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Michael F. Gorman

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Management Insights

Michael F. Gorman

School of Business Administration, University of Dayton, Dayton, Ohio 45469,
michael.gorman@udayton.edu

Tie Strength, Embeddedness, and Social Influence: A Large-Scale Networked Experiment (p. 1352)

[Sinan Aral](#), [Dylan Walker](#)

How does social influence in networks affect consumer demand? Newly emerging business analytical capability can rapidly deploy and iterate large-scale, microlevel data. Peer influence may be critical to estimating product demand and diffusion, creating effective viral marketing, and designing “network interventions” to promote positive social change. However, it is difficult to estimate without knowing the social or structural conditions under which influence is strongest. The authors evaluate the influence of adopters of a Facebook application to their 1.3 million peers and can better identify the moderating effect of tie strength and structural embeddedness on the strength of peer influence. They find that both embeddedness and tie strength increase influence. However, the amount of physical interaction between friends, measured by coappearance in photos, does not have an effect. The insight for management: More effective marketing strategies and social policy may be possible due to a new understanding of how social structure and peer influence spread behaviors in society.

Simultaneously Discovering and Quantifying Risk Types from Textual Risk Disclosures (p. 1371)

[Yang Bao](#), [Anindya Datta](#)

How much risk is there in a company’s 10-K filing? Though it is clearly an important thing to know, it is a nontrivial task to discover and quantify variables of interest from unstructured text. The authors seek to discover and quantify risk types from textual risk disclosures such as 10-Ks. The authors find that approximately two-thirds of risk types lack informativeness and have no significant influence. Moreover, they find that the informative risk types do not necessarily increase the risk perceptions of investors—the disclosure of three types of systematic and liquidity risks will increase the risk perceptions of investors,

whereas the other five types of unsystematic risks will decrease them. The insight for management: Textual disclosures from companies such as 10-Ks can affect the risk perceptions of investors.

Path to Purchase: A Mutually Exciting Point Process Model for Online Advertising and Conversion (p. 1392)

[Lizhen Xu](#), [Jason A. Duan](#), [Andrew Whinston](#)

Does the presence of an online ad that is not acted upon affect future shopping behavior? The authors make the observation that certain advertisement clicks may not result in immediate purchases, but they stimulate subsequent clicks on other advertisements, which then lead to purchases. The authors find that display advertisements have relatively low direct effect on purchase conversion, but they are more likely to stimulate subsequent visits through other advertisement formats. The insight for management: Catch your eye now, catch your dollars later; the commonly used measure of conversion rate is biased in favor of search advertisements and underestimates the conversion effect of display advertisements the most.

An Empirical Analysis of Digital Music Bundling Strategies (p. 1413)

[Brett Danaher](#), [Yan Huang](#), [Michael D. Smith](#),
[Rahul Telang](#)

Does this song go with that? The authors use panel data on digital song and album sales to determine own- and cross-price elasticities for songs and albums. The authors leverage the “big data” management paradigm within the media industries and provide managers with detailed guidance on optimal pricing and marketing strategies for digital music. Their results show that tiered pricing coupled with reduced album pricing increases revenue to the labels by 18% relative to uniform pricing policies traditionally preferred by digital marketplaces while also increasing consumer surplus by 23%. Thus, optimal

tiered pricing can yield a Pareto improvement over the prior status quo. Additionally, their results indicate that, even without tiered pricing, unbundling albums outperforms “album-only” pricing policies that dominated the era of physical CD/cassette sales. The insight for management: Creative pricing of music can result in higher profits and higher consumer surplus.

Integration of Online and Offline Channels in Retail: The Impact of Sharing Reliable Inventory Availability Information (p. 1434)

[Santiago Gallino](#), [Antonio Moreno](#)

How does a “buy-online, pick-up-in-store” (BOPS) program affect performance? The authors find that the implementation of a BOPS project is associated with a reduction in online sales and an increase in store sales and traffic. These results can be explained by two simultaneous phenomena: (1) additional store sales from customers who use the BOPS functionality and buy additional products in the stores (cross-selling effect) and (2) the shift of some customers from the online channel to the brick-and-mortar channel and the conversion of noncustomers into store customers (channel-shift effect). The authors explain these channel-shift patterns as an increase in “research online, purchase offline” behavior enabled by BOPS implementation, and they validate this explanation with evidence from the change of cart abandonment and conversion rates of the brick-and-mortar and online channels. The insight for management: Online and brick-and-mortar sales channels can be complementary.

