Application of Option Protection Strategy in Portfolio Risk Management

Tingkai Cui
UOW College Hong Kong, Hong Kong, china

Abstract: The option protection strategy is an important tool for portfolio risk management. Its core is to build an asymmetric income structure for the spot position by buying put options, so as to effectively lock down the downside risk without giving up the rising potential. This paper systematically discusses the theoretical basis, functional orientation and practical path of the strategy. From the theoretical perspective, the protection strategy relies on the option pricing theory to construct the market-oriented pricing and transfer mechanism of risk; From the perspective of function, it has unique comparative advantages over traditional risk management methods in terms of systematic risk prevention and income smoothing; From a practical perspective, the effective implementation of the strategy needs to accurately grasp the key elements such as the implementation price and protection period, and establish a dynamic adjustment mechanism in coordination with portfolio management. In the future, with the continuous development of derivatives market, option protection strategy will play a more important role in portfolio risk management.

Keywords: Option Protection Strategy; Portfolio; Risk Management; Downside Risk

1. Introduction

In the modern financial market, the risks faced by the portfolio are increasingly complex. How to effectively manage the downside risk has become the core issue of investors' attention. Traditional risk management methods, such as decentralized investment and stop loss strategy, have some limitations in dealing with systemic risks, and it is difficult to take into account the dual objectives of risk control and income acquisition[1]. Option protection strategy provides a new idea for portfolio risk management by virtue of its asymmetric income structure. This strategy constructs the risk bottom line for the spot position by buying put options, and locks in the maximum loss without giving up the rising potential. This paper aims to systematically explore the theoretical basis, functional positioning and practical path of option protection strategy, in order to provide theoretical reference and operational enlightenment for investors in the practice of risk management.

2.Theoretical Basis and Operation Mechanism of Option Protection Strategy

2.1 Connotation of Protection Strategy from the Perspective of Option Pricing Theory

The deep logic of the construction and operation of option protection strategy is rooted in modern option pricing theory. Based on the Classic Black Scholes model, option pricing theory reveals the intrinsic functional relationship between option value and underlying asset price, strike price, residual maturity, risk-free interest rate and volatility [2]. Protective put strategy, that is, holding spot assets and buying put options at the same time, is essentially to purchase a "insurance" for the price decline of spot long positions by paying a certain option fee. From the perspective of pricing theory, this option fee constitutes the protection cost of the strategy, and its amount is determined by the market expectation of the future volatility of the underlying asset. Therefore, the connotation of the protection strategy lies not only in its intuitive risk hedging function, but also in its accurate quantification and market-oriented pricing of the downside risk faced by the portfolio, so that investors can transfer the potential asymmetric risk to the option seller at a predictable cost, thus reconstructing the risk return structure of the portfolio.

2.2 Analysis of Risk Mitigation Mechanism of Protective Bearish Strategy

The core of the risk mitigation mechanism of

protective bearish strategy is that it realizes the asymmetric reconstruction of return and risk. Without protection, spot long positions face unlimited downside risk in theory, and price decline will directly erode the net value of the portfolio. After the introduction of put option, the profit and loss structure of the strategy has fundamentally changed: when the price of the underlying asset rises, investors retain the rising income and only lose the paid option fee; When the price of the underlying asset falls below the strike price, the put option is paid, effectively locking in the maximum loss of the portfolio[3]. This mechanism essentially truncates the return distribution of the portfolio, removes the left tail risk, and transforms the original linear symmetrical risk return characteristics into a nonlinear asymmetric form. In this way, the protection strategy builds a clear risk bottom line for the portfolio without giving up the rising potential, and significantly enhances the impact resistance and holding stability of the portfolio in extreme market environments.

2.3 Theoretical Boundary of Protection Effectiveness Under Different Market Situations

The effectiveness of protection strategy is not constant, and its degree of play is subject to multiple market situational factors, showing a clear theoretical boundary. First, the level of market volatility directly affects the cost and effectiveness of protection. In the high volatility environment, the option fee increases significantly, and the high protection cost may erode the portfolio income. In the low volatility period, the cost performance of protection strategy is relatively improved[4]. Secondly, the direction of market trend is very important. In the continuously rising market, although the strategy can obtain income, it needs to pay the option fee continuously, which is manifested as cost loss; In the volatile market, the protection strategy can effectively avoid the risk of frequent price fluctuations; In the sharply declining market, the protection effect is the most prominent, which can successfully avoid major losses [5]. In addition, the choice of protection period and execution price also constitutes an important boundary condition. If the period is too long, it may face the loss of time value, and if the period is too short, it is difficult to cover the risk exposure period; The level of execution price directly determines the trade-off relationship between protection depth and cost. These theoretical boundaries jointly determine that the protection strategy needs to be dynamically adjusted and optimized in a specific market situation.

