

Wilfred Amaldoss

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Education

- 1995-1998 **The Wharton School, University of Pennsylvania**
Ph.D. in Marketing
Dissertation Title: Collaborating to Compete: A game-theoretic model and experimental investigation of competition among alliances.
Dissertation Chair: Robert Meyer and Jagmohan Raju
- 1984-1986 **Indian Institute of Management, Ahmedabad, India**
Master of Business Administration

Experience

- 2002-till date **Fuqua School of Business, Duke University**
Professor of Marketing, 2010-till date.
Associate Professor in Marketing (2004- 2010; tenured in Fall 2007)
Assistant Professor in Marketing (2002-2004)
- 1998-2002 **Krannert Graduate School of Management, Purdue University**
Assistant Professor in Marketing
- 1986-1993 **Lintas Worldwide, India**
Lintas Worldwide is an advertising agency.
Positions Held: Client Services Director (1993)
Account Director (1992),
Senior Account Executive (1988).

Teaching Awards

- 2009 **2009 Week-end MBA Excellence in Teaching Award for Elective Course**
The recipient of this award is selected annually by the graduating class of the Duke Weekend MBA program.
- 2008 **2008 Week-end MBA Excellence in Teaching Award for Elective Course**

The recipient of this award is selected annually by the graduating class of the Duke Weekend MBA program.

- 2006 **2006 DaimlerChrysler Corporation Award for Excellence in Elective Teaching**
The recipient of this award is selected annually by the graduating class of the Duke MBA – Daytime program based on outstanding teaching.
- 2005 **2005 Cross-Continent MBA Excellence in Teaching Award**
The recipient of this award is selected annually by the graduating class of the Duke MBA – Cross Continent program based on outstanding teaching.
- 2001 **2001 Salgo Noren Outstanding Teacher**
The Krannert Graduate School of Management gave this award in recognition of teaching excellence to graduate students as evidenced by classroom effectiveness, ability to motivate and inspire students. I was rated the best teacher by the class of 2001 MBA students.
- 2000 **2000 Salgo Noren Outstanding Teacher**
The Krannert Graduate School of Management gave this award in recognition of teaching excellence to graduate students as evidenced by classroom effectiveness, ability to motivate and inspire students. I was rated the best teacher by the class of 2000 MBA students.

Research Awards

- 2011 **Finalist for Long Term Impact Award**
The INFORMS College of Marketing gave this award in recognition of the long term impact of an article published in an INFORMS-sponsored journal (Marketing Science/Management Science).
- 2010 **2010 *Management Science* Distinguished Service Award**
Award given for distinguished service to the journal as an Associate Editor.
- 2009 **2009 *Management Science* Distinguished Service Award**
Award given for distinguished service to the journal as an Associate Editor.
- 2001 **2001 Frank Bass Award**
The INFORMS College of Marketing gave this award in recognition of the best marketing paper derived from a Ph.D. thesis published in an INFORMS-sponsored journal (Marketing Science/Management Science).
- 2001 **2001 John C. Little Award**
The INFORMS College of Marketing gave this award for the best marketing paper published in Marketing Science or Management Science.

2000 **2000 Ross Young Faculty Scholar**
Purdue University gave this award in recognition of my research excellence.

Grants

2001-2004 **Four-year grant from NSF**
Title: "Contests: Experimental Investigation"
Granting Agency: National Science Foundation
PI: Wilfred Amaldoss
Total Award: \$134,203 for the period 04/01/2001-03/31/2005

Honors

Invited speaker, AMA doctoral Consortium 2011
Invited speaker, Marketing Science Doctoral Consortium 2009
Invited speaker, Second Workshop on Economics of Advertising and Marketing (2009),
Department of Economics, University of Virginia and University of Cergy, France
Invited speaker, 2008 Conference on Experimental Social Science at the Economics
Department of Washington University
Invited speaker, 2008 Conference on Meaning of Consumption at the Economics
Department of Johnson School, Cornell University
Invited speaker, 2007/2008 Marketing in Israel Conference
Invited speaker, AMA doctoral Consortium 2007
Invited speaker, 2005 University of Maryland Marketing Camp
Invited for the Young Marketing Scholar Program of Marketing Science Institute 2005
External Examiner for PhD dissertation, University of Alberta and Hong Kong University
of Science and Technology, 2003.
Invited speaker, AMA doctoral Consortium 2002
Listed in Marquis' Who's Who in America and Who's Who in the World 2001-till date

Research Focus

I am interested in understanding strategic behavior of consumers and firms in the area of new product development, pricing and advertising. In my research, I develop game-theoretic models of markets and then test the equilibrium predictions in a laboratory. In some of my research, I incorporate psychological findings into game-theoretic models and understand their implications for strategic behavior of firms.

Publications

1. Avi Goldfarb, Teck-Hua Ho, Wilfred Amaldoss, Alexander Brown, Yan Chen, Tony Haitao Cui, Alberto Galasso, Tanjim Hossain, Min Hsu, Noah Lim, Mo Xiao, Botao Yang, "Behavioral Models of Managerial Decision Making," *Marketing Letters*. Forthcoming.

