

INVESTORS' BEHAVIOR: THE CASE OF MUTUAL FUNDS IN HUNGARY

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Abstract. *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. Individually, investors base their acquisition decisions on past performances of funds and have the tendency to invest in funds that had previously very good performances. A large number of studies, most of them conducted in the US illustrate that mutual fund flows depend on the previous performance of funds and that a common behavior of investors is to rather invest asymmetrically in highly performing funds than to give up the funds that perform poorly. This paper studies the flows of mutual funds in Hungary by looking at inflows and outflows of capital for the period 2007-2014. The main purpose is to characterize the behavior of the investors in the emerging Hungarian capital market, mainly in terms of their investment choice. The paper also envisages recognizing if and how the financial crisis, as part of the studied period, did affect the behavior of Hungarian investors. The main findings of the research illustrate that there are a number of factors that have a say in 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 investors' 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 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. The paper offers new insights in the emerging markets from Central and Eastern Europe, as there is scarce literature in the field and none of it considers all funds categories. 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 given the studied period characterized by 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, but also considering the first 25% most performing funds and the last 25% least performing funds in each category. Investors' behavior is characterized accordingly.

Literature review

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; Li, 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, 2015).

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 a fund that performs 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.

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 (Li, 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). BAMOSZ 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 relationship between the fund flow and performance was 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 ($\text{LnTNA}_{i,t-1}$; $\text{STD}_{i,t-1}$; $\text{FLOW}_{i,t-1}$; $\text{FLOWCAT}_{s,t-1}$; $\text{RKI}_{i,t-1}$; $\text{SQRKI}_{i,t-1}$) influenced the dependent variable, namely the fund flow in the current period ($\text{FLOW}_{i,t}$). The results of the regressions are presented in the following section.

Empirical results

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 1 presents the P-value for the five categories of funds analyzed.

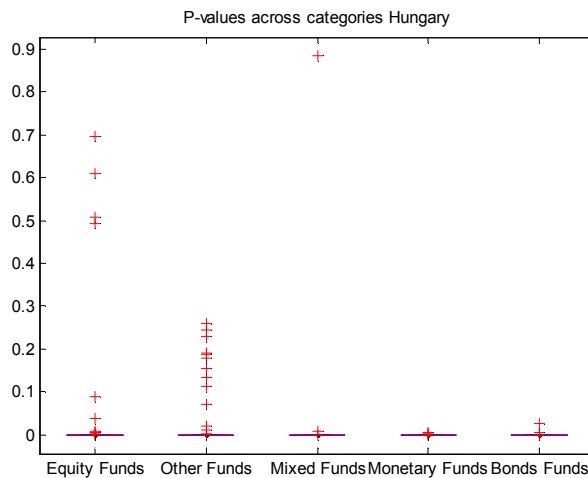


Figure 1. P-value of the regressions for the five categories of mutual funds from Hungary, 2007-2014

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.

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.

As it can be noticed in figure 2, 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 with 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” was 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.

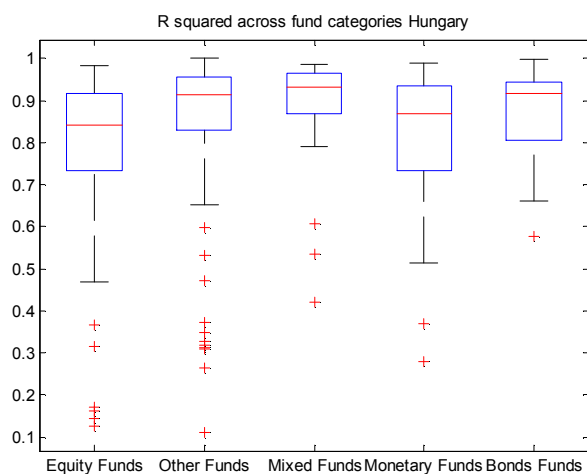


Figure 2. The determination coefficient R^2 for the five categories of mutual funds from Hungary, 2007 – 2014

The regression coefficients of the independent variables

Figures 3 – 8 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.

β_1 The logarithm of total net assets in the previous month ($LnTNA_{i,t-1}$)

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 3 presents the three graphs for β_1 .

