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INTERNAL COMPETITION, ACTIVE MANAGEMENT STRATEGY AND FUND PERFORMANCE

Abstract. *Clustering in shareholdings is one of the most common strategy that fund families use in Chinese stock market. The existence of internal competition among the funds in one family and clustering strategy they use, are deduced to cause the fund family to adopt positive portfolio strategy. We use game theory model to prove the existence of motivation to adopt positive portfolio strategy generated from fund family. We then use the empirical data from 2006 to 2015 to test the impact of positive portfolio strategy on funds' performance, using deviation of the fund from family portfolio to agent the index for measuring the positivity of the fund management. We find that positive portfolio strategy is related to higher fund performance, and deviation of the fund from family portfolio, proved robustly, can function as an important index in predicting and positively related to funds' performance.*

Key Words: *Internal Competition, positive portfolio strategies, fund family, fund performance*
JEL Classification: C12, G11, G23

1. Introduction

As it is well-known, the size and amount of the fund management companies and investment funds are rapidly increasing, as the development of the industry of investment fund. Under these circumstances, clustering in shareholdings is one of

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the most common-used strategies that fund management companies adopt. (Rong Lu, Liangsong Li,2008).Fund management companies use this strategy to increase the correlations among the funds in one fund family, and produce an effect like the effect of sheep flock, to increase the overall performance of the fund family and excess earnings of the holding portfolio. (Ke Li etc., 2015; Yiwei Li, 2014; Rong Lu, Liangsong Li ,2008; Rong Lu andYaqin Liu,2009). Fund management companies build star fund through clustering in the shareholdings, and attract the cash flow into the fund family, bringing spillover effect to other funds in the same family (Shu Lin etc.,2009; Bailan Liu and Jianhua Zhou, 2013;Yuanyu Qu and Weixing Wu, 2014). Moreover, using this method, funds companies can get scale economies effect on aspects of asset management, invest research and marketing, lower operation cost and lower the search cost for investors. (Yuanyu Qu and Weixign Wu, 2014.)

But it is undeniable that clustering in shareholding can bring potential risk and problems as well. Firstly, clustering in shareholding means high correlations in the fund families, which will increase the speed in price response. Although it is helpful, in some aspects, to increase the efficiency of the stock market, it increases the volatility of the stock price. If the bulk-holding stocks experience fatal incident or risk, prices will fluctuate greatly and even increase the instability of the market (Yiwei Li, 2014; Rong Lu and Yaqin Liu, 2009). Therefore, incentives exist where funds managers adopt active portfolio management strategy when cooperating on clustering strategy with the fund family so that potential drawbacks could be somehow eliminated. Secondly, fund companies usually rank the funds in the family to increase competition among the funds in the family, which turns the incentive to exceed the market return into narrower incentive to beat the other funds in the family. We will try to test whether the active portfolio management strategy under the condition of clustering strategy exist in Chinese funds families. And if it exists, will the active portfolio management strategy really improve the performance of the fund?

2.Theoretical Model

2.1. Basic Model

We are going to build a theoretical model to prove the existence of the incentive to adopt active portfolio management. The risk of clustering strategy has already been proved by other previous researches, we are here to prove the effects

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of performance competitions on the management strategies of fund family members.

We here adopt the tournament game theory model from Brown (1996) and the assumptions in Taylor (2003) to build a two-period model. In this model we assume that two fund managers, A and B, has the same primitive endowment Q, mid-term return is M_A and M_B, the fund manager will adjust his active portfolio management strategy according to his mid-term return. We can assume the level of the fund manager's active management is η, and the fund has a random return that is log-normally distributed with $E(\eta)$ and volatilityη, it is obvious that we have $E'(\eta) > 0$ and $E''(\eta) < 0$. When the fund manager increase the level of the active management, cost of $C(\eta)$ will be counted for sure. Cost will be significantly increase when increasing the level of the active management. Considering the existence of the technological support from the family and self-technology improvement, the fund should have a diminishing marginal cost, so we have $C'(\eta) > 0$, $C''(\eta) < 0$

Because the return of domestic fund return is positively correlated with the size of the fund, so the goal of the fund managers is to maximize the size of the fund. Two approaches can be considered for realizing this: increase the return; attract the cash inflow. We can assume a cash inflow δfor every period. To be simplified, we assume:

$$\delta_A = \begin{cases} \delta & if\ \ R_{Atotal\ return} > R_{B\ total\ return} \\ \frac{\delta}{2} & if\ \ R_{A\ total\ return} = R_{B\ total\ return} \\ 0 & if\ \ R_{A\ total\ return} < R_{\ return} \end{cases} \quad (1)$$

For the mid-term return , let $\gamma = \log M_A - logM_B$, for the second half year's return, let $\rho = \log R_A - logR_B$. So we have $\rho \sim N((E(\eta_A) - E(\eta_B)), \eta_A + \eta_B)$, the object function of fund manager A is:

$$E(Q_A) = (1 + M_A)Qe^{E(\eta_A)+\frac{1}{2}\eta_A} + \delta\Phi\left(\frac{\gamma + E(\eta_A) - E(\eta_B)}{\sqrt{\eta_A + \eta_B}}\right) - C(\eta_A) \quad (2)$$

