On the Markov Switching GARCH: a Brief Introductory

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Abstract

This paper describes briefly about GARCH with regime switching (SW-GARCH) following Markov Chain property. This approach accounts for jumps between volatility regimes which useful to detect some change of policies during the time horizon are running. To show the work of the employing this approach, an implementation through Unilever stock data has been tried. The results show that the data follow the change between two regimes with probability accordingly.

Keywords: GARCH, SWGARCH, Markov Switching Regime, Return

1. Introduction

Time series of asset's return often exhibits the so called effect of "volatility clustering", that is, the periods of high (low) volatility are followed by the periods of high (low) volatility. A well known model to describe such volatility is ARCH-GARCH proposed firstly by Engle (1982) and Bollerslev (1986). ARCH-GARCH has been claimed to be able to describe volatility and predicts it as a part of asset's return decision making. Most of ARCH-GARCH papers published by researchers give better result in volatility prediction rather than the classic econometric models. These models, however cannot detect the transition between the change of low volatility and high volatility regimes, and do not account for jumps in returns, while practitioners need this capability to improve their decision making.

Hamilton (1994) has proposed an alternative method which able to identify and to model data with some mean jumps using Markov switching approaches applied to autoregressive model. This success, however, still cannot explain the volatility. It is because autoregressive is generally only represents a mean model, not its volatility. To overcome this need, a proposed model called Markov switching to ARCH (SWARCH) has been published by Hamilton and Susmel (1994) and Cai (1994). SWARCH has been demonstrated in supporting an asset's return decision making, especially stock market index (Dueker (1997), Yuan (2000), and Chen (2000)).

More general model of SWARCH proposed firstly by Dueker (1997) and improved by Marcucci (2001) is called a switching GARCH (SWGARCH) model. Both researchers