This paper reviews the literature that applies behavioral economic models to managerial decisions. It organizes the literature into research that focuses on alternative utility functions and research that focuses on non-equilibrium models. Generally, behavioral models have seen less application to manager decisions than to consumer decisions and therefore there are many

opportunities to develop new theoretical models, new laboratory experiments, and new field applications. The application of these models to field data is particularly underdeveloped.

2. Wilfred Amaldoss and Huihui Wang, "Cognitive Dissonance: A Review of its Psychological Basis and Economic Implications." In D. Teece and A. Augier (Eds.), *The Palgrave Encyclopedia of Strategic Management*, Eds. London: Palgrave McMillan.

Cognitive dissonance theory has a long history in psychology, but has been sparsely examined in the economics literature. It can help answer several questions of practical significance: What causes the formation of social underclass (Oxoby 2004)? When does preaching morality increase immoral behavior (Rabin 1994)? Should the government regulate hazardous industries to ensure worker safety (Akerlof and Dickens 1982)? In this chapter, we provide an overview of Festinger's original formulation (1957), outline the subsequent revisions to cognitive dissonance theory, and review the related economics literature.

3. Wilfred Amaldoss and Woochoel Shin (2011), "Competing for the Low-end Market," *Marketing Science*, 30 (5), 776-788.

Recent business research points to the fortune awaiting to be tapped in low-end markets. In this paper, we investigate how the size of the low-end market influences a firm's profits and the pioneering firm's quality choice. As low-valuation consumers increase in a market, on average consumers' willingness to pay reduces. This may lead us to expect firms' profits to decrease as the size of the low-end market increases. Our analysis shows that, if the size of the low-end market is below a threshold, an increase in the size of the low-end market may actually dampen price competition and improve profits, as now firms strategically choose their quality levels such that their products are more differentiated. Conventional wisdom also suggests that the pioneering firm will offer a higher quality product and earn more profits compared to the later entrant. In contrast to this notion of quality advantage, our analysis identifies circumstances in which a pioneer can offer a lower quality product and yet earn more profits. An experimental test lends support for some of our model's predictions. We further extend the model to consider markets with multiple firms, firms with multiple products, and consumers with limited purchasing power.

4. Wilfred Amaldoss and Sanjay Jain (2010), "Reference Groups and Product Line Decisions: An Experimental Investigation of Limited Editions and Product Proliferation," *Management Science*, 56 (4), 621-644.

Some luxury goods manufacturers offer limited editions of their products while some others market multiple product lines. Researchers have found that reference groups shape consumer evaluations of these product categories. Yet little empirical research has examined how reference groups affect the product line decisions of firms. Indeed, in a field setting it is quite a challenge to isolate reference group effects from contextual effects and correlated effects. In this paper we propose a parsimonious model that allows us to study how reference groups influence firm behavior and that lends itself to experimental analysis. With the aid of the model, we investigate the behavior of consumers in a laboratory setting where we can focus on the reference group effects after controlling for the contextual and correlated effects. The experimental results show that in the presence of strong reference group effects, limited editions and multiple products can help improve firm's profits.

5. Wilfred Amaldoss and Chuan He (2010), "Product Variety, Informative Advertising and Price Competition," *Journal of Marketing Research*, 47 (1), 146-156.

In many product categories, consumer tastes are diverse and firms use finely targeted advertising to inform consumers about their products. In this paper, we propose a model of informative advertising that allows for diverse consumer tastes and a large number of competing firms. Using this framework, we analyze how diversity in consumers' tastes, informative advertising, and improvements in advertising technology impact prices. First, we show that informative advertising can lead to lower prices if consumer valuations are high. However, if consumer valuations are moderate, informative advertising can lead to higher prices. Second, our analysis shows that, when consumer valuations are high, price increases with diversity in tastes. This result, however, is reversed if consumer valuations are moderate. Third, while improvements in advertising technology lead to higher levels of advertising when consumer valuation is high, the opposite can be true when consumer valuation is moderate. Finally, we relate our theoretical findings to the empirical literature on advertising.

6. Wilfred Amaldoss and Richard Staelin (2010), "Cross-function and Same-function Alliances: How does Alliance Structure Affect the Behavior of Partnering Firms," *Management Science*, 56 (2), 302-317.

There has been an increase in the incidence of firms that collaborate to develop and deliver new products. Often these firms have different functional competencies and thus bring unique resources to the alliance. Extant empirical evidence on the success of cross-functional alliances is, however, mixed. On examining managerial perception of alliances, we find that same-function alliances are expected to perform better than cross-function alliances all else equal. However, our analytical model suggests that if alliance partners behave strategically then partners in cross-function alliances invest more in their alliances than those in same-function alliances. It is also commonly believed that increasing the number of partnering firms is not conducive for collaborative effort. Our analysis finds that this belief is correct for same-function alliances, but not for cross-function alliances. On extending the theoretical model, we find that partners in cross-functional alliances might invest less only when confronted with inefficiencies in pooling resources. We test our theoretical claims concerning the effect of type of alliance and alliance size on the investment behavior of alliance partners in an experiment. The experimental results support our claims.

