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EDUCATION

Ph.D. Applied Economics, The Wharton School, University of Pennsylvania (expected) 2014
Fields of Specialization: Quantitative Marketing, Empirical Industrial Organization

M.A. Statistics, The Wharton School, University of Pennsylvania 2011

B.S. Economics (Finance and Statistics), The Wharton School; and 2002
B.A. Economics with Honors, College of Arts & Sciences, University of Pennsylvania
Summa cum laude, Phi Beta Kappa

RESEARCH INTERESTS

Pricing, Consumer Search, Consideration Set Formation, Choice Modeling

DISSERTATION RESEARCH

Essay N^o.1 “Price Obfuscation and Consumer Search: An Empirical Analysis”

Job Market Paper; In Progress

Extended Abstract:

In many industries with sizable price or fee menus – including banking, travel, and hospitality – firms not only choose prices, but also decide how to communicate them to consumers. For seemingly homogeneous products, some firms quote a single total price, while others provide an array of constituent prices that together comprise the total. In the latter case, it is the consumer's onus to understand each price component and to compute a total price. Thus, in the way that price advertising promotes product awareness and draws products into consumers' consideration sets, price complexity obfuscates, making it more costly for consumers to search and expand their product consideration sets. This points to an underlying profit motive behind obfuscation: it potentially reduces the number of competing products to which a consumer compares the own product in the purchase decision. We investigate the magnitude of such profit motives by studying the impact of price complexity on consumer search, consideration set formation, and choice in the Portuguese market for driving instruction – an industry in which both search and price complexity are common. Schools typically do not publicly advertise price, and driving instruction is a one-off purchase; thus, students must invest both time and effort to learn schools' prices. Furthermore, schools do not use uniform schedules to respond to requests for price information, leading to opaqueness in pricing. We test empirically whether students' consideration sets respond to this price opaqueness.

While the potential role of search obfuscation as a strategic variable has been recognized in the theoretical literature and has been supported with anecdotal evidence, a unique feature of our research is that we have hand-collected, systematic information on both price and the detail and depth of the price information that schools – which differ in their market environments, characteristics, and students served – provided to a set of mystery shoppers. We therefore begin with a descriptive analysis of price complexity and search obfuscation patterns. Using our individual- and school-level data, we furnish evidence consistent with greater search frictions in markets with greater price complexity: price dispersion and markups are higher in markets with considerable complexity because incentives to search are weakest, in line with theoretical predictions of the search literature. In our context, price complexity hinders students' ability to compare schools on the price dimension, creating more effort costs to search additional schools. Schools respond by setting higher and more variable prices: they charge higher prices on average because greater overall price complexity lowers the probability that students continue searching upon visiting any one school, with higher-cost schools marking up their prices more significantly than lower-cost ones, thus inducing greater price dispersion in the market. While these facts provide evidence consistent with consumer search frictions, they do not allow quantification of the magnitude of potential profit gains to firms from complicating price information: how strongly does consumer demand respond to increases in obfuscation? Such an analysis requires a model of consumer choice behavior under price complexity and search obfuscation.

We therefore develop and estimate a joint model of consumer consideration set formation and demand, allowing the size and composition of each consumer's consideration set to be affected by the degree of price complexity and, thus, obfuscation in the market, as well as other costs of learning the prices of all schools under consideration. We use the estimated model primitives to derive implied search costs, and to uncover how changes in strategic complexity affect consumer demand and responsiveness to prices. Failing to account for heterogeneous consideration sets in markets in which search is important has potentially costly implications for price setting. In particular, the results of the joint model of consideration and choice suggest that price complexity has an economically and statistically significant effect on students' consideration sets. A model without complexity yields a poorer fit of the data, underestimates students' search costs in this market, and downward biases estimates of key measures such as demand elasticities. Hence, given the prominence of search and the practice of price complexity in many online and offline contexts, our results highlight the need to account for heterogeneity in consumers' consideration set formation processes in order to make viable marketing decisions. Having estimated the demand model, we plan to investigate firms' strategic behavior in this market as a next step. Specifically, we will jointly model firms' choice of price and complexity in an equilibrium model to study the interdependencies between these strategic instruments and their relationship to consumer search and demand conditions, a first in the empirical search literature.

