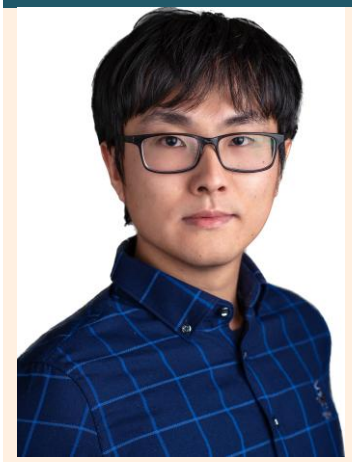
The Hong Kong University of Science and Technology

Dept of Information Systems, Business Statistics and Operations Management

OM Seminar



Optimal Online Learning under Uncertain Sequential Price Competition

by

Dr. Shukai LI

New York University Shanghai

Date	:	**12 December 2025 (Friday)**
Time	:	**2:30pm – 3:45pm**
Venue	:	**Case Room 1001, LSK Business Building**

Abstract:

Online learning for revenue management has been extensively studied in the past decade. However, literature often assumes the decision maker is the only firm in the market, overlooking the role of competition. Policies derived for single-firm markets can be suboptimal or inefficient for realistic, competitive markets. We extend online learning to revenue management in competition settings. The following two questions are investigated: (1) How can a firm maximize its revenue in uncertain competition? This question is hard, as analyzing convergence for multi-agent learning is an ongoing challenging practice. (2) Do firms' learning policies lead to unfair prices, i.e., prices higher than Nash equilibrium (NE)? This issue also attracts the attention of economists and antitrust agencies.

In this talk, I will demonstrate our results with an example of sequential price competition among multiple sellers over a selling horizon of T periods. In each period, sellers simultaneously offer prices and subsequently observe their respective demand, which is unobservable to competitors. The realized demand of each seller depends on the joint prices following a private unknown linear model. We propose a phased learning policy, which does not require sellers to communicate demand or future prices throughout the selling horizon. We show that our policy, when employed by all sellers, leads at a fast convergence rate to the NE. Meanwhile, each seller minimizes revenue loss with an optimal regret relative to a strong dynamic benchmark policy. I will also demonstrate how to extend our methodology to other operational problems in competitive settings.

Bio:

Shukai Li is an Assistant Professor of Operations and Business Analytics at New York University Shanghai. His research spans machine learning and AI, with a focus on both theoretical foundations and practical applications. His interests include the responsible use of AI and learning algorithms, risk assessment and management of generative AI, and applications in healthcare, revenue management, and supply chain management.

All interested are welcome!

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