

The MIT Data Science Lab

Theoretically Elegant & Practically Relevant Research

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MIT Data Science Lab: Executive Summary

Supply Chain Resiliency	Price Optimization	Personalized Offering	Inventory, Transportation & Procurement	Online Resources Allocation	Supply Chain Digitization
     	      	   	   	 	  

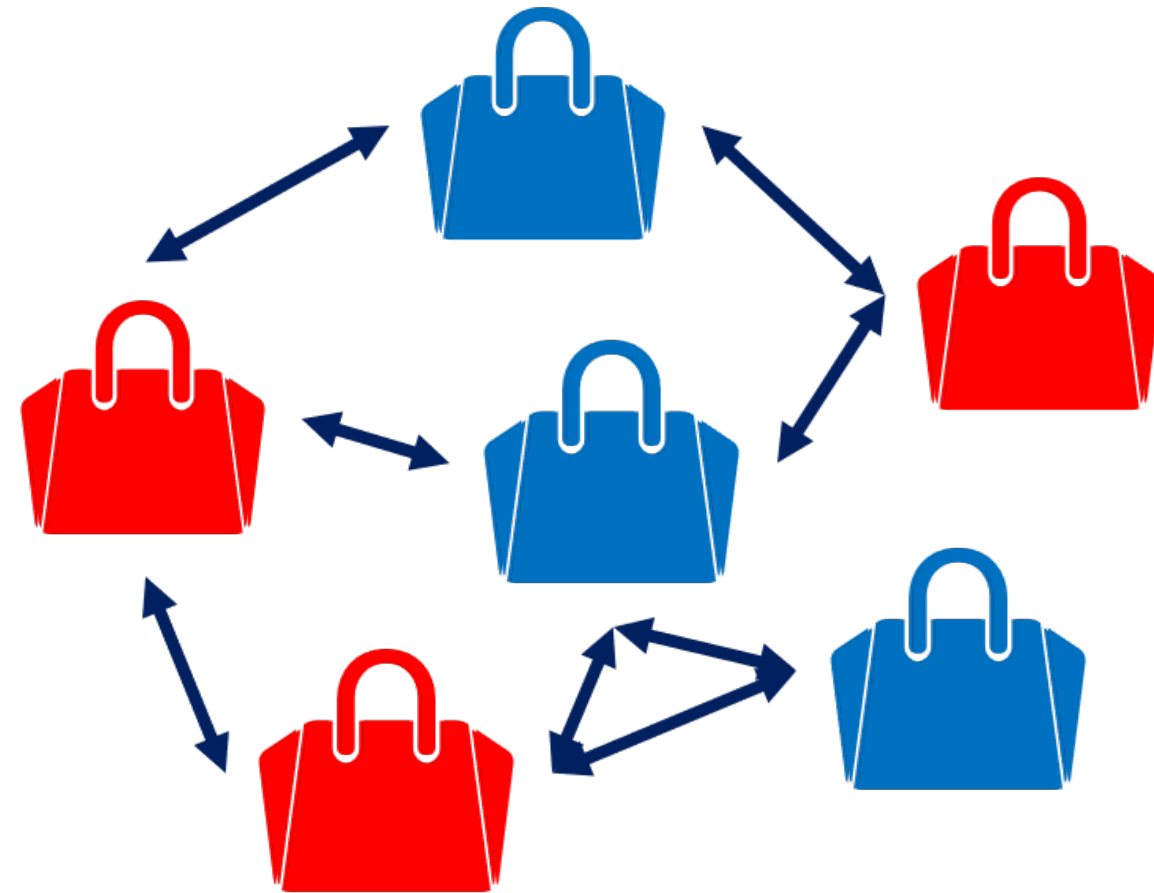
Strategic intent: Develop solutions to leading edge problems for lab partners through research that brings together data, modeling, and analysis to improve business performance

Gross-industry: Oil / Gas, Retail, Financial Services, Government, Insurance, Airlines, Industrial Equipment, Software

Global footprint: NA, EU, Asia, LA

Design and Analysis of Field Experiments

- **Standard experiments: assuming no interference**
 - randomly assign half units into treatment / control



- **Switchback experiments:**
 - assign all units treatment or control over time



- **Develop an optimal design for Switchback experiments**
 - Apply Minmax optimization techniques to maximize experiment precision, i.e., minimize experiment variance
- **Source:** Bojinov I, Simchi-Levi D, Zhao J. 2022. Design and Analysis of Switchback Experiments. **Management Science**.
- **Recognition:** First place in **2020 INFORMS Revenue Management and Pricing Student Paper Competition**

Assortment Display, Price Competition & Fairness in Online Marketplace

Characteristics:

- ▷ Multiple sellers
- ▷ Price competition
- ▷ Unlimited display space
- ▷ Visibility and fairness