7. Wilfred Amaldoss and Chuan He (2009), "Direct-to-Consumer Advertising of Prescription Drugs: A Strategic Analysis," *Marketing Science*, 28 (3), 472-487.

Consumers cannot purchase a prescription drug without a prescription from a physician, yet many prescription drugs are promoted to consumers with the help of direct-to-consumer (DTC) advertising. In this paper, we propose and test a competitive model of DTC advertising. We find that the brand specificity of DTC advertising can have an inverted-U shaped relationship with detailing, DTC advertising and profits. Further, an increase in the cross-price sensitivity between competing prescription drugs is not always detrimental to firm profits. A laboratory test lends qualitative support to some of our model

predictions. We also discuss potential implications of DTC advertising for generic drugs and over-the-counter (OTC) drugs.

8. Wilfred Amaldoss and Sanjay Jain (2009), "Strategic Pricing: An Analysis of Social Influences." In *Handbook of Research in Pricing*. Ed. Vithala Rao, Edgar Elgar Publishing, MA.

Social factors influence our everyday life in many ways. For example, consumers purchase conspicuous goods to satisfy not only material needs but also social needs such as prestige. In an attempt to meet these social needs, producers of conspicuous goods like cars, perfumes, and watches highlight the exclusivity of their products. In this paper, we discuss a model of conspicuous consumption and examine how purchase decisions are affected by the desire for exclusivity and conformity. We show that snobs can have an upward-sloping demand curve but only in the presence of consumers who are (weakly) conformists. The influence of these social needs on firm's profits is moderated by the structure of the market. In a monopoly, conformism is conducive to profits while snobbishness hurts profits. We find that the results are reversed in a duopoly. We also investigate how social needs may influence the prices and qualities of the products which consumers choose to buy. A series of laboratory tests lends support for some of our model predictions.

9. Wilfred Amaldoss and Amnon Rapoport (2009), "Excessive Expenditures in Two-stage Contests: Theory and Experimental Evidence." In I. N. Hangen and A. S. Nilsen (Eds.), *Game Theory: Strategies, Equilibria and Theorems*, 241-266, Nova Science Publishers, NY.

Symmetric, budget-constrained, and financially motivated members of independent groups participated in a series of two-stage contests to win a single, commonly valued, and exogenously determined prize. We present and test an equilibrium model that, in addition to the utility of receiving the prize, incorporates 1) a non-pecuniary utility of winning each stage of the contest, and 2) allows for misperception of the probability of winning, which is determined by Tullock's contest success function. The equilibrium solution accounts for the major finding of excessive aggregate expenditures in stage 1 of the contest. We then test a Cognitive Hierarchy model that attributes individual differences in stage 1 expenditures to different levels of depth of reasoning. Although the explanatory power of this model is limited, it suggests a critical role to the non-pecuniary utility of winning in accounting for the excessive expenditures.

10. Wilfred Amaldoss, and Sanjay Jain (2008), "Joint Bidding in the Name-Your-Own-Price Channel: A Strategic Analysis." *Management Science*, 54 (10), 1685-1699 (*lead article*).

In this paper, we study the Name-Your-Own-Price (NYOP) channel pioneered by Priceline. We theoretically and empirically examine whether asking consumers to place a joint bid for multiple items, rather than bid for one item at a time as practiced today, can increase NYOP retailer's profits. Relatedly, we also examine whether allowing consumers to self select whether to place a joint bid or itemwise bids can increase retailers profits and consumers surplus. We construct a dynamic model which incorporates both demand uncertainty and supply uncertainty to address these issues. Our theoretical analysis suggests that some consumers might bid more for the very same items when they place joint bids. We also show that there are conditions under which joint bidding can increase both NYOP retailer's profits and consumer surplus. We

conducted a laboratory study to assess the descriptive validity of some of the model predictions, as there are no field data on joint bidding in NYOP channel. The results are directionally consistent with our theory.

11. Wilfred Amaldoss, James Bettman, John Payne (2008), "Biased but Efficient: An Analysis of Asymmetric Dominance Effects on Strategy Choices." *Marketing Science*, 27(5), 903-921.

In several marketing contexts, strategic complementarity between the actions of individual players demands that players coordinate their decisions to reach efficient outcomes. Yet coordination failure is a common occurrence. We show that the well-established psychological phenomenon of asymmetric dominance can facilitate coordination in two experiments. Thus we demonstrate a counterintuitive result: a common bias in individual decision making can help players to coordinate their decisions to obtain efficient outcomes. Further, limited steps of thinking alone cannot account for the observed asymmetric dominance effect. The effect appears to be due to increased psychological attractiveness of the dominating strategy, with our estimates of the incremental attractiveness ranging from 3%-6%. A learning analysis further clarifies that asymmetric dominance and adaptive learning can guide players to an efficient outcome.

