

A Summary of Theoretical and Empirical Test on the Disposition Effect of Securities Investment Fund in China

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Abstract

The disposition effect is an irrational behavior of investors, that is, investors tend to sell winners too early and hold losers too long. There are many researches on the disposition effect of stock market, but few researches about the fund market. Therefore, we sort out the relevant literature examining the existence of the disposition effect of securities investment fund in China. Then, we use data of 306 open-end funds in China from 2010 to 2018 to examine the existence of the disposition effect of securities investment fund in China by establishing VAR model. The empirical results show that: there is no disposition effect on securities investment fund in China.

Keywords

Disposition Effect, Securities Investment Fund, Open-End Funds, VAR Model

1. Introduction

The efficient markets hypothesis and other classical financial theories are important theories to study the behavior of investors in securities market earlier. However, with the development of securities market, there are abnormal phenomena that cannot be explained by the classical financial theory. These anomalies make many people doubt these classical financial theories. And people begin to realize that investors in the securities market are not all rational. Some psychological studies have shown that people's actual investment decisions systematically deviate from rational decisions, and this deviation cannot be eliminated by statistical average. Therefore, people try to explain investors' behavior and market operation from the perspective of psychology, sociology and anthropol-

ogy.

The disposition effect is one of the most remarkable abnormal phenomena. First put forward by Shefrin and Statman (1985), it refers to the phenomenon that investors are eager to achieve profits and avoid losses, and sell winners quickly to lock in profits while continue to hold losers in the hope of turning losses into profits. Since the definition of the disposition effect, many scholars and experts from various countries have conducted a large number of experimental and empirical studies on this phenomenon and made a large number of researches on its causes, such as Ferris et al. (1988), Odean (1998), Frazzini (2006), Hens and Vlcek (2011), Zhao Xuejun and Wang Yonghong (2001), etc. At present, researches about the disposition effect are developing vigorously and many of them are trying to explore it from different angles.

However, compared with the stock market, there are few researches of the disposition effect of securities investment fund. What's more, the disposition effect of securities investment fund has not been fully proved and widely recognized. With China's economic development and social progress in recent years, people's educational level is gradually improved, and their financial concept is also strengthened. Fund market is gradually mature, the system also tends to perfect. All these are helpful for us to study the disposition effect of investors of securities investment fund market in China. Therefore, we sort out relevant literature examining the existence of investors' disposition effect of securities investment fund in China and test the existence of disposition effect of securities investment fund in China.

2. Summary of Relevant Literature

At present, the researches about the disposition effect are developing vigorously, but there are few studies about the existence of the disposition effect of China's fund investors, and the conclusions are inconsistent.

Some scholars believe that there is no disposition effect in China's securities investment fund. For example, Zhao Yanzhi and Wang Qingshi (2005) made a detailed analysis of selling behavior of investors of securities investment funds in China from 2000 to 2004 by comparing the duration of losing round trips to those of winning round trips and the proportion of gains realized (PGR) to the proportion of losses realized (PLR). Their results show that investors in securities investment funds do not have behavioral characteristics of disposition effect. However, the results only reflect the medium-term and long-term investment behavior, which cannot deny the short-term disposition effect of securities investment funds. After that, Chen Lei and Yang Guiyuan (2010) used the quarterly data of 14 open-end funds from January 2007 to December 2009 and divided the sample period into periods of rising and falling performance of funds. They set up a panel data model between redemption rate, yield, dividend and tested the existence of the disposition effect. They found that: in the period of rising performance of funds, the yield and redemption rate were significantly negatively correlated; in the period of falling performance of funds, its yield and

redemption rate are also significant negative correlation. The results show that no matter in which period the China's fund market does not show the disposition effect. In addition, [Du Weiwei \(2011\)](#) used the data from 2005 to 2010 published by China securities investment fund and combined with the "sell surplus to sales loss ratio" method of [Odean \(1998\)](#) and the "trading cycle time" method of [Shefrin and Statman \(1985\)](#). They found that the closed-end funds have disposition effect, but the open-end funds have no disposition effect and the securities investment funds as a whole do not show disposition effect.

