MELBOURNE CENTRE FOR FINANCIAL STUDIES

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ANALYZING THE SPECTRUM OF ASSET RETURNS: JUMP AND VOLATILITY COMPONENTS IN HIGH FREQUENCY DATA, PROF YACINE AIT-SAHALIA, OTTO A. HACK'03 PROFESSOR OF FINANCE AND ECONOMICS AND THE DIRECTOR OF THE BENDHEIM CENTER FOR FINANCE AT PRINCETON UNIVERSITY

Practitioner Synopsis

Dr Laurence Irlicht, Industry Funds Management, The Q Group

Prof. Ait-Sahalia of Princeton University provided a very interesting presentation on a technique for decomposing high frequency asset returns into a number of components - continuous movement, small jumps and large jumps.

The methodology involves investigating the asymptotic properties of a particular measure of asset returns at different sampling frequencies, and inferring the existence and relative strength of the components listed above.

He provided a very useful analogy comparing this methodology to that of spectroscopic analysis of a star. You get the light from the star, and a frequency analysis shows the existence of hydrogen, helium and other elements. Similarly, by adjusting the parameters of their measure, they can measure the relative important of the components of a particular asset's price movements over some sample of time.

The measure looks at differences in log stock prices at some sampling rate, raised to a particular power (p), and where they truncate those differences to a particular cut-off. Clearly, when p is high the measure will put more emphasis on larger moves (jumps) and the converse when it is low. By changing the cut-off point they can test for the existence of jumps of different sizes. Finally, changing the sampling frequency provides information on the convergence of the variations.

It is a very interesting approach, and made very accessible by the fact that they have kindly made available MATLAB code which implements their approach at http://www.princeton.edu/~yacine/research.htm.

Key Points

1. High Frequency Asset Returns can exhibit continuous and jump components. The technique presented allows the identification and characterisation of such components. The empirical results indeed indicate that jumps are present in the data along with a continuous component.

2. This has implications for trading and risk analysis at high frequencies. A better understanding of the amount to which (and ways in which) prices exhibit jumps may lead to better risk estimates and better trading algorithms.

3. Once these dynamics are estimated for an asset of interest, it would also be interesting to infer the magnitude and type of implications which may arise over a lower measurement frequency.