Differentiated by η_A:

$$\frac{\partial E(Q_A)}{\partial \eta_A} = \left(E'(\eta_A) + \frac{1}{2}\right)(1 + M_A)Qe^{E(\eta_A)+\frac{1}{2}\eta_A} - C'(\eta_A) +$$

$$\delta f\left(\frac{\gamma + E(\eta_A) - E(\eta_B)}{\sqrt{\eta_A + \eta_B}}\right)\frac{E'(\eta_A)\sqrt{\eta_A + \eta_B} - \frac{1}{2}(\gamma + E(\eta_A) - E(\eta_B))\frac{1}{\sqrt{\eta_A + \eta_B}}}{\eta_A + \eta_B} \quad (3)$$

The object function of fund manager B is:

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$$\mathrm{E}(Q_B) = (1 + M_B)\mathrm{Q}e^{E(\eta_B)+\frac{1}{2}\eta_B} + \delta\left[1 - \Phi\left(\frac{\gamma+E(\eta_A)-E(\eta_B)}{\sqrt{\eta_A+\eta_B}}\right)\right] - C(\eta_B) \quad (4)$$

Differentiated by η_B:

$$\frac{\partial \mathrm{E}(Q_B)}{\partial \eta_B} = \left(E'(\eta_B) + \frac{1}{2}\right)(1 + M_B)Qe^{E(\eta_B)+\frac{1}{2}\eta_B} - C'(\eta_B) -$$

$$\delta \mathrm{f}\left(\frac{\gamma+E(\eta_A)-E(\eta_B)}{\sqrt{\eta_A+\eta_B}}\right)\frac{-E'(\eta_B)\sqrt{\eta_A+\eta_B}-\frac{1}{2}(\gamma+E(\eta_A)-E(\eta_B))\frac{1}{\sqrt{\eta_A+\eta_B}}}{\eta_A+\eta_B} \quad (5)$$

Assuming the first-order differentiation as zero, we then get the equation：

$$\frac{\left(E'(\eta_A{}^*)+\frac{1}{2}\right)(1+M_A)Qe^{E(\eta_A{}^*)+\frac{1}{2}\eta_A{}^*-C\prime(\eta_A{}^*)}}{\left(E'(\eta_B{}^*)+\frac{1}{2}\right)(1+M_B)Qe^{E(\eta_B{}^*)+\frac{1}{2}\eta_B{}^*-C'(\eta_B{}^*)}} = \frac{E'(\eta_A{}^*)(\eta_A{}^*+\eta_B{}^*)-\frac{1}{2}(\gamma+E(\eta_A{}^*)-E(\eta_B{}^*))}{E'(\eta_B{}^*)(\eta_A{}^*+\eta_B{}^*)+\frac{1}{2}(\gamma+E(\eta_A{}^*)-E(\eta_B{}^*))} \quad (6)$$

2. Correlation between internal competition and active management

After the basic model frame is built, we can focus on the effects of performance competitions among fund family members on the management strategies of fund managers. We here assume under the condition that the mid-term performance of fund A is lower or higher than that of fund B, what strategy will the fund manager A choose.

Condition 1: mid-term performance of fund A is lower than that of fund B

Under the condition of that the mid-term performance of fund A is lower than that of fund B, which is $M_A < M_B, \gamma < 0$. If the active management level of fund manager A is lower than fund manager B, which is $\eta_A{}^* < \eta_B{}^*$, then we have left part of the equation $< \frac{E'(\eta_A{}^*)+\frac{1}{2}}{E'(\eta_B{}^*)+\frac{1}{2}} < 1$, if we assume $\gamma < \left(E'(\eta_A{}^*) - E'(\eta_B{}^*)\right)(\eta_A{}^* + \eta_B{}^*) + E(\eta_B{}^*) - E(\eta_A{}^*)$, it will conflict if the right part of the equation >1. So the conclusion is if the difference between two funds reach certain level, the backward fund manager would choose to adopt high active management level. Especially, if $\left(E'(\eta_A{}^*) - E'(\eta_B{}^*)\right)(\eta_A{}^* + \eta_B{}^*) + E(\eta_B{}^*) - E(\eta_A{}^*) > 0$, the fund manager A would definitely choose a higher level of active management, $\eta_A{}^* > \eta_B{}^*$.

Condition 2: mid-term performance of fund A is higher than that of fund B

Under the condition of that the mid-term performance of fund A is higher than that of fund B, which is $M_A > M_B, \gamma < 0$. If we have $0 < \gamma < \left(E'(\eta_A{}^*) - E'(\eta_B{}^*)\right)(\eta_A{}^* + \eta_B{}^*) + E(\eta_B{}^*) - E(\eta_A{}^*)$, then we have $\eta_A{}^* > \eta_B{}^*$, fund

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manager A will also choose a higher active management level. Especially, if $\gamma > \left(E'(\eta_A{}^*) - E'(\eta_B{}^*)\right)(\eta_A{}^* + \eta_B{}^*) + E(\eta_B{}^*) - E(\eta_A{}^*) > 0$, right side of the equation would <1. So fund manager A would not adopt a relatively higher active management level.

Correlation proved.