Essay №.2 “Online Consumer Search and Consideration Set Heterogeneity”

In Progress

Abstract:

Traditional discrete choice models assume consumers are fully informed about all products in the market. Previous research has shown this assumption to be problematic in industries with advertising: consumers' consideration sets are heterogeneous in brand awareness due to variation in advertising intensity. We argue that consideration sets are also heterogeneous in search frictions: consumers' search costs influence the size and composition of their consideration sets. Using a sample of U.S. households' online purchase and browsing activity of computer hardware – a product that generates intense online search given its durability and consumers' price sensitivity to it – we incorporate heterogeneous consideration sets in a limited information discrete choice demand model. Specifically, consideration sets vary by consumers' web and search intensity: households that engage in greater online search face lower search costs and, consequently, have larger and more varied consideration sets, all else equal. By incorporating consumers' actual consideration sets into a random coefficients logit framework, we correct downward biases on the model's parameters that would otherwise exist under the full information assumption. Our results stress the importance of using individual-level data to model online shopping as a process of both consideration and choice, which yields more meaningful estimates of elasticities and other primitives that practitioners can use to set prices.

Essay Nº.3 “Competitive Price Complexity and Search Obfuscation with Market Interventions: Evidence from Retail Bank Fees”

In Progress

Abstract:

The Durbin Amendment of the Dodd-Frank Act of 2010 forced U.S. banks to be more transparent with regard to their fees, including debit card and interchange fees. Regulators meant for consumers to reap the benefits of increased transparency, but we develop a simple theoretical model that reveals firms respond to a regulation in which they must offer a simple, attractively priced alternative with increased obfuscation via greater variation in equilibrium prices. Using a large panel of retail bank fees from 2005 to 2012, we investigate the strategic decisions of firms to set prices and price complexity (i.e., variance of prices) simultaneously and show that the results of our model are borne out empirically. Banks responded to regulation by adding more and larger fees, which had the consequence of increasing the variance of fees in the market substantially. Faced with greater market dispersion in fees, obfuscated consumers' search costs have increased. We estimate an empirical search model to show that the distribution of consumers' search costs increased during this period, implying that the regulation has caused more harm than good.

OTHER RESEARCH

“Drip Pricing When Consumers Have Limited Foresight: Evidence from Driving School Fees”

Working Paper (joint with Katja Seim and Maria Ana Vitorino), February 2013

Abstract:

This paper empirically investigates the add-on or “drip” pricing behavior of firms in the Portuguese market for driving instruction. We present a model along the lines of Gabaix and Laibson (2006) in which consumers purchase a base and, with some probability, an add-on product from the same firm, but are not always aware of the possible need for the add-on product. We show that a typical loss-leader pricing strategy emerges whereby markups on the upfront product are artificially lowered, while firms price the add-on at monopoly levels. We then test the implications of the model using a detailed snapshot of industry data on student characteristics and preferences, school attributes including prices and costs, and market demographics for a cross-section of local markets with differing numbers of school competitors. We find significant evidence in support of the model predictions, including that firms face a substantial profit motive in the add-on market. Most notably, markups for the base product, but not the add-on products, decline in the number of competitors a firm faces, a prediction that has not been established in the literature to date. Finally, we estimate an empirical version of the model to show that approximately 25 percent of students are not aware of the add-on when making their school choice. This result has important implications about the cross-subsidization from those students who are unaware of the add-on to those who are.

“Market Size, Quality and Competition”

In Progress (joint with Katja Seim and Maria Ana Vitorino)

Abstract:

We test Sutton's theory of endogenous sunk costs (1991) as it relates to investments in quality in the market for driving instruction in Portugal. We find evidence that the industry in the aggregate exhibits features of exogenous sunk costs – the market is highly concentrated with low barriers to entry – despite anecdotal evidence to the contrary. In reality, many schools belong to markets with low levels of concentration and high barriers to entry. We rationalize this apparent contradiction in market structure by noting that the mechanism linking students and schools affects markets of different sizes differently. Word-of-mouth and reputation matter more in small markets: students learn about and agree upon rankings of driving schools by quality. Consequently, schools respond to market expansion with additional investments in quality using fixed

costs, which has the effect of deterring additional entry. Our empirical analysis confirms higher levels of unobservable quality in smaller markets – measured as the residual in a regression of observable quality, schools’ pass rates, on observable student and school attributes – coupled with the endogenous sunk costs market structure characteristic of such markets. We show evidence that the exact opposite is true in large markets. Thus, we confirm Sutton’s theory of endogenous sunk costs when we disaggregate the industry into small and large markets. Despite evidence to the contrary in the aggregate, the market for driving instruction can be construed as a “natural oligopoly” when we segregate the industry into small and larger markets.

