

# On Estimating and Filtering Time-Changed Lévy Processes

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## Abstract:

This paper applies the Bates (Review of Financial Studies, 2006) methodology to the problem of estimating and filtering time-changed Lévy processes, using daily data on stock market returns over 1953-2006. In contrast to density-based filtration approaches, the methodology recursively updates the associated conditional characteristic functions of the latent variables. The specific application is primarily focused on using various time-changed Lévy process specifications to capture stochastic volatility, the “leverage” effect, and the substantial outliers occasionally observed in stock market returns. The paper also presents evidence that the autocorrelation of stock market returns varies substantially over time, necessitating an additional latent variable when analyzing older data on stock market returns.