Liquid Assets Risk and Financing Strategy based on Black-Scholes Model

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Abstract: In Liquid assets financing theory, there are three financing strategies-aggressive financing strategy, conservative financing strategy and moderate financing strategy. These three strategies adopt different proportions of long-term and short-term capital in order to achieve the best economic efficiency. After the definition of complete risk-neutral world, we can exclude the influence of risk on Liquid assets financing, and we can get the Liquid assets financing strategy without risk, that is, if there is no risk factor at all, the aggressive financing strategy is the best. However, this Hypothesis is not realistic enough, so it needs to be relaxed. Under the Hypothesis of limited risk neutrality, risk gradually influences Liquid assets financing strategy, and the advantage of aggressive financing strategy is weakened. Finally, we can get the Liquid assets financing strategy which is suitable for China's national conditions, that is, the conservative optimal strategy, by completely liberalizing the Hypothesis and combining with China's Liquid economic environment.

Keywords: Liquid assets financing theory; Risk-neutral world; Black-Scholes theory

1. Introduction

The financing involved in this paper is a narrow sense of financing, that is, the integration of funds. Financing is the starting point of the capital operation of the whole enterprise. Capital financing can be divided into long-term financing and short-term financing. Long-term financing includes common stock financing, preferred stock financing, long-term debt financing, finance lease and so on. Short-term financing mainly includes commercial credit, commercial paper, short-term financing bills and short-term loans.

Liquid assets are the assets deposited in the short-term in the production and operation process of the company according to China's Accounting Standards for Business Enterprises No. 30-Presentation of Financial Statements and IAS 1-Presentation of Financial Statements, which are generally expected to be realized, sold and consumed in a normal operation cycle.

Liquid assets have the following characteristics: First, the turnover rate is faster. Second, the liquidity is strong. Third, the form is changeable. The source of these three characteristics lies in the "high liquidity" of Liquid assets. Strong liquidity guarantees the financial security of enterprises, and the profitability of Liquid assets is weak among all assets. Holding excessive Liquid assets will make the company inadequate profitability, and over-holding fixed assets will make the company's financial risks soar. The real focus of modern Liquid assets theory is to balance the ability to resist financial risk and profitability.

2. Traditional Liquid Assets Financing Theory-Classification of Three Liquid Assets Financing Strategies

In Stephen A. Ross's book Corporate Finance, Liquid assets can be divided into permanent Liquid assets and temporary Liquid assets. Permanent Liquid assets refer to the Liquid assets that the company still holds when the operation cycle falls to the valley, and the funds invested in them are long-term. Temporary Liquid assets refer to Liquid assets that will change with seasonal and cyclical fluctuations in the operating cycle. As shown in Figure 1. The total asset demand curve fluctuates upward, and this trend is irregular. In the process of upward fluctuation of the total asset demand curve, there is an upward fluctuation interval, above the lower limit of this interval, it is temporary Liquid assets, below this lower limit, it is permanent assets composed of permanent Liquid assets and fixed assets.

The essence of how to solve the problem is the trade-off between capital gains and financial risks. In the process of solving this problem, there are three different financing strategies-conservative financing strategy, aggressive financing strategy and moderate financing strategy. These three different strategies reflect three different operator values.

Conservative financing strategy thinks that the stability of the company is more important than profitability, so not only long-term capital into fixed assets and permanent Liquid assets, but also permanent capital into temporary liquidity. Only part of the temporary Liquid assets is

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financed on a temporary basis. The aggressive financing strategy only uses part of the long-term capital to integrate into fixed assets and permanent Liquid assets, and the remaining fixed assets and permanent Liquid assets and all temporary Liquid assets use short-term capital to

integrate. Such operators tend to prioritize the profits of the company. Moderate is a compromise between short-term financing to finance temporary Liquid assets and long-term financing to finance permanent Liquid assets and fixed assets.
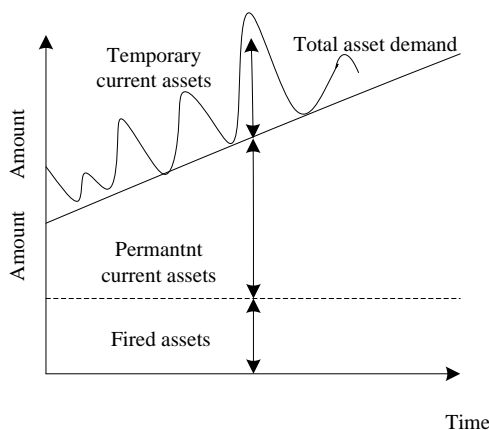

