# Portfolio Construction：CPPI Strategy

## 1. Background

Black and Jones (1987) proposed the Constant Proportion Portfolio Insurance strategy, which allows investors to set up their own portfolio insurance based on their individual requirements for asset returns and risk tolerance. The entire portfolio includes active assets and reserved assets. Among the two types of assets, the active assets have the higher risk and higher expected return, and the reserved assets have the lower risk and lower return.For example, in the case of stocks and risk-free assets, active assets refer to stocks, while reserved assets are risk-free assets.

## 2. Constant Proportion Portfolio Insurance

The CPPI strategy, which is the abbreviation of “Constant Proportion Portfolio Insurance”, is a kind of the investment portfolio insurance strategies. The CPPI strategy dynamically adjusts the investment portfolio so that it can not only provide protection against downside risks, but also maximize potential returns. The CPPI strategy allocates assets to low-risk assets such as free-risk assets and risky assets such as stocks to achieve principal security through quantitative asset class allocation. The strategy uses net cash inflows invested in low-risk assets to offset potential losses in the risky asset portfolio, and through investing in risky assets to obtain excess returns.

The basic principle of the CPPI strategy is that firstly calculate the value of the bottom line (define it as F) which is setting by the investor’s risk preference, and then calculate the buffer value exceeding the bottom line, and thereby determine the market value of the investment risk asset, which is the risk exposure of the portfolio. Define that the risk exposure is M times than the buffer value, and thus M is called the risk multiplier and it is usually greater than 1. The investment amount of risky assets shall not exceed the amount of " M \* (total value of the assets - capital protection threshold) ". The flexible adjustment of the risk multiplier M determines the level of the final return rate of the CPPI strategy portfolio. When the minimum insurance limit F is fixed, the greater the risk multiplier M, the greater the risk asset investment ratio. If the performance of risk assets is better, the return rate of portfolio insurance strategy is also greater. Conversely, the portfolio will lose more.

When applying the CPPI strategy, in the initial stage of the capital operation, low M values should be used, which means mainly to invest in risk-free fixed income products, and lightly participate in the investment of equity assets. After obtaining a certain return from the investment of fixed income products, if the net value of the entire product is higher than the initial amount, and the portfolio also has a certain risk tolerance for engaging in risky asset investment, then it means that the entire product can be guaranteed. When the risk asset market is judged to be better, the value of M can be increased. One can reduce the proportion of fixed-income products held and enlarge a certain multiple to invest in equity assets to obtain a higher rate of return. When it is judged that the market situation of risky assets is not good, or there is a certain loss in risky assets, which may endanger the safety of the principal, then one should reduce the value of M, which means that reduce investment in risky assets, and increase investment in low-risk fixed-income products, so as to ensure that the security of the principal will not be compromised.

## The Formulation of CPPI

Formulation 1 :

Formulation 2:

where is the total amount of the assets during all the t periods, is the amount invested in the risk-free assets, is the amount invested in the risky assets, is the minimum insurance amount, and M is the risk multiplier.