However, some scholars have concluded that China's securities investment funds have disposition effect. Among them, several scholars calculated the probability of investors' redemption of funds by means of survival analysis and analyzed the influence of various factors on the probability of investors' redemption. [Wang Meijin \(2005\)](#) studied the disposition effect of investors' behavior in China's fund market through duration model by using the transaction data of more than 310,000 accounts of four investment funds as samples, and studied different groups separately. He found that the disposition effect exists in China's fund market, and there are differences among different groups. He concluded that the disposition effect of individual investors is stronger than that of institutional investors, and the disposition effect is more obvious in the elderly. [Zhou Mingshan et al. \(2011\)](#) also used the survival model to verify the existence of disposition effect by using the transaction data of fund investors from 2002 to 2008 provided by a large fund management company in China, and found that the degree of disposition effect of more experienced male investors is low. These two articles were based on the Weibull distribution model. After them, some people adopted the survival analysis method based on Cox model to reach the same conclusion: [Wu Yanran et al. \(2016\)](#) took the trading data of 437,000 individual accounts of 5 open-end stock funds from September 2005 to December 2011 as samples, and tested the disposition effect and individual differences of fund investors by Cox survival analysis method with time-dependent covariables. They found that China's fund investors show obvious disposition effect. [Liu Xin and Zhang Yuefang \(2019\)](#) selected the data from 2015 to 2018 of 42 public offering of funds that formally completed their investment in the first quarter of 2015 and have been in normal operation ever since. They introduced the survival analysis method based on Cox model and added the time variable to analyze the strength and incentive of the disposition effect of securities investment funds in China. The results show that China's securities investment funds have disposition effect, and the disposition effect is affected by the funds' performance and size, the establishment time of the funds' management company, the size of the funds' management company and the market situation.

Other scholars have come to the conclusion that China's investors of funds have disposition effect by different methods. [Wang Jia \(2007\)](#) selected 15 open-end funds established before the end of 2002 as samples to investigate the changing relationship between net subscription ratio, growth rate of net asset value and average net value. The empirical results show that the disposition ef-

fect exists in China's open-end fund market and the change of investment style to some extent aggravates the disposition effect behavior of investors. Feng Jinyu (2009) used the redemption model of prospect theory and threshold regression method to analyze balanced panel data of 22 cross-sectional funds from 2004 to 2007 and found that the impact of funds' performance on redemption is always positive, and the higher the return, the more sensitive it was. He further proved that the redemption of China's open-end fund exists disposition effect. Li Xu-feng et al. (2010) took China's open-end funds and QFII as samples and conducted empirical test. They comparatively analyzed the disposition effect of 30 open-end funds and 14 QFII funds from 2005 to 2008 by constructing a new index to measure the disposition effect of investors. The results show that there is a significant disposition effect of open-end funds, while QFII have not disposition effect. Dong Peng (2012) took 50 stock type, 20 bond type and 17 balanced hybrid open-end funds from 2005 to 2011 as samples and used the scan statistics method to verify that the disposition effect exist in both stock type and balanced fund, but not in bond type fund. Moreover, he found that the disposition effect is most pronounced among fund investors during periods of volatility. Zhu Wensheng (2013) took open-end funds from January 2007 to December 2011 as objects and constructed VAR model to measure the relationship between net redemption rate and net return rate of funds. The results show that there is disposition effect in China's fund market.

Therefore we select the data of 306 open-end funds from 2010 to 2018 to test whether the disposition effect exists in China's fund market by establishing VAR model.