12. Wilfred Amaldoss and Sanjay Jain (2008), "Trading Up: A Strategic Analysis of Reference Group Effects." *Marketing Science*, 27(5), 932-942.

Reference groups influence product and brand evaluations, especially when the product is a publicly consumed luxury good. Marketers of such luxury goods need to carefully balance two important social forces: the desire of leaders to distinguish themselves from followers and the countervailing desire of followers to assimilate with leaders. In this paper we examine the theoretical implications of these social forces for firm prices, product design and target consumer selection. We show that the presence of reference group effects can motivate firms to add costly features which provide limited or no functional benefit to consumers. Our results show that reference group effects can induce product proliferation on one hand and motivate firms to offer limited editions on the other hand. We find that offering a limited edition may significantly increase sales and profits. In some cases reference group effects can even lead to a buying frenzy.

13. Amnon Rapoport and Wilfred Amaldoss (2008), "In Search of Experimental Support for an Alternating Equilibria Solution in Symmetric Investment Games," *Journal of Economic Behavior and Organization*, 67(1), 200-203.

Symmetric investment games have a symmetric (completely) mixed strategy equilibrium. In addition to this equilibrium, these games have an alternating mixed strategy equilibria solution. Our analysis supports the symmetric mixed strategy solution, but soundly rejects the asymmetric alternating equilibria solution.

14. Wilfred Amaldoss, Teck Ho, Aradhna Krishna, Kay-Yut Chen, Preyas Desai, Ganesh Iyer, Sanjay Jain, Noah Lim, John Morgan, Ryan Oprea, and Joydeep Srivasatava (2008), "Experiments on Strategic Choice and Markets," *Marketing Letters*, 19(3-4), 417-429.

Much of experimental research in marketing has focused on individual choices. Yet in many contexts, the outcomes of one's choices depend on the choices of others. Furthermore, the results obtained in an individual decision making context may not be

applicable to these strategic choices. In this paper, we discuss three avenues for further advancing our understanding of strategic choices. First, there is a need to develop theories about how people learn to play strategic games. Second, there is an opportunity to enrich standard economic models of strategic behavior by allowing for different types of bounded rationality and by relaxing assumptions about utility formulation. These new models can help us to more accurately predict strategic choices. Finally, future research can improve marketing practice by designing better mechanisms and validating the mechanisms using experiments.

15. Wilfred Amaldoss and Sanjay Jain (2005), "Conspicuous Consumption and Sophisticated Thinking." *Management Science*, 51 (10), 1449-1466 (*lead article*).

Consumers purchase conspicuous goods to satisfy not just material needs but also social needs such as prestige. In an attempt to meet these social needs, producers of conspicuous goods like cars, perfumes, and watches highlight the exclusivity of their products. In this paper, we study how consumer's purchase decisions are affected by the desire for exclusivity and conformity. Toward this goal, we propose a model of conspicuous consumption using the rational expectations framework. Contrary to some intuition, we find the desire for exclusivity can increase the demand for a good as price rises when there is a segment of consumers who are (weakly) conformists. A laboratory test lends support for this model prediction. With the help of the Sophisticated EWA model proposed by Camerer, Ho and Chong (2002), we attempt to understand how consumers learn to play such games and also unravel the level of sophisticated thinking among our subjects.

16. Wilfred Amaldoss and Amnon Rapoport (2005), "Collaborative Product and Market Development: A Theoretical and Experimental Investigation," *Marketing Science*, 24 (3), 396-414.

In alliances jointly developing product and market, we first investigate a) how the number of networks competing to develop a product, b) number of alternative technology platforms, and c) market sensitivity to product development expenditures affect investments of partnering firms. We find that, in equilibrium, when either the number of competing networks or technologies increases, investments are more likely to be directed toward market rather than product development. Second, we consider the case where firms continue to jointly develop a product but compete individually in the market. Our analysis suggests that forcing alliance partners to compete individually might not attenuate the under-investment problem associated with new product alliances. Thirdly, we extend the model to consider sequential market entry with rewards based on the order of entry, technology spillover, endogenous market size, and asymmetric technologies. Finally, key predictions of the basic model are tested in two experiments. The aggregate results provide strong support to the qualitative implications of the equilibrium solution but only mixed support to its quantitative predictions.

17. Jim Parco, Amnon Rapoport and Wilfred Amaldoss (2005), "Two-stage Contests with Budget Constraints: An Experimental Study," *Journal of Mathematical Psychology*, 49, 320-338.

We consider a class of two-stage contests with budget-constrained agents competing to win an exogenously determined prize. In stage 1, agents compete within their own groups by expending resources, and in stage 2 the winners of each group

compete with one another to win the prize by expending additional resources. Expenditures cannot exceed the initial budget, and winners in each stage are determined by Tullock's probabilistic contest rule. In addition to the utility derived from winning the prize, we allow for a non-pecuniary utility for winning stage 1, independent of prize value, and then construct a symmetric sub-game perfect equilibrium solution. The equilibrium solution is tested experimentally under two different information conditions. It accounts well for the mean stage 1 expenditures for several different prize values and also for the change in these expenditures over trials if the utility for winning stage 1 is allowed to decrease over time. However, it over-predicts the mean stage 2 expenditures. An adaptive learning model accounts for several features of the dynamics of play but significantly under-predicts the stage 1 expenditures.

