ABSTRACT

In this paper, we model asset returns as a Markov switching processes to capture important features such as heavy tails, persistence, and nonlinear dynamics. We compute the probability distribution function of $h$–period-ahead simple and aggregate returns, which we use to approximate the Value-At-Risk (VaR). Because the VaR approximation under a Markov switching model requires numerical methods, we also propose an upper bound on the $h$–period-ahead VaR that is very easy to calculate. We derive a closed-form solution for the $h$–period-ahead Expected Shortfall risk measure and we characterize the mean-variance dynamic efficient frontier of the simple and aggregate linear portfolio. Using daily observations on S&P 500 and TSE Index futures contracts, we find that the efficient frontier of the $h$–period-ahead optimal portfolio is time varying, and in 73.56% of the sample the conditional optimal portfolio performs better then the unconditional one. However, when we lengthen the horizon $h$, the performance and the efficient frontier of the conditional optimal portfolio converge to those of the unconditional one.

JEL Classification: C22, C52, G19

Keywords: Markov switching model; characteristic function; probability distribution; Value-At-Risk; Expected Shortfall; simple return; aggregate return; upper bound VaR; Mean-Variance portfolio.