3. Research Method and Data

3.1. Research Method

In this paper, a VAR model is established in order to study the dynamic relationship between variables. The variables included in the VAR model are as follows: net redemption rate of funds reflects the dynamic situation of investors' behavior of buying and selling funds. The net return rate is used to reflect the funds' profits and losses. Because the disposition effect shows that investors tend to sell the profitable funds and keep the loss-making funds, we can judge whether there is a disposition effect by the dynamic relationship between the net redemption rate of funds and their net return rate. We also added the market return rate into the VAR model, because the overall situation of the market has an important impact on the behavior of investors. We also added funds' dividend and size, which may affect the choice of investors. The VAR model of this paper is shown as follows:

$$Y_t = [\text{SHL}_t, \text{SYL}_t, \text{FH}_t, \text{GM}_t, \text{RM}_t]' \quad (1)$$

$$Y_t = c + A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_k Y_{t-k} + u_t \quad (2)$$

Y_t is a vector containing all variables, where SHL_t is funds' net redemption

rate, SYL_t is funds' net return rate, FH_t is funds' dividend, GM_t is funds' size, and RM_t is market return rate.

3.2. Data

The operation time of funds may directly affect the stability, continuity and comprehensiveness of the evaluation. Therefore, funds issued less than 36 months are not evaluated. Considering the late start of China's fund market, we choose the open-end funds established before 2007 as samples. Since the data of China's securities investment funds are disclosed on a quarterly basis, we select the quarterly data of samples from the first quarter of 2010 to the second quarter of 2018 for empirical study. The reasons are as follows: on the one hand, there is enough data for the study in this sample period. On the other hand, during this period, the securities market experienced clear bull and bear cycle, so its data are representative. After our screening, 306 open-end funds are included in the sample. The raw data are from the CSMAR database. CSMAR database is an industry-leading economic and financial database in China. It is developed based on the professional standards of CRSP, Compustat, TAQ, I/B/E/S, Thomson and other internationally renowned databases and combined with China's actual conditions.

The net redemption rate of funds is calculated as: (total fund shares at the beginning – total fund shares at the end)/total fund shares at the beginning. The net return rate of the fund is calculated as: (net fund share at the end of the current quarter – net fund share at the end of the previous quarter)/net fund share at the end of the previous quarter. For the market return rate, we choose the return rate of CSI 300 index as the proxy variable. The proxy variable of funds' dividend is the number of dividend. The funds' size is the net value of the fund share at the end of last quarter, and takes its logarithm.

4. Results

The stationarity test of the time series is conducted firstly, and the ADF test results indicate that all variables are stationary.

4.1. Granger Causality Test

We used Granger causality test to analyze the causality among the main variables. The results are shown in **Table 1**. The value of F-test with "SYL does not Granger Cause SHL" as null hypothesis is 6.854 and its P value is 0.001. This means that we reject the null hypothesis, that is, the net return rate (SYL) may be the Granger cause of the net redemption rate (SHL), indicating that the net return rate of funds does affect the behavior of investors in buying and selling funds. The value of F-test with "RM does not Granger Cause SHL" as null hypothesis is 12.468 and its P value is 0.000. We also reject the null hypothesis. Therefore market return rate (RM) is the Granger cause of net redemption rate (SHL), which means that market conditions will affect the behavior of investors to buy and sell funds.

Table 1. Granger causality tests.

Null Hypothesis	obs	F-Statistic	Prob.
SYL does not Granger Cause SHL	30	6.854	0.001
SHL does not Granger Cause SYL		0.408	0.801
FH does not Granger Cause SHL	30	2.072	0.121
SHL does not Granger Cause FH		3.636	0.021
GM does not Granger Cause SHL	30	2.519	0.072
SHL does not Granger Cause GM		2.881	0.048
RM does not Granger Cause SHL	30	12.468	0.000
SHL does not Granger Cause RM		0.720	0.588

However, the value of F-test with “FH does not Granger Cause SHL” and “GM does not Granger Cause SHL” as null hypotheses are 2.072 and 2.519. Their P values are 0.121 and 0.072, both greater than 5%. Thus under the significance level of 5%, dividend of funds (FH) and size of funds (GM) are not Granger cause for net redemption rate of funds (SHL). This shows that the funds’ dividend and size do not affect the behavior of investors’ behavior. According to the research, dividend generally affects the net redemption rate of funds within a week after dividend, while the quarterly data used in this paper may eliminate its effects.