From the proof above, we can conclude that when performance of the fund in the family is falling behind or at minor dominance, fund managers all have the incentive to adopt a higher active management level; only when the lead is great, the fund is performing far better than other funds in the family, the manager will spontaneously lower the active management level. It should be emphasized that, the range of γ is not exact, it is only to illustrate that if the difference of the performance reach certain level, regardless it is the good fund or the bad fund, the manager always have incentives to choose a higher active management level, this incentive generally exists.

3. Design of the model

(1) Measurement of active management level

Active management level is to refer the capacity that the fund managers have to achieve alphas through his professional skills, thus the active managers must hold a portfolio that is different from the target index portfolio. Earlier in the research, tracking error is used for measuring the level of active management, which is the standard error between fund return and index return in a period of time. Cremers and Petajisto(2009),thinks that tracking error cannot fully review the level of active fund management, and proposed a new method to measure, which is called *Active Share*.

It can be defined as following:

$$\text{active\_share} = \sum_{i=1}^{N} \left| w_{fund,i} - w_{index,i} \right| \quad (7)$$

where $w_{fund,i}$ and $w_{index,i}$ represent the weight of stock i in the fund and in the index respectively. Adding together all the weight difference between the portfolio and the index, active share shows the deviation of the fund portfolio to the index.

We thus use active share to measure the level of active management, considering we are here studying the fund family management, thus we alter the target base to the family fund, the active share thus manifests the deviation between the fund in the family and the fund family, defined as following：

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$active\_share\_\text{family} = \sum_{i=1}^{N} \left| w_{fund,i} - w_{\text{family},i} \right|$ (8)

Where $w_{i,j}$ is the weight of stock j in fund i, $w_{m,j}$ is the weight of stock j in the funds other than fund i. We here adopt a different entry point from the earlier studies. In the earlier studies, researchers use top ten bulk holdings as samples to calculate the deviations. However, according to the previous analysis, clustering strategy requires fund family members to hold some portfolios as others'. What the top ten bulk holdings illustrate is more of the crowding effect, whereas the active management is detected in other stock holdings. Thus, apart from calculating the top ten bulk holdings deviations, we use the whole stock holding data to calculate the deviation to stand for the agency of the fund active management level.

(2) Regression model

Based on the analysis above, we here construct the empirical analysis model to test the correlation between active management skills and performance, illustrated as following:

$$\alpha_{it} = \beta_0 + \beta_1 \text{active\_share\_family}_{i,t-1} + \beta_2 family\_value_{i,t} + \beta_3 family\_num_{i,t} + \beta_4 stock\_\text{num}_{i,t} + \beta_5 age_{i,t} + \beta_6 net\_asset_{i,t} + \beta_7 \alpha_{i,t-1} + \beta_8 flow_{i,t} + \beta_9 style_{i,t} + \varepsilon_{i,t} \quad (9)$$

Where $\alpha_{i,t}$ is the excess return of stock i at time t, calculated using (Carhart, 1997) four-factor model.

$active\_share\_family_{i,t-1}$ is the active management level of fund i relative to the fund family;

$family\_value_{i,t}$ is the log value of total asset the fund family has at time t;

$family\_num_{i,t}$ is the number of funds in fund i's family at time t;

$stock\_\text{num}_{i,t}$ is the number of the fund i hold at time t;

$net\_asset_{i,t}$ is the scale of the fund, we here use the natural log of fund's total net asset as agency;

$\alpha_{i,t-1}$ is the history performance of the fund, which is fund's excess return of the previous period;

$age_{i,t}$ is the age of the fund, which is the time between the foundation and the end of the sample;

$flow_{i,t}$ is the net cash flow of the fund, calculated as following;

$flow_{i,t} = net\_asset_{i,t} - net\_asset_{i,t-1} * \frac{nav_{i,t}}{nav_{i,t-1}}$, where $net\_asset_{i,t}$ represents total net asset of fund i at time t;

$nav_{i,t}$ is the net value of fund i at time t;

$style_{i,t}$ is a dummy variable to represent the fund type, 1 represents a hybrid fund, 0 represents a common equity fund;

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$\varepsilon_{i,t}$is a random error term.

(3)Data

We use the data of equity funds and hybrid funds in Chinese equity market from 2006 to 2015, and eliminate the structured funds. All the data are resourced from Wind, including 65 fund families and 480 funds.

For identifying the fund families, we here adopt the definition in Kempf and Ruenzi (2008) that the fund family is the set of the funds that one fund company manages. According to this definition, one fund company can be seen as a fund family. Because we need to calculate the fund deviation from the family portfolio, so we eliminate the fund company with only one fund.

(4) Analyzing Method

We here adopt the analyzing framework used by Cremers and Petajisto(2009) and Ronghua Luo (2011), which use cross-section analysis and regression analysis to empirically test the correlation between Active Share of the fund family members and their future performance. In cross-section analysis, they firstly slice the funds into three groups by their Active Share Index, and then calculate the future fund performance for each group, and at lastthey test whether significant difference exist between the highest and lowest Active Share fund groups.

4. Empirical Analysis

4.1. Descriptive analysis

(1)Descriptive analysis of fund sample

According to previous analysis, clustering strategy in fund family requires funds to hold passive position, and at the same time, for risk aversion and inner competition, fund managers have incentives of active management as well. In short, the fund family members tend to adopt a hybrid strategy containing active and passive management. The existence of hybrid strategy can be identified through the difference between Deviation of each Whole Position from the family portfolio and Deviation of each Top Ten Holdings from the family portfolio. Generally saying, clustering effect will occur in bulk holdings of the fund, so Active Share calculated by top 10 holdings will be lower, and Active Share calculated using the total holding data should be higher. From the statistic result of our finds, this evidence is transparent.

