

## **Research Highlight: Economic equilibrium and conditional expectation of correspondences**

### **Work of Professor SUN Yeneng**

A stochastic game models repeated interactions of players through stage games which vary with some publicly observable states. It was first studied by Nobel Laureate Lloyd Shapley in 1953. The most fundamental solution concept in stochastic games is stationary Markov perfect equilibrium, which requires the players to use only time-independent strategies relying on the current state instead of the entire past history of states and action profiles. However, such equilibria may not exist under a general state space.

Prof SUN Yeneng and his coauthor HE Wei (Ph.D from NUS in Mathematics in 2014) propose a general condition of “(decomposable) coarser transition kernels”, and show the existence of stationary Markov perfect equilibrium. To prove the existence result, they adopt a remarkably simple approach by establishing a connection between stochastic games and conditional expectation of correspondences. They also characterize various properties for conditional expectation of correspondences and apply the results to economics.

#### **References:**

W. He and Y. N. Sun, Stationary Markov perfect equilibria in discounted stochastic games, *Journal of Economic Theory* 169 (2017), 35-61.

W. He and Y. N. Sun, Conditional expectation of correspondences and economic applications, *Economic Theory* (2017), published online.