The P value of F-test with “SHL does not Granger Cause FH” and “SHL does not Granger Cause GM” as null hypotheses are 0.021 and 0.048. We can reject these two null hypotheses. Hence, Funds’ net redemption rate (SHL) is the Granger cause of dividend of funds (FH) and size of funds (GM). It can be seen that funds’ net redemption rate will affect funds’ size and dividend. For example, when a fund encounters a large scale of unforeseen redemption, the fund’s profitability may be hit, resulting in a loss of fund’s net worth.

4.2. VAR Model

We confirmed the lag period before establishing the VAR model, and the test results are shown in **Table 2**. The first column of the table shows the lag order. The remaining columns are the results of five different tests. The asterisk implies lag period recommended by each test. The results of all five tests showed the model with lag period of 4 is better, so VAR modeling with lag period of 4 is selected.

The results of VAR model are shown in **Table 3**. Limited by space, we will only show partial results of the VAR model. SHL is funds’ net redemption rate for the current period, SYL is funds’ net return rate for the current period, FH is funds’ dividend for the current period, GM is funds’ size for the current period, and RM is market return rate for the current period. SHL(-1) is funds’ net redemption rate with a lag of one period, SYL(-1) is funds’ net return rate with a lag of one period, FH(-1) is funds’ dividend with a lag of one period, GM(-1)

is funds' size with a lag of one period, and $RM(-1)$ is market return rate with a lag of one period. We can see that there is a strong relationship between the current funds' net redemption rate and the remaining variables lagging by one period.

4.3. Impulse Response Function

The stability test of VAR model shows that the reciprocal of all roots is in the unit circle, so we can establish the impulse response function. Combined with the needs of this paper, results are selected here as the basis for interpretation. The impulse response function of funds' net redemption rate (SHL) to funds' net return rate (SYL) is shown in **Figure 1**.

Table 2. Lag length criteria.

Lag	LR	FPE	AIC	SC	HQ
0	NA	0.004	8.744	8.977	8.818
1	143.543	0.000	4.429	5.830	4.878
2	51.228	0.000	3.400	5.969	4.221
3	24.050	0.000	3.348	7.085	4.544
4	43.636*	0.000*	0.167*	5.071*	1.736*

LR: sequential modified LR test statistic (each test at 5% level). FPE: Final prediction error. AIC: Akaike information criterion. SC: Schwarz information criterion. HQ: Hannan-Quinn information criterion.

Table 3. VAR model.

	SHL	SYL	FH	GM	RM
SHL(-1)	-0.011	0.000	0.000	0.000	0.000
	(0.092)	(0.000)	(0.000)	(0.000)	(0.000)
	[-0.124]	[0.081]	[-0.151]	[-0.688]	[0.493]
SYL(-1)	177.106	0.201	-0.003	0.118	0.073
	(391.628)	(0.085)	(0.008)	(0.038)	(0.076)
	[0.452]	[2.352]	[-0.332]	[3.112]	[0.959]
FH(-1)	1186.115	0.322	-0.013	0.379	-0.224
	(4234.160)	(0.915)	(0.091)	(0.410)	(0.823)
	[0.280]	[0.351]	[-0.140]	[0.923]	[-0.271]
GM(-1)	-931.832	0.411	0.019	0.192	-0.019
	(858.434)	(0.186)	(0.018)	(0.084)	(0.167)
	[-1.085]	[2.215]	[1.031]	[2.294]	[-0.115]
RM(-1)	-65.477	0.153	0.001	0.085	0.247
	(419.017)	(0.091)	(0.009)	(0.041)	(0.082)
	[-0.156]	[1.693]	[0.065]	[2.084]	[3.004]

Standard errors in () & t-statistics in [].