Figure 1. Assets over time

3. Black-Scholes Risk-neutral World

3.1. Black-Scholes main theory

The definition of risk neutrality appeared in the field of finance, mainly used in the pricing of options and futures. The Black-Scholes differential equation is a pricing formula for options, there are no variables related to investment risk appetite in the equation, following variables appear in the equation: the Liquid price of the stock, the variance of the stock price, the exercise price of the option, the exercise time and the risk-free interest rate. These variables are independent of the risk appetite, because the key variable of the expected return rate of the stock, which is closely related to the risk appetite of the investor, has been eliminated in the derivation of the equation. Therefore, when pricing options, any kind of risk appetite has no effect on the valuation of options.

The Black-Scholes equation is:

$$C_t = S_t \bullet N(d_1) - X \bullet e^{-r_f(T-t)} \bullet N(d_2)$$

Where Ct is the price of the call option at time t; St is the time value of the stock t; X is the execution price of the stock; N (d2) is the exercise possibility of options in a risk neutral world, and X $\cdot$ N (d2) is the exercise price multiplied by the probability of payment of the exercise price; St N(d1) $\cdot e^{r_f T}$ denotes the following variable: in a risk-neutral world, when the execution price is higher than the execution price, the variable is equal to the stock price, and in all other cases zero. δ is the standard deviation of stock price fluctuation; Rf is the risk-free interest rate and T is the execution time.

3.2. Hypothesis of risk-neutral world

The equation assumes that all investors are risk-neutral and that the world is risk-neutral. "Risk neutral" means that investors are independent of risk appetite, do not require a risk premium, and all expected returns are risk-free interest rates. In a risk-neutral world, we can replace the expected rate of return with arbitrary rate of return, and further we can replace the expected rate of return of securities with a risk-free rate of interest.

The risk neutrality adopted in this paper is a more specific "fully risk neutral world", and the following Hypothesis are made in this paper:

In a "fully risk neutral world", all investors have no risk premium and require the same return on investment for any type of investment, regardless of its risk (volatility).

In a "fully risk neutral world", there is no risk aversion or preference, i.e. Investors not only do not demand a higher return on their investments due to increased risk, but also invest the same amount in any project and do not choose to refuse to invest.

The market is frictionless and there is no transaction cost of financing, i.e. The only cost of financing is the return on investment to the providers of funds, i.e. Dividends and interest.

There is no time lag in the integration of funds, i.e. Both long-term and short-term financing will be able to obtain the required funds immediately after a financing decision has been made.

There are no barriers to entry for the issuance of shares or bonds.

There is no government, that is, no government market intervention and no tax issues.

These Hypothesis exclude the following factors: First, the impact of risk on the enterprise. Second, factors that do not meet the Hypothesis of a perfectly competitive market. After making such Hypothesis, the impact of the value of the investment project is limited to liquidity.

4. The Impact of Liquid Assets Financing Strategies in a Perfectly Risk-neutral World

4.1. Analysis on the aggressive financing strategies of liquid assets

In the "completely risk neutral world", the financing cost of adopting aggressive financing strategy only depends on liquidity, that is, the financing cost of long-term capital is higher than that of short-term capital. If other conditions remain unchanged, it would seem more advantageous to try to use temporary funding as much as possible.

However, from the Liquid mainstream of finance, the main factors that will have an impact on the value of the company are divided into solvency and profitability, as well as operating capacity, development capacity and so on. The financing strategy of Liquid assets generally does not have a significant impact on the operational capacity and development capacity of enterprises, so the real impact of the factors are solvency and profitability.

Solvency is divided into long-term solvency and short-term solvency. The long-term solvency is mainly related to the long-term operation of the enterprise, and the short-term debt and rigid debt repayment is mostly related to the short-term solvency, so the solvency referred to in this paper is short-term solvency.

In a completely risk-neutral world, the risk of bankruptcy is greatly reduced due to Hypothesis 1 and 2. When a firm is in financial distress, under Hypothesis 4 and 5, the firm is able to finance a sufficient amount of capital from the capital and money markets, even though the risk is already high. Because in a completely risk-neutral world, investors don't choose to avoid the risks of a business. This ensures that no matter what kind of financial difficulties the enterprise is facing, it can be easily financed and get through the difficulties, and the solvency of all enterprises tend to be infinite.

