (size of the fund) in the previous month
$STD_{i,t-1}$= standard deviation of returns in the previous month
$FLOW_{i,t-1}$= flow of new money in the previous month
$FLOWCAT_{s,t-1}$ = growth in percentage of the new money of the entire fund category
$RK_{i,t-1}$ = rank in the fund category it belongs to
$SQRK_{i,t-1}$ = square of the rank in the fund category it belongs to

These regressions were performed for each fund according to its particular category. A twelve-month rolling interval held in order to compute the yearly values for all the explanatory variables. The length of the time interval for each fund varied depending on the length of the existence of each fund in the analysis. There were performed 394 regressions that studied how the independent variables ($LnTNAi_{,t-1}$; $STDi_{,t-1}$; $FLOWi_{,t-1;}$ $FLOWCATs_{,t-1}$; $RKi_{,t-1}$; $SQRKi_{,t-1}$) influenced the dependent variable, namely the fund flow in the current period (FLOWi,t). The results of the regressions are presented in the following section.

The performance measurement and empirical data

a) The analysis of the four moments of the time series: the mean returns, standard deviation, skewness, and kurtosis are presented in the next section as a development of previous work of Tudorache et al. (2015b).

Mean returns

Figure 1, reveals that the medians of the mean returns of the five categories of funds differ to a great extent while presenting interesting characteristics. Firstly, it can be observed that the median of the mean returns for "monetary funds" (0,0037) was lower than the median of the mean returns for "mixed funds" (0,0039), illustrating a lower than expected mean returns for a low-risk category of funds, such as the "monetary funds".

Among the five categories, the median of the mean returns for "equity funds" is the lowest and the only one with a negative value (-0,0003), being the closest to the median of the mean returns of BUX (-0,0018). This is a foreseeable result, given the fact that this fund category comprises shares traded on the stock exchange. Also, the spread of the mean returns is the largest for this category, among all five categories, as half of the 126 equity funds have mean returns comprised between – 0,0035 and 0,0037, ranging from negative to positive values. This illustrates that for the mutual funds market, the "equity fund" category has the highest risk, as expected.
As far as the "other funds" category is concerned, it can be noticed that this is the only category of mutual funds that has a very large number of funds positioned outside the superior and inferior limits of the boxplot and its whiskers, with eight mutual funds (out of 125) with negative values of their mean returns (comprised between -0,0243 and -0,0051).

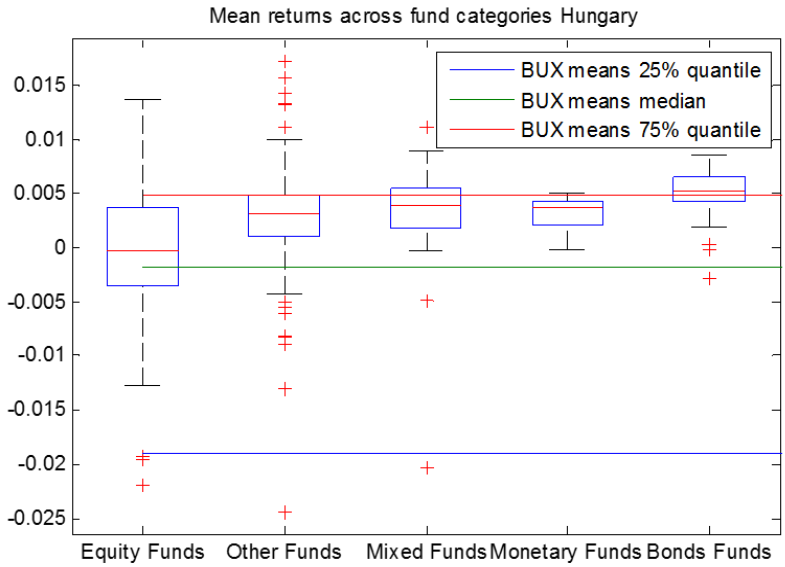


Figure 1. Median of the mean returns for the five categories of funds in Hungary 2007-2014

Among all the high-risk funds, for the analyzed period, the "mixed funds" category managed to have positive mean returns for 42 of the 45 funds, with only three funds with negative values (-0,0002; -0,0049 and -0,0203). The median of this fund category (0,0039) has a higher value than the one for "monetary funds" category (0,0037), which is considered to be a category with lower risk, depicting at the first glance an atypical situation. Even though the median of the "monetary funds" category does not have a

value to be considered superior to the whole mutual funds market, this fund category has the smallest spread among all funds categories (half of the funds in this category have values comprised between 0,0021 and 0,0043) and has no outlier values, therefore representing the funds with the lowest risk in the Hungarian market.

The "bond funds" category offered on average the best mean returns in the market, as half of the 52 funds in this category had results comprised between 0,0043 and 0,0066, values above the values of the boxplots (50% of the funds in the respective category) for three of other categories of funds. The spread of mean returns in this category is small, as expected for a fund category with safe investments.

Figure 1 shows that in the period 2007-2014, the mean returns of the BUX index of the Budapest Stock Exchange had a high volatility, an expected situation in a period in which many of the European countries faced a profound economic crisis. In a relationship with that, the best performing in the Hungarian market were "the bond funds". The median of the mean returns of "bond funds" (0,0052) was higher than the 75% quantile of the BUX median, illustrating that except just one fund (-0,0027), all the other 51 bond funds had mean returns superior to the median of the monthly mean returns of BUX (-0,0018).

For the most important moment used to study the evolution of the open investment funds, namely the mean returns, it can be stated that in Hungary in the analyzed period the mean returns for the "monetary funds" and the "bond funds" overpass with their median, the mean returns of the other three categories of studied funds. The high-risk categories of funds (equity funds, mixed funds, and other funds) did not manage to obtain better mean returns than the low-risk categories of funds (bond funds and monetary funds). The explanation can be related to the fact that the studied period incorporated the global economic and financial crisis of 2008-2009. Therefore, we can say that the period 2007-2014 was not a good period for investors who invested in high-risk funds in Hungary, as they had lower mean returns than the low-risk funds.

To conclude, for the analyzed period 2007-2014, the medians of the mean returns for the five categories of funds (-0,0026; 0,0031; 0,0039; 0,0037; 0,0052) were higher than the median for the BUX index (-0,0018) of the Budapest Stock Exchange, demonstrating once again that the portfolio diversification can lead to superior results than the BUX index.

