

Title: Revenue Management under Aggregate and Disaggregate Quality Rating Systems

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Abstract:

Problem Definition: Online platforms increasingly rely on customer rating systems to reduce quality uncertainty and assist consumer choice. This paper investigates how optimal pricing and platform profitability are affected by the design of such systems—specifically, whether a platform displays one score across multiple products (aggregate system) or individual scores for each product (disaggregate system). **Methodology/Results:** We develop an analytical model where a set of substitutable products are sold through an online platform, and consumer demand is governed by the multinomial logit (MNL) framework. Ratings influence product attractiveness and market share, which in turn shapes future ratings. We compare aggregate and disaggregate rating systems across three pricing scenarios: exogenous prices, centralized pricing, and decentralized pricing. Our analysis reveals that rating design significantly alters equilibrium pricing strategies: the aggregate system yields differentiated markups across products, while the disaggregate system leads to uniform margins. Surprisingly, under centralized pricing, both systems generate identical total profit for the platform despite these contrasting price structures. This result highlights a novel form of strategic equivalence shaped by rating-based externalities. Under decentralized pricing, rating design continues to shape equilibrium outcomes, though the implications become more nuanced. **Managerial Implications:** Our findings offer new insights into the interplay between information design and pricing strategy in multi-product environments. Platform operators can use these insights to design rating systems that balance transparency, competitive positioning, and profitability. Even when transparency affects individual product performance, the platform may still achieve equivalent profitability through strategic price adjustments, depending on its control over pricing.

Keywords: online retailing, customer rating system, pricing, multinomial logit model