CPPI – constant proportion portfolio insurance: protection with dynamic allocation control

It is well known that the largest part of a portfolios return derives from the decision, in which asset class to invest (allocation). The selection and the timing of the individual investments contribute rather marginally in this context. This essay explores advantages and drawbacks of the asset allocation controlling CPPI strategy.

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Particularly in times of high market volatility or after a bull market, investors may seek protection for their investments. *Portfolio insurance concepts* discuss management techniques to protect a portfolio against losses, i.e. to control the market (systematical) risk whereas the specific risk of individual investments is contained by diversified investments. Black/Perold and Black/Jones first described the constant portfolio protection insurance (CPPI) concept in 1982 and 1987, which led to a certain popularity. However, they were eclipsed by the continuing bull market in the 90s and the altered risk perception of the market participants.

Portfolio insurance aims to participate in rising markets and to limit the losses when markets are declining, having asymmetrical return distribution. Structured products with capital guarantee do the same by typically investing in zero bonds and derivatives. CPPI does not need the use of derivative instruments to obtain similar results.

CPPI divides a portfolio into risky and riskless (or low-risk) assets and manages the portfolio depending on the development of the risky asset. It is a proactive strategy. Two parameters are specified: a constant multiplier and the value of the portfolio which should not be breached (floor). Then the amount which is invested in a risky asset is determined by the product of the multiplier and the excess of the portfolio over the floor (cushion). The remaining difference of the portfolio value and the asset exposure is invested in an asset with little risk. If the risky asset increases in value, the excess over the floor increases as does the allocation of the portfolio in the risky asset due to the constant multiplier. Consequently, the allocation in risky assets is lowered in falling markets, approaching zero when the value of the portfolio comes close to the floor. Reallocations are done as a function of the market's development, not of the elapsed time.

Advantages of the CPPI strategy

- *Very transparent* – In contrast to options-based portfolio insurance strategies the investor always has a very transparent overview of the investments.
- *Straightforward* – CPPI explicitly rules out market timing and is quite simple to apply. There is no need for extensive research on companies and markets.
- *Flexible* – Floor and multiplier can be arbitrarily chosen and changed at any time. However, it should be avoided to use this flexibility too extensively in order not to dilute the CPPI strategy.
- *Profits can be locked in* – With the use of a ratchet strategy, the floor can be increased after market rises.
- *Strategy can be terminated at any time* – As derivatives are not used, the investments can be sold at any time. Also, the protection runs during the whole time and not only to a certain redemption date.

Drawbacks of the CPPI strategy

- *Protection can be breached in the event of a market crash* – If there is a sudden drop in the market such that the investor is not able to rebalance his portfolio adequately, the floor can be breached. The multiplier determines the amount of market loss permissible, being its reciprocal value. With a multiplier of 5, the market would be allowed a 20% overnight drop, which is unlikely but not impossible.
- *Cashing out effect* – The exposure to the risky asset reaches zero as the portfolio approaches the floor. If this happens shortly after the initial investment, re-entering the stock market can be difficult if not impossible.

Costs

Transaction costs may be high as the revision interval becomes shorter due to high multipliers or volatile markets. Usually, a fixed fee comprising transactions, custody and management is agreed in contrast to options-based insurance strategies, where a comparatively high premium has to be paid at the beginning of the term including the time value of the options.

Backtesting

We tested the CPPI strategy with the following data: the risky asset is the SMI on a weekly basis, the low-risk asset is the "Citigroup WGBI All Maturities CHF"; the floor was set at 95%, the multiplier at 4, and an all-in fee of 1.5% p.a. was applied. Starting on December 31, 1989 and ending on December 31, 2005, the CPPI had a return similar to the stock market but with less volatility. The reason for this very good result comes from the bear market 2000 to 2003 in which the CPPI strategy worked pretty well. In particular, the chart on the previous page shows that the stock quota was reduced to nil during that period and no cashing-out occurred after the market resurged. The reason for this was, that the part invested in the low-risk asset produced interest as well as performance which fed the cushion. On the other hand, as this asset class was not completely risk free, the floor was breached when both SMI and bonds were negative. This effect, however, was rather marginal. The floor is successively adjusted upwards in times of market advances in the sense of a ratchet strategy. This is one of the main reasons that volatility can be reduced and that attractive returns can be produced over time. The dispersion of weekly returns meets our expectations.

Conclusion

Backtesting shows that a CPPI strategy can lead to a better risk-return ratio by controlling the allocation of a portfolio. In any case, the insurance results were achieved. They show that CPPI is a valid alternative to static, options-based portfolio insurance when managing a portfolio, particularly over a long period of time. It would be interesting to see the effect of increasing the maximum allowable exposure to over 100% of the value of the portfolio under the ratchet strategy. Leverage of the risk-free or low-risk asset would have to be allowed for this modification of the strategy. Volatility would most probably be higher. Whether it would lead to a better risk-return ratio remains to be reviewed.