PEER-REVIEWED CONFERENCE PRESENTATIONS (* PRESENTER)

“Drip Pricing When Consumers Have Limited Foresight: Evidence from Driving School Fees”

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| • NBER Industrial Organization Program Meeting, Palo Alto CA | 2013 |
| • UT-Dallas Frontiers of Research in Marketing Science Conference, Dallas TX | 2013 |
| • INFORMS Marketing Science Conference, Boston University, Boston MA* | 2012 |

“Market Size, Quality and Competition”

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| • INFORMS Marketing Science Conference, Rice University, Houston TX* | 2011 |
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HONORS, AWARDS, AND GRANTS

Center for Teaching and Learning Graduate Fellowship	2013-2014
Wharton Doctoral Program Travel Grant	2011-2013
Jay H. Baker Retailing Center Grant	2012
Zurich Initiative on Computational Economics Fellow, University of Zurich	2011
William and Phyllis Mack Center for Technological Innovation Grant	2010-2011
Amy Morse Public Policy Prize, Awarded to Most Promising 1 st Year Student	2009

EMPLOYMENT

Teacher, Saint Peter’s Preparatory School, Jersey City NJ	2003-2008
• <i>Courses Taught:</i> Algebra II, Geometry, AP Economics, AP Statistics; Latin I, Latin II	
Teacher, Saint Joseph’s Preparatory School, Philadelphia PA	2002-2003
• <i>Courses Taught:</i> Geometry Honors	

TEACHING INTERESTS AND EXPERIENCE

Teaching Interests

Principles of Marketing, Marketing Research, Pricing, Marketing Modeling, Internet Marketing

Teaching Experience

Recitation Instructor

- Managerial Economics (Undergraduate) [AVERAGE RATING: 3.8/4.0] 2011

Teaching Assistant

- Managerial Economics (MBA and Executive MBA) 2011-2012
- Issues in International Banking (Joint Undergraduate/MBA) 2009-2011
- Firms, Markets, and Public Policy (Undergraduate) 2010
- Basic Microeconomic Analysis (MBA) 2010

Guest Lecturer

- “Random Coefficients Estimation: The BLP Approach” 2009
In Professor Jagmohan Raju’s Economics/OR Models in Marketing PhD class

Participant, Wharton Teacher Development Program

2010

SELECTED PHD COURSEWORK

Marketing

- Economics/OR Models in Marketing Jagmohan Raju
- Empirical Models in Marketing David Bell, Maria Ana Vitorino
- Marketing Strategy George Day, Christophe Van den Bulte

Statistics and Econometrics

- Econometrics I: Fundamentals Áureo de Paula
- Econometrics III: Cross-Sectional Econometrics Áureo de Paula, Flávio Cunha
- Applied Econometrics I Linda Zhao
- Applied Econometrics II Dylan Small
- Linear Models Andreas Buja
- Bayesian Statistics and Computation Shane Jensen
- Empirical Methods of Economics and Public Policy Matthew White
- Empirical Methods of Corporate Finance Michael Roberts

Economics

- Microeconomic Theory I Richard Kihlstrom
- Microeconomic Theory II: Game Theory George Mailath
- Game Theory and Applications Philipp Kircher
- Empirical Industrial Organization Elena Krasnokutskaya
- Topics in Industrial Economics Katja Seim, Joel Waldfogel
- Numerical Methods in Economics Ulrich Doraszelski

COMPUTER LANGUAGES

AMPL, Matlab with KNITRO, R, SAS, Stata

SERVICE TO THE SCHOOL

Introduction to Diversity in Doctoral Education and Scholarship (IDDEAS) Conference	2013
Wharton Undergraduate Division's Take a PhD to Lunch Program	2011-2013
Penn Lambda Grads / Graduate LGBT Organization	2009-2012
Wharton Doctoral Council (President 2011-2012)	2008-2012
Wharton Doctoral Programs Executive Committee	2011-2012
Wharton Doctoral Programs Orientation Speaker	2010-2011

REFERENCES

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Professor Jean-François Houde
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Professor Kent Smetters [TEACHING REFERENCE]
The Boettner Chair Professor and Professor
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