18. Tülin Erdem, Kannan Srinivasan, Wilfred Amaldoss, Patrick Bajari, Hai Che, Teck Ho, Wes Hutchinson, Michael Katz, Michael Keane, Robert Meyer, and Peter Reiss, "Theory Driven Choice Models," *Marketing Letters*, 16, 3-4, 225-237.

We explore issues in theory-driven choice modeling by focusing on partial-equilibrium models of dynamic structural demand with forward-looking decision-makers, full equilibrium models that integrate the supply side, integration of bounded rationality in dynamic structural models of choice and public policy implications of these models.

19. Wilfred Amaldoss and Sanjay Jain (2005), "Pricing of Conspicuous Goods: A Competitive Analysis of Social Effects," *Journal of Marketing Research*, 42, 30-42.

Social needs play an important role in the purchase of conspicuous goods. In this paper, we extend traditional economic models to accommodate social needs, such as desire for uniqueness and conformism, and examine their implications for pricing conspicuous goods. In the context of a duopoly, we identify the conditions under which the desire for uniqueness can increase demand among some consumers as the price of a product increases. Second, we show that while the desire for uniqueness leads to higher prices and firm profits, a desire for conformity leads to lower prices and profits. Third, we find that consumers purchase high quality products not because of their desire for uniqueness, but despite it. Finally, marketers of conspicuous goods might find it beneficial not to highlight the functional differences among their products when the need for uniqueness is high. In a laboratory test, we find support for the claim that demand for a product among consumers who desire uniqueness might increase as its price increases.

20. Wilfred Amaldoss and Amnon Rapoport (2005), "Effects of Idiosyncratic Investments in Collaborative Networks: An Experimental Analysis," In R. Zwick and A. Rapoport (Eds.), *Experimental Business Research*, Vol. II. Boston: Kluwer.

There has been an increase in the incidence of firms that collaborate to develop and market new products. Partners in these collaborations often make investments that are idiosyncratic to the collaboration and have limited value outside the scope of the alliance. Amaldoss and Rapoport (2003) report that the joint investment of a network does not decrease if the number of partners increases. Specifically, if the investments are only partially idiosyncratic, the joint investment increases as a network grows in size. If they are fully idiosyncratic, then the joint investments are predicted to be independent of

the number of partners. In this paper, we test these predictions in a laboratory setting. The experimental results support the qualitative predictions of the model, and adaptive learning accounts for the investment patterns of our subjects over time. We also extend the model to consider competitions among more than two networks.

21. Amnon Rapoport and Wilfred Amaldoss (2004), "Mixed Strategy Play in Single-Stage All-Pay Auctions with Symmetric Players," *Journal of Economic Behavior and Organization*, August, 584-607.

We consider sealed-bid, first-price, all-pay auctions with complete information, discrete strategy space, budget constraint, and symmetric players, and then construct the equilibrium solution in mixed strategies for both fixed and variable prizes. The equilibrium solution yields predictions concerning the effects of group size and value of the prize that are tested experimentally. The experimental results support equilibrium play on the aggregate but not individual level. Adaptive learning on the individual level accounts for the major trends in the aggregate expenditures over time.

22. Wilfred Amaldoss and Sanjay Jain (2002), "An Analysis of the Impact of Social Factors on Purchase Behavior," in *Review of Marketing Science*, 2, (1).

Consumers purchase conspicuous goods to satisfy not just material needs but also social needs such as prestige. In an attempt to meet these social needs, marketing managers of conspicuous goods like cars, perfumes, and watches employ several strategies to highlight the exclusivity of their products. These strategies include using exclusive distribution, charging high prices, and limiting production. Further, marketing textbooks suggest that the demand curve for prestige goods could be upward sloping and therefore firms should not set prices that are "too low." In this paper we examine whether the desire for exclusivity can lead to an upward-sloping demand curve. We also investigate how social factors such as the desire for exclusivity and conformity affect prices and firms' profits. To analyze these issues, we develop a model of conspicuous consumption using the rational expectations framework. We consider two different market structures: monopoly and duopoly. Our results shows that the desire for exclusivity can lead to an upward-sloping demand curve when there is a segment of consumers who are (weakly) conformists. The impact of exclusivity and conformity on prices and profits varies with the market structure. Interestingly, an increase in perceived functional differentiation of products consumed by snobs could decrease firms' profits and prices. In the laboratory, we observe an upward sloping demand curve for snobs, in both the monopoly and duopoly setting. We also track consumer's expectations, and find on average that subjects' beliefs are consistent with the observed outcome and the rational expectations equilibrium solution.

23. Wilfred Amaldoss and Sanjay Jain (2002), "David versus Goliath: An analysis of asymmetric mixed strategy games and experimental evidence," in *Management Science*, 48 (8).