Standard deviation

In figure 2 the standard deviation of the mean returns of the open-ended investment funds, grouped into the five categories, presents the risk associated with each category of funds, as well as an overall picture of the limits within which the mean returns of the five categories of funds fit.
The "equity funds" category has the highest median among all five categories, but at the same time, it has the largest deviations from the cluster (0,047-0,068), demonstrating again that it is risky to invest in this category of funds. The other two high-risk categories of funds managed to obtain small standard deviations for the category they belong to.

For the "other funds" category, the median of the standard deviations is of 0,018, with a cluster of the boxplot with values between (0,011-0,030) and two large values (0,073; 0,101), found outside the whiskers. By comparison with the median of the "mixed funds" category (0,021), the median for the "other funds" category (0,018) offers a better value and implicitly suggests a lower risk for investors in this category. However, taking into consideration the differences between the 25% and the 75% of the standard deviations of the "other funds" categories (0,011 -0,030) and comparing them with the differences for the "mixed funds" category (0,013-0,028), it can be noticed that "mixed funds" category offers overall better results, reversing (in our opinion) the advantage obtained by a better median for the "other funds" category.

As far as the "monetary funds" category is concerned, it can be stated that open-ended investment funds in this category managed to obtain the smallest standard deviations, comprised between (0,000167-0,0135). This is congruent with the expectations that in this category are grouped funds with low risk. At the same time, the 25%-75% quartiles cluster of observations has a small gap (0,0013-0,0020) and a median of 0,0018, reinforcing the finding.

The last category of mutual funds, the "bond funds" that has in its portfolio funds with low risk, did not manage to obtain values as good as the ones for "monetary funds". The 52 funds in this category have the results of the cluster in the boxplot comprised between (0,085-0,022) and a median of 0,0176. It is to be mentioned that there were two funds that overpass the whiskers reaching values of the standard deviations of 0,060 and 0,062.

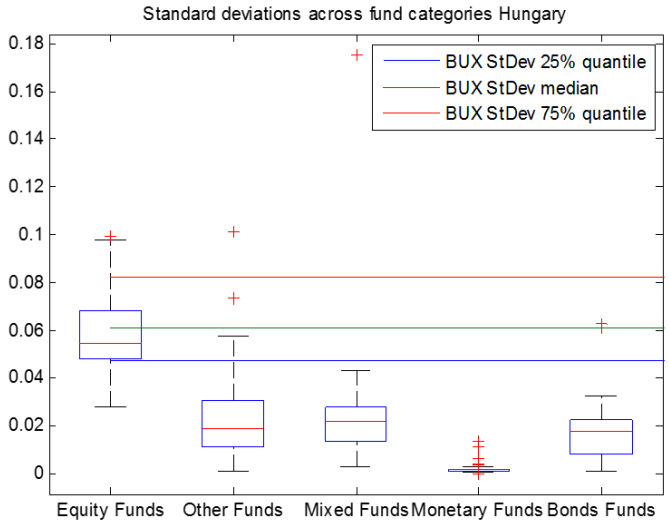


Figure 2. Standard deviation of the mean returns for the five categories of funds in Hungary 2007-2014

In conclusion, we can state that for all funds categories except the ”bond funds”, the standard deviations were in concordance with the level of risk for each funds category (high risk for equity funds, mixed funds and other funds and low risk for monetary funds). It also should be noted the low gap between the values of the standard deviations in the “monetary funds” category as compared with the gaps for the other categories of funds and the BUX index, illustrating a higher homogeneity for these funds.

Even though the standard deviations of the open-ended funds of investments in the “bond funds” category did not offer as good values as the “monetary funds” category, it can be observed that they managed to offer a lower level of risk than the “other funds” and “mixed funds” categories that themselves obtained very good values and very small standard deviations.

From the analysis of the three open-ended investment funds with high risk, the only category that had standard deviations with values similar to the ones of the median of BUX of the Budapest Stock Exchange was the “equity funds” category, as it was expected given the fact that 80% of this fund category portfolio is formed of shares traded at the Stock Exchange. The other two categories of funds with high risk (“other funds” and “mixed funds” categories) with only two exceptions (0,1013; 0,0736) had values of their standard deviations much below the median of the BUX index. We can, therefore, conclude that the portfolio diversification in the case of the open-

ended equity funds that comprise shares traded at the Stock Exchange, managed to reduce the risk associated with them.

Skewness

The third order derivative of the mean returns is called skewness and it shows the frequency with which the mean returns are clustered in one or another direction (positive or negative) and it is also known as the "third moment" of the mean return distribution. For a normal distribution of the mean returns, the skewness is equal to zero. When the skewness has a positive value, the mean returns distribution has long tails on the right side and when the skewness is negative the tails are long on the left side.

In figure no. 3 it can be noticed that for the "equity funds" category the skewness presents the lowest values for the median (-0,593) and the gap of the middle values (50%) is from -0,986 to - 0,323, being the smallest gap in all categories. Taking into consideration the skewness, the risk of having highly negative values of the mean returns is the highest for this category of open-ended investment funds.

Even though the median of the skewness of the "other funds" category (-0,303) has the highest value among the three categories of high-risk funds, we can not state that this funds' category offer has the lowest risk of having highly negative values for the mean returns, because this fund category has the largest gap of the skewness boxplot (from -1,406 to 0,269) in all funds categories. Also, the "other funds" category includes the highest number of funds (9) with the values of the skewness outside the whiskers, being highly negative.

The "mixed funds" category has skewness coefficients similar to the values of the skewness of the "equity funds" category, but with a larger gap in the boxplot (from -0,992 to 0,026). This category is the only category that has only one fund that is outside the inferior limit, having the lowest skewness in all funds categories (-8,939). On overall, there are similar results between "mixed funds" and "equity funds".