From the perspective of profitability, When the amount of temporary Liquid assets required by the company is fixed, Under the aggressive financing strategy, the financing cost of Liquid assets can be divided into long-term funds used to incorporate part of fixed assets and part of permanent Liquid assets, and short-term funds used to incorporate all temporary Liquid assets and remaining fixed assets and permanent Liquid assets. Let the total cost of financing be A; The cost of long-term funds to incorporate part of the fixed assets and part of the permanent Liquid assets is ALong1, the cost of short-term funds to incorporate the remaining fixed assets and permanent Liquid assets is AShort1, and the cost of short-term funds to incorporate all temporary Liquid assets is AShort2. So there is

$$A = ALong1 + AShort1 + AShort2$$

In these three items, the use price of temporary liquidity is lower than the use price of long-term liquidity. In the case of unlimited sources of funding, greater use of temporary funds does make the overall cost of funding lower. Another advantage of using ad hoc funds is flexibility. The demand for temporary Liquid assets is unstable, and having temporary funds can quickly change according to the demand for temporary Liquid assets, thus saving the financing cost caused by holding excessive liquidity.

4.2. Analysis on conservative financing strategies of liquid assets

In terms of solvency, it has a higher safety factor than aggressive Liquid assets. But in a "completely risk-neutral world", capital is almost infinite in such a completely risk-neutral world, so the same ability to resist risk is infinite, so in fact the solvency of conservative and aggressive in this world is the same.

From the perspective of profitability, conservative financing strategy uses more long-term capital to achieve the purpose of financing Liquid assets. Let the total financing cost be B; The cost of long-term funds for incorporation into fixed assets and permanent Liquid assets is B Long1, the cost of long-term funds for incorporation into temporary liquidity is BLong2, and the cost of temporary funds for incorporation into remaining temporary Liquid assets is BShort1. So, there's "B = BLong1 + BLong2 + B Short1.". In these three items, it is clear that the proportion of short-term funds in the composition of B is far lower than that of A, (B Short1< A short2 < A short1 + A short2). Decreasing the proportion of short-term funds will lead to an increase in the total cost of financing. In addition, since long-term capital cannot be increased or decreased in the short term after the adoption of conservative financing strategy, excess capital will cause unnecessary losses when it is at the lowest point of aggregate demand. Therefore, from this point of view, in a completely risk-neutral world, the cost of conservative financing strategy is higher than that of aggressive financing strategy.

4.3. Analysis on the moderate financing strategies of liquid assets

Moderate financing strategy in solvency, the moderate financing strategy and the above two strategies are the same, the ability to resist risk is tending to infinite. In terms of profitability, the financing cost of moderate financing strategy is between the two, assuming that the total financing cost is C, the short-term financing cost for temporary Liquid assets is CShort, and the long-term financing cost for permanent Liquid assets and fixed as-

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sets is CLong. The proportion of short-term funds in moderate type is between aggressive type and conservative type (BShort1 < CShort = AShort 2 < AShort1 + AShort2). The profitability of moderate financing strategy is between aggressive and conservative.

4.4. Rational choice of liquid assets financing strategies in a complete risk-neutral world

In a fully risk-neutral world, because firms can access money and capital markets without restrictions, no financing strategy affects their solvency.

From the profitability point of view, we use weighted average cost of capital to analyze, that is, RWACC, this paper uses RWACC, not debt or equity to distinguish its capital structure, but short-term and long-term capital to divide its capital structure. Let L be the long-term fund, S the short-term fund, RL the long-term fund cost and RS the short-term fund cost. Therefore:

$$R_{WACC} = R_L \times 0 + R_s \times 1 = R_s$$

Because of RL > RS, the specific gravity of S increases and RWACC decreases. The aggressive strategy has the strongest profitability, the moderate strategy is the second, and the conservative strategy is the worst. In a fully risk-neutral world, we can further infer that short-term financing should be used exclusively in the capital structure. If L=0, S=L+S, the equation becomes

$$R_{WACC} = R_L \times 0 + R_s \times 1 = R_s$$

Its weighted average cost of capital is the lowest, equal to the cost of short-term capital. Therefore, in a completely risk-neutral world, a rational liquidity financing strategy is to adopt an extremely aggressive concept, all assets are financed with short-term funds.

5. Hypothesis of Finite Risk-neutral World

A fully risk-neutral world that can accommodate capital indefinitely in effect means that there is no limit to the amount of capital available in the market. This Hypothesis contradicts the resource scarcity Hypothesis in economics, so we need to change the Hypothesis to make it more applicable.

For the "limited risk neutral world", this paper makes the following Hypothesis:

In a "limited risk neutral world", all investors have no risk premium and require the same return on investment for any type of investment, regardless of risk.

