Research on the Liquidity Risk Management of Open-end Fund

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Abstract: Liquidity risk of open-end fund come from the free redemption system of fund share. In exceptional circumstances, increase of liquidity risk of the fund will lead to disastrous liquidity crisis. This paper establishes the mathematical model which reveals the formation mechanism and influencing factors of liquidity risk of the open-end fund. At same time and the countermeasures from the improvement of the market trading system and strengthen the internal mobility management of fund.

Authors Brief

Key words Open-end funds, Liquidity risk, redemption, Financial derivative products, hedging

1 Introduction

Since September 2001 the first closed-end fund Huaan innovation has been set up, at the end of 2006, China had 268 open-end fund fully operational. Open-end fund provide a function of a relatively convenient entry and exit mechanism. But from the fund manager's point of view, because of such features, it makes an open-end fund scale also has considerable elasticity which leading to a great different in management methods style between an open-end fund and a closed-end funds. Advantage of the free redemption for open-end fund share led to the liquidity risks difficult to avoid.

2 An Analysis on Formation Mechanism Model with Open-end Fund Liquidity Risk.

2.1 Establishment of Model

Liquidity risk of open-end fund is asset losses or uncertainty of transaction costs arising from it is difficult realized investment portfolio liquidation in a fair prices within a reasonable time when fund managers face of the pressure of holders redemption. To the fund managers, focal point in liquidity management is to meet financial needs of redemption for fund investors. Due to the imperfections of the securities market and lack of hedging tool in China, the fund investment portfolio on a larger risk exposure. So liquidity risk triggered by price shocks from the stock market became the focus of risk management. In order to better understand the liquidity risk of such a process, we analysis by established the following model:

To simplify the model first made the following assumption: the assumption that the existing assets of the Fund is v, day-to-day management of costs is 0, normal preparations for the liquidation is m, so which can be used for portfolio investment assets is (v-m). Assuming theoretical foundation of a fund investment portfolio constructed base on modern portfolio theory. portfolio risk asset portfolio and risk-free asset portfolio composition, Fund portfolio composed risk asset portfolio and the risk-free asset portfolio, the proportion of the investment for both is the p and (1-p). Assuming for one reason or another that the current t. Moment on the stock market, resulting in the Fund's portfolio of assets under p%, the Fund's assets loss is \( L_0 = v \times p\% \). Assuming the investor redemptions is a function of the fund loss, \( s_0 = f(L) \). There have the following model according to the liquidity risk definition.: 

\[ S_0 > m \quad \text{in liquidity risk} \]

\[ S_0 < m \quad \text{not happen liquidity risk} \]
We can see that when $s > m$, trigger liquidity risk. At this time if fund managers can get liquidity support by means of short-term financing, they will be able to resolve the current crisis. Its operating loss is the short-term financing costs. For this the liquidity crisis will not have a fundamental impact on development of the Fund itself. But if fund managers can not get short-term financing or can not borrow short-term funds to meet liquidity requirements, was forced to the sell securities products of the holders. Such operation will affect market price of securities products which caused the Fund's assets value decline, so triggered investor dissatisfaction and redemption requests. Fund operations fall into a circle formation similar to the "bank run" phenomenon, a circulation mechanism of this liquidity risk at any time is a threat to the existence of the Fund. So it is the focus of fund managers for risk management. To describe such a cycle mechanism, the paper established the following dynamic model to analyze:

As liquidity risk is mainly caused by the prices decline of stock market which made fund managers turn securities into cash assets. Liquidate losses directly affect investor expectations. In order to describe the impact of this process, this article is assumptive that investors redeem $S$ is function of a fund liquidity loss previous. In the absence of empirical data to support, we can not determine the specific form of this function. So here first assumption $S_t = f(L_{t-1})$. Therefore:

$$S_t = s_0 \quad t=0$$
$$S_t = f(L_{t-1}) \quad t>0$$

We can see that when fund managers can not have be prepared or have short-term liquidity assets or financing to meet investor redemptions, the potential circle of mechanisms may occur. Losses of fund assets into cash caused investors will keep new redemptions, and the new redemption forcing fund managers to a large-scale realization for assets cash. Such a cycle, if it can not take effective measures will ultimately lead to the liquidation of the Fund.

