

A nonparametric approach to the unconditional distribution of volatility

Simone Alfarano ^{a,c}, Mishael Milaković ^a, Friedrich Wagner ^b

^a*Department of Economics, University of Kiel*

^b*Department of Physics, University of Kiel*

^c*Center for Numerical Simulations, University of Kiel*

Abstract

The stochastic volatility decomposition (SV hereafter) of financial returns defines the returns as a product of two random variables, namely a noise term η and a positively correlated volatility σ . This decomposition reproduces the empirically identified positive correlation of simple return transformations (for instance absolute or squared returns) and the absence of correlation in raw returns. The latter is often interpreted as an imprint of market efficiency. Given the SV decomposition, the two stochastic variables η and σ are latent factors, since the only directly measurable quantity is their product. Therefore, it is the joint contribution of η and σ that determines the conditional and unconditional properties of financial returns under the SV decomposition. In our paper, we propose a non-parametric method to determine the functional form of the unconditional distributions of the volatility factor σ , denoted as $p(\sigma)$. The non-parametric nature of the method consists in extracting information about the probability density of the variable σ , without making any parametric assumptions about the stochastic process for the noise term in the SV decomposition.

Key words: Stochastic Volatility, Non-parametric method, Method of moments.