Trade-Offs:

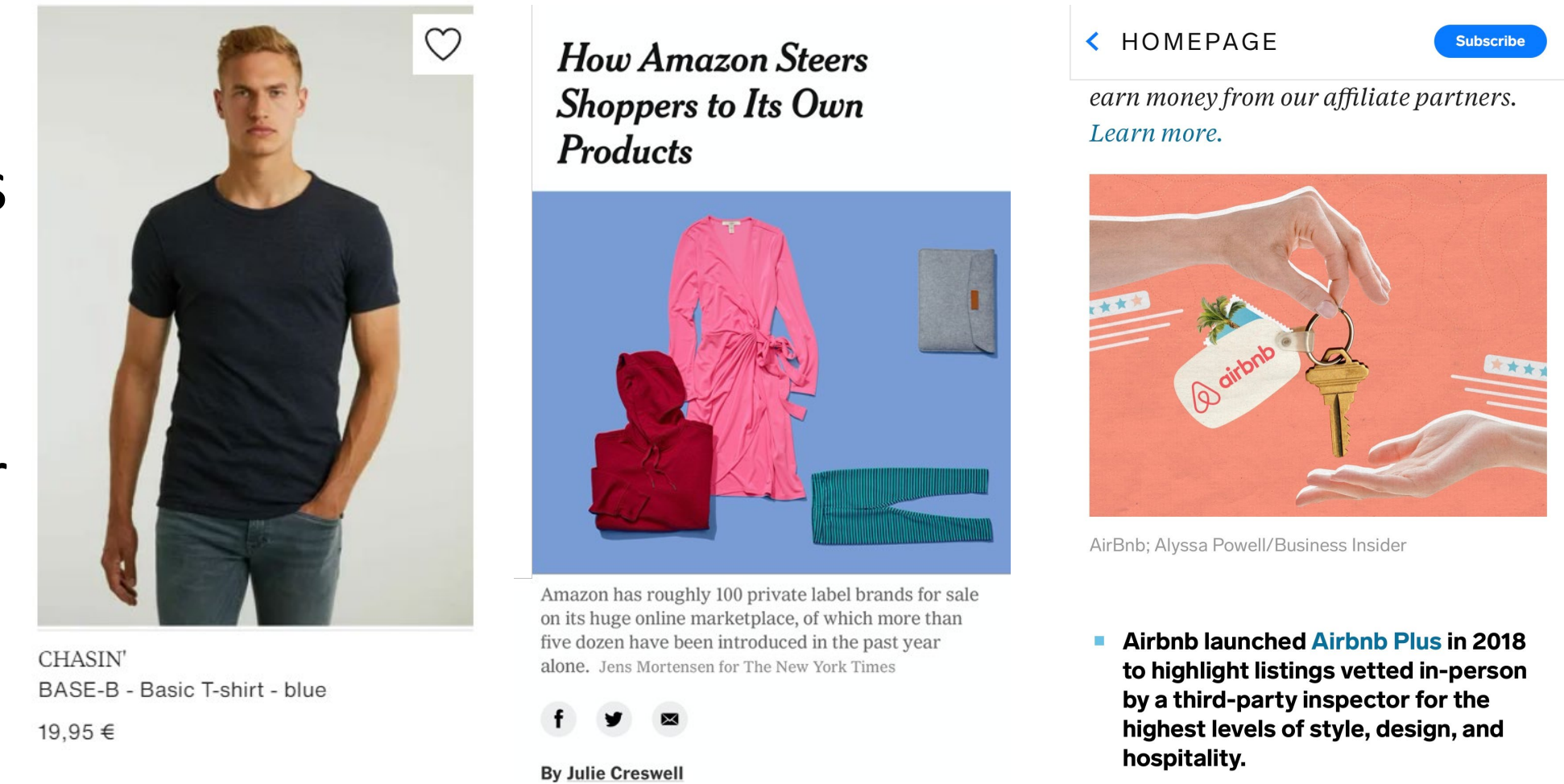
- ▷ The more sellers the platform displays to individual consumer,
- ▷ the higher the probability of a purchase
- ▷ the lower the price offered to consumer

Research Questions:

- ▷ Under what condition is the default display policy (i.e., display the entire assortment to all customers) optimal?
- ▷ If the default display policy is not optimal, what is the optimal policy?
- ▷ If the current policy is not optimal, how do we ensure that the optimal policy is fair? What is the cost of implementing such a display policy?

Sources:

- ▷ Chen, H., Li, H., Simchi-Levi, D., Wu, M. X., Zhu, W. Assortment Display, Price Competition and Fairness in Online Marketplace. Working Paper
- ▷ Li, H., Simchi-Levi, D., Wu, M. X., Zhu, W. Estimating and Exploiting the Impact of Photo Layout: A Structural Approach. **Management Science**



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