

Information Barriers and Crash Caused by Fund Competition



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Abstract: With the continuous improvement of per capita wealth level, people's willingness to participate in financial investment continues to raise, funds as one of the important investment tools, favored by the public, resulting in the increasing number and scale of securities investment funds, the collapse of fund net value will have a huge impact on investors and financial markets. The increasing number of fund institutions makes the relationship between them more complex and the competition more intense, forming a complex institutional investor relationship network, so from the perspective of the competitive relationship network, what impact will the fund relationship network have on the net value of the fund? What is the mechanism of influence in between? Based on the stock market and fund market data from 2012 to 2020, this paper constructs a fund competition network from the perspective of social network relationship, analyzes the relationship between the structural variables of the competitive network and the risk of collapse of fund net value through multiple regression, and discusses the impact of fund information competition relationship on the risk of net value collapse. The results show that: (1) the competition intensity of the fund will increase the risk of its own net value plummeting; (2) There is a positive U-shaped relationship between the degree of proximity to centrality and the risk of a collapse in the net value of the fund, and this effect will dominate in a highly competitive environment; (3) There is an inverted U-shaped relationship between intermediary centrality and the risk of a collapse in the fund's net value, and this effect will dominate in a moderately competitive environment. The results show that the information barrier caused by competition between funds can significantly increase the risk of a fund's net value plummeting. The results of this study are not only conducive to enhancing investors' risk awareness when investing in funds, but also provide a reference for regulators to understand the relationship between fund competition and the collapse of their net value.

Keywords: Securities Investment Funds; Information Network; Crash

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1 Introduction

According to the statistics of China's securities investment funds, as of the end of September 2021, the total scale of China's public funds reached 23.90 trillion yuan, of which the net value of open-end funds was 20.99 trillion yuan, accounting for about 87.8% of the total net value of funds, and the total number of open-end funds was 7720, of which the number of equity funds and hybrid funds was 5436, accounting for 70.4%, and the growing fund scale put forward higher requirements for the investment ability of fund managers. However, in recent years, the theme of speculation

and institutional investors and other events, once the bubble burst, will cause the net value of the fund to retract rapidly in a short period of time, such as the star fund "E Fangda Blue Chip Selection" and "CEIBS Medical Health" fell by more than 20% in 15 trading days after the Spring Festival in 20 years, causing significant property losses to the majority of investors. With the sharp fluctuations in the net value of the fund, the investment ability of the fund manager has been constantly questioned, and the risk of the collapse of the net value of the fund has begun to receive attention from the

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academic community. Hou Weixiang and Yu Jin [1] studied the impact of fund asset networks on the risk of a sharp decline in the net value of funds. Xu Lin et al [2] carried out the impact on fund performance and the risk of the collapse of the net value of the fund from the perspective of the social network of fund managers.

2 Theoretical Analysis and Research Hypothesis

As an institutional investor with information advantage, the fund's investment decisions are often made based on the information obtained by itself, and information, as an important resource in the financial market, also has the problem of scarcity, so the competition for information between institutional investors will make them compete with each other. Luo Ronghua and Tian Zhenglei [3] found that the competitive barrier generated by the competitive network inhibits the sharing of information in the cooperative network, and each fund on the node of the competitive network will be affected by the information suppression effect of direct competitors with similar stylistic distances and even indirect competitors with a greater stylistic distance [4-6].

Therefore, when a fund has more competitors similar to its style, it indicates that the more individuals who establish direct competitive links with it in the competitive network, the greater the intensity of its individual competition, at the same time, the stronger the information barrier in the information exchange process, and the worse and worse the information environment makes the fund unable to obtain feedback from information exchange, nor can it provide reasonable support for its investment decisions, and it is impossible to accelerate the price discovery of the market through information sharing, which will increase the risk of the fund's net value plummeting [7-9]. Based on this, we propose the hypothesis:

Hypothesis 1: The greater the intensity of individual competition in the fund's competitive network, the greater the risk of the fund's net value plummeting.

Burt [10] argues that an individual's position in the network determines their own resource endowments, so there are differences in the ease with which funds in different positions have access to information. In the competitive network of funds, the degree of information barrier faced by funds in different network positions is naturally different. The higher the mediation centrality of a node in a competitive network, the shortest path it is in for more other nodes [11], and a fund in the intermediary

position may be affected by two effects as its intermediary centrality increases. On the one hand, foundations in competitive networks actively hide their valuable information, thereby increasing the risk of a sharp decline in the net value of the fund; On the other hand, market liquidity brought about by fierce competition means that it can quickly liquidate assets at prices close to the market, thereby reducing the risk of a sharp decline in the fund's net value [12]. Based on this, we propose hypothesis 2:

Hypothesis 2: There is an inverted U-shaped relationship between the centrality of a fund's intermediary in the competitive network and the risk of a sharp decline in its net worth.

