



# An empirical study of the impact of stock market volatility on fund size

Hao Zhang<sup>1,\*</sup>

<sup>1</sup>Northwestern Polytechnical University, Xi 'an City, China

\*1258025809@qq.com

**Abstract.** Compared with mature foreign markets, China's securities market is more volatile and fund size has grown very rapidly in recent years, so does stock market volatility affect fund size? Based on this, this paper analyzes the impact of China's stock market volatility on fund size by constructing a VAR model and using empirical analysis, and draws the following conclusions: 1. Stock market volatility is an influencing factor on fund size, and stock market volatility will affect investors' fund returns and investor sentiment, thus affecting their purchase and redemption behavior and causing changes in fund size; 2. The impact of stock market volatility on fund size There is a lagged effect, with an impact time of about six months. Stock market fluctuations have a positive impact on fund size changes, and the impact tends to last for a certain period of time. Based on the above findings this paper proposes the following policy recommendations: first, the government should establish a sound social security system and introduce preferential policies such as reasonable pension and education savings plans to guide family funds for fund investment and improve the current situation of institutionalized fund holdings; second, the stock market trading system should be further improved and fund investment behavior regulated, supervision and punishment for violations should be strengthened to prevent abnormal stock market price movements. This will help optimize China's fund management and promote the development of China's securities market.

**Keywords:** stock market volatility; fund size; VAR model

## 1 Introduction

This paper summarizes the research literature related to stock market volatility and fund size, selects stock market volatility, fund return and institutional holding ratio as factors affecting fund size based on theoretical analysis, and analyzes the fund size impact mechanism through VAR model. Based on the data of public funds in recent years, this study analyzes the impact of stock market volatility on fund size. Different from most of the literature that studies the effect of fund size on stock market volatility, this paper investigates the inverse effect of stock market volatility on fund size, which is an extension and innovation of previous studies. At the same time, this study also provides a basis for China to formulate reasonable policies to regulate stock mar-

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ket price volatility, which is of practical significance to promote the development of China's fund market.[1]

## 2 Research Design

Based on the previous theoretical analysis and research hypotheses, this paper establishes a VAR econometric model consisting of stock market volatility, fund returns, and institutional holding ratios. According to this model, the impact of stock market volatility on fund size is further studied.[2]

### 2.1 Construction of the VAR model

VAR model is widely used in practice. VAR model applies the regression analysis of the current period explanatory variables on the lagged period variables of the relevant independent variables. It is often used for forecasting changes in time series variables to explain the dynamic relationship between variables. The impact of stock market fluctuations on fund size often takes some time, and the effect of each variable has a lagged effect. Therefore, based on the previous theoretical analysis and research hypotheses, this paper establishes a VAR (p) model of fund size with stock market volatility, fund returns and institutional investors' ownership ratio as influencing factors as shown below:

$$S_t = \alpha + \beta_1 \sum_{i=0}^p V_{t-i} + \beta_2 \sum_{i=0}^p R_{t-i} + \beta_3 \sum_{i=0}^p R_{t-i} + \beta_4 \sum_{i=1}^{p-1} R_{t-i} + \zeta_t$$

In the above model, S, V, R and P are model variables in the time series. s represents the change in fund size, V represents stock market volatility, R and P are control variables, representing fund returns and institutional investors' ownership ratio, respectively;  $\beta_1, \beta_2, \beta_3, \beta_4$  is the parameter matrix to be estimated, and p in the model is the lagged order of the variables;  $\zeta_t$  is the random disturbance term, which can be correlated between the same period, but cannot be autocorrelated and correlated with the right-hand side of the model. variables are correlated.[3]

### 2.2 Variable selection and description

According to the research needs, the change in fund size is the explanatory variable of the study in the VAR model constructed in this paper, and the stock market volatility is the explanatory variable of the model.[4] In order to comprehensively examine the comprehensive impact of various factors on fund size, this study introduces two control variables, fund return and institutional investors' holding ratio, so as to better explain the change in fund size. In order to better analyze and understand the meaning of each variable, relevant variables are selected in this paper and described in Table 1:

**Table 1.** Research variables and descriptions

Variable Type	Variable Name	Variable Symbols	Variable Definition
Explained variables	Fund Size Change	S	Change in fund size = LN (total fund shares for the period - total fund shares for the previous period) / total fund shares for the previous period
Explanatory variables	Stock Market Volatility	V	Stock market volatility = LN (current SSE Composite - previous SSE Composite) / previous SSE Composite
	Fund Yield	R	LN (Fund Monthly Return)
Control variables	Percentage of institutional holdings	P	LN (institutional investment as a percentage of total share)