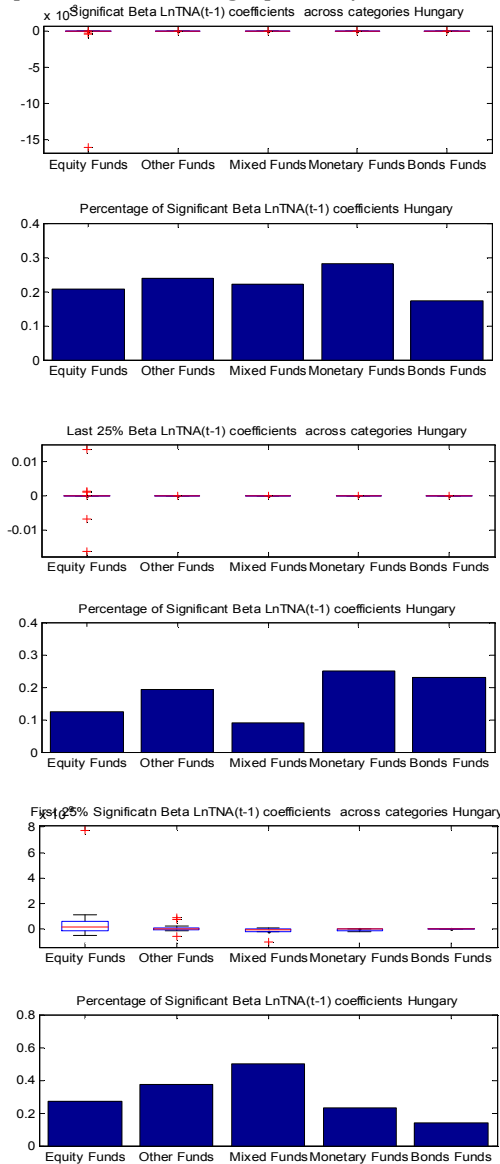


Figure 3. The coefficients of regression β_1 the logarithm of total net assets in the previous month ($LnTNA_{i,t-1}$) for all fund categories in Hungary, 2007-2014

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 β_1).

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 β_1 . 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 a positive relationship, illustrating that an increase in the net assets of the fund determines an 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.

β_2 The standard deviation of returns in the previous month ($STD_{i,t-1}$)

For 85 of the 394 open-ended investment funds studied in Hungary, the standard deviation of returns in the previous month ($STD_{i,t-1}$) is a significant influencing factor, as presented in figure 4. 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 β_2 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.

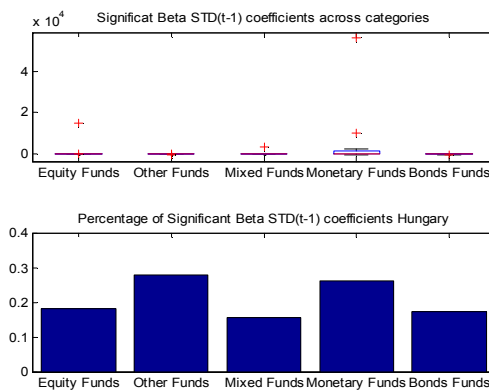
For the “equity funds” category there were 23 funds for which the two variables had a significant relationship, most of them being positive (17), illustrating that at

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 fund categories (bonds funds, mixed funds, and other funds) with significant relationships of β_2 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 β_2 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 β_2 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.