Mixed strategy Nash equilibrium is one of the most fundamental concepts of noncooperative game theory. But some of the implications of asymmetric mixed strategy solutions are counterintuitive. We develop a stylized model of a patent race to examine these implications. In our model two firms compete to develop a product and obtain a patent. However, one firm values the patent more because of its market advantages,

such as brand reputation and distribution network. Contrary to intuition, we find that the firm that values the patent less is likely to invest more aggressively in developing the product and will also win the patent more often. We argue that the reason for these results is inherent in the very concept of mixed strategy solution. In a laboratory test, we find that the aggregate behavior of our subjects is consistent with the game-theoretic predictions. With the help of the Experience-Weighted Attraction (EWA) learning model proposed by Camerer and Ho (1999), we show that adaptive learning can account for the investment behavior of our subjects.

24. Wilfred Amaldoss, Robert Meyer, Jagmohan Raju and Amnon Rapoport (2000), "Collaborating to Compete," in *Marketing Science*, 19 (2). (*lead article*)

In collaborating to compete, firms forge different types of strategic alliances: same-function alliances, parallel development of new products, and cross-functional alliances. A major challenge in the management of these alliances is how to control the resource commitment of partners to the collaboration. In this research we examine both theoretically and experimentally how the type of an alliance and the prescribed profit-sharing arrangement affect the resource commitments of partners. We model the interaction within an alliance as a noncooperative variable-sum game, in which each firm invests part of its resources to increase the utility of a new product offering. Different types of alliances are modeled by varying how the resources committed by partners in an alliance determine the utility of the jointly-developed new product. We then model the inter-alliance competition by nesting two independent intra-alliance games in a super game in which the groups compete for a market. The partners of the winning alliance share the profits in one of two ways: equally or proportionally to their investments. The Nash equilibrium solutions for the resulting games are investigated.

In the case of same-function alliances, when the market is large the predicted investment patterns under both profit sharing rules are comparable. Partners developing new products in parallel, unlike the partners in a same function alliance, commit fewer resources to their alliance. Further, the profit-sharing arrangement matters in such alliances -- partners commit more resources when profits are shared proportionally rather than equally.

We test the predictions of the model in two laboratory experiments in which subjects played the inter-alliance competition game for a monetary payoff contingent on performance. The results provide strong support for the game-theoretic model. A new analysis of Robertson and Gatignon's (1998) field survey data on the conduct of corporate partners in technology alliances is also consistent with our model of same-function alliances.

25. Amnon Rapoport and Wilfred Amaldoss (2000), "Mixed Strategies and Iterative Elimination of Strongly Dominated Strategies: An Experimental Investigation of States of Knowledge", *Journal of Economic Behavior and Organization*, 4 , 483-521

The competition between two firms developing a new technology product is modeled as a two-person nonzerosum game in strategic form in which each firm invests a part of its endowment in the development of a new product. The investments of both firms are assumed to be project specific and nonrecoverable. The firm investing the highest amount wins the competition. The case of symmetric firms with the same

investment capital and that of asymmetric firms with different investment capital are examined. The Nash equilibrium in both cases calls for mixed strategies yielding payoffs which are independent of the size of reward, equal to the minmax payoff and Pareto deficient. Our experimental results show that individuals are able to mix strategies and their aggregate behavior seems to approximate the game-theoretic prediction. In the asymmetric game, we also find that individuals delete dominated strategies, but the ability to do so varies among individuals.

26. Amnon Rapoport and Wilfred Amaldoss, W. (1999). Social dilemmas embedded in between-group competitions: Effects of contest and distribution rules. In M. Foddy, M. Smithson, S. Schneider, and M. Hogg (Eds.), *Resolving Social Dilemmas: Dynamic, Structural, and Intergroup Aspects*. Psychology Press.

We investigate how an individual's incentives to cooperate in two of the most commonly studied within-group social dilemmas are enhanced when these dilemmas are embedded in between-group competitions for divisible private goods. We provide a structure for classifying these social dilemma problems along three dimensions: payoff structure of the within group conflict, contest rule for the between group competition, and profit-sharing rule for dividing the private good. Then we outline some testable implications of our analysis.

Working Papers

27. Wilfred Amaldoss and Chuan He, "Multi-product Competition and Informative Advertising." Under review in *Marketing Science*.

In product categories such as cereals, ice cream, and detergents, competing firms market a variety of products to meet the needs of their diverse consumers. Furthermore, these firms inform consumers about their products using advertising. In this paper, we propose a novel framework for studying multi-product competition and informative advertising in a horizontally differentiated market. Our conceptualization of product advertising and brand advertising recognizes that consumer attention span is limited, consumer memory is fallible and captures effects such as advertising clutter, advertising confusion, and brand dilution. Using the framework, we analyze how market structure and different types of informative advertising affect a firm's product-line length.

We find that when firms release product specific advertising, the number of products offered by a monopolist increases with advertising reach, but the result is reversed in the presence of competition. By contrast, when firms release brand advertising to inform consumers about their products, the length of product-line can be increasing for both the monopolist and duopolists, but under very different conditions. In choosing between product and brand advertising, the monopolist favors brand advertising. Duopolists, on the other hand, prefer product advertising; however, they increase the emphasis placed on brand advertising as the diversity in consumers' taste increases or consumers' attention span decreases.