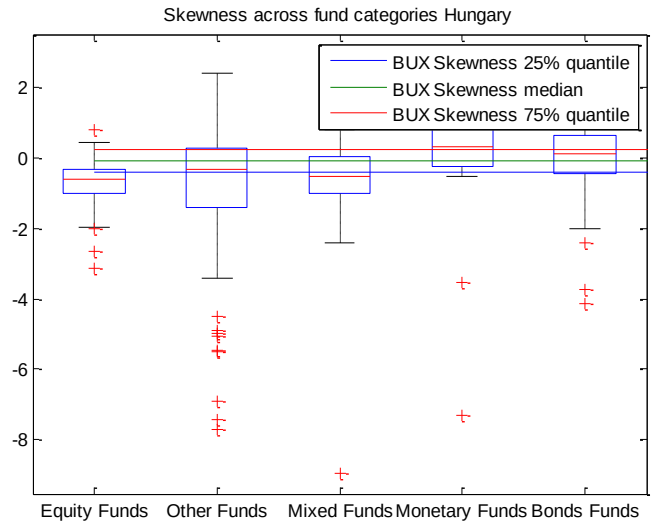


Figure 3. Skewness of the mean returns for the five categories of funds in Hungary 2007-2014

Among the two low-risk funds categories, the "monetary funds" category has the highest skewness (0,3146), illustrating the lowest risk of obtaining highly negative values of the mean returns. Also, only 15 of the 46 open-ended investment funds from this category have negative values of the skewness, reinforcing the idea of lower risk for this category.

In the "bond funds" category the median of the skewness is also positive (0,119), but lower than the median of the "monetary funds" category. This funds category has a larger gap of the boxplot (from -0,459 to 0,651) than the "monetary funds" category, suggesting on overall a higher risk for this fund category than for the "monetary funds".

It can be concluded that for the three high-risk funds categories (equity funds, mixed funds, and other funds), the medians of the skewness are similar to the median of the skewness for the BUX index of the Budapest Stock Exchange. Both the literature studying this relationship worldwide (Braun, Nelson & Sunier, 1995; Campbell & Hentschel, 1992; Engle & Ng, 1993; Pindyck, 1984) and our findings for Hungary show that the portfolios of the high-risk funds categories have negative skewness of their mean returns that are similar to the mean returns of the Stock Exchange index (BUX in our case).

Kurtosis

The kurtosis coefficients of the open-ended investment funds in Hungary grouped on funds categories illustrate if the mean returns of the open-ended investment funds are different from the normal distribution, being known that investors in the capital markets base their decisions on the fact that the mean returns are not normally distributed.

When the kurtosis equals 3, the mean returns distribution is the same with the normal distribution and it is called mesokurtic distribution. When the mean returns are distributed more to the peak of the distribution, there are small possibilities that the mean returns will have extreme values. The kurtosis, in this case, has low values and the distribution is called platykurtic distribution. Finally, for the leptokurtic distribution, the kurtosis has values higher than 3, has a smaller number of values at the peak, being higher than the normal distribution with higher probability to have values in the extreme areas of the mean returns distribution.

In the high-risk funds categories, the lowest median (4,085) belongs to the "equity funds" category. This category presents the smallest gap between the kurtosis of the 25% and that of the 75% of the funds, with values between 3,516 and 5,539. At the same time, 11 funds of the total of 126 equity funds have large kurtosis coefficients situated outside the superior limit of the whiskers (e.g. 20,733).

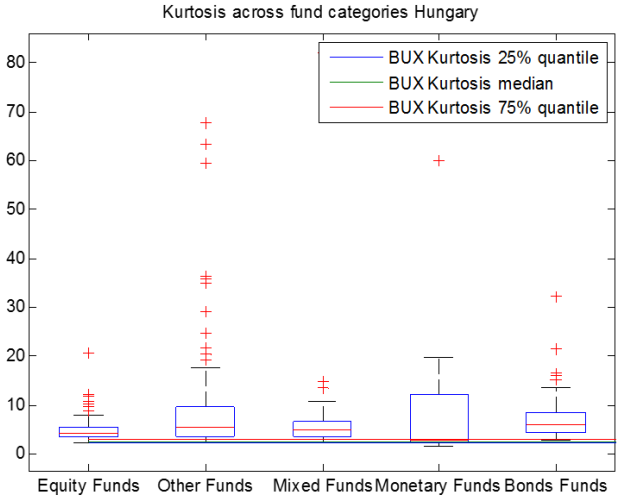


Figure 4. Kurtosis of the mean returns for the five categories of funds in Hungary 2007-2014

As it can be noticed in figure 4, all of the three high-risk funds categories have leptokurtic distributions of their mean returns. The highest value of the median of the kurtosis belongs to the "other funds" category (5,437). It can also be observed that this funds category has the highest number of funds (16 out of 125) with the kurtosis coefficients outside the superior whiskers limit, three of them having extremely high kurtosis coefficients (67,597; 63,375; 59,543). Consequently, we can state that this funds category, the "other funds" category have a high risk to include extreme values. But, it should also be mentioned that in the "other funds" category there are 19 funds (out of 125) that have mesokurtic distribution, illustrating a low risk of having extreme values. Therefore, the situation is mixed, illustrating a higher heterogeneity of funds in this category.

As far as the "mixed funds" category is concerned, both the median of the kurtosis coefficient (5,065) that is large and the gap of the boxplot (3,672 – 6,750), place the "mixed funds" category in-between the other two high-risk funds categories, in terms of risk of having extreme values.

The "monetary funds" category is the only category that managed for 25 out of 46 funds, to have kurtosis coefficients lower than 3, with a platykurtic distribution for the mean returns of these funds. The median of the "monetary funds" category is 2,876 the lowest value among all funds categories. Consequently, the "monetary funds" category offers for more than half of its funds, low risks of having extreme values. Even more, in this funds category, there are two funds that have kurtosis coefficients lower than two (1,744; 1,937) illustrating an even lower risk of having extreme values.

In the group of the low-risk funds categories, the "bond funds" did not manage to perform as well as the "monetary funds", having only one fund with a platykurtic distribution and low risk of extremes. The median for this category is 6,205, the highest among the medians of all funds categories in Hungary, illustrating a high risk of extreme values, an unusual situation for this category of funds.

Figure 4 illustrates the kurtosis coefficient for the BUX index of the Budapest Stock Exchange that has a platykurtic distribution and the value of 2,555, illustrating low probabilities of having extreme values. Very few funds in the three categories of funds that comprise shares traded at the Stock Exchange, managed to register values close to the BUX index, meaning that they present larger risks of encountering extreme values. Only the category "monetary funds" managed to have similar good values of the kurtosis as the ones of the Stock Exchange index.

To conclude, in none of the three funds categories that have shares traded on the Stock Exchange in their composition, the portfolio diversification managed to reduce the risk of having extreme values. The results of the regression analysis are presented here as a development of previous analysis conducted by Tudorache and Nicolescu (2016). This section presents the results of the 394 regression run for all five categories of mutual funds in Hungary for the period 2007-2014.

P-value

In order to validate the statistical hypothesis, we applied the F-test to test the null hypothesis. P-values have been calculated for the overall regression and for all seven variables of the regression. Figure 5 presents the P-value for the five categories of funds analyzed.