The shorter the distance the fund reaches other funds through the shortest path in the competitive network, the higher its proximity to the center, and the higher the proximity to the center, the shorter the path it passes when transmitting information in the network, making the information transmission more accurate and timely, which helps to improve the efficiency of information transmission. When the close centrality of the fund is small, the distance from other funds is farther, and with the improvement of the proximity to the center, it is conducive to the fund to obtain the activity information of competitors and establish information advantages, and the risk of the net value of the fund plummeting is small. However, with the improvement of the degree of proximity to the center, too close to too many competitors, while obtaining the information of other competitors, their own information may also be leaked, so that the information advantage is gradually lost, the mutual imitation between funds is intensified, and the portfolio converges [13-14]. Based on this, we propose hypothesis 3:

Hypothesis 3: There is a U-shaped relationship between a fund's proximity to the competitive network and its risk of a sharp decline in net worth.

3 Research Design and Model Building

3.1 Data Sources and Sample Selection

In this paper, open-ended equity funds and open-end hybrid funds in A-share listed companies and public securities investment funds are selected as research samples, excluding passive investment funds such as index-type, bond-type and currency-type, and the fund sample range is 2012-2020. Both equity data and weekly

return data are derived from the RESSET database, and the fund position data is from the CSMAR database. According to the usual practice of relevant literature, this paper also treats the literature as follows: (1) Exclude financial listed companies; (2) Exclude samples under missing data and extreme markets; (3) Exclude stock samples with less than 30 trading weeks per year; (4) The sample outliers were processed, and Winsorize was used to reduce the upper and lower 1% of the tails.

3.2 Explanatory Variables

(1) The competitive intensity of the fund.

Referring to the methods of Hoberg et al [15], this paper uses the stylistic distance between funds to build a competitive network for each fund. The intensity of fund competition reflects the scale and intensity of competition of funds. Burt believes that the non-redundant connection is connected by the structural hole, a structural hole is the non-redundant connection between the two actors, embodied in the competitive network, it represents the non-redundant competitive relationship between the fund and other funds, therefore, this paper selects the structural hole as an alternative indicator of the fund's competitive strength, concisely reflects the competitive intensity of the fund itself, and adopts the effsize and efficienc in the structural hole as its measurement indicators.

Effsize_i indicates the actual size of the individual network of a fund *i* in the competitive network minus the redundancy of the network, reflecting the effective competitive size of the fund.

$$R_{it} = \alpha_i + \beta_1 R_{m,t-2} + \beta_2 R_{m,t-1} + \beta_3 R_{m,t} + \beta_4 R_{m,t+1} + \beta_5 R_{m,t+2} + \varepsilon_{it} \quad (5)$$

Among them, R_{it} is the weekly net value compound return rate of the fund *i* considering dividends and splits, and R_{mt} is the weighted weekly average return of the circulating market value of all A-share net worth, and lags and advances it by two periods to solve the impact of non-synchronous trading in the market. Define W_{it} as the

$$\text{effsize}_i = \frac{\sum_j (1 - \sum_q p_{iq} m_{jq})}{N-1}, q \neq i, j \quad (1)$$

effsize_i indicates the ratio of the effective size of the fund *i* to the actual size in the competitive network, reflecting the competitive efficiency of the fund.

$$\text{efficienc}_i = \text{effsize}_i / j \quad (2)$$

(2) Competitive network centrality.

The degree of intermediary centrality (betweenness_i) indicates the degree to which the fund *i* controls information resources in the competitive network, acts as a bridge in the competitive network, and has the ability to control the exchange of information among other funds.

$$\text{betweenness}_i = \frac{[\sum_j^n \sum_k^n g_{jk}(i) / g_{jk} g_{jk}(i) / g_{jk}]}{(N-1)(N-2)/2}, j \neq k \neq i, j < k \quad (3)$$

Closeness_i represents the sum of the shortcuts between the fund *i* and all other funds in the competitive network, reflecting the proximity to other funds.

$$\text{closeness}_i = \left[\frac{\sum_{j=1}^n d_{ij}}{N-1} \right]^{-1} \quad (4)$$

The above variables are calculated using the network analysis software Ucinet.

