Management Insights

A Model of Consumer Inertia with Applications to Dynamic Pricing
Xuanming Su

Consumers exhibit inertia when they have an inherent tendency to delay purchases. For example, holiday shoppers often wait until the last minute, and travelers often procrastinate on making vacation plans. In many cases, consumers choose to wait even though they know that they will end up facing high prices and limiting choices. A decision model captures this behavioral phenomenon. We show that consumer inertia has both positive and negative effects on firm profits: it decreases willingness to pay but intensifies competition among consumers for the product. We study several measures that can be used to influence the level of consumer inertia: (i) offer returns policies (when inertia is caused by loss aversion), (ii) provide decision-making tools (when inertia is caused by decision errors), (iii) reduce up-front transaction costs (when inertia is caused by immediate hassle costs).

Will More Purchasing Options Benefit Customers?
Wedad Elmaghraby, Steven A. Lippman, Christopher S. Tang, and Rui Yin

Traditional pre-announced clearance price policies have been used by retailers such as Filene's Basement to improve profits when selling seasonal products. Recently, some retailers have combined the pre-announced clearance pricing policy with a non-withdrawable reservation mechanism that allows customers to reserve a product at the post-season clearance price. In this paper, we consider a retailer that sells a seasonal product by pre-announcing a premium price and a post-season clearance price. We analyze two operating regimes: The "no reservation regime" allows a buyer either to purchase the product at the premium price when he arrives or to enter a lottery to purchase at the clearance price if the product remains unsold. The "reservation regime" offers each buyer one extra option than the no reservation regime: reserve the product for purchase at the clearance price. If the buyer reserves the product under the reservation regime and if it remains unsold at the end of the selling season, then he is obligated to purchase it at the clearance price. When customers are strategic in the sense that they take other customers' purchasing behavior into their purchasing consideration, we show that strategic customer behavior can render the customers to be worse off and the retailer to be better off under the reservation regime, despite the fact that this regime offers one extra option (reservation) to a customer. Hence, more purchasing options do not necessarily benefit customers.

Channel Strategies for Durable Goods: Coexistence of Selling and Leasing to Individual and Corporate Consumers
Vera Tilson, Yunzeng Wang, Wei Yang

In durable goods markets, such as those for automobiles or computers, the coexistence of selling and leasing to both corporate and individual consumers is common. Leases to corporate consumers affect the price of used goods on the second-hand market, which in turn affects the buying and leasing behavior of individual consumers. The setting of prices (or volumes) for sale and lease to individual and corporate consumers is a complicated problem for manufacturers. We study how the corporate channel, substitutability of new goods and used goods, and transaction costs in the second-hand market affect consumers' behavior and the manufacturer's pricing decisions. As leasing to the corporate consumer becomes more profitable, the manufacturer should not necessarily reduce retail sales to limit cannibalization from the used goods channel. Rather the manufacturer can maintain the retail sales price and increase the retail lease price, thereby reducing retail leases. As production costs increase the manufacturer should increases prices across all channels: sales and leases, retail and corporate. When transaction costs increase, the manufacturer should increase lease prices reducing leasing in both corporate and retail channels.

Static and Dynamic Pricing of Excess Capacity in a Make-To-Order Environment
Joseph M. Hall, Praveen K. Kopalle, David F. Pyke

We consider a make-to-order manufacturer serving two types of customers: core customers who pay a fixed negotiated price, and "fill-in" customers who

make purchase decisions based on the current price set by the firm. These "fill-in" customers represent a possible way to profitably make use of any excess capacity available to the firm, and we explore the possible gains from selling to these customers under a range of possible pricing policies. Specifically, we examine: (1) constant pricing, (2) constant pricing up to a cut-off congestion level, beyond which no fill-in work is accepted, and (3) general dynamic pricing. Our chief result is that constant pricing up to a cut-off congestion level can dramatically outperform constant pricing, while at the same time achieving most of the increase in revenue achievable from general dynamic pricing. Thus, constant pricing up to a cut-off congestion level presents an attractive trade-off between the ease of implementation and revenue gain.

