

STUDY ON THE LONG-TERM RATE OF RETURN WHEN HOLDING RISK ASSET

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ABSTRACT. *This paper uses the Monte Carlo method to randomly simulate the rate of return series, and then studies the characteristics of the long-term investment rate of return and its variance. The computing results show that, when compared with the short-term rate of return and its variance, both the long-term rate of return and variance decrease with the increasing of investment term; and when the short-term rate of return is a relatively minor positive value, the long-term rate of return might be significantly negative. In addition, this paper also studies the long-term rate of return and variance with stop-loss strategy, and the results showed that the stop-loss strategy improve the long-term investment rate of return greatly. The relation between the distribution of short-term rate of return and that of long-term rate of return is complicated, it is improper to directly and blindly judge the long-term rate of return and variance only according to the distribution of short-term rate of return.*

Keywords: Short-term rate of return, Long-term rate of return, Monte Carlo method, Risk assets, Investment

1. Introduction. People are familiar with the relation between short-term rate of return and long-term rate of return, and the computing formula of long-term rate of return is extensively used in the calculation of average growth rate, bank compound interest and pricing of premium in the insurance actuary. As we have known, the long-term rate of return is the geometric mean of all short-term rates of return, and the arithmetic mean of all short-term rates of return is considered as the expectation of short-term rate of return. In the analysis of investment, people are accustomed to measure the return level by the expectation of short-term rate of return, and measure the uncertainty (risks) of investment returns by the variance of short-term rate of return. However, when investors plan to invest in a relatively long period continuously, it is blindly and error-prone to judge the long-term rate of return and variance of risk asset based on the expectation and variance of their short-term rate of return. It is very difficult to compute the rate of return and variance of long-term investment, when the historical data are not sufficient or comparability of the data is not high enough. As we know, the short-term rate of return is random, so the rate of return of successive investment in a certain period is also random, and there is no simple theoretical formula expressing the relation between the short-term rate of return and variance and long-term rate of return and variance. For example, assume that the annual rate of return of some asset is 10%, its standard deviation is 0.35, and the return obeys the approximate normal distribution. Without careful calculation, people will think that the average annual rate of return of holding this asset for a long period might be close to 10%, and just the long-term rate of return has a higher uncertainty. However, the real computing results show that when the holding