Big Data Investment, Skills, and Firm Value (p. 1452)

[Prasanna Tambe](#)

What is the return for the firm on human capital investment? The author uses a new data source—the LinkedIn skills database—to consider how labor market factors have shaped early returns on investment in big data technologies. The author hypothesizes that returns on early investments in Hadoop—a key big data infrastructure technology—have been concentrated in select labor markets due to the importance of aggregate corporate investment levels within a labor market for producing a supply of complementary technical skills during the early stages of technology diffusion. The author is able to attain direct measurement of firms’ investments in emerging technical skills such as Hadoop, MapReduce, and Apache Pig. Productivity estimates indicate that, from 2006 to 2011, firms’ Hadoop investments were associated with 3% faster productivity growth, but only for firms

(a) with significant existing data assets and (b) in labor networks characterized by high levels of aggregate Hadoop investment. Evidence for the importance of labor market concentration disappears for investments in mature data technologies, such as Structured Query Language-based databases, for which the skills have diffused and are readily available through universities and other channels. The insight for management: Do not discount the importance of geography, corporate investment, and channels for technical skill acquisition for explaining differences in productivity growth rates across labor markets during the spread of new information technology innovations.

Estimating Demand for Mobile Applications in the New Economy (p. 1470)

[Anindya Ghose](#), [Sang Pil Han](#)

Is there an app for that? In 2013, the global mobile app market was estimated at more than \$50 billion and is expected to grow to \$150 billion in the next two years. The authors evaluate the vibrant platform competition between mobile (smartphone and tablet) apps on the Apple iOS and Google Android platforms and estimate consumer preferences toward different mobile app characteristics. They find that app demand increases with the in-app purchase option wherein a user can complete transactions within the app. In contrast, app demand decreases with the in-app advertisement option where consumers are shown ads while they are engaging with the app. The direct effects on app revenue from the inclusion of an in-app purchase option and an in-app advertisement option are equivalent to offering a 28% price discount and increasing the price by 8%, respectively. The authors also find that a price discount strategy results in a greater increase of app demand in Google Play compared with Apple App Store, and app developers can maximize their revenue by providing a 50% discount on their paid apps. The insight for management: Mobile apps have enhanced consumer surplus by approximately \$33.6 billion annually in the United States, with opportunities for improved marketing, pricing, and design of applications.

A General Multiple Distributed Lag Framework for Estimating the Dynamic Effects of Promotions (p. 1489)

[Eelco Kappe](#), [Ashley Stadler Blank](#), [Wayne S. DeSarbo](#)

What is the effect of in-game promotions on Major League Baseball (MLB) game attendance? Game attendance resulting from ticket sales is the single largest revenue stream for MLB teams. The authors develop a model to estimate MLB attendance drivers and focus specifically on the differential direct and carryover

effects of in-game promotions. They account for serial correlation and promotion-specific dynamic effects. The authors develop an optimal model of attendance drivers for the Pittsburgh Pirates' 2010–2012 MLB seasons. They find that although children's promotions have the highest direct effect on attendance, giveaway and entertainment promotions have substantial carry-over effects and the largest total effects. The insight for management: An optimized Pirates' promotional schedule across promotional categories can increase profits between 39% and 88%.

On Theoretical and Empirical Aspects of Marginal Distribution Choice Models (p. 1511)

Vinit Kumar Mishra, Karthik Natarajan,
Dhanesh Padmanabhan, Chung-Piaw Teo, Xiaobo Li

Can estimation of discrete choice models be improved? The authors study the properties of a recently proposed class of semiparametric discrete choice models—referred to as the marginal distribution model (MDM)—by optimizing over a family of joint error distributions with prescribed marginal distributions. Surprisingly, the choice probabilities arising from the family of generalized extreme value models of which the multinomial logit model is a special case can be obtained from this approach, despite the difference in assumptions on the underlying probability distributions. The authors use this connection to develop flexible and general choice models to incorporate consumer- and product-level heterogeneity in both partworths and scale parameters in the choice model. They use simulated and empirical data sets to test the performance of this approach, and they evaluate the performance against the classical multinomial logit, mixed logit, and a machine learning approach that accounts for partworth heterogeneity. The insight for management: MDM provides a practical semiparametric alternative to choice modeling.

