Volatility models and risk management

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2 Objectives

The objective of the course is to give a broad introduction and overview of the field of volatility models and its various applications in asset pricing and risk management. Students will learn theoretical properties of the models, estimation techniques, as well as testing and forecasting procedures. Numerous empirical examples illustrate the theoretical concepts.

3 Contents

1. Introduction
2. Volatility clustering
3. GARCH
   (a) Properties
   (b) Estimation
   (c) Testing and forecasting
   (d) Extensions
   (e) Applications of unvariate GARCH
   (f) Multivariate GARCH

(g) Applications of multivariate GARCH

4. Stochastic Volatility

5. Realized Volatility

4 Background literature

A. Monographs

– Bauwens, L., Hafner, C.M. and Laurent, S. (2012) *Volatility Models and Their Applications*, Handbook in Financial Engineering and Econometrics, Wiley.

– Campbell, J.Y., Lo, A.W. and MacKinlay, A.C. (1997) *The econometrics of financial markets*, Princeton University Press.

– Francq, C. and Zakoian, J.-M. (2010) *GARCH Models*, Wiley.

– Franke, J., Härdle, W. and Hafner, C.M. (2011) *Statistics of financial markets*, 3rd ed., Springer.

– Shephard, N. (2005) *Stochastic volatility – Selected readings*, Oxford University Press.

B. Review papers

– Bauwens, L., Hafner, C.M. and Laurent, S. (2012) Volatility Models, in: L. Bauwens, C.M. Hafner and S. Laurent (Eds.), *Handbook of Volatility Models and Their Applications*, Wiley (2012), Chapter 1, p.1-45.

– Bauwens, L., Laurent, S. and Rombouts, J. (2006) Multivariate GARCH Models: A Survey, *Journal of Applied Econometrics*, 21, 79-109

– Hafner, C.M. (2009) GARCH modelling, in: *Encyclopedia of Complexity and System Science*, ed. by R.A. Meyers, Springer Verlag, Vol.4, 4114–4133.

– Silvennoinen, A. and Teräsvirta, T. (2008) *Multivariate GARCH Models*, in: Andersen, T.; Davis, R.; Kreiss, J.-P. and Mikosch, T. (Eds.) Handbook of Financial Times Series, Springer, 201-229.