Integrated AR and ARCH processes and the FIGARCH model: origins of long memory

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Although the properties of the ARCH(∞) model are well investigated, the existence of long memory FIGARCH and IARCH solution was not established in the literature. These two popular ARCH type models which are widely used in applied literature, were causing theoretical controversy because of the suspicion that other solutions besides the trivial zero one, do not exist. Since ARCH models with non-zero intercept have a unique stationary solution and exclude long memory, the existence of finite variance FIGARCH and IARCH models and, thus, the possibility of long memory in the ARCH setting was doubtful. The present paper solves this controversy by showing that FIGARCH and IARCH equations have a non-trivial covariance stationary solution, and that such a solution exhibits long memory. The existence and uniqueness of stationary Integrated AR(∞) processes is also discussed, and long memory, as an inherited feature, is established. Summarizing, we show that covariance stationary IARCH, FIGARCH and IAR(∞) processes exist, their class is wide, and they always have long memory.