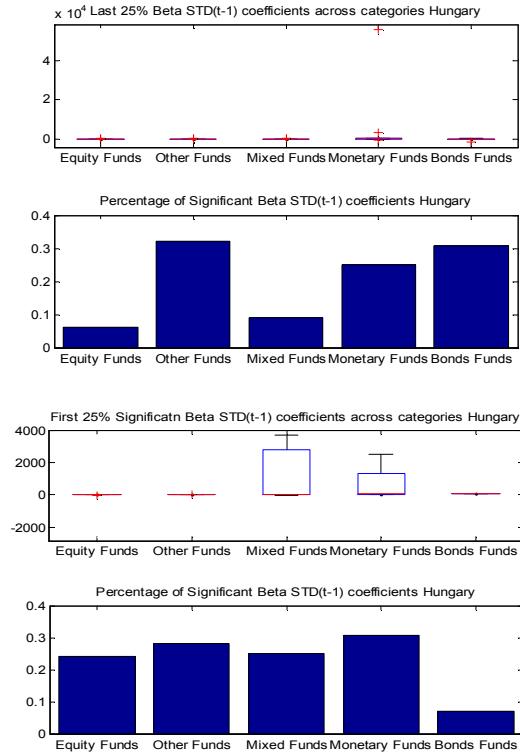
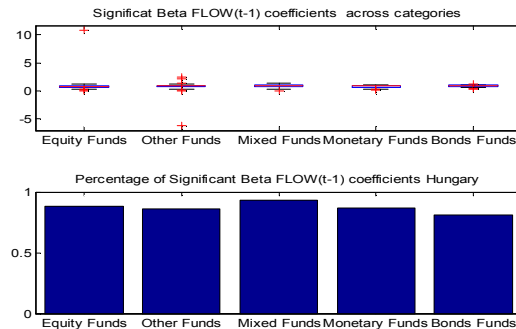


Figure 4. The coefficients of regression β_2 the standard deviation of returns in the previous month ($STD_i, t-1$) for all fund categories in Hungary, 2007-2014

β_3 Flow of new money in the previous month ($FLOW_i, t-1$)

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 5.



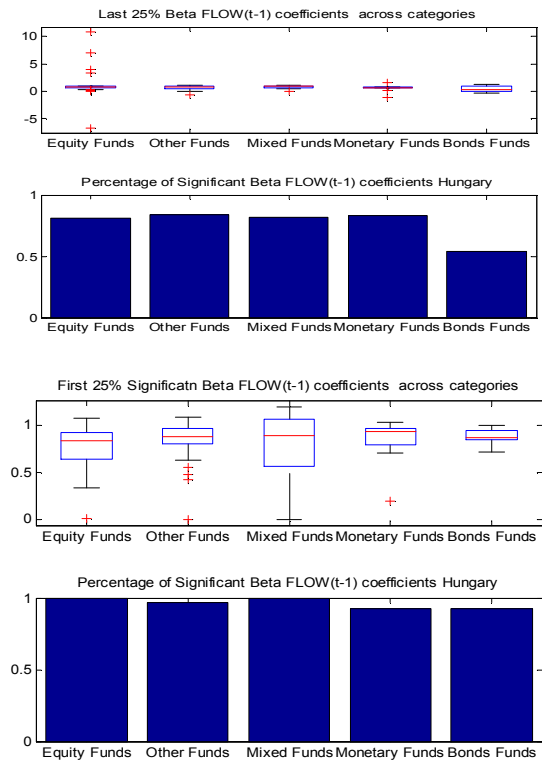


Figure 5. The coefficients of regression β_3 flow of new money in the previous month ($FLOW_{i,t-1}$) for all fund categories in Hungary, 2007-2014

All β_3 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 β_3 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 is 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.

β_4 Growth in percentage of the new money of the entire fund category in the previous month ($FLOWCAT_{s,t-1}$)

The growth in percentage of the new money of the entire fund category in the previous month ($FLOWCAT_{s,t-1}$) 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 β_4 is significant was comprised between 5% and 11%. The funds for which β_4 is significant increases for “bonds funds” (at 25% of all bond funds) and for “other funds” (31% of all other funds). See Figure 6.

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 β_4 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 β_4 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, influence in a positive manner the present flow for that fund category.

For the “monetary funds” category the relationship is the other 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 a new unit 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 β_4 the growth in percentage of the new money of the entire fund category in the previous month ($FLOWCAT_{s,t-1}$), 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.

β_5 Rank in the fund category it belongs to ($RK_{i,t-1}$)

As presented in Figure no. 7 the regression coefficient β_5 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%).