### 2.2 Explain the Model

Through assuming the investor redemptions is a function of the loss suffered by fund into assets to describe the revolving mechanism “redemption—liquidation—redemption”. Although in the absence of empirical data support, we can not ascertain the function in the specific form of mathematical, but that assumption is built on the basis of theory of supply and demand and expected. In the actual stock market, the short-term market prices of assets mainly decided by supply and demand balance of power and investors expected to the market. So we think the fund manager behavior of assets liquidation will result a pressure drop in securities prices in theory. So this is an asset that fund managers act in realized certain, when the stock market prices have fallen, investors will change the psychological expectations, the decline in prices will lead to the Fund's assets further shrinking, thereby triggering new investor redemptions. Through the above analysis, we can see the logic of such an assumption is established, the theoretical study is qualitative reasonable and necessary.

### 3 Analysis on Risk Factor of Open-end Fund Liquidity

From the formation mechanism of liquidity risk, we can see the open-end fund liquidity risk is the direct cause of the redemption of fund holders, without the redemption there would not exist liquidity risk. the reasons Impact the redemption of the fund holders both the factors for the fund's liquidity risk. Reasons which impact on liquidity risk of fund is multiple, both by external reasons, such as financial environment, the impact of market trends, and by the inherent factors such as fund investment strategy, fund performance and so on. At the same time, it also connected with the holder's investment philosophy, psychology. But in China, liquidity risk of an open-end fund was particularly prominent in the following two aspects:

#### 3.1 Structure Asymmetric Caused by High Mobility of the Source of Funds and Low Liquidity Assets to Match
First, from the asset structure of view, in general, the more of the financial products and the better liquid of financial products will have greater room for fund to choose and formed their own assets. So the Fund's own mobility can be guaranteed. However, compared with overseas mature securities markets in hundreds of financial investment tools, China's current securities market is limited in quantity and variety, and in addition to government bonds, other varieties are with a huge market shocks in liquidation. Therefore, from the current structure of financial products, an open-end fund assets business faces greater liquidity risk:

Secondly, from the source of funds, generally speaking, the greater of institutional investors in the proportion, the smaller liquidity of the sources of funds, and the better for stability. Entering the 1990s, the trend which fund source from institution have an accelerated development overseas. But in China’s market, the ratio of individual investors was an important reference indicator to measure the fund redemption pressure and the stability. The usual yardstick is the higher the ratio of individual investors, the lower of the redemption pressure.

We can draw this is a paradox: Structure Asymmetric Caused by High Mobility of The Source of Funds and Low Liquidity Assets to Match. The contradictions become the main factors which triggered liquidity risk of open-end fund in China.

3.2 High transaction costs, lack of hedging mechanisms

Currently, securities market system is still not perfect on the bulk transactions, process transactions, short mechanism and avoid risks of the financial tool in China. Open-end funds The lack of system environment for survival, making the higher transaction costs and limit the trading species liquidity of their own. China's capital market has larger systemic risk which means decentralization of investment at this stage play a very small role on risk aversion. There are not short hedging mechanisms and stock index futures, options and other derivatives to reverse Systemic risks in China, which has hampered China's securities investment fund managers control systemic risk. If a long-term bear market or a stock market crash, a large number of redemptions will resulting in the Fund facing a tremendous liquidity risk.

4 Measurement Methods to Liquidity Risk of China's Open-end Fund

When fund managers in dealing with investors redeem, whether the assets can timely turn to cash depends on the liquidity of fund. The main investment target of the open-end fund is stocks and bonds, the liquidity of bonds be after of cash and deposits. Therefore, at present, the liquidity of the stock they held is critical factor to measure the mobility of open-end fund assets. there are three characteristics in stock mobility: First time; second turnover; Third, price fluctuations. Accurate description of the liquidity of stocks, we should also consider the three factors. We setting of the two liquidity index below at the same time consider the three factors.

Stocks liquidity index 1

\[ L_1 = \frac{(P_{\text{MAX}} - P_{\text{MIN}})}{P_{\text{MIN}}} \times \frac{1}{V} \]  

PMAX is the highest price of the trading days
PMIN is the minimum price of the trading days,
V is the trade amount of money of the trading days
L1 is the largest rate of price changes in a trading days caused by unit trade amount of money. The greater the numerical indicators, said in a trading days, the greater of price fluctuations rate caused by unit trading trade amount of money, the stocks will be the mobility of the poorer. On the contrary stocks liquidity goes up.