Real-Time Optimization of Personalized Assortments (p. 1532)

Negin Golrezaei, Hamid Nazerzadeh,
Paat Rusmevichientong

Orbitz.com has noted that Apple Macintosh users are willing to pay 30% more for a hotel room. Can online retailers take advantage of information like this to increase revenues? The product recommendations that Amazon.com makes to each customer dynamically change depending on recent reviews, ratings, purchases of the customer herself, purchases by other customers with similar interests to hers, and several other factors. But these recommendations are not based on known factors about the browser, computer, and location of the buyer. Motivated by the avail-

ability of real-time data on customer characteristics, the authors consider the problem of personalizing the assortment of products for each arriving customer. Using actual sales data from an online retailer, they demonstrate that personalization based on each customer's location can lead to more than 10% improvements in revenue compared to a policy that treats all customers the same. The approach is also flexible and can be combined with existing methods, resulting in a hybrid algorithm that brings out the advantages of other methods while maintaining the worst-case performance guarantees. The insight for management: Information is power; taking advantage of known attributes of buyers can increase revenues.

Business Analytics for Flexible Resource Allocation Under Random Emergencies (p. 1552)

Mallik Angalakudati, Siddharth Balwani,
Jorge Calzada, Bikram Chatterjee, Georgia Perakis,
Nicolas Raad, Joline Uichanco

Can the scheduling of preventative maintenance and emergency repairs be improved? A large multistate gas utility¹ is faced with a challenging problem of allocating repair crews to scheduled and unscheduled jobs. The authors study the resource allocation problem in which maintenance crews perform standard jobs (which must be done before a specified deadline) and respond to emergency gas leaks (which occur randomly throughout the day and could disrupt the schedule and lead to significant overtime). The goal is to perform all of the standard jobs by their respective deadlines, to address all emergency jobs in a timely manner, and to minimize maintenance crew overtime. The authors create a model that has two parts: A job scheduling phase, where standard jobs are scheduled over a time horizon, and a crew assignment phase, which solves a stochastic mixed-integer program to assign jobs to maintenance crews under a stochastic number of future emergencies. They developed a decision support tool that is being piloted in one of the utility's sites. The insight for management: The utility's new decision support tool is projected to result in a 55% reduction in overtime hours.

When Does the Devil Make Work? An Empirical Study of the Impact of Workload on Worker Productivity (p. 1574)

Tom Fangyun Tan, Serguei Netessine

They say that the devil makes work for idle hands; does that imply that busy workers are better? The authors analyze a large, detailed operational data set

¹ In the original "Management Insights" paragraph, which published in the June 2014 print issue, the authors' partner company was incorrectly identified.

from a restaurant chain to shed new light on how workload (defined as the number of tables or diners that a server simultaneously handles) affects servers' performance (measured as sales and meal duration). They show that servers strive to maximize sales and speed efforts simultaneously, depending on the relative values of sales and speed. The authors find that, when the overall workload is small, servers expend more and more sales efforts with the increase in workload at a cost of slower service speed. However, above a certain workload threshold, servers start to reduce their sales efforts and work more promptly with the further rise in workload. In the focal restaurant chain, they find that this saturation point is currently not reached, and, counterintuitively, the chain can reduce the staffing level and achieve both significantly higher sales (an estimated 3% increase) and lower labor costs (an estimated 17% decrease). The insight for management: Do more with less; busier workers can result in higher sales.

Website Morphing 2.0: Switching Costs, Partial Exposure, Random Exit, and When to Morph (p. 1594)

John R. Hauser, Guilherme (Gui) Liberali, Glen L. Urban

To morph, or not to morph? "When?" is the question. Website morphing customizes the look and feel of a website to customers' cognitive styles and clickstreams to maximize revenue. The current method is based on a preset number of clicks and then selects the best "morph." But switching costs, potential website exit, and all clicks prior to morphing are ignored. Is it possible to morph too soon? Morphing earlier means more customer clicks are after the morph; morphing later reveals more about the customer's tastes that can lead to a more effective morph. The insight for management: Timing is everything in morphing website look and feel; sales can increase dramatically with the right morph at the right time.