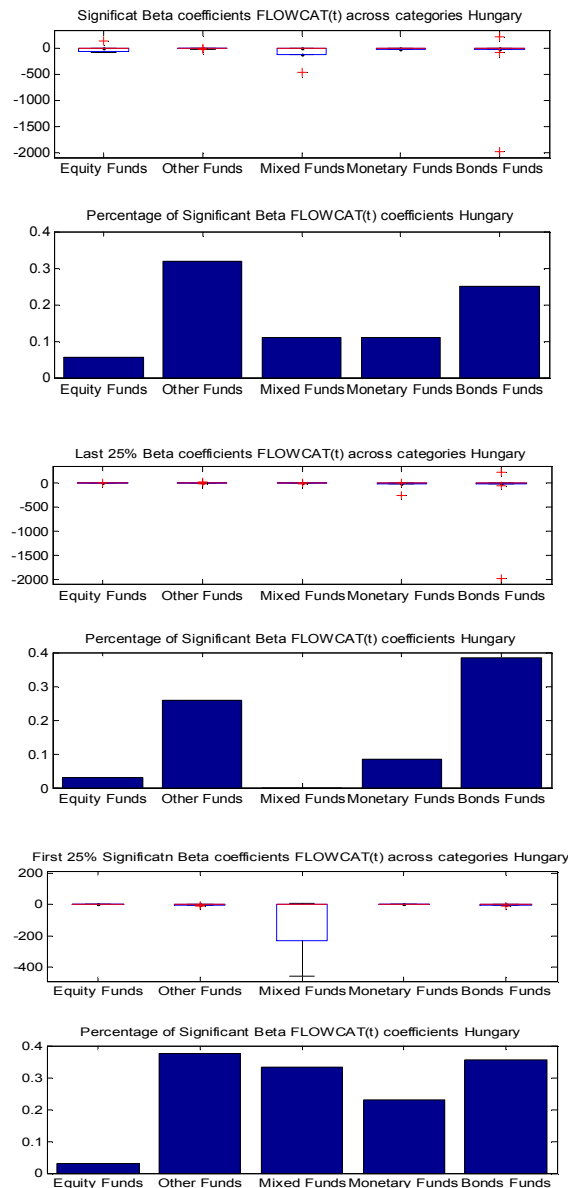


Figure 6. The coefficients of regression β_4 Growth in percentage of the new money of the entire fund category in the previous month ($FLOWCAT_{i,t-1}$), for all fund categories in Hungary, 2007-2014

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 the β_5 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 β_5 increases for all funds categories. Interesting results are encountered in the case of "monetary funds" for which β_5 shows a significant relationship for 36% of the funds (increased as compared to the 30% of the whole category). Similarly for the "bonds funds", β_5 indicates a significant relationship for 21% of the most performing funds as compared to only 17% of the whole fund category. The sign of β_5 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 β_5 . 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 β_5 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.

β_6 Square of the rank in the fund category it belongs to ($SQRK_i, t-1$)

The regression coefficients β_6 the square of the rank in the fund category do not differ a lot from the previous coefficient β_5 . For instance, β_6 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 8.

In the case of "monetary funds", similar to β_5 , also β_6 recorded a statistically significant relationship for the highest number of funds (32%). The relationship is rather negative (10 negative and 5 positive), 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.

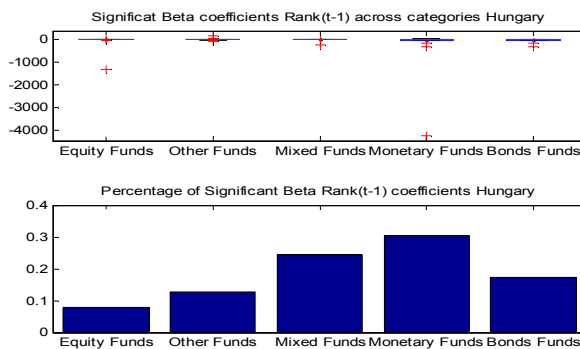
Most of the Hungarian investors do not consider the rank of the funds in their category and the square rank of the funds, when making investment decisions ("mixed funds" 16%; "bonds funds" 16%).

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 β_6 are of 54% of all performing funds (as compared to 32% for the whole fund category), without a clear direction of the influence (β_6 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).



