

The Hong Kong University of Science and Technology
Department of Information Systems,
Business Statistics and Operations Management

Seminar Announcement

*Selfish Drug Allocation for Containing an International
Influenza Pandemic at the Onset*

by

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Date: Friday, 8 January 2010

Time: 11:00 – 12:30 pm

Venue: Room 4379, ISOM Conference Room (Lift 17/18)

~~~~~ All interested are welcome ~~~~~

**Abstract:**

Recent epidemiologic studies have suggested that the prophylactic use of antiviral drugs could slow down the spread of an influenza epidemic. Since drug stockpiles are presently scattered in different countries, the outbreak of an epidemic gives rise to a game in which each country must make decisions about how best to allocate its own stockpile in order to protect its population. We develop a two-period multivariate Reed-Frost model to represent the spread of the epidemic within and across countries at its onset. We consider the first two periods only to mimic the exponential growth of an epidemic in its early stage, while keeping the model tractable. Preliminary numerical studies suggest that insights from the two-period model hold in general when considering the entire time horizon. Our model captures three critical sources of uncertainty: the number of initial infections, the spread of the disease, and drug efficacy. We show that for small probabilities of between-country infections, the underlying game is supermodular, Nash equilibrium exists and there is a unique one that is Pareto optimal among all existing equilibria. Further, we identify sufficient conditions under which the optimal solution of a central planner (such as the World Health Organization) constitutes a Pareto improvement over the decentralized equilibrium, suggesting that countries should agree on an allocation scheme which would benefit everyone. By contrast, when the central planner's solution does not constitute a Pareto improvement, minimizing the total number of infected persons globally requires some countries to sacrifice part of their own population, which raises intriguing ethical issues.

**Biography:**

Liu Yang is a Ph.D. candidate in Decision Sciences at the Fuqua School of Business at Duke University. Her research interests center on applying operations research methods and economic theory in health care systems as well as behavioral operations management. Liu Yang completed her MS in High Performance Computing at Singapore-MIT-Alliance in 2004, and her BS in Electrical Engineering at Tsinghua University, China in 2003.