STATISTICS DEPARTMENT  SEMINAR

TITLE: **Long-Memory and Aggregation**

SPEAKER: Kung-Sik Chan
Dept. of Statistics & Actuarial Science
The University of Iowa

TIME: 4:00 P.M.

DATE: Wednesday, April 9, 2008

ROOM: 140 BARDEEN

ABSTRACT:

Many time-series data are found to be of long-memory, i.e. the autocorrelation function of the underlying process is not absolutely summable and the spectral density function admits some pole. If a pole occurs at a frequency other than zero, then the process is said to be of seasonal long-memory whereas if the only pole occurs at frequency zero, t is said to be of regular long-memory. The long-memory property implies a different scaling behavior for the sample mean and some other statistics than the case of iid or short-memory data, which has important bearings on practice.

Time-series data with regular and/or seasonal long-memory are often aggregated before analysis. Often, the aggregation scale is large enough to remove any short-memory components of the underlying process but too short to eliminate seasonal patterns of much longer periods. In this talk, we discuss the limiting correlation structure of aggregate time series within an intermediate asymptotic framework that attempts to capture the aforementioned sampling scheme. In particular, we study the autocorrelation structure and the spectral density function of aggregates from a discrete-time process. The underlying discrete-time process is assumed to be a stationary Seasonal AutoRegressive Fractionally Integrated Moving-Average (SARFIMA) process, after suitable number of differencing if necessary, and the seasonal periods of the underlying process are multiples of the aggregation size. We derive the limit of the normalized spectral density function of the aggregates, with increasing aggregation. The limiting aggregate (seasonal) long-memory model may then be useful for analyzing aggregate time-series data, which can be estimated by maximizing the Whittle likelihood. We prove that the maximum Whittle likelihood estimator is consistent and asymptotically normal, and study its finite-sample properties through simulation. The efficacy of the proposed approach is illustrated by a real-life internet traffic example.

Coffee and Cookies at 3:30 p.m. in Room 1210 MSC