Developments in Measuring and Modeling Financial Volatility

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In this thesis we present developments in measuring and modeling financial volatility. From the econometric point of view, the stochastic volatility jump diffusion process creates new challenges. It is important to measure and model time-varying volatility robustly to jumps in asset prices. But it is also of great interest to test for the presence of jumps and to differentiate the price variation due to jumps from that to the continuous sample path as both have very different implications in financial economics. These two concerns outline effectively the central focus-point of this thesis. The content of this thesis consists of four independent research papers and it quite naturally falls into two parts. Chapters 2 and 3 focus on direct volatility measurements based on high-frequency data. Chapters 4 and 5 both address modeling of financial volatility, in particular the aim is to model the time-varying dependence of multiple assets. Each chapter is self-contained, has its own notation and can be read independently. Each chapter is preceded with an abstract that highlights major developments and findings. We discuss why standard statistical methods may not be sufficient for providing good and reliable volatility estimates, and we point out where the methods of this thesis promise to provide better results. The novelty and contribution of the method are discussed separately in the individual chapters, where we relate our research results to existing alternative approaches.