3.3 Interpreted Variable: Crash

Borrowing from indicators of stock crash risk: NCSKEW and DUVOL to measure the risk of a sharp decline in the net value of a fund, calculated as follows:

market-adjusted return of the Fund *i* in the *t*-th week:

$$W_{it} = \ln(1 + \varepsilon_{it}) \quad (6)$$

where ε_{it} is the residual term in the regression equation (6).

Secondly, NCSKEW and DUVOL are calculated as follows:

$$\text{NCSKEW} = -[n(n-1)^{3/2} \sum W_{it}^3] / [(n-1)(n-2)(\sum W_{it}^2)^{3/2}] \quad (7)$$

$$\text{DUVOL} = \ln\{[(n_u - 1) * \sum_{\text{down}} W_{it}^2] / [(n_d - 1) * \sum_{\text{up}} W_{it}^2]\} \quad (8)$$

where *n* is the number of weeks the fund trades in the current year, and *n_u* (*n_d*) means the number of weeks that W_{it} is greater than (less) the average annual yield W_i . The larger NCSKEW and DUVOL, the greater the risk of a plunge in the fund's net worth.

3.4 Control Variables

The control variables selected in this article are shown in Table 1.

Table 1 Description and definition of related variables

Variable	Metrics
Navol	(Return on the Fund's net value at the end of the current period - Return on the net value at the end of the previous period) / Return on the net value at the end of the previous period
Size	The natural logarithm of the fund's net value at the end of the current period
Age	The natural logarithm of the number of days the Fund was established at the end of the current period
Sum_flow	Current subscription fee minus redemption fee
F_stotal	The natural logarithm of the total net value of the fund under the company in which the fund is located in the current period
F_qtotal	The sum of the number of funds under the current period of the company in which the fund is located

3.5 Research Model

In order to test Hypothesis 1 and explore the impact of effective competitive scale, the following model is constructed:

$$\text{Crash}_{it} = \alpha_0 + \beta_1 \text{Shole}_{it} + \beta_2 \text{control}_{it} + \varepsilon_{it} \quad (9)$$

Among them, Crashit is a variable that represents the risk of a sharp decline in the net worth of a fund, and Sholeit is a variable that indicates the efficiency of competition in the hole in the network structure, including effective effsizeit and efficiencit.

In order to test hypothesis 2 and explore the influence of proximity to centrality, the following model is constructed:

$$\text{Crash}_{it} = \alpha_0 + \beta_1 \text{Closeness}_{it} + \beta_2 \text{Closeness}_{it}^2 + \beta_3 \text{control}_{it} + \varepsilon_{it} \quad (10)$$

In order to verify hypothesis 3 and explore the influence of mediation centrality, the following model is constructed:

$$\text{Crash}_{it} = \alpha_0 + \beta_1 \text{Betweenness}_{it} + \beta_2 \text{Betweenness}_{it}^2 + \beta_3 \text{control}_{it} + \varepsilon_{it} \quad (11)$$

4 Data Description and Empirical Results

All of the data in this study were panel data, and the results of Hausman's test showed that the null hypothesis should be rejected, so all regression models in this study were estimated using bidirectional solid effects of panel data, taking into account the effects of heteroscedasticity and sequence correlation.

The regression results are shown in Tables 2 and 3. Columns (1)-(3) in Table 2 and Table 3 are empirical tests for hypothesis 1, hypothesis 2 and hypothesis 3, respectively, and for the robustness of the results, in order to test the robustness of the results, the intermediary centrality and proximity centrality and their squared terms are added to column (4) to test the overall effect of network centrality on the risk of the fund's net value plummet; In addition, in column (5), all the variables in this article have been added for re-examination to make the research conclusions more reliable.

Table 2, column (1), examines the relationship between competitive strength and NCSKEW. The regression results show that after controlling the relevant variables,

as well as the solid effects of individuals and time, the coefficients of the effective scale and efficiency of competition are significantly positive, Table 3 tests the relationship between competition intensity and DUVOL in column (1), and the regression coefficient is also significantly positive, indicating that there is a positive correlation between the competitive intensity of the fund and the risk of the net value of the fund plummeting significantly, that is, the competition intensity of the fund increases to increase the risk of its net value plummet, assuming that H1 is established.