In Table 1, we have the descriptive analysis of fund families. We can see that average deviation calculated with Top Ten Holdings is far lower than the one with

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total holding. It means that the top 10 holdings are not quite deviated from the fund family. In the top ten holdings, fund managers are more passively managing. From the aspect of the total holding, individual fund deviates from the family at a level of 80.026%, average deviation is quite high, which means active management strategy in fund family exist, which is consistent with our previous model analysis. Average of *Style* is 0.966, so almost all the funds are stock preference hybrid funds; average age of funds is 4.753 year, so funds are generally young funds; average number of funds in a family is 8, so tournament exists under objective condition; average stock holding of one family is 63, enough targets are provided. So in general, fund families in China are of considerable size and short existing period.

Table 1. Descriptive Analysis of Fund Family

Signal	Explanation	Average	Maximum	Minimum	Median
α(%)	Excessive Return	-0.001	0.003	-0.010	-0.001
active_share_family_total(%)	Active Share calculated with total holding	80.026	167.913	16.057	81.106
active_share_famliy_ten(%)	Active Share calculated with top ten holdings	36.264	99.638	5.102	34.749
family_value	Log of total value of the fund family	23.333	25.358	17.560	23.599
family_num	Number of funds in fund family	8.145	26.000	2.000	7.000
stock_num	Number of stock holding of the fund	63.245	948.000	7.000	50.000
style	Style of the fund	0.966	1.000	0.000	1.000
age	Age of the fund	4.753	14.000	1.000	4.000
net_asset	Log value of the fund's net asset	21.164	24.447	16.081	21.452
flow(100 million)	Cash inflow of the fund	-0.208	30.184	-16.325	-0.132

In figure1, we have the tendency of Active Share measured by fund deviation in a time scale, the solid line represents average Active Share calculated with total holding, and the dotted line represents average Active Share calculated with top ten holdings. It can be seen from the graph that since 2005, active_share_family_tenis steadily increasing, from 0.318 in late 2006, to 0.421 in early 2016, experiencing a growth of 32.3%, which means in deciding bulk holdings, managers are effected by his family, showing functions of passive portfolio; also, active_share_family_totalexperiences a growing tendency each year, fund deviation grows from 0.692 in late 2006 to 0.412 in early 2016, a growth of 23.26%, which means active management strategy is gradually being appreciated by managers.

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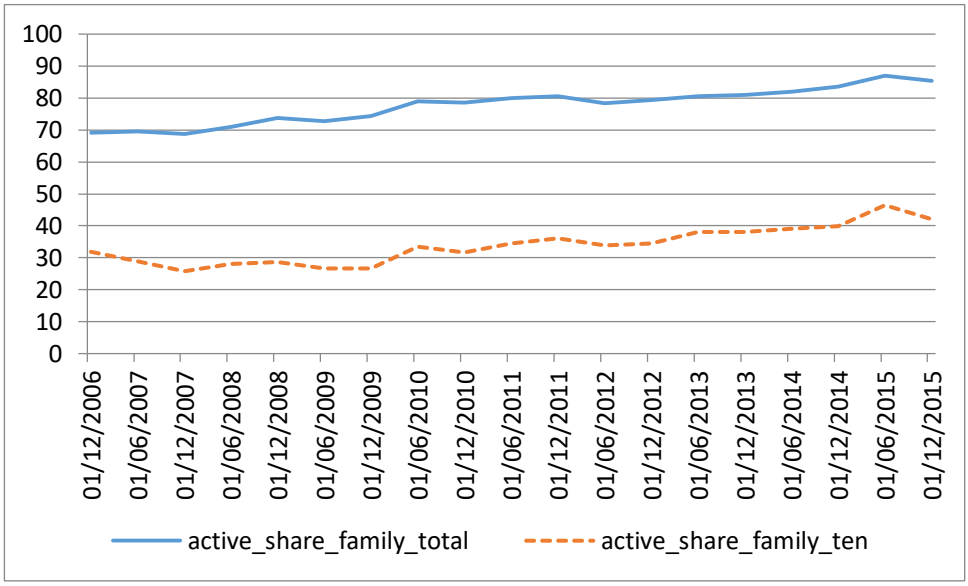

Figure 1.Tendency of active share measured by fund position deviation

(2)Management strategy and fund performance

We use the test methods in Kacperczyk, Sialmandand Zheng(2005) and Ronghua Luo(2011), we use group inspection and virtual portfolio to study the impact of active management on fund performance. The sample is divided into three groups according their Active Share, as illustrated in Table 2 and Table 3, decile 1 is the group with the lowest Active Share, and decile 3 the group with the highest Active Share. We calculate the excess earnings of the funds in each group, and calculate the difference of decile 1 and decile 3. We test the significance of difference between the lowest Active Share group and the highest Active Share group using T-test. For better explanation, we use average weighted and market capitalization weighted daily average excess earning α for the fund portfolio in the group.