28. Wilfred Amaldoss, Preyas Desai and Woochoel Shin, "First Page Bid Estimates and Key Word Advertising: A Strategic Analysis." Being revised for second round in *Marketing Science*.

In contrast to prior literature on keyword search advertising, which focuses attention on the behavior of advertisers, we analyze the search engine's strategic behavior. For example, in a recent innovation Google provides advertisers bid estimates for their advertising links to feature in the first page of search results. Google's transition from stipulating advertiser-specific minimum bids (ASMB) to merely providing first-page bid estimate (FPBE) is puzzling: Unlike ASMB, FPBE is not always enforced by the search engine and as such it could hurt the search engine's profits. Our theoretical analysis explains why and when FPBE mechanism yields higher profits for the search engine compared to ASMB mechanism or classic generalized second-price (GSP) auction. Advertisers often fear that the search engine may increase its profits by altering the listing order of advertisers in the slate of advertisements. We find that under FPBE mechanism (unlike ASMB mechanism) there is no incentive for the search engine to alter the listing order of advertisers. We further show that the search engine can leverage FPBE mechanism to address two of its common challenges: click fraud and budget-constrained advertisers. The common belief is that the search engine turns a blind eye to inflationary click fraud as it improves the search engine's profits. In FPBE mechanism, however, the search engine's incentives are aligned to reduce click fraud, not condone it. Also, in the event a high-valuation advertiser is budget constrained, the search engine can use FPBE mechanism to alter the listing order with the intent of keeping the high-valuation advertiser in the auction for a longer time. The resulting increase in search engine's profits is not necessarily at the expense of the advertisers as the combined profits of the advertisers and the search engine increases.

29. Wilfred Amaldoss and Chuan He, "Pricing Prototypical Products." Ready to be sent for review.

When we think of colas, Coca-Cola first comes to mind. Products such as Cola-Cola, Tide laundry detergent and Chapstick lip balm are the prototypical products in their respective categories. Over three decades, research in consumer psychology has accumulated evidence on how prototypicality structures memory, shapes the composition of consideration set and influences purchase decision. Yet there is no research on how it affects the competitive behavior of firms. For example, some prototypical products are lower priced than other products in their category, whereas in certain other categories the prototypical product is higher priced. Using a novel model, we make an initial effort to examine theoretically the impact of prototypicality on the pricing decisions of firms competing in a horizontally differentiated market. Our analysis shows that when consumer valuations are low, the prototypical product charges a lower price and yet earns more profits compared to other products in the category. However, when consumer valuations are high, the rank order of the prices of the prototypical product and a nonprototypical product becomes reversed, but not the order of profits. We subject these predictions to an empirical test. The experimental results lend support for the qualitative predictions of the model.

30. Wilfred Amaldoss and Chuan He, "Informative Advertising, Product Variety, and Price Competition: An Experimental Analysis."

In many product categories, consumers' tastes are diverse and firms use advertising to inform consumers about their products. Prior empirical literature on the effect of advertising on price reports very divergent findings. With the aid of a game-

theoretic model, we investigate in the laboratory how informative advertising affects market price. Study 1 shows that informative advertising can lead to higher prices if consumer valuations are low. Study 2, on the other hand, points to the possibility that informative advertising can lead to lower prices if consumer valuations are high. Although consumers' tastes are diverse in several product categories, its effect on price has not been explored in the empirical literature. In Study 3 we show that if consumer valuations are low, price decreases with diversity in taste. On the contrary, in Study 4 price rises when diversity in consumers' taste increases. Our experimental investigation is a useful complement to prior empirical literature on advertising, as it provides evidence on the causal relationship between the focal variables and clarifies the conditions under which we may observe divergent results.

Conference Presentations

Wilfred Amaldoss, Preyas Desai and Woochoel Shin, "First Page Bid Estimates and Key Word Advertising: A Strategic Analysis." Marketing Science Conference, June 2011, Houston.

Wilfred Amaldoss and Chuan He, "Multiproduct Competition and Informative Advertising," Marketing Science Conference, Cologne, June 2010.

Wilfred Amaldoss and Woochoel Shin, "Competing for Low-end Market," Marketing Science Conference, Cologne, June 2010.

Wilfred Amaldoss and Chuan He, "On the trade-offs between brand and product advertising." Marketing Science Conference, Ann Arbor, June 2009.

Wilfred Amaldoss and Chuan He, "Informative Advertising and Product Variety." Second Workshop on Economics of Advertising and Marketing, St.Germain en Laye, Paris, June 2009.

Wilfred Amaldoss and Sanjay Jain, "Reference Groups and Product Line Decisions." UTD-FORMS Conference, Dallas, February 2009.

Wilfred Amaldoss and Sanjay Jain, "Strategic Implications of Social Influences on Consumption." Conference on Meaning of Consumption, Department of Economics, Johnson School, Cornell University. August 2008.