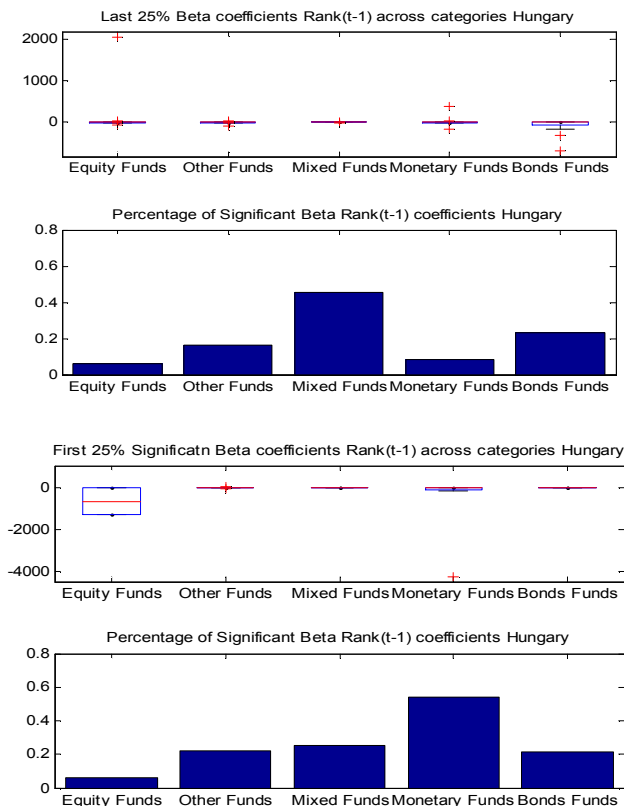


Figure 7. The coefficients of regression β_5 Rank in the fund category it belongs to ($RK_{i,t-1}$), for all fund categories in Hungary, 2007-2014

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 behaviour 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.

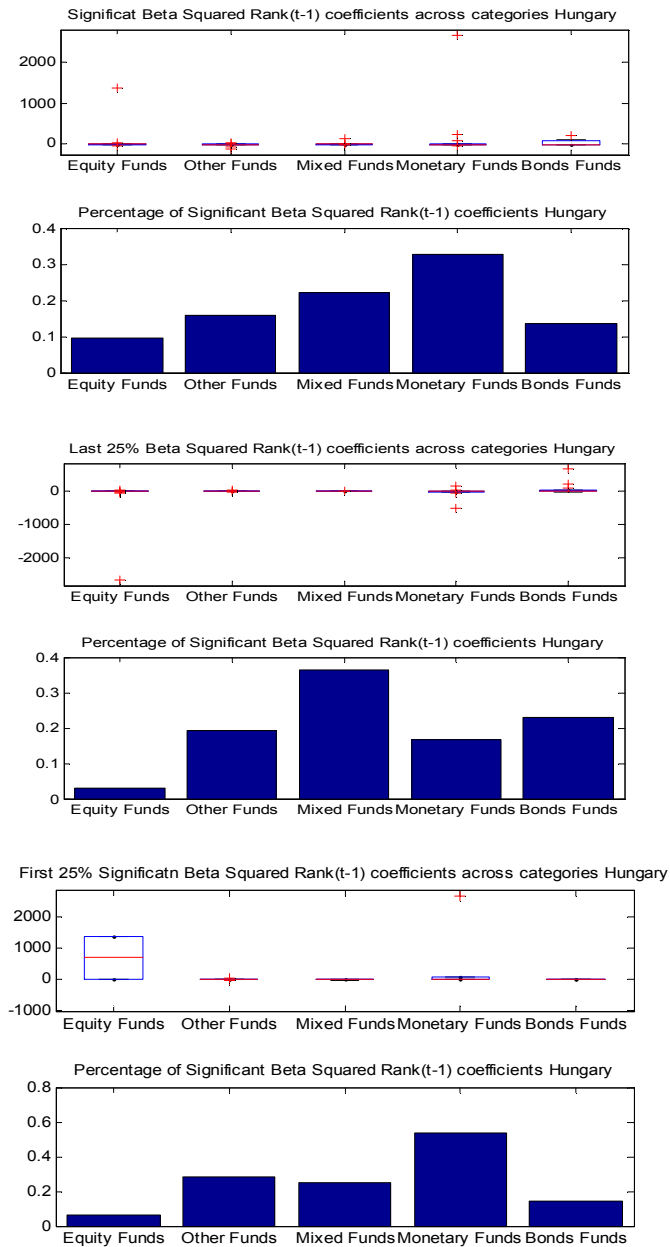


Figure 8. The coefficients of regression β_6 Square rank in the fund category it belongs to ($RK_{i,t-1}$), for all fund categories in Hungary, 2007-2014

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.

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 investment that is 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.

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