Optimal Pricing and Rebate Strategies in a Two-level Supply Chain
Soo-Haeng Cho, Kevin F. McCardle, Christopher S. Tang

Ever since Proctor and Gamble issued rebate coupons to consumers in the 1970s, many manufacturers and retailers have followed suit. Due to certain adverse effects, however, some manufacturers and retailers are contemplating the elimination of their rebate programs. This paper sheds light on the debate about the value of rebate programs by presenting a model for evaluating the conditions under which a firm should offer rebates in a competitive environment. Specifically, we consider a two-level supply chain comprising one manufacturer and one retailer. Each firm evaluates the trade-off between the fixed cost of launching a rebate program and the additional gross profit generated by the rebate program. In this vertical competition game, each player is strategic and takes the other party's decision into consideration. As a result of strategic interaction, the conditions under which either firm should offer rebates are fairly complex and non-intuitive. For instance, a more effective manufacturer rebate program would lead to a win–win situation in which both firms enjoy higher profits, while a more effective retailer rebate program could lead to a win–lose situation in which the manufacturer enjoys a higher profit and the retailer obtains a lower profit.

Improving Performance in Outpatient Appointment Services with a Simulation Optimization Approach
Kenneth J. Klassen, Reena Yoogalingam

Providers of outpatient health care services are facing increasing pressure to improve the quality of their service through effective scheduling of appointments. A simulation optimization approach is used to deter-mine optimal scheduling rules for an outpatient health care system facing uncertainty in terms of client arrival times, physician service times, and no-show rates. This method is able to find high-quality solutions while simultaneously capturing the uncertainties in the system and is flexible in accounting for a wide variety of performance measures, variables, and clinic sizes. Results suggest that a few appointments at the beginning and end of the session should be shorter, with longer appointments in the interior portion; best results are obtained when the interior appointments are all the same length. We denote this scheduling pattern a "plateau-dome". This rule is robust over many different clinic environments. Furthermore, clinics experiencing no-shows can benefit from a strategy of double-booking the first two clients and, as no-show levels increase, shortening the length of appointments on the plateau. Results also demonstrate that restrictive session end times imposed by the physician result in excessive client waiting times which significantly reduces the performance of the system.

Resource-constrained project scheduling for timely project completion with stochastic activity durations
Francisco Ballestín, Roel Leus

Projects are often subject to considerable uncertainty, which derives from many different sources, including estimation errors, resource unavailability, and materials arriving behind schedule. Nevertheless, the scheduling objective is usually a measure for timely project completion, which justifies modeling the uncertainty in the processing times only. A solution to this scheduling problem is a *strategy* that defines an appropriate action for each event occurring during project execution. For a project in isolation, the average makespan (the time difference between the start and finish of a sequence of jobs or tasks) is the most appropriate objective for a *risk-neutral* decision maker. In order to represent risk averseness, one can impose bounds on the probability of exceptionally high makespan realizations. These additional constraints are usually satisfied as well as possible by a minimum-makespan schedule. If the decision maker wants to restrict the makespan variance, however, he/she may need to sacrifice a considerable increase in makespan expectation. When a project deadline has been negotiated with external clients beforehand, it may be more useful to adapt the scheduling objective in order to reflect penalty structures, which can take the form of either a fixed charge or a charge per unit-time overrun. There is considerable evidence for the thesis that for most practical purposes, it suffices to focus on the minimization of the expected makespan in order to perform well on these latter objectives.

Sourcing Decisions with Stochastic Supplier Reliability and Stochastic Demand
Gerard J. Burke, Janice E. Carrillo, Asoo J. Vakharia

Supplier sourcing strategies are a crucial factor driving supply chain success. The primary focus of this analysis is to offer managerial insights concerning a buying firm's optimal supplier selection and order allocation decisions when there is both upstream (i.e., supply) and downstream (i.e., demand) uncertainty. We propose a simple ratio to determine whether or not a single supplier strategy is appropriate. Of supply side interest is that while the lowest cost supplier is guaranteed to receive a positive order, it will not necessarily receive the largest order. For given downstream market parameters, each selected supplier will receive an order amount based on its unit cost, mean reliability, and variance in reliability. We also characterize how the newsvendor's downstream market may influence the optimality of sourcing from a single supplier versus multiple suppliers. Our analysis favors a single supplier strategy when mean demand is low and multiple sourcing when mean demand is high. Somewhat surprisingly, an increase in the variability in demand favors a single sourcing strategy. In this situation, the buying firm tends to hedge the financial risk induced by increased demand uncertainty by leveraging the lowest cost source of supply. Finally, relatively high shortage costs of unsatisfied demand (i.e., underage costs) are associated with a multiple sourcing strategy, while relatively high salvage values may predispose the buying firm to single source.