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EDUCATION

Ph.D., Marketing, Carnegie Mellon University, Pittsburgh, PA, 2010 (expected)
M.A., Economics, Vanderbilt University, Nashville, TN, 2005
M.S., Polymer Science and Engineering, Nanjing University, Nanjing, China, 2002

RESEARCH INTERESTS

- Dynamic Structural Model
- Empirical IO
- Health Care Markets
- Service and Technology Products
- Distribution Channels

AWARDS AND HONORS

- Thomson Reuters MarketScan Dissertation Support Program, 2009
- AMA-Sheth Doctoral Consortium Fellow, University of Missouri, 2008
- INFORMS Marketing Science Conference Doctoral Consortium Fellow, 2006, 2009
- Theory-Rich Marketing Models Workshop Student Fellow, Duke University, 2007
- V. Seenu Srinivasan Scholarship, Carnegie Mellon University, 2006
- Experimental Economics Workshop Student Fellow, George Mason University, 2006
- William Larimer Mellon Fellowship, Carnegie Mellon University, 2005–2008
- Graduate Student Fellowship, Vanderbilt University, 2003–2005

DISSERTATION: “A Dynamic Structural Analysis of Health Care Service Market with Information Asymmetry”

Dissertation Committee: Kannan Srinivasan (co-chair) Baohong Sun (co-chair)
 George-Levi Gayle Kinshuk Jerath Nitin Mehta

My dissertation provides a dynamic structural analysis of demand and supply in a service market with information asymmetry. Specifically, I examine the health care market, which accounts for 17% of U.S. GDP and arguably is the most personal and important service consumers buy. Unlike regular “want” services, health care, particularly preventive care represents a service that consumers need but may not want, so they often use it with reluctance, despite the massive potential benefits, especially for people with chronic diseases. Moreover, the health care market often suffers from adverse selection and moral hazard problems. Firms’ profits depend on both the actions and the identity of consumers. The empirical analysis in my dissertation is based on a unique data set that I constructed to include purchases of insurance policies, health care consumption histories, insurance premium and plan characteristics, and individual demographic information from January 2005 to December 2007. I develop econometric models of consumer demand and firm contract design that extend relevant literature in marketing, health economics, and contract theory.

I investigate consumers' health care choices with endogenous health insurance choices, using a structural model of dynamic demand in a principle-agent framework. Health care choices inherently are dynamic, because consumers trade off between the information benefit of preventive care and costly curative care or the cost of delay. Moreover, the cost-sharing aspects of insurance plans change the effective price of health care over time. First, I show how to model nested choices in a dynamic framework that allows for a sequence of sub-period consumption during each main policy period, conditional on consumers' health status. Second, I demonstrate how to incorporate people's evolving health status and private signals into a learning framework, which accommodates health investment and asymmetric information. The model is solved using simulated maximum likelihood in a nested dynamic framework. This empirical analysis reveals several important patterns describing how insured consumers make health care choices over time as their health status updates. Adverse selection appears to result from asymmetric learning, not initial private information. Premium elasticity estimates from the joint model are approximately 40% lower than those from a sole insurance model. The low premium elasticity might explain why market-based health plan competition does not necessarily result in premiums near marginal cost. Additionally, I demonstrate that the observed minimal use of preventive care partially reflects slow learning speeds. Ignoring preventive care causes untimely curative care or lack of care, which harms consumers' long-term well-being. Consumers need multiple periods of preventive care to learn about their health status, which suggests that significant economic value and reduced unnecessary or untimely curative care could result if insurers or policymakers encouraged more precise preventive care. Copayment and coinsurance changes and weekly deductibles also might reduce sorting-induced biases in insurance choices and have significant impacts on consumer health care consumption.

I also examine dynamic insurance contract designs using this same data set. I combine the dynamic demand structure from the previous case with supply-side contract design under adverse selection and moral hazard. Prior work on moral hazard assumes consumers are myopic or do not distinguish adverse selection, which may not be appropriate for repeated insurance purchases. To accommodate asymmetric learning and adverse selection, I develop an approach that allows for forward-looking consumers and insurers. In turn, I explore the implications of asymmetric learning and renegotiation on insurance choices. One particular challenge for this investigation is separating adverse selection from ex ante/ex post moral hazard. Therefore, I employ rich, transaction-level data and the restrictions from optimal contracting behavior to differentiate the effects of hidden information from the effects of pure moral hazard. Combining these data with observed pricing decisions, I can estimate the firm's indirect cost and assess the profitability of alternative pricing policies. This model may be relevant for any service market in which hidden information and hidden actions exist at the same time.

