Mixture Inverse Gaussian for Unobserved Heterogeneity in the Autoregressive Conditional Duration Model

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Abstract

In this paper we assume that the duration of a process has two different intrinsic components or phases which are independent. The first is the time it takes for a trade to be initiated in the market (for example, the time during which agents obtain knowledge about the market in which they are operating and accumulate information, which is coherent with Brownian motion) and the second is the subsequent time required for the trade to develop into a complete duration. Of course, if the first time is zero then the trade is initiated immediately and no initial knowledge is required. If we assume a specific compound Bernoulli distribution for the first time and an inverse Gaussian distribution for the second, the resulting convolution model has a mixture of an inverse Gaussian distribution with its reciprocal, which allows us to specify and test the unobserved heterogeneity in the autoregressive conditional duration model (ACD).

Our proposals make it possible not only to capture various density shapes of the durations but also easily to accommodate the behaviour of the tail of the distribution and the non?monotonic hazard function. The proposed model is easy to fit and characterises the behaviour of the conditional durations reasonably well in terms of statistical criteria based on point and density forecasts.