Stocks liquidity index 2

\[ L_2 = \frac{(P_{\text{MAX}} - P_{\text{MIN}})}{P_{\text{MIN}}} \times \frac{1}{H} \]  

the difference between Indicators 2 and indicators 1 is trade amount of money V will be replaced by turnover H. The higher the numerical indicators that when equity flows are the same, the greater the
price volatility caused by unit volume trading in a trading, the worse the mobility of stocks; on the contrary stocks liquidity goes up. When calculated stocks liquidity, the fund managers can be realized by matching and proportion the two methods to realized investment portfolio. Matching realized, that is when the need for a certain amount of realizable securities, securities in the portfolio will be realized in accordance with the same amount. Realization ratio method, that is, when the need for a certain amount of realizable securities, securities in the investment portfolio will be realizable accordance with the original proportion of the portfolio.

5 Countermeasures

5.1 Perfect trading system and the development of the financial derivatives markets

Open-end funds are characterized by diversified investment and trading volume, the bulk transactions can reduce transaction costs. Meanwhile, China's securities market on the systemic risks of the total risk of 81.3 percent, so they are necessary for market risk management to construct multi-level market system , gradually develop stock index futures, options and other financial derivatives. With purposes of "Futures Exchange Management Regulations" in the April 15 2007, stock Index Futures will become the first powerful financial derivative for open-end fund to avoid liquidity risk.

5.2 Strengthen the management of internal liquidity

The existing investment environment, strengthen assets liquidity and source of funds management on open-end fund is effectively methods to prevent from liquidity risk. The liquidity of the asset management refers to an open-end fund use and configurations co-ordinate to ensure that the liquidity of assets and profitability. In actuality, there are mainly concentrated fund, which is concentrated funds of open-end fund from different sources together, and configurations reasonable with the risk, yield and liquidity. The liquidity of the sources of funds management refers to financing operational and management activities which open-end fund assets to compensate for its lack of liquidity of the assets. Its main content is that sources of funding of an open-end fund shift from passive to active, positive innovative financing tools, extensive organizations source of funds to meet the liquidity needs of redemption.

5.3 According to principal for risk preferences of investor to design different personalized products and redemption way of Fund

The same assets to different investors have different risk feelings and utility function, a utility function also decided the shape and characteristics of indifference curve (IDC). Investor’s indifference curve is also different in height, concavity-convexity and curvature. superimposing individual indifference curve on effectively set map which can be achieved by portfolio, so we can identify the optimal portfolio .(figure 1).
From Figure 1, it can be seen that investors' optimal portfolio is decided by indifference curve and the effective set of investment portfolio, and the different indifference curves caused investors to select different investment portfolio. Point A is the optimal portfolio of radical investors and B is that of conservative investors. Different indifference curves determine the investors' investment portfolio preferences differently, investor demand is also not the same, so we need different risk and liquidity of investment instruments. In reality, China's fund products design proceeds type, the balance type, and other funds were invested in stocks, bonds, money market, so as to satisfy investors' risks and benefits of different preferences.

It should be said that this design is very broad, covering the needs of different clients on risk requirements. However, the design of this product is very extensive which investment style and earnings volatility is very similar, investment strategy too homogeneous, performance instability, that is the main reason caused liquidity risk. Therefore, saluting liquidity risk, we should consider that fund product design must be broken down investor demand further, design more personalized products and different redemption to meet the customer demand.

6 Conclusion

Judging from the current phenomenon which domestic open-end funds generally encountered redemption, the asymmetric in the source of funds and assets application, higher of the systemic risk and hedging mechanism shortage is the result of imperfect system in the securities markets to a large extent. At the same time it may also be one of the important factors which triggered and accelerate China's open-end fund liquidity risk. In this paper, the above analysis shows that we must improve the external investment environment of open-end fund, establish internal risk control system in the fund management companies and constantly develop new products to meet the preferences of different investors flows that can be effectively controlled and avoid liquidity risk.

References


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