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## **ANALYSIS OF VOLATILITY AND CONTAGION IN HEDGE FUND STRATEGIES**

### **Abstract:**

Hedge funds are often said to be potentially amplify market volatility. They are generally free to change their dynamic trading strategies as market conditions evolve. This flexibility is a distinctive feature that delivers hedge fund returns, independent broad market trends. However, the benefit of diversification for investing hedge funds has been questioned, especially during the financial crises.

The objective of this paper is to investigate the volatility of hedge fund strategies focusing on the tail event behavior. Our empirical questions are whether and what extent hedge fund strategies react similarly or differently. Our research targets are to detect the short-lived crises and to examine the contagion among hedge fund strategies during the financial crisis of 2007-2009. This analysis employs the ARMA-GARCH-type models and the Markov Regime-switching model by using the daily data of the HFRX Global Hedge Fund Index from March 31, 2003 to March 16, 2017, in which four principal strategies are selected. Four hedge fund strategies indices have peculiar characteristics of statistical properties-that is, serially correlated, volatility clustered returns and their return distributions are heavy-tailed and negatively skewed.

At first, the ARMA-GARCH, GJR and EGARCH models are examined and compared with each other. The ARMA-GJR model is selected for four primary strategies and reveals that Equity Hedge, Event Driven and Relative Value Arbitrage have the leverage effect and only Macro/CTA shows the opposite asymmetric impact of the shock on volatility. However, the ARMA-GJR model fails to capture hedge fund tail event behavior.

Next, this paper applies the Markov Regime-switching Model by distinguishing three regimes with different volatility levels and highlights the high-volatility state for focusing hedge fund tail events. We find that the persistence of the high volatility state yields an extra source of volatility persistence compared to the ARMA-GJR model in describing substantial volatility clustering during the financial crisis. After that, we estimate the summed, and the joint probabilities of all four strategies being in the high volatility state to consider the impact of the hedge fund sector on systemic risk developed in Chan, Getmansky, Hass, and Lo, (2005). Our estimates reveal that the contagion among all hedge fund strategies happened only during the financial crisis of 2007-2009 for the sample period and the spikes in the joint probabilities coincide with the short-lived crises: the Quant Meltdown of August 2007, the collapse of Bear Stearns of March 2008, and the Lehman Brothers' bankruptcy of August 2008.

### **Keywords:**

Hedge funds; Contagion; Financial crises; ARMA-GARCH modeling, Regime-switching model.

**JEL Classification:** C58, G01, C24