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Management Insights

Modeling a Presidential Prediction Market

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Many firms are establishing internal prediction markets, while public prediction markets increasingly cover all manner of business, economic, and political events. Should managers treat these markets seriously, especially when they price complex, interdependent events? Our case study of the 2004 presidential election market suggests they should. We explore the consistency of security prices associated with presidential election contracts that traded in the Intrade.com prediction market during the run up to the 2004 presidential election. In that prediction market, traders placed bets on various election outcomes such as “George Bush will win both Florida and Ohio” and “George Bush will be elected President of the United States.” We find that these prices were mutually consistent with the rules governing the Electoral College, and that traders appeared to quickly and efficiently assimilate new information as it unfolded over the campaign. This suggests that prediction markets can be a valuable tool for managers who face decisions that may depend on the outcome of complex and interdependent events. Established prediction markets will likely do a good job assessing events in which interest is widespread. For events of narrower interest, establishing an internal prediction market may be an effective way to aggregate information within the firm.

An Integrated Decision-Making Approach for Improving European Air Traffic Management

Yael Grushka-Cockayne, Bert De Reyck,
Zeger Degraeve

Europe’s airspace is extremely congested, mainly due to inefficiencies resulting from the air traffic management system being fragmented and based around national practices. To accommodate the doubling in air traffic predicted by 2020, while maintaining safety and reducing the environmental impact, all European aviation players must cooperate to develop a modernized and unified system, which can be achieved by gradually introducing technological improvements. These stakeholders, however, typically disagree not only on the benefits any proposed improvements would bring, but also on what the main objectives

of these enhancements should be. This paper introduces a methodology for evaluating numerous interdependent system improvements in this context. We found that, although the different stakeholders’ views seemed hard to reconcile, our model revealed options that all stakeholders could agree upon. Using our model to streamline airport operations, a compromise emerged in the form of a set of technologies and policies that enable more efficient flight paths and improved approach, arrival and departure procedures, resulting in an optimal balance between capacity and environmental considerations. Supported by Eurocontrol, the European air traffic management organization, our model is currently being adopted as the formal methodology for supporting the Single European Sky initiative.

Dynamic Allocation of Airline Check-In Counters: A Queueing Optimization Approach

Mahmut Parlar, Moosa Sharafali

How should airport check-in counters be managed to improve the overall image of the airport as perceived by the passengers at the lowest possible cost? A good staffing schedule can achieve shorter queues, reduced congestion, faster check-in times, and consequently, happier passengers. This research addresses the important question of how best to manage the allocation of counters in an exclusive check-in counter system dedicated to a specific flight. More specifically, we consider how the airport operator should periodically review congestion status and either add or subtract counters. Our approach differs from those currently in use in that it facilitates real-time decision making by balancing passenger wait costs, counter staffing costs, and aircraft delay costs. The results of this research can help airport service providers, airport regulatory authorities, and airlines in the management of the valuable resource of check-in counters and the associated check-in staff.

How Near-Misses Influence Decision Making Under Risk: A Missed Opportunity for Learning

Robin L. Dillon, Catherine H. Tinsley

Prior to the space shuttle *Columbia* disaster, foam debris regularly struck space shuttles during ascent, and with each successful mission, it appears as if NASA engineers and managers decreased their perception of the risk associated with this debris problem. Rather than successes, these prior shuttle

missions should be characterized as near-misses—successful outcomes in which chance plays a critical role in averting failure. We conducted a series of behavioral experiments with both students and NASA managers and contractors. Our results show that project managers whose decisions result in a near-miss are judged more favorably and are more deserving of a promotion than project managers whose same decisions result in a failure. If project outcome is the single determinant of project success, then both managers and organizations miss opportunities to learn from near-misses—for example, to collect data that might mitigate future risks, and project managers are not held accountable for bad decisions that lead to good results. In addition, our research shows that near-misses decrease a decision maker's perception of the risk. Feeling the situation to be less risky, decision makers are more confident of a successful outcome and more likely to choose a risky alternative than those without near-miss information. We offer theory and data to explain why managers who have experienced near-misses may choose alternatives with greater statistical risk than those who have not. We conclude with suggestions for reinterpreting near-misses so that they may serve as warning signals and trigger managerial and organizational learning.

Managing the Inventory of an Item with a Replacement Warranty

[Wei Huang, Vidyadhar Kulkarni, Jayashankar M. Swaminathan](#)

A replacement warranty is an integral part of most product sales today. Based on interactions with a projector manufacturer, we study how a firm should adapt its inventory policy while providing such warranty services in addition to selling new products. A fundamental difficulty in determining the optimal inventory policy is that the number of warranty replacements, and hence the inventory needed to supply them, depends on previous sales. Because of the complexity, some manufacturers ignore inventory needs for warranty replacements and plan only for the inventory of new production. In this paper, we show that an order-up-to inventory policy is optimal when both demands from new products and those from warranty are taken into account simultaneously. Further, in situations where the underlying demand for the new product does not change between periods, the target inventory level is the same in every period. Through a computational study, we also demonstrate that adopting the optimal policy can lead to 69% average improvement in expected costs when compared to a policy that neglects demands from items under warranty.