Firstly, we used the top ten holdings to do group inspection. It can be seen from the previous descriptive analysis; deviation of top ten holdings is comparatively lower than of total holding, more of a passive management, showing a clustering strategy. Therefore, we group according to the top ten holdings to study under the condition of passive management, the relation between Active Share and excess earnings.

From table 2 we can see that, under equal-weighted condition, the difference of excess earnings between decile 1 and decile 3, are significantly larger than zero and significantly smaller than zero in different periods. In fact, top ten holdings show a significant clustering strategy effect (Ke Li(2015)). According to opinion divergence hypothesis and message-advantage hypothesis, clustering strategy can effectively lower opinion divergence, lower the turnover rate and can master more private information, so in some of the periods, the lower the Active Share is, the

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more clustering strategy effect and higher performance is. By comparing two groups of data, we can see that, when high-low is significant positive, equal-weighted excess earnings is significantly higher than market-capitalization weighted excess earnings, which means smaller funds will have higher returns. When high-low is significantly negative, difference between two sets of data is not significantly different.

It is a remarkable fact that, even the half-year excess return of top ten holdings portfolio, are all negative except for 2007, which is quite different from some of the previous research (YuyuanQu(2014), Ke Li(2015)). One of the reasons for this is that, since most of the top ten holdings data are based on a quarter frequency, quarterly excess return is calculated. However, top-ten-holdings portfolio does not beat the market. That is to say, clustering strategy cannot win the market in the long run.

Table 2. Top-Ten-Holdings Group Inspection-Equal Weighted

Group Inspection-Equal Weighted					
Time Range	**Decile1 (Low Deviation)**	**Decile2 (Mid Deviation)**	**Decile3 (High Deviation)**	**High-low**	**T Value**
2006-2nd	-0.101%	-0.060%	-0.056%	0.046%***	12.19
2007-1st	-0.077%	-0.032%	0.008%	0.085%***	14.55
2007-2nd	-0.074%	-0.053%	-0.060%	0.014%***	6.70
2008-1st	-0.200%	-0.187%	-0.187%	0.013%***	7.99
2008-2nd	-0.067%	-0.070%	-0.065%	0.002%***	2.08
2009-1st	-0.024%	-0.036%	-0.030%	-0.006%***	-2.62
2009-2nd	-0.113%	-0.088%	-0.078%	0.036%***	21.25
2010-1st	-0.118%	-0.089%	-0.100%	0.018%***	12.29
2010-2nd	-0.124%	-0.116%	-0.112%	0.012%***	8.22
2011-1st	-0.063%	-0.046%	-0.039%	0.024%***	16.24
2011-2nd	-0.067%	-0.074%	-0.074%	-0.007%***	-8.35
2012-1st	-0.078%	-0.113%	-0.116%	-0.038%***	-29.26
2012-2nd	-0.104%	-0.078%	-0.122%	-0.018%***	-13.28
2013-1st	-0.184%	-0.198%	-0.187%	-0.003%***	-1.48
2013-2nd	-0.139%	-0.153%	-0.156%	-0.017%***	-10.82
2014-1st	-0.115%	-0.127%	-0.110%	0.005%***	2.68
2014-2nd	-0.123%	-0.144%	-0.142%	-0.019%***	-10.59
2015-1st	-0.243%	-0.321%	-0.268%	-0.025%***	-6.72

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2015-2nd	-0.088%	-0.114%	-0.114%	-0.026%***	-12.50
2016-1st	-0.052%	-0.106%	-0.097%	-0.045%***	-31.20

Table 3. Top-Ten-Holdings Group Inspection-Market Capitalization Weighted

Group Inspection-Market Capitalization Weighted					
Time Range	**Decile 1 (Low Deviation)**	**Decile 2 (Mid Deviation)**	**Decile 3 (High Deviation)**	**High-low**	**T Value**
2006-2nd	-0.034%	-0.006%	-0.002%	0.032%***	12.10
2007-1st	0.035%	0.047%	0.057%	0.022%***	4.87
2007-2nd	-0.057%	-0.041%	-0.043%	0.014%***	9.52
2008-1st	-0.092%	-0.079%	-0.086%	0.007%***	6.15
2008-2nd	-0.048%	-0.049%	-0.046%	0.002%***	2.26
2009-1st	-0.126%	-0.137%	-0.129%	-0.003%***	-2.07
2009-2nd	-0.106%	-0.088%	-0.084%	0.023%***	17.51
2010-1st	-0.041%	-0.031%	-0.039%	0.002%***	2.51
2010-2nd	-0.112%	-0.106%	-0.101%	0.011%***	10.15
2011-1st	-0.135%	-0.120%	-0.117%	0.018%***	15.50
2011-2nd	-0.081%	-0.088%	-0.085%	-0.004%***	-4.84
2012-1st	-0.085%	-0.121%	-0.122%	-0.037%***	-29.64
2012-2nd	-0.096%	-0.102%	-0.102%	-0.006%***	-7.99
2013-1st	-0.114%	-0.121%	-0.116%	-0.002%***	-1.55
2013-2nd	-0.132%	-0.146%	-0.145%	-0.013%***	-8.75
2014-1st	-0.165%	-0.175%	-0.162%	0.003%***	1.91
2014-2nd	-0.125%	-0.153%	-0.149%	-0.024%***	-14.35
2015-1st	-0.271%	-0.358%	-0.327%	-0.055%***	-17.91
2015-2nd	-0.077%	-0.114%	-0.119%	-0.043%***	-23.37
2016-1st	-0.059%	-0.110%	-0.107%	-0.048%***	-35.97