Columns (2) and (3) of Table 2 examine the relationship between the proximity centrality and NCSKEW in the fund's competitive network and the relationship between the intermediary centrality and NCSKEW. Columns (2) and (3) of Table 3 examine the relationship between proximity centrality and DUVOL in the fund's competitive network and between intermediary centrality and DUVOL. The regression results show that the primary term coefficients of the near centrality are all significantly negative, and the secondary term coefficients are significantly positive, indicating that there is a positive U-shaped relationship between the near centrality in the fund competition network and the risk of the net value plunge, that is, with the improvement of the fund's

proximity, the plunge risk shows a trend of first falling and then rising, assuming that H2 is established; After the addition of the secondary term, the secondary term coefficients are significantly negative, indicating that there is an inverted U-shaped relationship between the intermediary centrality and the risk of the plunge of the net value of the fund, that is, with the improvement of the

degree of intermediary, the plunge risk shows a trend of first rising and then decreasing, assuming that H3 is established. The regression results also verify the above conclusions by placing mediation centrality and proximity centrality and their squared terms in column (4) of Table 2 and column (4) of Table 3, and all variables in column (5) of Table 2 and column (5) of Table 3.

Table 2 Regression results - NCSKEW

variable	(1)	(2)	(3)	(4)	(5)
effsize	0.001*** (4.60)				0.001*** (4.39)
efficienc	0.085*** (2.14)				0.082 (1.59)
Closeness		-0.25* (-1.89)		-0.284** (-2.14)	-0.251* (-1.83)
Closeness ²		0.2** (2.54)		0.205*** (2.60)	0.197** (2.46)
Betweenness			0.123*** (2.97)	0.118*** (2.70)	0.05 (1.12)
Betweenness ²			-0.056*** (-2.70)	-0.055*** (-2.60)	-0.032 (-1.57)
Controls	control	control	control	control	control
Sample	9787	9490	9878	9490	9490
R ²	0.143	0.138	0.139	0.139	0.144

Note: ***, **, * The regression coefficients are significant at the 1%, 5%, and 10% levels, respectively, the same below.

Table 3 Regression results - DUVOL

variable	(1)	(2)	(3)	(4)	(5)
effsize	0.001*** (3.65)				0.001*** (3.41)
efficienc	0.075** (2.45)				0.081** (2.00)
Closeness		-0.193* (-1.92)		-0.225** (-2.22)	-0.175 (-1.63)
Closeness ²		0.155** (2.46)		0.16** (2.54)	0.143** (2.19)
Betweenness			0.114*** (3.47)	0.109*** (3.12)	0.066* (1.86)
Betweenness ²			-0.055*** (-3.28)	-0.053*** (-3.04)	-0.039** (-2.25)
Controls	control	control	control	control	control
Sample	9787	9490	9878	9490	9490
R ²	0.136	0.135	0.135	0.137	0.140

5 Conclusions and Implications

In this paper, the open-end equity funds and open-end hybrid funds in China's public securities investment funds are selected as research samples, and the fund competition network is constructed based on the characteristics of fund style, so as to explore the impact of the competitive intensity, network proximity and intermediary centrality

of public funds on the plunge of the net value of the fund. The results of the study show that: (1) The more direct and effective competitors around the fund, the fiercer the competition, the greater the competitive intensity, and the greater the risk of the fund's net value plummeting. (2) There is an inverted U-shaped relationship between the degree of intermediary centrality and the risk of net value plummeting, in the initial stage, with the improvement of the intermediary centrality of the fund, the risk of its net value plummeting will be increased, but with the degree

of intermediary centrality exceeding a certain critical value, it can further increase, which can reduce the risk of the net value of the fund plummeting. (3) There is a U-shaped relationship between the proximity to the center degree and the risk of the net value plummeting, that is, with the improvement of the degree of fund intermediation, the plunge risk shows a trend of first rising and then decreasing.

The enlightenment of this study is: (1) Appropriate benign competition between institutional investors such as public funds is conducive to improving the efficiency of information utilization, reducing their own risks and stabilizing the market, but vicious competition will cause great harm to the financial market. (2) Some "core" funds should be aware of the crucial role of their own behavior in the financial market, and should formulate a reasonable evaluation mechanism to avoid blindly pursuing short-term performance and rankings, and these funds should participate in competition rationally and establish a long-term value investment concept. (3) Fund investors should strengthen the study of fund products and long-term investment concepts, and avoid blindly following the trend in the short term to redeem a large number of times, which is not only conducive to their own interests, but also conducive to improving China's investment environment.

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Biography

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