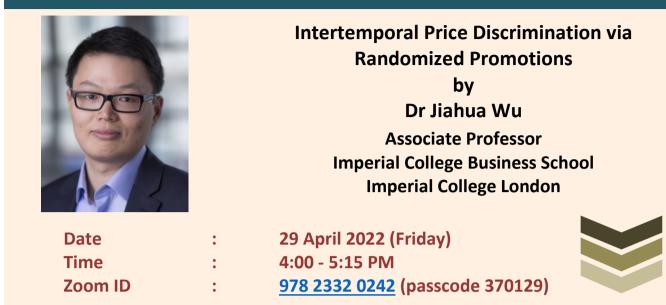# The Hong Kong University of Science and Technology
Dept of Information Systems, Business Statistics and Operations Management
Dept of Industrial Engineering & Decision Analytics
Joint Seminar Announcement

Intertemporal Price Discrimination via Randomized Promotions
by
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Abstract: The undesirable but inevitable consequence of running promotions is that consumers can be trained to time their purchases strategically. In this paper, we study randomized promotions, where the firm randomly offers discounts over time, as an alternative strategy of intertemporal price discrimination. Specifically, we consider a base model where a monopolist sells a single product to a market with a constant stream of two market segments. The segments are heterogeneous in both their product valuations and patience levels. The firm pre-commits to a price distribution, and in each period, a price is randomly drawn from the chosen distribution. We characterize the optimal price distribution as a randomized promotion policy and show that it serves as an intertemporal price discrimination mechanism such that high-valuation customers would purchase immediately at a regular price upon arrival and low-valuation customers would wait for a random promotion. Compared against the optimal cyclic pricing policy, which is optimal within the strategy space of all deterministic pricing policies, the optimal randomized pricing policy beats the optimal cyclic pricing policy if low-valuation customers are sufficiently patient and the absolute discrepancy between high and low customer valuations is large enough. We extend the model in two directions. We first consider Markovian pricing policies where prices are allowed to be intertemporally correlated in a Markovian fashion. This additional maneuver allows the firm to reap an even higher profit when low-valuation customers are sufficiently patient, by avoiding consecutive promotions but on average running the promotion more frequently with a smaller discount size. We then consider a model with multiple customer segments, and show that a two-point price distribution remains optimal and our conclusion from the two-segment base model still holds under certain conditions that are adopted in the literature. Our results imply that the firm may want to deliberately randomize promotions in the presence of forward-looking customers.

Bio: Dr Jiahua Wu is an Associate Professor at Imperial College Business School. He received his Ph.D. in Operations Management from Rotman School of Management, University of Toronto. He also holds a Master in Electrical and Computer Engineering from University of Toronto, and a Bachelor in Electronic Engineering from Tsinghua University. Jiahua's research interests include behavioral decision-making, revenue management and supply chain management.

All interested are welcome!
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