Table 4 and table 5 show a group inspection of virtual portfolio excess return with total holdings under two ways of weighting. Column 1 to column 3 is the average excess earnings of three groups, column 4 is the difference between decile 3 and decile 1, column 5 is the t value of the difference. We can see from the table that, for high deviation portfolio, whatever equal-weighted or market-capitalization weighted is, daily excess return is significantly higher than low deviation portfolio. Excess return of three groups is increasing as the deviation grows, which means

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that the higher the active management skills the family members have, the better the performance of the funds will be. When the stock market is in its bull time (early 2007 and early 2015), active management brings more daily excess return, 0.0539% and 0.0918 (equal-weighted), 0.0303% and 0.0812% (market-capitalization-weighted) respectively. And we also notice that, the excess earning difference between high active management level and low active management level is higher under equal-weighted portfolio than the market-capitalization-weighted portfolio, which means smaller funds have higher return.

We notice that, whatever grouping method we choose, average daily excess return is always below zero, which means, funds are averagely worse than the market, comparing to the total market asset, fund management skills require improving. It can be explained by the young age of the funds as described in the descriptive analysis. We will explain the relationship between age and excess earnings through regression analysis in the later part.

Table 4. Total-Holding Group Inspection-Market Capitalization Weighted

Group Inspection-Equal Weighted					
Time Range	**Decile 1 (Low Deviation)**	**Decile 2 (Mid Deviation)**	**Decile 3 (High Deviation)**	**High-low**	**T Value**
2006-2nd	-0.083%	-0.080%	-0.057%	0.0253%***	6.62
2007-1st	-0.058%	-0.047%	-0.004%	0.0539%***	8.05
2007-2nd	-0.067%	-0.063%	-0.059%	0.0079%***	4.28
2008-1st	-0.202%	-0.193%	-0.180%	0.0218%***	14.3
2008-2nd	-0.072%	-0.069%	-0.062%	0.0093%***	8.62
2009-1st	-0.039%	-0.033%	-0.019%	0.0201%***	9.16
2009-2nd	-0.098%	-0.095%	-0.086%	0.0114%***	6.64
2010-1st	-0.108%	-0.105%	-0.093%	0.0151%***	10.26
2010-2nd	-0.122%	-0.119%	-0.112%	0.0095%***	6.97
2011-1st	-0.056%	-0.049%	-0.043%	0.0136%***	9.59
2011-2nd	-0.073%	-0.072%	-0.070%	0.0029%***	3.46
2012-1st	-0.109%	-0.110%	-0.086%	0.0233%***	17.82
2012-2nd	-0.113%	-0.090%	-0.101%	0.0116%***	5.65

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2013-1st	-0.208%	-0.199%	-0.163%	0.0456%***	22.98
2013-2nd	-0.166%	-0.158%	-0.125%	0.0403%***	25.71
2014-1st	-0.136%	-0.125%	-0.092%	0.0437%***	25.12
2014-2nd	-0.150%	-0.141%	-0.117%	0.0333%***	18.77
2015-1st	-0.308%	-0.309%	-0.216%	0.0918%***	24.62
2015-2nd	-0.110%	-0.105%	-0.101%	0.0092%***	4.2
2016-1st	-0.087%	-0.098%	-0.070%	0.0162%***	11.05

Table 5. Total-Holdings Group Inspection-Market Capitalization Weighted

Group Inspection-Market Capitalization Weighted					
Time Range	**Decile 1 (Low Deviation)**	**Decile 2 (Mid Deviation)**	**Decile 3 (High Deviation)**	**High-low**	**T Value**
2006-2nd	-0.023%	-0.018%	-0.003%	0.0203%***	7.82
2007-1st	0.034%	0.039%	0.064%	0.0303%***	7.32
2007-2nd	-0.052%	-0.047%	-0.042%	0.0101%***	7.45
2008-1st	-0.093%	-0.087%	-0.078%	0.0157%***	15.17
2008-2nd	-0.052%	-0.048%	-0.044%	0.0074%***	8.51
2009-1st	-0.137%	-0.133%	-0.123%	0.0141%***	9.93
2009-2nd	-0.095%	-0.093%	-0.089%	0.0061%***	4.68
2010-1st	-0.039%	-0.038%	-0.034%	0.0047%***	5.9
2010-2nd	-0.110%	-0.109%	-0.100%	0.0101%***	8.98
2011-1st	-0.130%	-0.126%	-0.117%	0.0126%***	11.33
2011-2nd	-0.087%	-0.086%	-0.081%	0.0055%***	6.93
2012-1st	-0.116%	-0.117%	-0.092%	0.0235%***	18.88
2012-2nd	-0.106%	-0.104%	-0.089%	0.0173%***	22.49
2013-1st	-0.129%	-0.122%	-0.100%	0.0294%***	21.25
2013-2nd	-0.156%	-0.149%	-0.118%	0.0386%***	26.63

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2014-1st	-0.183%	-0.175%	-0.145%	0.0381%***	27.37
2014-2nd	-0.156%	-0.149%	-0.122%	0.0339%***	20.72
2015-1st	-0.344%	-0.350%	-0.262%	0.0812%***	26.53
2015-2nd	-0.108%	-0.105%	-0.098%	0.0098%***	5.19
2016-1st	-0.092%	-0.104%	-0.080%	0.0128%***	9.32

In a nutshell, from the aspect of top ten holdings, there is no stable relation between active management strategy and performance of the fund. The fact that low Active Share group perform better than the high Active Share group can be explained by the opinion divergence hypothesis and message-advantage hypothesis; from the aspect of total holdings, active management can significantly improve fund performance, Amhud and Goyenko(2012), Ronghua Luo etc.(2011) also mentioned that the impact of active management to performance is only significant under some of the conditions. However, we here find a significant improving effect of active management strategy in fund family members.