UNDER REVIEW / WORKING PAPERS (available upon request or on web site)

- "A Dynamic Model of Consumption and Insurance Purchase in the Health Care Service Industry" (Job Market Paper)
- "Channel Motivations in Emerging Markets: An Empirical Analysis," with Laurens Debo, Sunder Kekre, and Baohong Sun (under revision at Management Science)
- "A Structural Two-Sided Matching Model in the Business-to-Business Market," with Kannan Srinivasan (to be submitted to Marketing Science)
- "Dynamic Pricing Competition between Generic Brands and Established Brands: A Case of Cigarette Market," with Baohong Sun (to be submitted to Marketing Science)
- "Service Pricing Dynamics and Time Inconsistency of Durable Goods," with Tao Chen and Kannan Srinivasan

WORKS IN PROGRESS

- “Contract Design and Dynamic Pricing in Service Market with Asymmetric Learning,” with George-Levi Gayle
- “Adverse Selection and Ex ante/Ex Post Moral hazard: Informational Asymmetry in Health Care Service,” with Baohong Sun
- “Spatial Differentiation, Demand Dynamics and Oblivious Eq. of Newspaper Outlets”
- “A Dynamic Model of Financial Portfolio Market with Learning and Switching Cost”

TEACHING EXPERIENCE

Carnegie Mellon University

Recitation Leader 2008–2009

Marketing Principles (Undergraduate Core Course)

Teaching Assistant 2006–2009

Marketing Management (MBA)

Pricing (MBA)

Interactive Marketing Leveraging Technology (MBA)

Data Mining in Marketing (MBA)

Microeconomics II (Ph.D.)

Game Theory (Ph.D.)

Vanderbilt University

Teaching Assistant 2004–2005

Health Economics

TEACHING INTERESTS

Marketing Research

Health Care Marketing

Marketing Management

Pricing Strategy

Distribution Channels Management

Database Marketing

CONFERENCES AND PRESENTATIONS

INFORMS Marketing Science Conference, 2006, 2009

CMU Applied Micro Seminar, 2008

QME Conference, Chicago, IL, 2007

Mid-west Economics Theory Conference, Nashville, TN, 2005

PROFESSIONAL EXPERIENCE

Sports Journalist and News Analyst, Nanjing, China

2002

Wrote reviews and commentary on European soccer leagues and 2002 World Cup.

Analyzed results and statistics of European soccer for sport gambling company.

GRADUATE COURSEWORK

Course

Marketing

Marketing Seminar I: Advanced Data Analysis

Marketing Seminar II: Advanced Choice Models

Marketing Seminar III: Behavioral Research

Marketing Seminar IV: Internet Marketing

Marketing Seminar V: Analytical and Structural Models

Marketing Seminar VI: Behavior Decision Theory

Marketing Seminar VII: Bayesian Statistics

Marketing Seminar VIII: Survey in Marketing Literature

Instructor

Vishal Singh

Baohong Sun

Ajay Kalra

Alan Montgomery

Kannan Srinivasan

Uzma Khan

Alan Montgomery

Peter Boatwright

Econometrics and Statistics

Econometrics I: Small Sample Theory
Econometrics II: IV, MLE, GMM
Econometrics III: Structural Estimation
Econometrics IV: Nonparametric & Semi-parametric
Econometrics V: Current Issues in GMM
Intermediate Statistics
Statistical Analysis
Statistical Computing
Statistical Machine Learning

George-Levi Gayle
Holger Sieg
Ronald Goettler
George-Levi Gayle
Fallaw Sowell
Kathryn Roeder
Mototsugu Shintani
Surya T. Tokdar
John Lafferty/Larry Wasserman

Microeconomics and Industrial Organization

Microeconomics-I
Microeconomics-II
Microeconomic Theory
Game Theory
Industrial Organization-I
Industrial Organization-II
Contract Theory
Behavior Economics

Andrew Daughety
Quan Wen
Paul J. Healy
Paul J. Healy
Andrew Daughety
Jennifer Reinganum
Onur Kesten
George Lowenstein

REFERENCES

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Abstracts of Working Papers

“A Dynamic Model of Consumption and Insurance Purchase in the Health Care Service Industry” (Job Market Paper)

Health care service, arguably one of the most personal and important service that consumers buy, is very expensive. The expenditure on it accounted for 17% of U.S. GDP, which surpassed \$2.6 trillion in 2008. The increase of health care costs is particularly relevant in the context of chronic diseases, which account for 75% of total health care expenditure. In such a context, consumers have two types of health-care consumption choices: preventive care (which includes the measures such as diagnostic tests and drugs that help manage or prevent the illness) and curative care (which includes the treatment and therapies such as surgeries and more expensive drugs that help restore health). Although the vast majority of cases in chronic diseases could be managed by preventive care according to experts, more than 96% of the health care expenditure goes to more expensive curative care.

In this paper, we attempt to understand, in the context of chronic diseases, the underlying reasons behind these inefficiencies (i.e., why consumers opt for more expensive curative care which leads to a significant increase in the overall health care costs, but only a marginal increase in their welfare) and how these inefficiencies can be reduced. To do so, we build a dynamic structural model of how consumers choose between different insurance plans (which vary in terms of the coverage), and conditional on the insurance plans, how they make the health care consumption decisions (i.e., preventive vs. curative care). We apply the model to a proprietary data set provided by a large insurance company, which includes insurance pricing schemes, consumer insurance purchases and health care consumption decisions over time.

