

Stanford University
Department of Statistics

DEPARTMENTAL SEMINAR

4:30pm, Tuesday, March 5, 2019
Sloan Mathematics Center Room 380C

Refreshments served at 4pm in Sequoia Lounge.

Speaker: Bernard Silverman
Professor of Modern Slavery Statistics, University of Nottingham,
Emeritus Professor of Statistics, University of Oxford

Title: **Multiple Systems Estimation and
the Quantification of Modern Slavery**

Abstract:

Multiple Systems Estimation is a key estimation approach for hidden populations such as the number of victims of Modern Slavery. The UK Government estimate of 10,000 to 13,000 victims was obtained by a multiple systems estimate based on six lists. A stepwise method was used to choose the terms in the model.

Further investigation shows that a small proportion of models give rather different answers, and that other model fitting approaches may choose one of these. Three data sets collected in the Modern Slavery context, together with a data set about the death toll in the Kosovo conflict, are used to investigate the stability and robustness of various Multiple Systems Estimate approaches. The crucial aspect is the way that interactions between lists are modelled, because these can substantially affect the results.

I will describe two methodological approaches. A Markov Chain Monte Carlo Bayesian approach gives robust and stable results at least for the examples considered. Looking a bit deeper, this problem is an example of sparse contingency tables and, as has been noted by Rinaldo and Fienberg, for example, standard generalised linear model packages do not properly check for the existence and uniqueness of maximum likelihood estimators. The Multiple Systems Estimation context provides an example of how to handle this issue properly.