4.2. Quantitative Model Analysis of Management Strategy and Fund Performance

In the descriptive analysis, we find that fund family member can use active management strategy to effectively improve performance. Here we are going to do further quantitative analysis on this impact. We are going to test the robustness of fund deviation on defining activeness of fund management, further forecasting fund performance. Whether fund deviation can be a new aspect for measuring fund is a problem we will discuss here.

We here use panel regression analysis. Firstly, we use Hauseman test to decide using fixed effect model or random effect model. We get a Hauseman test result of Prob>chi2 =0.9067, which means we can't reject the hypothesis, so we use fixed effect model here. Also, we use OLS regression as a reference like Ronghua Luo did in 2011. The result is shown in Table 6. On the left is the result of panel regression, on the right is the result of OLS regression.Both show similar conclusion.

We can see from Table 6 that:

(1) Fund deviation is significantly positively related to excess return. The bigger the deviation of individual fund from its family is, the higher excess return is. This is consistent with descriptive analysis.

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(2) Panel regression result shows that, size of the fund is significantly negatively related to fund return. We attribute this liquidation. The bigger the size of the fund, the lower the liquidation is. Bigger size means slower speed and higher cost in changing position. However, this is not significant in OLS regression. It is worth paying attention to that the size of the family is significantly positively related to individual performance. The larger the family is, the greater the excess return will be. It might be correlated with spillover effect.

(3) Number of stocks the fund holds is both positively related to excess return in panel regression and OLS regression. On the one hand, the more stocks one fund holds, the larger space the managers have for active management, on the other hand, diversified investment can effectively lower the risk, good for a better performance.

(4) Panel regression shows that age of the fund is significantly positively related to fund return, which means that as the fund grows older, experience and skills it gains can help to get better return.

(5) Fund earnings have a significant momentum effect; excess return is significantly positively related to its prior period. Furthermore, type of fund is irrelevant to return.

In conclusion, from the perspective of total-holdings, as an index for active management skill, when deviation from the family becomes higher, fund performs better, which can absolutely prove that active management strategy can effectively improve fund performance.

Table 6. Regression Result of Active Management and Fund Performance

	Panel Regression	**p-Value**	**OLS Regression**	**P-Value**
Explanatory Variable	**Coefficient**	**significance**	**Coefficient**	**significance**
Deviation of the Fund	6.17E-06***	（0.00）	4.94E-06***	（0.00）
ln ~ Size of Fund Family	5.00E-05***	（0.00）	1.03E-04***	（0.00）
Number of Funds	-6.83E-06	（0.19）	-2.70E-05***	（0.00）
Number of Stocks	9.00E-07***	（0.00）	6.00E-07*	（0.07）
Type of Fund	-8.22E-05	（0.25）	-1.4E-04	（0.12）

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Age of Fund	1.74E-05***	（0.00）	-1.50E-05**	（0.03）
ln ~ Size of Fund	-2.44E-05*	（0.05）	4.16E-05***	（0.01）
α_{t-1}	4.53E-01***	（0.00）	3.56E-01***	（0.00）
Net Cash Flow	-1.02E-05	（0.21）	-2.30E-05**	（0.02）
Constant	-1.90E-03***	（0.00）	-4.18E-03***	（0.00）

Significance level of 1%, 5%, 10% are denoted by three, two and one asterisks, respectively, p-values are given in the parenthesis.

For testing the robustness of fund deviation to forecasting return. We here use excess return calculated using Fama three-factors model as dependent variable to test whether fund deviation can also be used for forecasting future returns. Results are shown in Table 7.

We can see in table that:

When using excess return calculated by Fama three-factor return, fund deviation and fund excess return have the same positive correlation, which means fund deviation, as an agency of active management level can effectively forecast fund return. When active management level of the fund to its family is high, fund return is expected to be high.

Other correlations between explanatory variable and return are similar to our previous research. It means that different models induce to a same result. So we can say that fund deviation is an important index for measuring active management level of fund, and it can robustly forecast fund return.

