

Structural GARCH: The Volatility-Leverage Connection*

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Abstract

We propose a new model of volatility where financial leverage amplifies equity volatility by what we call the “leverage multiplier”. The exact specification is motivated by standard structural models of credit; however, our parametrization departs from the classic Merton (1974) model and is, as we show, flexible and accurate enough to capture environments where the firm’s asset volatility is stochastic, asset returns can jump, and asset shocks are non-normal. As a result, our model also provides estimates of daily asset returns and asset volatility. In addition, our specification nests both a standard GARCH and the Merton model, which allows for a simple statistical test of how leverage interacts with equity volatility. Empirically, the Structural GARCH model outperforms a standard asymmetric GARCH model for approximately 74% of the financial firms we analyze. We then apply the Structural GARCH model to two empirical applications: the leverage effect and systemic risk measurement.

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