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Wavelet-Based Equity VaR Estimation

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Abstract
Economic risk analysis has two dimensions: time and frequency. Asset return varies by time because of economic cycles and economic structural changes. Risk is higher during economic recessions and smaller during economic expansions. In addition, different economic structures may exist at different time scales. Risk measures calculated based on daily, weekly, monthly and yearly historical data can be very different. The appropriate frequency depends on the time horizon of the analysis. Therefore, it is important to measure economic risk at both the time level and the frequency level. However, time series analysis and statistical analysis that have been widely adopted in economic risk analysis focus on only one of the two dimensions.

In this paper, wavelet models are used to enhance both time-invariant analysis and time-variant analysis. Wavelet models can systematically analyze risk by time and frequency and provide richer information than time series models. Using wavelet models, risk measurement can easily be adjusted based on time horizon in a consistent way. Equity VaR estimation is selected to demonstrate the application of wavelet analysis in risk management.