### 1. Selection of explanatory variables.

The purpose of this study is to find the effect of stock market volatility on fund size, or more precisely, to analyze how fund size changes when stock market prices fluctuate. Therefore, this study considers the growth rate of fund size as a more appropriate explanatory variable. [5] In terms of the choice of explanatory variables, the net cash flow of funds is commonly used to quantitatively study fund size changes in foreign literature, i.e., the growth rate of fund net assets, while the growth rate of fund shares is generally used to study this issue in China, which can isolate the effect of size changes brought about by net value changes and can better measure the impact of investors' subscription and redemption behavior on fund size. In this paper, the growth rate of fund shares is chosen as the explanatory variable, which can more intuitively and accurately represent the changes in fund size.

### 2. Selection of explanatory variables.

According to the purpose of this paper, stock market volatility is the explanatory variable of the VAR model. The stability of the stock market plays an important role for the capital market and the measurement of stock market volatility is an important area of academic research. Among them, Markowitz's method of expressing stock market volatility by the variance or standard deviation of stock price index returns is the most widely used and simple to apply. This paper is applicable and practical. [6]

### 3. Selection of control variables.

In addition to the above-mentioned indicators, the fund returns, and the percentage of institutional investors' holdings are selected as control variables for this paper to make the empirical results more accurate. These two variables explain the intrinsic causes of fund size changes at the micro level, among which fund return tends to affect fund size in the short term, while institutional investor ownership ratio affects fund size changes in the long term. The impact of these factors on fund size tends to take some time, so this paper chooses their lagged terms as explanatory variables. [7]

## 3 Empirical Analysis

Based on the VAR model constructed in the previous section, this section will further investigate the impact of stock market volatility on fund size. The main methods used

are descriptive statistical analysis, unit root test, impulse response analysis and Granger causality test.[8]

### 3.1 Descriptive analysis

From Table 2, in the studied fund sample, S represents the change in fund size with a mean value of 0.1639, which is positive, indicating that the overall size of open-end funds in China is on an upward trend. However, the difference between the maximum and minimum values of this indicator is large, showing a large variation in the size change of each fund. The mean value of stock market volatility V is 0.0250, which is greater than 0, indicating that the stock market price index is positive in terms of the overall securities market, i.e., the market shows a smaller upward trend. However, the difference between its maximum and minimum values is large, indicating that the stock market prices are more volatile. The mean value of fund return R is 0.0220, and this indicator shows that fund investors are generally profitable, which is related to the increase in stock market prices during the period. The mean value of institutional investment to total shares is 39.7%, which is overall a larger proportion of institutional holdings. This ratio also shows a more pronounced institutionalization of fund holders in China.

**Table 2.** Descriptive statistics results

Variables	Average value	Standard deviation	Maximum value	Minimum value
S	0.1639	3.9458	32.8000	-1.0000
V	0.0250	0.2177	0.3498	-0.3616
R	0.0220	1.2464	8.9330	-0.8714
P	0.3970	0.1588	0.9974	0.0017

### 3.2 Unit root test

As shown in Table 3, according to the results of the unit root test, the values of ADF statistics for each variable in the model are -7.8214, -3.4873, -5.1368 and -6.3440, which are less than the respective critical values at the 5% significance level and pass the test, so it is known that the original data series is smooth.

**Table 3.** Unit root test results

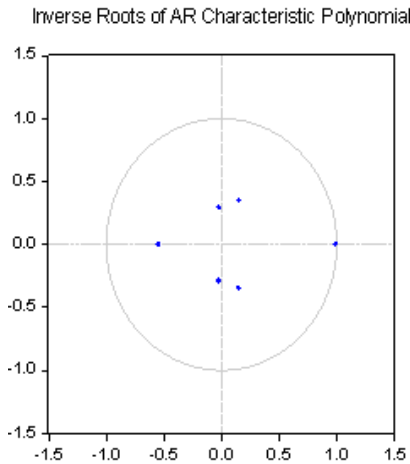
Test sequence	ADF statistics	Critical values at different significance levels			Stability
		1%	5%	10%	
S	-7.8214	-3.5022	-2.8929	-2.5836	Stability
V	-3.4873	-3.5022	-2.8929	-2.5836	Stability
R	-5.1368	-3.5022	-2.8929	-2.5836	Stability
P	-6.3440	-3.5002	-2.8963	-2.5854	Stability

### 3.3 Stability of the VAR model

As shown in Table 4 and Fig.1.To make the estimated parameters of the VAR model stable, this paper applies the mode and distribution of the unit root to test the robustness of the VAR model. The impulse response function results obtained are stable and reliable only when the VAR model estimation is stable. The relevant results are shown in the following table. The inverse of the mode of all roots of the model is less than 1, and all roots are within the unit circle, which proves that the obtained model is stable and can be used for impulse response analysis.