Table 7. Robust Test of Active Management and Fund Return

	Panel Regression	**p-Value**	**OLS Regression**	**P-Value**
Explanatory Variable	**Coefficient (Significance)**	**significance**	**Coefficient (Significance)**	**significance**
Deviation of the Fund	4.63E-06***	（0.00）	5.41E-06***	（0.00）
ln ~ Size of Fund Family	4.73E-05***	（0.01）	6.24E-05***	（0.00）
Number of Funds	-8.08E-06*	（0.07）	-1.65E-05***	（0.00）
Number of Stocks	1.11E-06***	（0.00）	7.16E-07**	（0.02）
Type of Fund	-6.18E-05	（0.31）	-1.28E-04	（0.11）
Age of Fund	1.57E-05***	（0.00）	-4.23E-06	（0.49）
ln ~ Size of Fund	-5.38E-05***	（0.00）	7.08E-06	（0.60）

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α_{t-1}	4.32E-01***	（0.00）	3.82E-01***	（0.00）
Net Cash Flow	-1.01E-05	（0.15）	-4.02E-05***	（0.00）
Constant	-1.09E-03***	（0.00）	-2.53E-03***	（0.00）

Significance level of 1%, 5%, 10% are denoted by three, two and one asterisks, respectively, p-values are given in the parenthesis.

5. Conclusions

We build a tournament game theory model in the fund family to describe the impact of active management strategy on fund performance under the condition of fund family's clustering strategy. The result shows that, in China, fund family members are apt to adopt a hybrid strategy with both passive management and active management. Because of the clustering strategy trend in China, sample funds all need to hold some of the passive position, this is more a common scene in the top ten holdings. Meanwhile, for risk aversion and family performance, funds have the incentive to actively manage the fund, this is more revealed in the total holdings.

Specifically, we use top-ten-holdings data and total-holdings data separately to calculate the fund deviation index. Average deviation is far lower in top-ten-holdings data than in total-holdings data. This means that bulk holdings are more affected by clustering trend in the family, and total holdings are affected significantly less. What's more, average deviation from 2006 to 2015 is steadily upward, showing that active management strategy is more and more adopted in Chinese fund families.

In some of the previous studies which use only top-ten-holdings, active management is not proved to have enhancing effect on fund performance. When we control the market factors and some other factors, a positive correlation is proved using total-holdings data, which fill a blank space for Chinese corresponding area. Theoretic and analytic result shows that, the active management index we build here is significantly useful for investors to choose funds in the family, deviation of the fund from its family can be used as an important index for measuring active management level, and proved good for forecasting fund performance.

For sure, there are more to discuss on active management in the fund family, for example, the relationship between corporate governance regime and active management, which is to study how to optimize corporate governance regime to create better fund performance; characteristics of fund manager and active management strategy. Those are all very interesting topics for further study.

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REFERENCES

[1] **Amihud Y, Goyenko R. (2013),** ***Mutual Fund's R^2 as Predictor of Performance***. Review of Financial Studies, 26(3):667-694;

[2] **Bailan Liu, Jianhua Zou (2013),** ***Does Following Star Families Guarantee Abnormal Returns****?* Securities Market Herald,6,33-44;

[3] **Brown, K. C., Harlow, W. V. & Starks, L. T. (1996),** ***On Tournaments and Temptations: An Analysis of Managerial Incentives in the Mutual Fund Industry***. Journal of Finance, 51(1), 85-110;

[4] **Carhart, M. M. (1997),** ***On Persistence in Mutual Fund Performance***. Journal of Finance, 52(1), 57-82;

[5] **Cremers, K. J. M. (2009),** ***How Active Is your Fund Manager? A New Measure that Predicts Performance***. Review of Financial Studies, 22(9), 3329-3365;

[6] **Kacperczyk, M., Sialm, C. & Zheng, L. U. (2005),** ***On the Industry Concentration of Actively Managed Equity Mutual Funds*****.** The Journal of Finance, 60(4), 1983–2011;

[7] **Ke Li, RongLu,Yi Xia (2015),** ***Fund family Co-holding: Differences of Opinion and Stock Return***. Economic Research, 10,64-75;

[8] **Kempf, A. & Ruenzi, S. (2008),** ***Family Matters: Rankings within Fund Families and Fund Inflows***. Journal of Business Finance & Accounting,35(1-2), 177-199;

[9] **Rong Lu, Liangsong Li (2008),** ***Research on the Effect of Co-holding by Fund Families on the Performance and Risk of Funds***. Journal of Financial Research ,2,141-151;

[10] **RongLu,Yaqin Liu (2009),*****Research on Domino Effect of Performance-change of Stocks Heavily Co-held by Funds of a Fund Family on the Performance of the Whole Fund Family***. Journal of Finance and Economics,35(4),60-71;

[11] **Ronghua Luo,WeiLan,Yunhong Yang (2011),*****Does Active Management Improve Fund's Performance****?*. Journal of Financial Research,10,127-139;

[12**] Shu Lin, Xiang Li, Xiongsheng Yang, Onkit Tam (2009),** ***Are They the Real Stars?- Evidence from China Mutual Fund Industry***. Journal of Financial Research,5,107-120;

[13] **Taylor, J. (2003),** ***Risk-taking Behavior in Mutual Fund Tournaments***. Journal of Economic Behavior & Organization, 50(3), 373-383;

[14] **Yiwei Li (2014),** ***An Empirical Study of Fund Families' Joint Holding Behavior and Stock Return and Volatility***. Doctoral dissertation .Shang Hai Jiao Tong University;

[15] **YuanyuQu,Weixing Wu (2014),** ***On Star-making Strategy of Mutual Fund Families:From the Perspective of Differentiated Performance of Co-holding Stocks***. Journal of Finance and Economics,40(4),103-116.

DOI: 10.24818/18423264/52.1.18.09