

The Hong Kong University of Science and Technology
Dept of Information Systems, Business Statistics and Operations Management
Dept of Industrial Engineering & Decision Analytics
Joint Seminar Announcement



**Closed-Form Solutions for Distributionally Robust
Inventory Models**

by

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Date : **16 December 2022 (Friday)**
Time : **10:30 – 11:45 AM**
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Abstract: When only the moments of the underline distribution are known, many max-min optimization models can be interpreted as zero-sum games, in which the firm chooses actions to maximize her expected profit while Nature chooses a distribution subject to the moment conditions to minimize the firm's expected profit. For single-period models, we reformulate the zero-sum game as a robust moral hazard, in which 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 firm's first-order conditions, which give rise to additional moment constraints and an extended reformulation of the dual problem in a higher dimensional space, facilitating the search for the closed-form solution. In the equilibrium, the additional moment constraints are binding but have *zero* Lagrangian multipliers. This property enables us to derive closed-form solutions for several distributionally robust inventory models that the extant literature is unable to solve. For multi-period models, we apply subgame perfect conditions to eliminate Nature's dominated strategies so that we can conveniently compute the firm's time-average cost under Adverse Nature's *undominated* strategy. We then solve the robustly optimal base-stock level with positive lead time and lost sales (or backorder). The theme of this ambitious research program is to combine both zero-sum games and semi-infinite programming tools.

Bio: Dr 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.

All interested are welcome!
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