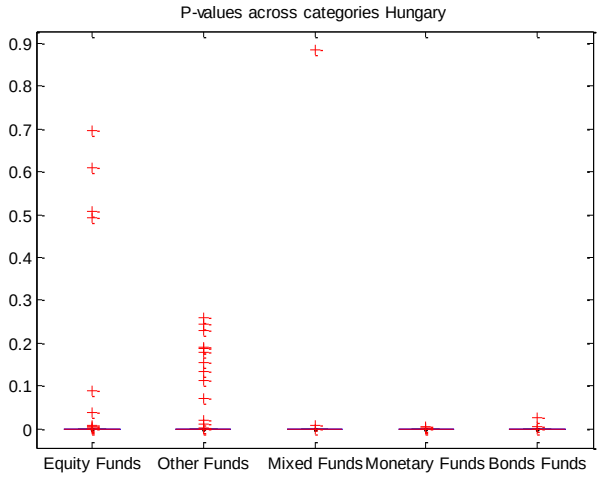


Figure 5. P-value of the regressions for the five categories of mutual funds from Hungary, 2007-2014

For the "equity funds" category, the null hypothesis is rejected for 121 of the 126 equity funds, illustrating the validity of the regression with a 95% probability. There are only five equity funds from the total of 126, for which the regression is not verified, as they have P-values higher than 0,05.

The "other funds" category had nine funds out of 125 for which the regression did not verify and the "mixed funds" category had only one fund out of 45 for which the regression did not verify. In conclusion, we can state that the results illustrate on overall that the regression is valid for a large

part of the mutual funds (379 out of the total of 394) and the chosen independent variables explain the evolution of the flow of mutual funds.

The determination coefficient R^2

In a regression when the differences between the observed values and the forecasted values are very small and random, it can be stated that the model has been chosen correctly. The determination coefficient (R^2) measures statistically how close are the real values from the values calculated based on the regression model.

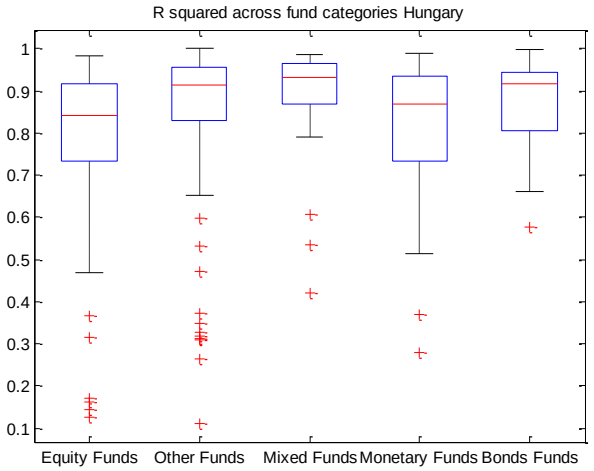


Figure 6. The determination coefficient R^2 for the five categories of mutual funds from Hungary, 2007 – 2014

As it can be noticed in figure 6, the median of the R^2 for the "equity funds" category is 0,842, a value close to 1 that illustrates the validity of the regression. The validity of the regression is also re-confirmed by the fact that three-quarters of the equity funds had high values of the P-values that surpass the values of 0,732. The "monetary funds" category had similar values to the "equity funds" (the median was 0,868 and three-quarters of the funds had values of R^2 over 0,733).

The determination coefficients for the other categories of mutual funds had better values: the median of R^2 for "other funds" was 0,912, the median of R^2 for "mixed funds" was 0,930 and the median of R^2 for "bonds funds" were 0,915, all values very close to 1. It can be concluded that the determination coefficient R^2 restates that the regression equation explains to a large extent

the dependent variable, the flow, for most of the open-ended funds in Hungary.

The regression coefficients of the independent variables

Figures 7 –12 present the significant values of the regression coefficients for the independent variables and the percentage of funds for which, each independent variable is significant at the level of each fund category among the five categories in which are grouped the 394 mutual funds studied in Hungary. For each variable are presented three graphs: the first graph is a graph that illustrates the general relationship between the flows and each independent variable; the second graph presents the same relationship but for the last 25% the least performing funds (based on returns) and the last graph presents the relationship for the first 25% the most performing funds in each category.

β1 The logarithm of total net assets in the previous month (LnTNAi,t-1)
The percentage for which this coefficient is statistically significant varies between 18%-29% for all five categories of funds, a relatively small percentage, but still important. Figure 7 presents the three graphs for β1.

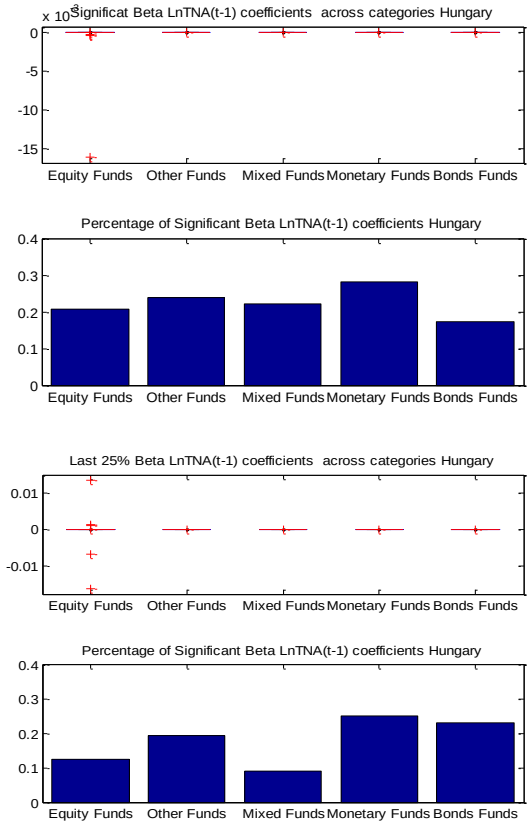
For the "bond funds" category there were 18% (9) of the funds that had a significant relationship between flows and the logarithm of total net assets in the previous month and for most of them (8 out of 9) the relationship was negative illustrating that a decrease in the net assets in the previous month leads to an increase in flows. At the first glance, this can be interpreted as an irrational behaviour of the Hungarian investor, but if we consider the fact that the studied period was characterized by economic turmoil, the results can indicate the fact that many investors prefer to shift from high-risk funds toward low-risk funds, even when those low-risk funds are decreasing in size. In a similar situation were also the "other funds" for which 24% of the funds (30 out of 124) had a significant relationship between the two variables and its direction was rather negative (22 negative β1).

