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Abstract

This paper provides an insight to the time-varying dynamics of the shape of the distribution of financial return series by proposing an exponential weighted moving average (EWMA) model that jointly estimates volatility, skewness and kurtosis over time using a modified form of the Gram-Charlier density in which skewness and kurtosis appear directly in the functional form of this density. In this setting, Value-at-Risk (VaR) can be described as a function of the time-varying higher moments by applying the Cornish-Fisher expansion series of the first four moments. An evaluation of the predictive performance of the proposed model in the estimation of 1-day and 10-day VaR forecasts is performed in comparison with the historical simulation, filtered historical simulation and generalized autoregressive conditional heteroscedasticity (GARCH) model. The adequacy of the VaR forecasts is evaluated under the unconditional, independence and conditional likelihood ratio tests as well as Basel II regulatory tests. The results presented have significant implications for risk management, trading and hedging activities as well as in the pricing of equity derivatives.

Keywords: Exponential weighted moving average ▪ time-varying higher moments ▪ Cornish-Fisher expansion ▪ Gram-Charlier density ▪ risk management ▪ value-at-risk

JEL: C51, C52, G53, G15

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