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GARCH models in Risk Management. MEASURING VOLATILITY

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Title:	GARCH models in Risk Management. MEASURING VOLATILITY
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Abstract:	The objective of this chapter is to examine the ARCH family of volatility models and its use in risk analysis and measurement. An overview of unconditional and conditional volatility models is provided. The former is based on constant volatilities while the latter uses all information available to produce current (or up-to-date) volatility estimates. Unconditional models are based on rigorous assumptions about the distributional properties of security returns. While the conditional models are less rigorous and treats unconditional models as a special case. In order to simplify the VaR calculations unconditional models are make strong assumptions about the distributional properties of financial time series. However the convenience of these assumptions is offset by the overwhelming evidence found in the empirical distribution of security returns, e.g. fat tails and volatility clusters. VaR calculations based on assumptions that do not hold underpredict uncommonly large (but possible) losses. In this chapter we will argue that one particular type of conditional model (ARCH/GARCH family)provide more accurate measures of risk because they capture the volatility clusters present in the majority of security returns. A comprehensive review of the conditional heteroskedastic models is provided. This is followed by an application of the models for use in risk management. This shows how the use of historical returns of portfolio components and current portfolio weights can generate accurate estimates of current risk for a portfolio of traded securites. Finally, the properties of the GARCH family of models are treated rigiously in the Appendices at the end of the document.