For the other categories of mutual funds (monetary funds, mixed funds, and equity funds) the significant relationships were both positive and negative in relatively equal proportions, therefore there was no clear direction of the influence between the two variables.

For the last 25% least performing funds (based on returns), the high-risk funds (equity funds, mixed funds, and other funds) presented relationships of dependency that were both negative and positive, without having a

majority direction. For the low-risk funds very few of the underperforming funds had a significant relationship among the two variables, illustrating that the size of the fund was not an influencer for investors in case of poorly performing funds.

For the first 25% the most performing funds (based on returns) it can be noticed an increase in the percentage of funds for which the relationship is significant for β1. For instance, for "mixed funds" , for the most performing funds 50% of them had a significant relationship between variables, as compared to 18% for the whole category. Most of those expose o positive relationship, illustrating that an increase in the net assets of the fund determines and increase in flows. The situation is similar for "monetary funds" as well. This illustrates that in the case of funds with good performances the investors' behavior is more sensitive to the size of the funds, chasing funds that increase in size.



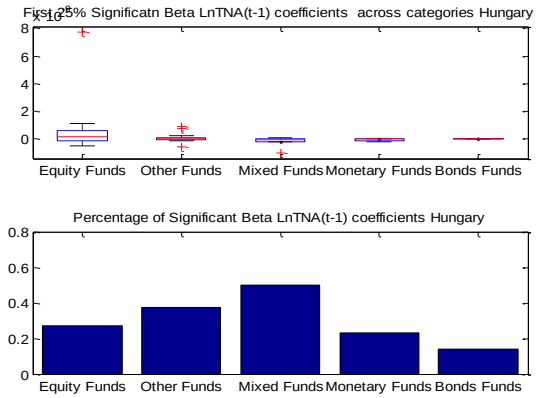
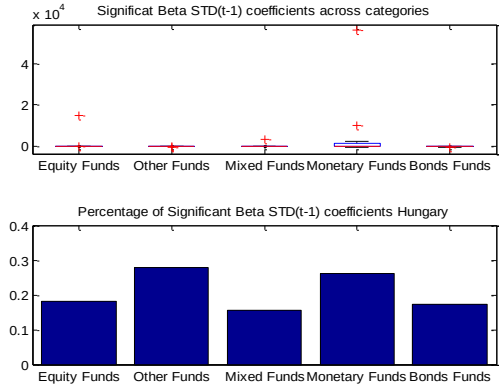


Figure 7. The coefficients of regression β1 the logarithm of total net assets in the previous month (LnTNAi,t-1) for all fund categories in Hungary, 2007-2014

β2 The standard deviation of returns in the previous month (STDi,t-1)

For 85 of the 394 open-ended investment funds studied in Hungary, the standard deviation of returns in the previous month (STDi,t-1) is a significant influencing factor, as presented in figure 8. It is to be noticed that the only fund category for which the relationship between the flow and standard deviation of returns in the previous month is positive for most of the funds is the "monetary funds" category, that had 11 funds with positive relationships among the 12 funds for which β2 was different from zero (out of the total of 46 monetary funds). This illustrates a higher volatility of the "monetary funds" to the movement of interest rates, that registered large decreases in the period of financial distress when Central Banks tried to re-launch economies by offering capital at low cost.



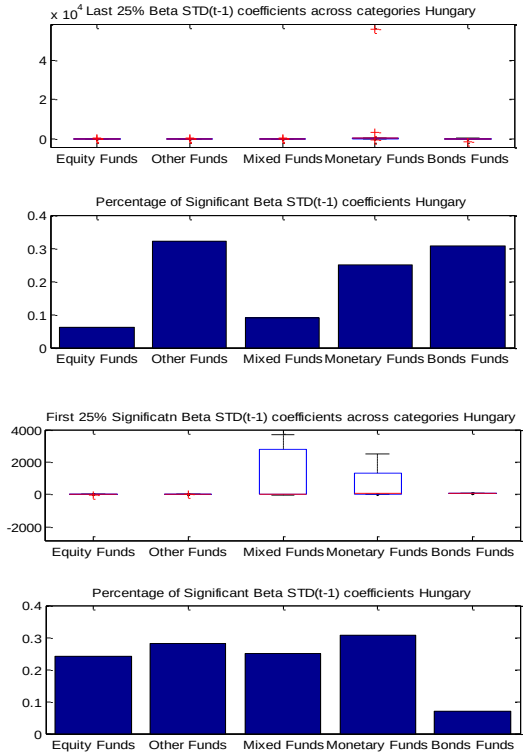


Figure 8. The coefficients of regression β2 the standard deviation of returns in the previous month (STDi,t-1) for all fund categories in Hungary, 2007-2014

For the "equity funds" category there were 23 funds for which the two variables had a significant relationship, most of them being positive (17), illustrating that at higher risks, the flows increased, probably for those investors who hoped that the direction of change in the returns will be in their favour and they were willing to take higher risks. The other funds categories (bonds funds, mixed funds, and other funds) with significant relationships of β2 had no clear directions of the relationships.

For the first 25% most performing funds in most fund categories it was noticed a slight increase in the number of funds with values of β2 significant, with the exception of "bonds funds". For the last 25% least performing funds it was registered a large decrease in the percentages of funds with significant relationships as compared to the whole category (from 18% to 6% for "equity funds" and from 18% to 9% for "mixed funds").

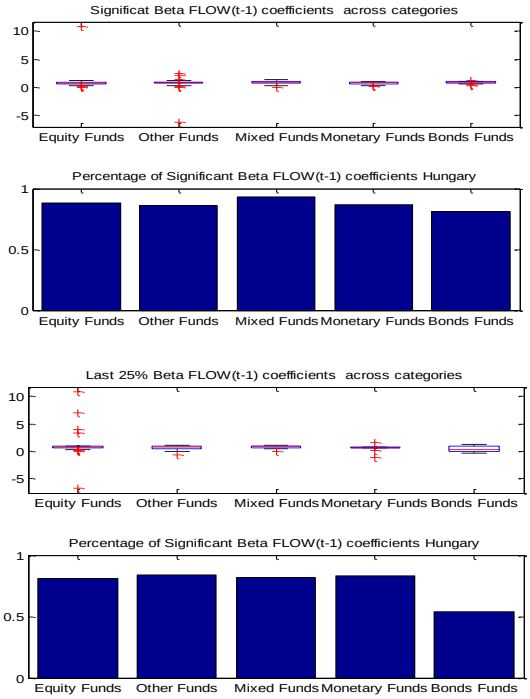
As a first observation, it can be noticed that the flow of the open-ended investment funds in Hungary is more sensitive to the standard deviation of

returns in the previous month for the first 25% most performing funds and insensitive to the standard deviation of returns in the previous month for the poorly performing funds. This explains the behavior of the Hungarian investor who for the performing "equity funds" takes more risks and increases the acquisitions for these funds based on the large differences in the returns registered in the previous month, with the chance of obtaining large gains if the differences are in their favor. The same type of behavior is met for "mixed funds", another high-risk fund category, while for the "bonds funds" the behavior is reverse.

