

SÉMINAIRE DE MATHÉMATIQUES ACTUARIELLES ET FINANCIÈRES

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A Geometric Framework for Covariance Dynamics

This paper proposes a new approach to modeling covariance dynamics by employing methods of differential geometry. Our approach respects intrinsic geometric properties of covariance space and allows economically meaningful modeling of covariance dynamics. We develop covariance models that utilize either asset returns or realized covariances and propose new parameter estimation and performance evaluation methods. Empirical studies suggest that our models outperform existing models and realized covariance-based models outperform return-based ones. We also show that the time-series variation of a covariance matrix can be identified by a small number of principal components, implying potential for a parsimonious specification of covariance dynamics.

This paper is joint work with Frank C. Park (Seoul National University)