

# 中国科学院数学与系统科学研究院 应用数学研究所

## 华罗庚应用数学青年论坛

报告题目: Efficient Frontier and Applications in Product Offering and Pricing

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地 点: 南楼 N620

**摘 要:** Problem definition: The joint assortment and pricing problem is notoriously challenging to solve, especially for large problems under various operational constraints arising from business practices. In this paper, we consider joint optimization problems under the constrained logit choice models with product-differentiated price sensitivities in static, randomized and dynamic settings.

Methodology/results: We develop a unified optimization methodology that applies efficient frontier and dimensional reduction and transforms the joint optimization into a single-variable problem with the aggregate resource consumption rate. The efficient frontier is employed to transform the non-concave objective function equivalently into its concave counterpart. We show that the optimal prices are uniquely determined by the target adjusted markup. The mixed combinatorial optimization can be simplified by searching over efficient sets of polynomial size. In the randomized assortment and pricing problem where the product offer set and prices follow certain distribution, we show that randomization can further increase the total revenue to the exact efficient frontier that is the best possible solution which the static problem may fail to achieve. For dynamic joint product selection and pricing, we find that the optimal policy adopts a simple time-threshold structure that can be pre-computed. We also illustrate the robustness of our methodology by extending the analysis to general settings as well as to the nested logit model.

Managerial implications: The proposed methodology contributes to the increasingly popular topic in retail management by significantly reducing the computational complexity of joint product offering and pricing under different constraints. Our results for the impacts of product set constraints and price bounds provide insightful guidance to practitioners on product offerings and pricing in various business scenarios.

**个人简介：** 卢立建博士毕业于哥伦比亚大学，现为香港科技大学工商管理学院助理教授。他的研究兴趣包括数据驱动的决策科学及其在电子商务、定价与收益管理、供应链管理、医疗服务系统、金融与运作管理交叉等的应用。曾获得 Finalist of INFORMS George Nicholson Student Paper Competition 和 Second place of POMS College of Supply Chain Management Student Paper Competition。在加入香港科技大学工商管理学院之前，卢立建曾在金融、电子商务和在线展示广告三个领域担任高级领导职务。卢立建曾任 UniQuant Capital 创始人兼首席信息官，领导定量研究团队，管理 30 亿美元的定量多空对冲基金；曾任中国创新基金执行董事，引领 TMT 领域 1500 亿资产规模的 PE/VC 投资；曾任高盛资产管理公司副总裁，领导量化因素投资组合研究和管理，资产管理规模达 150 亿美元；曾任奈特资本集团高频交易、亚马逊电子商务和物流优化、AppNexus.com 在线展示广告市场的高级研究科学家。