A second observation relates to the fact that for the"bonds funds" category on overall β2 has balanced positive and negative values, while for the 25% the least performing funds, the values are mostly negative. This means that for "bonds funds", the Hungarian investors tend to acquire less of these funds when the risks increase.

β3 Flow of new money in the previous month (FLOWi,t-1)

The flow of new money in the previous month is the predictor with the highest level of significance among all independent variables included in the present regression. See figure 9.



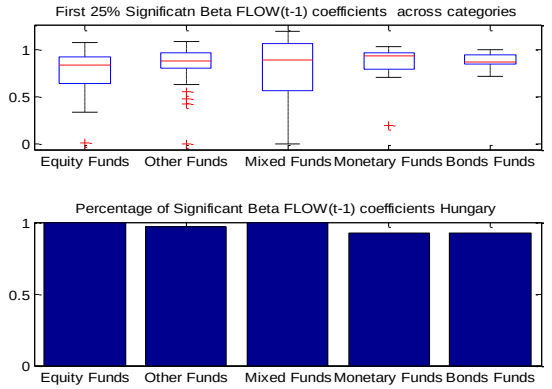


Figure 9. The coefficients of regression β3 flow of new money in the previous month (FLOWi,t-1) for all fund categories in Hungary, 2007-2014

All β3 with a significant relationship had positive values, illustrating that the flows in the present month are very sensitive to the flows variations in the previous month. The highest level of statistical significance it is encountered in the case of "mixed funds" for which 93% of the funds had a significant relationship between present flows and flows in the previous month.The "bonds funds" category had the β3 significant for the lowest percentage of funds (80%), but still at a high level. Looking at the two groups of funds for all fund categories on overall, it can be observed that for the first 25% most performing funds the regression coefficients are statistically significant for percentages comprised between 92% and 100%. For the last 25% least performing funds, the degree of significance of the relationship decreases, as the percentage of funds for which the relationship statistically significantly varies between 83% and 53%, much lower values. It can be concluded that the statistical significance of the regression coefficients increases up to 100% of the funds for good performing funds, suggesting a sensitivity of the flows to the performances of funds. This illustrates that the Hungarian investor is willing to invest in the most performing funds that were appreciated in the past as well.

β4 Growth in percentage of the new money of the entire fund category in the previous month (FLOWCATs,t-1)

The growth in percentage of the new money of the entire fund category in the previous month (FLOWCATs,t-1) is a factor with little statistical significance for the fund categories "equity funds", "mixed funds" and "monetary funds", as the percentage of funds for which β4 is significant was comprised between 5% and 11%. The funds for which β4 is significant increases for "bonds funds" (at 25% of all bond funds) and for "other funds" (31% of all other funds). See figure 10.

The significant regression coefficients for the "other funds" category are mostly negative (30 out of 39 with a significant relationship), with similar results for both the first 25% most performing funds and the last 25% least performing funds. As far as the "bonds funds" are concerned, it can be noticed an increase in the percentages of funds with a significant relationship when we analyze the two-quarters, the superior and the inferior quarters in terms of performance, reaching 35% and respectively 38%, as compared with the percentage of funds for which β4 is significant for the whole category (25%). We also identified a difference in the signs of the coefficients from the two-quarters: in the superior quarter, the coefficients are mostly negative (4 negative and one positive), while for the last quarter the situation is mixed (3 positive and 2 negative). For "bond funds" an increase in the percentage of new money of the entire fund category, leads to a decrease in the present fund flow or said in another way the investors invest more in this fund category when there is less capital invested on overall in these funds. This can be related to the movement of capital from high-risk markets to low-risk markets, even when those low-risk markets decrease.

At the same time, for the first 25% most performing funds from "mixed funds" and "monetary funds" categories, there is an increase in the number of funds for which β4 is significant (33% of the total of "mixed funds" and 23% of the total of "monetary funds"). The relationships are rather positive illustrating that the growth in the percentage of the new money of the entire fund category, influences in a positive manner the present flow for that fund category.

For the "monetary funds" category the relationship is another way around: an increase in the percentage of the new money of the entire fund category in the previous period leads to an increase in the present flow. This illustrates that investors in Hungary take into consideration the previous behavior of other investors when they acquire new units of monetary funds, influencing each other. The growth in the percentage of the new money of the entire fund category in the previous month, attract new investments in these funds, especially for those with high performances. A possible explanation could be that the Hungarian investor informs himself about the previous evolution of "monetary funds" and takes decisions based on this.

To conclude, we can state that at a general level β4 the growth in percentage of the new money of the entire fund category in the previous month (FLOWCATs,t-1), is statistically significant for a relatively low number of funds (maximum 31% for whole categories and maximum 38% for quartiles in the categories), illustrating that only for these funds the

flows are influenced by the growth in percentage of the new money of the entire fund category in the previous month. For most of the funds, the influence of this factor is low.

β5 Rank in the fund category it belongs to (RKi,t-1)

As presented in figure 11 the regression coefficient β5 the rank in the fund category it belongs to it is not significant for 92% of the funds in the "equity funds" category and for the ten funds for which the relationship is significant, the relationships are balanced (5 positive and 5 negative). A similar situation is encountered in the case of "other funds". The only two categories of funds for which there is a higher level of significance are "mixed funds" (24%) and "monetary funds" (30%).

For these funds, an increase in the rank of a monetary fund in its category in the previous period determines an increase in the present flow, as most of β5 were positive. For the "bonds funds," the relationship is significant for 17% of the funds with a positive direction, illustrating that flows increase with an improvement of the rank of a fund in its category.