In the "completely risk neutral world", there is a risk aversion behavior, investors will choose to refuse to invest, although they will not demand higher return because of the concentration of risk.

The market is frictionless and there is no transaction cost of financing, i.e. The only cost of financing is the return on investment to the providers of funds, i.e. Dividends and interest.

There is no time lag in the integration of funds, i.e. Both long-term and short-term financing can obtain the re-

quired funds immediately after the financing decision is made.

There are no barriers to entry for the issuance of shares or bonds.

There is no government, that is, no government market intervention and no tax issues.

In this "limited risk neutral world", investors are no longer completely indifferent to risk, although there is still no risk premium in the market, but investors are risk-averse, for projects with high volatility, will avoid high or stronger returns.

5.1. Analysis on the aggressive financing strategies of liquid assets

In terms of solvency, there is still no premium on capital and money markets for companies with different risks, but when the risk increases, the total amount of money they can finance through credit or equity in the market decreases. Unlimited solvency in previously completely risk-neutral markets no longer exists in a finite risk-neutral world. Because the company cannot repay the due funds, it will incur financial constraints cost, there is a considerable part of temporary funds to finance permanent assets, the liquidity is often poor, will produce a greater discount, the company's financial risks are great.

In terms of profitability, the part of financing cost paid to investors by adopting aggressive financing strategies has not changed much in a more completely risk-neutral world. However, the likelihood of financial constraint costs arising from financial constraints increases considerably. In the tight cost, not only include forced liquidation of discount losses, but also because the financial situation of the company is unstable, resulting in managers unwilling to operate, employees to work slackness and trust in the company decline, resulting in opportunity costs.

Therefore, in fact, the total financing cost of adopting aggressive financing strategy is: long-term financing cost + short-term financing cost + financial constraints cost. In a finite risk neutral world, financing costs are no longer simply inversely proportional to the ratio of short-term funds to all funds.

5.2. Analysis on the conservative and moderate financing strategies of liquid assets

Compared with the aggressive type in the finite risk neutral world, the shortcomings of the gradually exposed, conservative type in the finite risk neutral world, but gradually show its advantages.

From the point of view of solvency, conservative financing strategy is safe, and the financial risk it may face is far less than aggressive financing strategy.

In terms of profitability, a significant proportion of long-term funding will be raised in the form of equity, which

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further reduces risk. So, the cost of financial constraints is less than that of aggressive ones.

The analysis of solvency and profitability of moderate financing strategy is similar to that in a completely risk-neutral world, and its solvency and profitability are still between conservative strategy and aggressive strategy.

5.3. Rational choice of liquid assets financing strategies in limited risk-neutral world

In the finite risk neutral world, risk has an impact on investors, solvency of the three options is no longer the same, aggressive risk rises to the highest of the three, while conservative risk is the lowest of the three.

In addition, profitability cannot be measured simply by RWACC, in addition to the long-term and short-term financing costs that can be clearly predicted when making financing decisions, but also the financial constraints caused by financial risks.

It is precisely because of the intervention of the variable "risk" that the proportion of liquidity is no longer always inversely proportional to the cost of financing, as it is in a completely risk-neutral world, but is directly proportional to the cost of financial constraints. What kind of financing strategy is the most appropriate, we should combine the managers' expectation of the possible financial constraints cost and their own risk aversion degree, then we can get.

6. Strategic Choices in the Liquid Economic Environment in China

The real economic environment does not conform to any completely risk-neutral or limited risk-neutral Hypothesis, the ideal world of risk-neutral Hypothesis has been completely broken into more variables that will affect decision-making, and the most important change is the introduction of risk premium.

Risk premium makes the use of aggressive financing strategy, its implied risk increases will lead to higher risk returns required by fund providers. Creditors will raise interest rates on borrowings, and shareholders will de-

mand higher dividends to offset the loss they may suffer if their company goes bankrupt because of insolvency. As a result, the lower financing costs incurred by companies that use large amounts of short-term funds for financing will be reduced or even offset by the higher returns required by the providers of funds. Unlike aggressive strategies, conservative strategies will suffer less risk premiums because they may generate far less financial risk than aggressive strategies. At the same time, conservative financing strategy has not lost its advantage in resisting financial risks, but has increased.

Finally, the advantages of conservative financing strategy are further reflected in the light of the Liquid reality in China, that is, low social integrity, lack of liquidity management capacity and other objective factors.

Due to the low integrity of Chinese companies, the Liquid assets management capacity is often weak. In the Liquid economic situation, conservative financing strategy should be adopted.

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