3. Functional Positioning of Option Protection Strategy in Risk Management

3.1 Management Logic of Protection Strategy for Portfolio Downside Risk

The management logic of protection strategy for portfolio downside risk is reflected in the paradigm shift from passive risk bearing to active risk management. Traditional portfolio management often relies on asset allocation diversification to reduce non systematic risks, but for the systemic risks caused by the overall market downturn, the diversification strategy often fails. The protective put strategy constructs a clear risk bottom line through option contracts, and its management logic is to convert unpredictable extreme losses into predictable limited costs. For example, suppose an investor holds a CSI 300 index fund with a market value of 1million yuan. In order to prevent the market from falling sharply, he pays a premium of 20000 yuan to buy put options with an exercise price equivalent to 95% of the current index. When the index fell by 20%, although the investor lost 200000 yuan on the spot side, the option side could receive compensation of about 150000 yuan, and the net loss was effectively controlled at about 70000 yuan, which was far lower than the loss of 200000 yuan without protection. The key to this logic is that the protection strategy shifts the focus of risk management from post recovery to pre prevention, so that investors can still maintain their operational concentration in extreme market fluctuations and avoid amplifying losses due to panic selling.

3.2 Theoretical Trade-Off Between Protection Cost and Benefit Smoothing Effect

The core trade-off in the application of protection strategy is the dynamic balance between protection cost and benefit smoothing effect. The protection cost is mainly composed of the option fee, which depends on the strike price, the length of the term, the implied volatility of the market and other factors. From the perspective of income smoothing effect, the protection strategy cuts off the left tail of the

portfolio income distribution, making the net worth curve more smooth and avoiding the sharp retreat of the net worth caused by severe market fluctuations. However, the realization of this smoothing effect is not without cost. For example, if investors continue to carry out rolling protection for a stock portfolio within a year, they will pay about 1% of the option fee every month, and the cumulative protection cost for the whole year will reach 12%. If the stock portfolio only rises by 10% in the current year, the net income after deducting the protection cost is negative; If the market shows a mild upward trend throughout the year, the protection strategy will lose ground to the simple holding strategy due to cost loss. This reveals the essential contradiction between protection cost and benefit smoothing effect: more adequate protection means higher cost expenditure, and excessive protection may erode benefits in a stable market. Investors need to find an appropriate balance in this trade-off according to their own risk preference, income objectives and judgment on the market trend.

3.3 Analysis of Comparative Advantages with Traditional Risk Management Methods

Compared with traditional risk management methods, option protection strategy shows unique comparative advantages in multiple dimensions. Although the traditional stop loss strategy is easy to operate, its implementation depends on the discipline of investors, and it can not be effectively implemented when the market is short and open low, which is prone to the risk of sliding point that the actual stop loss price is far lower than the preset stop loss price. The protection strategy ensures the certainty of the protection effect in any market environment through the legal binding force of the option contract. Compared with the asset allocation diversification strategy, the protection strategy has a targeted preventive effect on systemic risks. Historical experience shows that in the global financial crisis in 2008, the sharp fluctuations of a shares in 2015 and other systemic risk events, even the highly decentralized portfolio is difficult to be independent, while the portfolio using the protection strategy effectively controls the withdrawal range. In addition, compared with the stock index futures hedging, the protection strategy retains the right to participate in the rising earnings, while the futures hedging also locks in the upward earnings while locking in the downward risk, and there are essential differences in the income structure between the two. The asymmetric characteristics of the protection strategy make it more suitable for the dual demands of long-term investors between retaining the rising potential and controlling the downside risk.

3.4 Analysis of Applicable Conditions and Limitations of The Strategy

Option protection strategy is not a universal tool applicable to all countries. Its effective application needs to meet specific applicable conditions, but also has limitations that can not be ignored. From the perspective of applicable conditions, this strategy is most suitable for the scenario where investors are optimistic about the underlying assets for a long time but worry about market fluctuations in the short term, such as investors hold a large number of profitable chips, hoping to keep the floating earnings without missing the potential rising opportunities. In addition, the protection strategy also has high adaptability for institutional investors with low risk tolerance and strict constraints on the maximum withdrawal, such as pension funds and insurance funds. From the perspective of limitations, the primary issue is the continuous expenditure of protection costs. In the long-term volatile or moderately rising market environment, the strategy may face continuous negative income contribution. Secondly, the protection strategy can not prevent non systematic risks at the individual stock level. Put options are only effective for the underlying index or specific stocks. If the portfolio positions are scattered, multiple positions need to be protected separately, and the operation complexity and cost increase significantly. Moreover, the liquidity of options and the standardization of contracts also constitute constraints in practice, and it may be difficult to find a perfect match in the market for non standardized protection needs. When using this strategy, investors need to carefully assess their own situation and market environment to avoid the counterproductive effect of strategy mismatch.