We find that (i) while preventive care mainly provides information about the health status (informative effect), curative care mainly improves the current health status (investment effect). (ii) Decreasing deductible or copayment increases frequency of preventive care more as compared to curative care, and decreasing coinsurance rate does the opposite. (iii) One underlying reason for the inefficiencies stem from the fact that a sizable segment of risk-averse consumers, who are not very sick, but are uncertain about their health status. These consumers opt for more comprehensive insurance plans; and once in that plan, rather than choosing preventive care that would help provide accurate information about the severity of their illness, they prefer to go for more expensive curative care (since the overall price of curative care for them are low in the comprehensive insurance plans). (iv) Subsidizing preventive care increases consumer welfare and decreases overall health care costs; on the other hand, subsidizing curative care increases consumer welfare, but also increases the overall costs. (v) Providing more accurate information about health status through preventive care increases both consumer welfare and decreases overall costs, consistent with recent trend of personalized medicine.

“Channel Motivations in Emerging Markets: An Empirical Analysis” with Laurens Debo, Sunder Kekre, and Baohong Sun (under revision at *Management Science*)

This study investigates the effectiveness of channel incentives for manufacturers as a means to manage dealers in emerging markets. Using data collected from a leading international manufacturer in the Indian power tool industry, we highlight how promotions may backfire and lead to sales inefficiencies and bloated channels. Such risks are hidden when dissimilar dealer types get aggregated. Recognizing dealer heterogeneity, we reveal that dealers differ significantly in their reactions to channel incentives, which creates varied performance effects. For modern dealers, credit and sales incentives from manufacturers are complementary, effectively boosting sales and

improving dealers' inventory turns. However, for traditional dealers, the incentives represent substitutes, such that sales incentives help boost sales but are detrimental to inventory turnover, and credit incentives harm both sales performance and inventory turnover. As the first empirical research to examine dealer responses to channel incentives at the individual level in an emerging market, this study reveals a pattern of heterogeneity in dealer networks. The results have significant implications that may help address manufacturers' pressing need to understand dealer motivations in such markets and use them to redesign their incentive offerings.

“A Structural Two-Sided Matching Model in the Business-to-Business Market” with Kannan Srinivasan

We have developed a matching-type model of a business-to-business sourcing market, in which we study how this market achieves stability under the influence of a broker. Conventional regression frameworks, which regress value chain spillover on the observed characteristics of firms, factories, and orders, become problematic when the characteristics can be observed only partially, in which case firm and factory matching is endogenous, because each prefers partners with higher intrinsic quality. The two-sided matching model can control for endogenous matching and provides Bayesian inference using a Gibbs sampling algorithm with data augmentation. We find evidence of positive assorted matching in pairs' size. Firms that do not maximize profits tend to pair with unsuitable factories, through the intervention of the broker. To investigate the role of incentives in the principle-agent framework, we conduct a series of counterfactual analyses that suggest eliminating the broker would lead to an allocation in which inefficient firms dominate. This finding confirms the importance of the matching process and explains why brokers can succeed in this market. Moreover, it suggests the future direction of the “leveraged growth” value chain.

“Dynamic Pricing Competition between Generic Brands and Established Brands—A Case of the Cigarette Market” with Baohong Sun

We develop an empirical dynamic oligopoly model of the cigarette industry to study the responses of firms to price cuts initiated by one of the biggest players in the cigarette market, driven by exogenous factors. The existence of heterogeneous consumer segments provides an incentive for firms to compete in their own segments, but the competing incentive also drives firms to penetrate other segments' markets. The dynamic model captures the addictive nature and price fluctuations in the cigarette market. Using a combination of micro- and macro-level data, we estimate consumer demand while considering addiction and consumer heterogeneity and thereby solve for firms' Markov perfect Nash equilibrium pricing policies.

“Service Pricing Dynamics and Time Inconsistency of Durable Goods” with Tao Chen and Kannan Srinivasan

This paper considers a market served by a monopolist that sells a service with durable goods. We examine the possible pricing dynamics of the service when the monopolist faces heterogeneous consumers in an effort to confirm the rationality of high profits obtained from services and the relatively lower profits from products in the retailing industry, as well as determine whether better pricing strategies are possible. Using a two-period model, we demonstrate the commitment role of service price in the durable goods market. If the monopolist also has a monopoly power in the service market, it can achieve a renter's result. Service is nondurable, so to the extent that the firm can transfer its monopoly power to the service area, it can take greater advantage of its position. The revenue the monopolist earns from providing the service with the durable goods means that the second-period profit reflects the value of products used at the beginning of the second period.

However, if the market for the service is competitive, the monopolist still suffers the classical time-inconsistency problem.