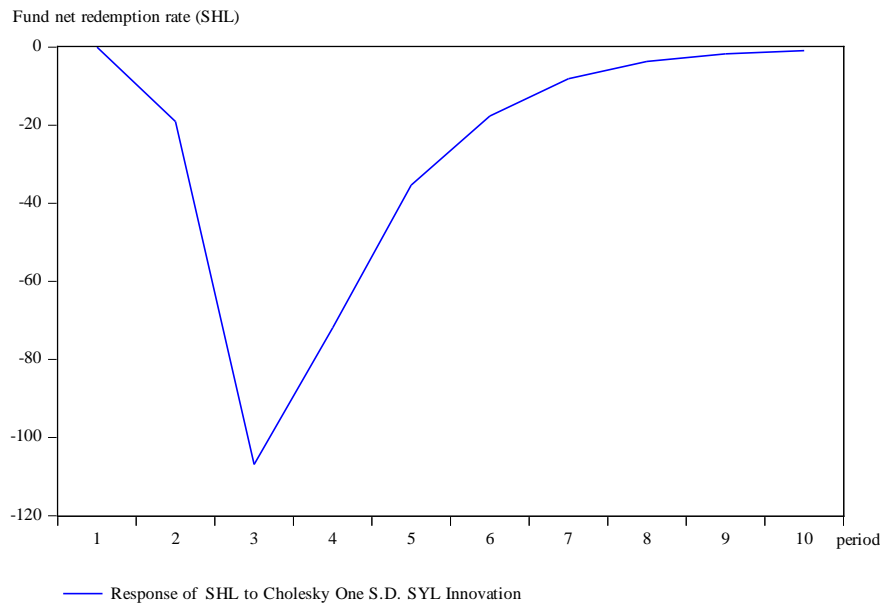


Figure 1. Impulse response function.

After a positive impact on the funds' net return rate (SYL) in the current period, the funds' net redemption rate (SHL) declined slowly from the first period to the second period, quickly declined to the lowest point during the second period to the third period, and then slowly recovered. This shows that the net return rate of the fund is negatively impacted by an impact of external conditions on the net redemption rate of the funds. This indicates that when the net return of funds rises, investors will not redeem the funds, but purchase the funds, indicating that there is no disposition effect behavior of fund investors in China. After the third period, the impact effect of the funds' net return rate on the funds' net redemption rate gradually weakened, and it was not until the ninth period and tenth period that the effect disappeared. This indicates that the impact effect of the funds' net return rate on the funds' net redemption rate lasts a long time.

5. Conclusion

This paper selects data of 306 open-end funds from 2010 to 2018 and establishes VAR model to test the dynamic relationship between funds' net redemption rate and funds' net return rate. Our results show that there is no disposition effect in China's fund market. China's investors of funds on the whole do not have the disposition effect in the long term, which reflects the gradual maturity of China's fund market.

It can be seen that a mature and perfect securities market can help investors form rational expectations of the market and reduce their irrational behaviors in the process of investment decision-making. Therefore, the government should formulate policies and regulations with stability, strengthen the independent regulation function of the market, and strengthen the education and guarantee for investors. It is recommended to strengthen coordination and communication

among government agencies to achieve data sharing, analysis and policy consistency. In addition, in order to strengthen the crisis handling ability of the regulatory authorities, it is necessary to clarify the responsibilities and powers of the authorities in emergency situations in laws and regulations, simulate the crisis handling mechanism in the form of scenario hypothesis, conduct crisis stress tests according to the potential risk points of the market and make emergency preparations in advance.

This paper only tests China's securities fund market as a whole, which does not mean that individual fund market or some investors has not the disposition effect, nor does it show whether the disposition effect appears in different periods. In the future, we can use further subdivision of fund markets and periods and also obtain data of individual investors for research.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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