4. Application Path and Optimization Direction of Option Protection Strategy

4.1 Key Elements and Operational Considerations of Strategy Implementation

The successful implementation of the option

protection strategy depends on the accurate grasp and prudent operation of several key elements. The first is the choice of execution price, which is the core variable that determines the depth and cost of protection. Parity options have the strongest protection but the highest cost. The cost of virtual options is low but it needs to tolerate a certain range of decline. Investors need to make a trade-off according to their own risk tolerance. For example, conservative investors may choose to balance cost and protection with the option of 95% strike price, while radical investors may accept 90% strike price to reduce periodic expenses. The second is the setting of the protection period. The longer the period, the lower the single transaction cost but the faster the time value loss. If the period is too short, it will face the operational risk of frequent extension and the accumulation of transaction costs. In addition, the timing and mode of the extension operation are also key. When the market volatility intensifies, early extension may lock in adverse costs, while orderly extension in the stable period will help to control the total cost. Investors also need to pay attention to the liquidity of option contracts to avoid the increase of hidden transaction costs due to too small positions or too large bid ask spread.

4.2 Discussion on Strategy Adaptability Under Different Investment Objectives

The application of option protection strategy needs to match the specific investment objectives of investors, and there are significant differences in the focus and implementation methods of strategies under different goal orientations. For institutional investors whose primary goal is asset preservation, such as pension funds or insurance asset management, the core appeal is to control the withdrawal of net worth and ensure the safety of the liability side. It is appropriate for such investors to adopt sustained protection strategies and choose options with higher strike prices to obtain full protection, even at relatively high costs. For example, a pension holding a large blue chip portfolio can buy parity put options at the beginning of each quarter for rolling protection to ensure that the maximum withdrawal of the portfolio is controlled within the preset range. For investors seeking to enhance their earnings, the protection strategy is more used as a timing tool, which is only used temporarily when anticipating the increase of market risk to avoid continuous cost loss. For individual long-term investors, they can choose key time points such as the financial reporting season and before the release of major policies for periodic protection, so as to prevent the impact of sudden black swan event on long-term compound interest accumulation at a lower cost.

4.3 Dynamic Adjustment Mechanism and Portfolio Management Collaboration

The option protection strategy should not be regarded as a static one-time operation, but should be integrated into the dynamic management framework of the portfolio to achieve organic coordination with the overall strategy of the portfolio. The dynamic adjustment mechanism is mainly reflected in three levels: first, the dynamic adjustment of protection, that is, the proportion of protection is flexibly adjusted according to the market valuation level, volatility index, macroeconomic environment and other leading indicators. When the market valuation is at a historical high and the volatility is at a low level, increase protection; When the market valuation is reasonable and the trend is clear, the protection proportion should be appropriately reduced to save costs. Second, the dynamic optimization of the protection structure can consider building a stepped protection portfolio, such as protecting some positions with parity options and some with dummy options, forming a multi-level risk defense line. Third, it cooperates with Portfolio Rebalancing operations. For example, when rebalancing quarterly or annually, it reviews the effectiveness of protection strategies at the same time, makes extension decisions on options that are about to expire, and adjusts protection targets according to portfolio position changes. This dynamic coordination mechanism makes the protection strategy truly an organic part of portfolio management, rather than an isolated hedging tool.

4.4 Future Development Direction and Practical Enlightenment

Looking ahead, the development of option protection strategy will show a new trend driven by multiple factors, such as the promotion of financial technology, the deepening of product innovation and the popularization of investor education. At the product level, the rich development of structured products provides a more convenient channel for individual investors

to participate in protection strategies. For example, the principal guaranteed structured notes embed put options in the product design, and investors can enjoy the downside protection function without operating the option contract by themselves, reducing the technical threshold for the implementation of the strategy. At the technical level, the intelligent investment advisory system can dynamically generate personalized protection schemes according to investors' risk preference and market environment, and realize real-time optimization of protection costs. At the level of regulation and market construction, the continuous enrichment of options and the improvement of liquidity will further enhance the operability and cost efficiency of protection strategies. For practitioners, the core enlightenment is that the value of protection strategy is not only reflected in avoiding losses, but also in giving investors the ability to maintain a long-term perspective in the market fluctuations and avoid deviating from the established investment plan due to short-term panic. In the future, with the maturity of the derivatives market and the improvement of investors' cognition, the option protection strategy is expected to move from professional institutions to a broader group of investors.

5. Conclusion

As an important tool for portfolio risk management, the core value of option protection strategy is to effectively control downside risk through asymmetric income structure, while retaining the right to participate in the rising potential. From the perspective of theoretical basis, the protection strategy relies on the option pricing theory to construct the market-oriented pricing and transfer mechanism of risk; From the perspective of function orientation, it has unique advantages over traditional methods in terms of systematic risk prevention and income smoothing; From the perspective of practical application, the effective implementation of the strategy needs to accurately grasp the key elements and establish a dynamic adjustment mechanism in coordination with portfolio management. In the future, with the continuous development of derivatives market and the deepening of investors' cognition, option protection strategy will play a more extensive and important role in portfolio risk management.

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