

# MARKETING COLLOQUIA

SPRING 2018 – ABSTRACT

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## SCALABLE (PRICE) TARGETING

*ABSTRACT:* We study the welfare implications of scalable price targeting, an extreme form of third-degree price discrimination implemented with machine learning for a large, digital firm. Targeted prices are computed by solving the firm's Bayesian Decision-Theoretic pricing problem based on a database with a high-dimensional vector of customer features that are observed prior to the price quote. To identify the causal effect of price on demand, we first run a large, randomized price experiment and use these data to train our demand model. We use L1 regularization (lasso) to select the set of customer features that moderate the heterogeneous treatment effect of price on demand. We use a weighted likelihood Bayesian bootstrap to quantify the firm's approximate statistical uncertainty in demand and profitability. We then conduct a second experiment that implements our proposed price targeting scheme out of sample. Theoretically, both firm and customer surplus could rise with scalable price targeting. Optimized uniform pricing improves revenues by 64.9% relative to the control pricing, whereas scalable price targeting improves revenues by 81.5%. Firm profits increase by over 10% under targeted pricing relative to optimal uniform pricing. Customer surplus declines by less than 1% with price targeting; although nearly 70% of customers are charged less than the uniform price. Smaller firms with fewer job benefits are more likely to buy in the targeted pricing cell versus the uniform pricing cell. Our weighted likelihood bootstrap estimator also predicts demand and demand uncertainty out of sample better than a post-selection inference approach.