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A Model of Stochastic Beta With Stochastic Volatility

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Abstract

A large empirical literature finds that firms' loadings on systemic risk, or betas, change through time. We propose a model where both beta and volatility follow stochastic, mean-reverting processes (SVB). Using Bayesian methods, we estimate the model across industry portfolios and the cross-section of individual stocks. Model-selection criteria suggest both stochastic beta and stochastic volatility are important features. When including stochastic volatility, we find beta to be much more persistent compared to other studies. We demonstrate the model fit in cases when we know beta changes (corporate restructurings) and during periods of extreme increases in volatility. Unlike the stochastic beta model (SB), the SVB model beta estimates do not "chase" returns during high volatility periods, producing more persistence in beta.

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