

Empirical stochastic time change variable of equity returns with high frequency data

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Abstract

This study empirically identifies the time change variable that is used to recover normality of stock returns using a concept of stochastic time change process. Though it is well-known that equity returns distribution exhibits non-normality properties, empirical studies using the time change concept are very limited. Clark (1973) provides a linkage between physical time interval asset returns and subordinated stochastic time change process which assumed to be log-normally distributed and identifies the trading volume as the proxy for time change process. Ane and Geman (2000) do not specify the distribution of the time change process but derive the time change variable through moment matching method. The moment comparison results show that the cumulative number of trades is the better proxy for the time change variable and the conditional returns on cumulative number of trades shows normality properties. This study applies the similar method as Ane and Geman (2000) to high frequency data of seven stocks from various industries with different characteristics traded on Tokyo Stock Exchanges during January to February 2011. We show that both volume and number of trades are not appropriate proxies of stochastic time change variable.

Reference

- Ane, T. and H. Geman (2000), "Order flow, transaction clock, normality of asset returns," *Journal of Finance* vol. 55, no. 5, 2259-2284.
- Clark, P.K. (1973), "A subordinated stochastic process model with finite variance for speculative prices," *Econometrics*, vol. 41, no. 1, 135-155.