

# Financial Risk Management with Bayesian Estimation of GARCH Models: Theory and Applications\*

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ISBN 978-3-540-78656-6

doi 10.1007/978-3-540-78657-3

stable URLs

<http://www.springer.com/economics/econometrics/book/978-3-540-78656-6>

<http://www.springerlink.com/content/978-3-540-78656-6>

## Summary

This book presents in detail methodologies for the Bayesian estimation of single-regime and regime-switching GARCH models. These models are widespread and essential tools in financial econometrics and have, until recently, mainly been estimated using the classical Maximum Likelihood technique. As this study aims to demonstrate, the Bayesian approach offers an attractive alternative which enables small sample results, robust estimation, model discrimination and probabilistic statements on nonlinear functions of the model parameters.

The first two chapters introduce the work and give a short overview of the Bayesian paradigm for inference. The next three chapters describe the estimation of the GARCH model with Normal innovations and the linear regression models with conditionally Normal and Student-*t*-GJR errors. For these models, we compare the Bayesian and Maximum Likelihood approaches based on real financial data. In particular, we document that even for fairly large data sets, the parameter estimates and confidence intervals are different between the methods. Caution is therefore in order when applying asymptotic justifications for this class of models. The sixth chapter presents some financial applications of the Bayesian estimation of GARCH models. We show how agents facing different risk perspectives can select their optimal VaR point estimate and document that the differences between individuals can be substantial in terms of regulatory capital. Finally, the last chapter proposes the estimation of the Markov-switching GJR model. An empirical application documents the in- and out-of-sample superiority of the regime-switching specification compared to single-regime GJR models. We propose a methodology to depict the density of the one-day ahead VaR and document how specific forecasters' risk perspectives can lead to different conclusions on the forecasting performance of the MS-GJR model.

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\*PhD thesis presented under the title *Bayesian Estimation of Single-Regime and Regime-Switching GARCH Models: Applications to Financial Risk Management* to the Faculty of Economics and Social Sciences at the University of Fribourg Switzerland in fulfillment of the requirements for the degree of Doctor of Economics and Social Sciences. A copy of the PhD thesis is available from <http://opac.rero.ch/gateway?skin=fr&lng=en>.

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