In the case of the first 25% the most performing funds, it can be stated that the significance of β5 increases for all funds categories. Interesting results are encountered in the case of "monetary funds" for which β5 shows a significant relationship for 36% of the funds (increased as compared to the 30% of the whole category). Similarly for the "bonds funds", β5 indicates a significant relationship for 21% of the most performing funds as compared to only 17% of the whole fund category. The sign of β5 is positive illustrating again that a better rank in the category leads to an increase in flows. This is more prominent in the case of the low-risk funds as compared to high-risk funds.

For the last 25% the least performing funds, the "mixed funds" category is to be remarked as the percentage of funds for which the relationship is significantly increased from 25% for the whole category to 45% for the least performing funds with mixed signs for β5. This illustrates that the investors who operate with less performing funds (the last 25%) are more proactive in selling and buying fund units according to their rank in the category, in comparison with investors who buy units of "mixed funds" in general. In the case of "monetary funds," the situation is reverse as β5 indicates a significant relationship for only 8% for the least performing funds, as compared to the 30% funds with the significant relationship for the whole fund category. This would suggest that in the case of less performing "monetary funds", the rank in the category is not an influential factor in the acquisition decision of the investors.

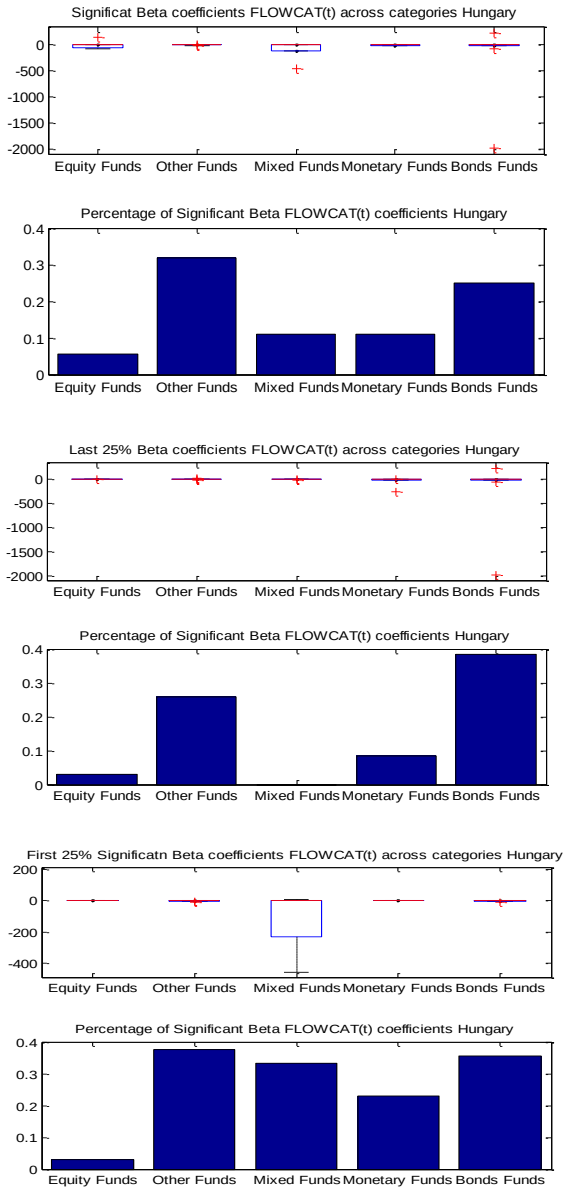


Figure 10. The coefficients of regression β4 Growth in percentage of the new money of the entire fund category in the previous month (FLOWCATs,t-1), for all fund categories in Hungary, 2007-2014

β6 Square of the rank in the fund category it belongs to (SQRKi,t-1)

The regression coefficients β6 the square of the rank in the fund category do not differ a lot from the previous coefficient β5. For instance, β6 indicates that for the "equity funds" the relationship is significant for only 9% of funds, showing that this factor has a small influence on the evolution of flows. See figure 12.

In the case of "monetary funds", similar to β5, also β6 recorded a statistically significant relationship for the highest number of funds (32%). The relationship is rather negative (10 negatives and 5 positives), meaning that flows increase with a decrease in the square rank in the fund category. The Hungarian investor prefers to move his money from high-risk funds towards low-risk funds, even when they are less performing, just because they are safer.

Most of the Hungarian investors do not consider the rank of the funds in their category and the square rank of the funds, when making investment decisions ("mixed funds" 16%; "bonds funds" 16%).

For the last 25% least performing funds among "mixed funds", the relationship is significant for a higher number of funds (36% as compared to 22% for the whole category), but with an unclear direction. In the case of "monetary funds," the significant relationships decrease from 32% for the whole fund category to 17% for the least performing funds. This reaffirms that the factor is not taken into consideration by the Hungarian investor when acquiring unit funds.

In the case of the first 25% most performing funds for the "monetary funds" category the number of significant coefficients β6 are of 54% of all performing funds (as compared to 32% for the whole fund category), without a clear direction of the influence (β6 coefficients: 4 negative and 3 positive). The results show that the Hungarian investor is more proactive in taking investment decisions in the most performing monetary funds. For the other categories of funds, there were no large differences in the case of the first 25% most performing funds as compared to the whole category, neither in the case of number funds for which the relationship is significant nor in the case of the sign.

Conclusion

The analysis of the mutual fund market and behavior of investors in Hungary based on the regression shows that the regression equation was valid for more than 90% of all funds (based on p-values), illustrating an

exiting influence of the independent variables on the dependent variable (the flow). The coefficient of determination R^2 reaffirms that the regression equation explains to a large extent the dependent variable and that it exists a strong relationship between the variables. The analysis of the size of the fund expressed through net assets in the previous month, lead to the conclusion that this factor is an influencer (for around 20-35% of all funds).

The examination of the standard deviation of returns shows that the risk factor influences the flows (for 21-22% of all funds) and that risk is an influencing factor for the investors' acquisition behavior. An atypical behavior of investors in "monetary funds" was encountered in the sense that they invested more money in the riskier "monetary funds". At the first glance this might appear as being illogical, however considering the period in which the study was conducted, a period of economic unrest, an explanation can be that the financial crisis affected the behavior of the consumers, who preferred to shift their investment from high-risk mutual funds towards low-risk mutual funds (such as monetary funds) in spite of their lower performance and higher risk, just because the risk is lower than for other categories of funds.

The fund flows in the previous month is the factor that influences the most the current flows and investors from Hungary invest only in funds that attracted previously more capital (new money).