Inventory Models for Substitutable Products: Optimal Policies and Heuristics

[Mahesh Nagarajan, S. Rajagopalan](#)

Retailers typically carry substitutes within a product category (e.g., Duracell and Energizer size C batteries) and consumers often purchase a substitute when their preferred item is out of stock. Although substitution behavior affects the amount of inventory retailers should carry, managers often ignore substitution when making inventory decisions because they lack a simple approach to account for it. In this paper, we examine the nature of optimal inventory policies when a retailer manages two or more substitutable products. We show that a simple order-up-to policy based on understocking and overstocking costs and the substitution rate between products is optimal in some settings and robustly effective as long as substitution rates and aggregate demand variation are not too high. By using the methods described in this paper, retail managers can account for substitution behavior among consumers and strike a more profitable balance between inventory costs and sales revenues than is possible with policies currently used in practice.

Confidentiality and Information Sharing in Supply Chain Coordination

[Lode Li, Hongtao Zhang](#)

Does a confidentiality agreement actually keep exchanged information confidential? Not always. In a supply chain with many retailers, if one retailer shares its demand forecast with a supplier, other retailers may learn the information in two possible ways: (a) they may get it directly from the supplier or (b) they may infer the information from the supplier's action (e.g., wholesale price setting, where a higher price suggests a rosier market condition). A nondisclosure legal agreement may prevent direct disclosure but not indirect inference. If so, does the confidentiality agreement make any difference? The answer is yes according to our analytical model. Confidentiality benefits the retailers because it makes their order quantities more sensitive to changes in wholesale price and thus prompts the supplier to lower the wholesale price. Confidentiality also benefits the supplier by encouraging information sharing from retailers. This suggests that confidentiality is a vital precondition for supply chain information sharing, as it not only protects the interests of information owners but also improves the supply chain efficiency as a whole.

A Bargaining Framework in Supply Chains: The Assembly Problem

[Mahesh Nagarajan, Yehuda Bassok](#)

A key management challenge faced by manufacturers is negotiation of prices for components from suppliers. The outcomes of these negotiations obviously

depend on the relative power of the manufacturer; for instance, a large manufacturer may be able to force suppliers to accept a low price in order to keep its business, while a small manufacturer may have little leverage over supplier prices. But they may also depend on the sequence in which the negotiations take place; for instance, the manufacturer may establish a reputation with one negotiation that affects later negotiations. In this paper, we develop a model of sequential negotiations between a manufacturer and its suppliers. This model enables us to understand when alliances among suppliers may emerge. In particular, we find that when suppliers are traditionally weaker compared to the manufacturer, they should unite into large coalitions to maximize profitability. When they are powerful, they should negotiate individually with the manufacturer. This insight provides guidelines to managers of component suppliers on when to join alliances when negotiating with manufacturers. It also shows manufacturers what supplier alliances to expect when negotiating terms of trade.

Queuing for Expert Services

Laurens G. Debo, L. Beril Toktay,
Luk N. Van Wassenhove

In many service contexts, customers do not know the appropriate level of service they need. They rely on the advice of an expert who typically also supplies the subsequent service, such as doctors, lawyers, and car mechanics. When billing is proportional to the service time, the expert has an incentive cheat, i.e., to supply with “extra” service they do not really need. When discovered, this behavior can have a devastating impact on the reputation of the organization for which the expert works. We find that workload fluctuations are a major determinant of cheating incentives: When the expert’s workload is low, she or he is the most tempted to cheat as otherwise there is unutilized service capacity. To limit cheating, organizations

can avoid time-dependent billing rates and charge a fixed fee only, invest in expert training and an ethical work culture in environments where inducement is deemed to be more likely, and take operational measures to limit workload fluctuations (decreasing the variability of work arrival and service times, segmenting customers and assigning different servers to similar consumer segments, carefully avoiding too much excess expert capacity, using workload planning models with the possibility of redeploying experts in other customer segments).

Fluid Models for Overloaded Multiclass Many-Server Queueing Systems with First-Come, First-Served Routing

Rishi Talreja, Ward Whitt

Public housing authorities aim to provide affordable housing to low-income households. To evaluate alternative housing policies, which may involve constructing or purchasing new facilities, developing new ways to classify low-income households, or creating new rules for allowing tenants to remain in the housing units, policymakers need to estimate the consequences upon the resulting system performance. Among the important consequences of candidate housing policies are the required waiting times before tenants can be assigned a housing unit, the number of tenants waiting, the tenant assignment rates to various facilities, and the tenant abandonment rates, as a function of the tenant classification system and the system design. In this paper, we develop mathematical tools for estimating these important performance measures in advance, so that policy makers can properly evaluate alternative strategies. Prior to these tools, analysts had to rely on simulation to estimate these performance measures. Because our models are simpler to create and faster to analyze, they are better suited to answering “what if” questions that are central to the policy making process.