

# Online Seminar

# A Zero-Sum Game Approach to Solving Distributionally Robust Inventory Models



**Dr. Erick Li**

**The University of Sydney**

**Date: 01 September 2021 (Thursday)**

**Time: 10: 00 - 11: 30**

**Link:**

<https://cityu.zoom.us/j/99190853093?pwd=THJHN2N1MTEzdVJZcU0yQkRmUmZCdz09>

**(Zoom Meeting ID: 991 9085 3093 Password: 628568)**

**Abstract:**

When only the moments (mean, variance or  $i$ -th moment) of the underlining distribution are known, numerous max-min optimization models can be interpreted as a zero-sum game, in which the firm chooses actions to maximize her expected profit while Adverse Nature chooses a distribution subject to the moment conditions to minimize the firm's expected profit. We propose a new method to efficiently solve this class of zero-sum games under moment conditions. By applying the min-max inequality, our method reformulates the zero-sum game as a robust moral hazard model, in which Adverse Nature chooses both the distribution and actions to minimize the firm's expected profit subject to incentive compatibility (IC) constraints. Under quasi-concavity, these IC constraints are replaced by the first-order conditions, which give rise to additional moment constraints. We show that in equilibrium, these moment constraints are binding but have zero Lagrangian multipliers and thus enable us to derive closed-form solutions for several distributionally robust inventory models with different levels of complexity, including the case with mean and  $t$ -th moment, the case with multiple supply sources, and the case with component commonality.

**Biography:**

Erick (Zhaolin) Li received a Ph.D. in Business Administration from The Pennsylvania State University, a Master of Commerce in Accounting from The University of New South Wales, and a Bachelor of Engineering in Materials Science & Industrial Engineering from Shanghai Jiao Tong University. Dr. Li has been with The University of Sydney Business School since January 2009. Before moving to Sydney, he had worked in Ernst & Young LLP and City University of Hong Kong. He has published seven articles in Production and Operations Management, making him the most prolific Australian author in this flagship journal of his field.

**Your attendance is most welcome!**