The percentage growth of the fund category has a small influence on flows, this not being an influencing factor for a large number of funds in Hungary (only two categories of funds have it as an influencing factor for around 20% of the funds in category). The Hungarian investor tends to invest in "bond funds" even when there is less capital invested on overall in those funds, suggesting again that in spite of an unfavorable evolution, low-risk funds are preferred in a period of economic crisis.

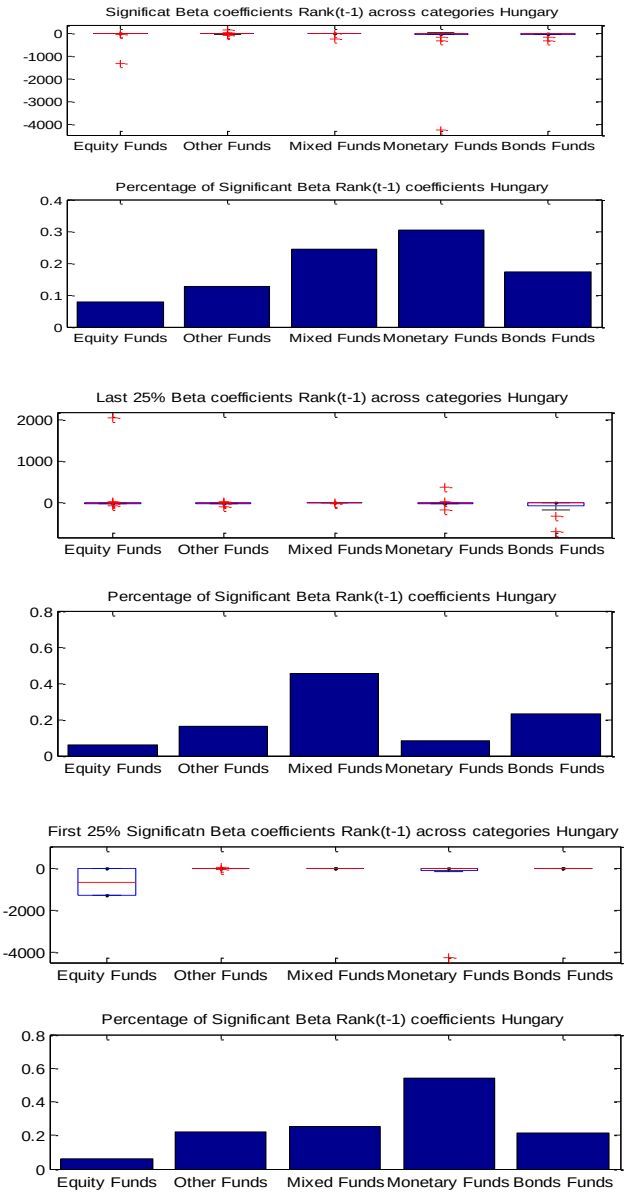
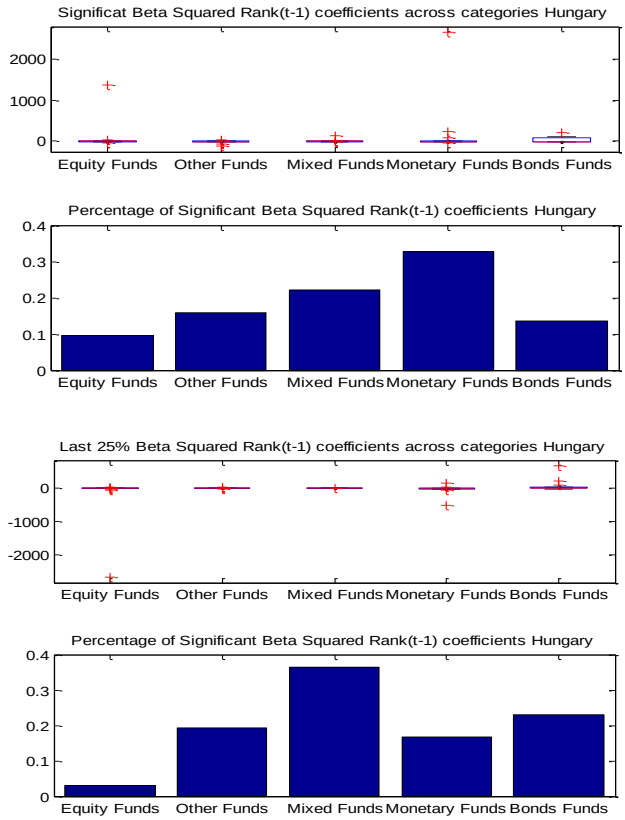


Figure 11. The coefficients of regression β5 Rank in the fund category it belongs to (RKi,t-1), for all fund categories in Hungary, 2007-2014

The rank and the square rank of funds in their categories are not very influential factors for flows. The only fund categories for which fund flows increased with a better position of the fund in the category were the low-risk funds ("bond funds" and "monetary funds"). It seems that Hungarian investors pay attention to performance in terms of position only for the

investments that are safe, for which the returns are guaranteed. This is also part of the tendency to shift from high-risk funds to low-risk funds, due to the high level of uncertainty in a volatile market.

Such information related to the factors that influence investment behavior can be used by asset management companies in their marketing activities and in communicating with the investors. Information that is highly considered by investors when investing (such as previous capacity in attracting new capital, the size of the fund, the risk associated with the fund) are to be provided to investors in order to attract them.



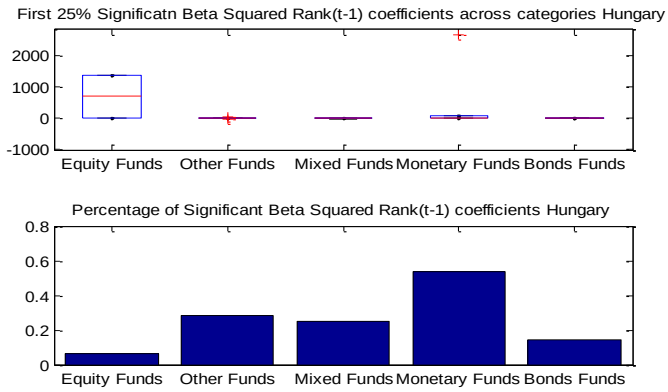


Figure 12. The coefficients of regression β6 Square rank in the fund category it belongs to (RKi,t-1), for all fund categories in Hungary, 2007-2014

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