**Table 4.** Modes of unit roots

Unit Root	Countdown of mode
0.991848	0.991848
-0.545165	0.545165
0.151579 - 0.347344i	0.378977
0.151579 + 0.347344i	0.378977
-0.022871 - 0.289693i	0.290595
-0.022871 + 0.289693i	0.290595
0.061246 - 0.168634i	0.184521
0.061246 + 0.168634i	0.184521



**Fig. 1.** Unit root distribution diagram

### 3.4 Impulse response analysis

As shown in Fig.2.To study the influence pattern of stock market volatility on fund size, this paper further analyzes the response of fund size to the magnitude of stock market volatility changes based on the VAR model constructed in the previous section. Because the stock market volatility factor is the influencing factor for the change

of fund size in China, the pattern of the influence of stock market volatility on fund size can be further analyzed through impulse response diagram.

As shown in the figure below, when the stock market volatility factor gives a positive shock, the fund size shows a positive response, the fund size rises first in the short term and then falls eventually slowly tends to stabilize, in the second period, the fund size reflects the most intense change in stock market volatility, the third period falls to the smallest, about 0.25%, and then tends to stabilize and gradually converge, the impact of the stock market volatility factor on the fund size time It will last about 6 periods.[9]

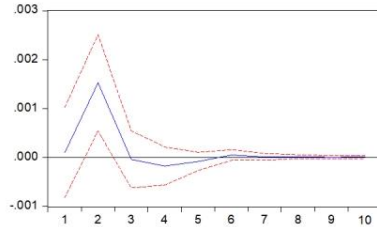


Fig. 2. Impulse response plot

### 3.5 Granger causality test

The Granger causality test based on the VAR(6) model is as follows: at the 5% significance level, it can be determined that the stock market volatility factor is the Granger cause of the fund size change, but the fund size change does not in turn become the Granger cause of the stock market volatility. This indicates that the stock market volatility factor is an influential factor in the change of fund size in China. As shown in Table 5.

Table 5. Granger causality test results

Null Hypothesis:	Obs	F-Statistic	Prob.
V does not Granger Cause S	3034	3.79258	2.E-05
S does not Granger Cause V		0.99947	0.4319

## 4 Conclusions and Policy Recommendations

### 4.1 Research conclusions

Compared with mature foreign markets, China's securities market is still in the development stage and has disadvantages such as high market volatility, unreasonable investor structure and lack of shorting mechanism. Stock market fluctuations will directly affect the performance of the fund, causing investors to make multiple subscriptions and redemptions, thus affecting the size of the fund. Frequent changes in fund size have a very negative impact on the fund's liquidity management and fund operations. In this paper, a theoretical and empirical analysis of the impact of stock market

volatility on fund size in China is conducted by constructing a VAR model. The study draws the following conclusions:

First, stock market volatility is an influential factor in the change of fund size. Stock market volatility affects investors' fund returns and investor sentiment, which further affects their purchase and redemption behavior and asset allocation decisions, and then causes changes in fund size.[10]

Second, the impact of stock market volatility on fund size shows a lag effect, with an impact time of about six months. From the impulse corresponding analysis, when the stock market price rises, the fund size shows a trend of first rising and then gradually weakening, with an impact period of about six months. This indicates that stock market fluctuations have a positive impact on fund size changes, and the impact tends to last for a certain period.

## 4.2 Policy recommendations

Stock market volatility affects the investment decisions of fund investors, driving them to make frequent subscription and redemption operations, resulting in constant changes in fund size. This has a very negative impact on the fund's liquidity management and fund operations. Based on the above research findings, this paper argues that two aspects should be taken to promote the development of fund market.

First, the government should establish a sound social security system and introduce reasonable preferential policies in terms of pension and education savings plans to guide families and individual funds to invest in funds and improve the current situation of institutionalized fund holdings. By introducing more individual investors, the fund size can be promoted to expand and become more stable, thus reducing the drastic impact of short-term stock market fluctuations on the fund size.

Second, the stock market trading system should be further improved, and fund investment behavior regulated. Managers need to formulate stock market policy rules at the macro policy level that are suitable for our current reality to prevent abnormal stock market price movements. At the same time, supervision and punishment should be strengthened to avoid "rat positions" and insider trading. These policy guidelines can promote the stock market fluctuations to be reasonable, thus influencing investors to make rational investment decisions, which will help to stabilize our fund size management and promote the development of our securities market.

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