Wilfred Amaldoss and Chuan He, "Multiproduct Competition and Informative Advertising." Marketing Science Conference, Vancouver, Canada, June 2008.

Wilfred Amaldoss and Sanjay Jain, "Reference Groups and Product Line Decisions: An Experimental Investigation of Limited Editions and Product Proliferations." Marketing Science Conference, Vancouver, Canada, June 2008.

Wilfred Amaldoss and Sanjay Jain, "Trading Up: A Strategic Analysis of Reference Group Effects." Presented at the 2007/2008 Marketing in Israel Conference, Tel Aviv University/Hebrew University of Jerusalem/IDC, December 2007-Jan 2008.

- Wilfred Amaldoss and Sanjay Jain, "An Analysis of Conspicuous Consumption." Presented at the Choice Conference, Wharton School, University of Pennsylvania, Philadelphia, July 2007.
- Wilfred Amaldoss and Sanjay Jain, "An Analysis of Limited Edition Products." Presented at the Economic Science Association Meeting, Tucson, October 2007
- Wilfred Amaldoss, Jim Bettman and John Payne, "Biased but Efficient: Coordination Facilitated by Asymmetric Dominance." Presented at the Marketing Science Conference, Pittsburgh, 2006
- Wilfred Amaldoss and Amnon Rapoport, "Excessive Expenditures in Two-stage Contests: Theory and Experimental Evidence." Economic Science Association Meeting, Tucson, September 2005
- Wilfred Amaldoss and Sanjay Jain, "An Experimental Investigation of the Rational Expectations Hypothesis." Presented at the Marketing Science Conference, Emory University, June, 2005.
- Wilfred Amaldoss and Sanjay Jain, "Pricing of Conspicuous Goods: A Competitive Analysis of Social Effects." Presented at the Summer Institute in Competitive Strategy, University of California at Berkeley, June, 2004.
- Wilfred Amaldoss and Sanjay Jain, "Conspicuous Consumption and Sophisticated Thinking." Presented at UNC, Chapel Hill, October 2004.
- Wilfred Amaldoss and Amnon Rapoport, "Collaborative Product and Market Development: A theoretical and Experimental Investigation." Presented at the Marketing Science Conference, University of Maryland, June 2003.
- Wilfred Amaldoss and Sanjay Jain, "Conspicuous Consumption and Sophisticated Thinking." Presented at the Marketing Science Conference, University of Maryland, June 2003.
- Wilfred Amaldoss and Amnon Rapoport, "Effects of Idiosyncratic Investments in Collaborative Networks: An Experimental Analysis." 2nd Asian Conference on Experimental Economics Research, HKUST, December 2003.
- Wilfred Amaldoss, and Sanjay Jain, "Name Your Own Price: An Analysis of Multi-Item Bidding." Presented at the ACR conference, UT Austin, October 2001
- Wilfred Amaldoss and Amnon Rapoport, "Network versus Network: Theory and Experimental Evidence on Inter-network Competition." Presented at the ACR conference, Salt Lake City, October 2000. Also Co-Chaired a special session on experimental economics (with Teck-Ho).
- Wilfred Amaldoss and Amnon Rapoport, "Network versus Network: Theory and Experimental Evidence on Inter-network Competition." Presented at the Marketing Science Conference, UCLA, June 2000.

Wilfred Amaldoss and Amnon Rapoport, "Bundling Products for Success: The role of asset-specificity and bundle size in fostering collaboration" Presented at the Special Session in Experimental Economics at Association of Consumer Research Meeting, October 1999.

Amnon Rapoport and Wilfred Amaldoss, "Mixed Strategies and Iterative Elimination of Strongly Dominated Strategies: An Experimental Investigation of States of Knowledge," Marketing Science Conference, Syracuse University, Syracuse, May 1999

Wilfred Amaldoss, Robert Meyer, Jagmohan Raju and Amnon Rapoport "Collaborating to Compete: A Game-Theoretic Model and Experimental Investigation of the Effect of Profit-Sharing Arrangement and Type of Alliance on Collaboration," Marketing Science Conference, Syracuse University, Syracuse, May 1999

Wilfred Amaldoss, Jagmohan Raju and Jehoshua Eliashberg, "Forecasting the Demand for Videocassette Sell-Through Sales: A Utility Theory Based Model", Marketing Science Conference, University of California, Berkeley, March 1997

Invited Talks

In 2011, I was invited to talk at:

- INSEAD, France.
- Carnegie Mellon University
- Yale University

In 2009, I was invited to present my work at Second Workshop on the Economics of Advertising and Marketing, St.-Germain en Laye, France.

In 2008, I was invited to present my work at:

- Cornell University (Economics)
- Washington University, St. Louis (Economics)
- Texas A&M
- University of California, Riverside

In 2007, I was invited to

- Present my work at the Marketing in Israel conference
- Be a discussant at the QME conference organized at the University of Chicago;

In 2006, I gave talks at:

- University of California at Berkeley,
- Cornell University,
- University of Michigan, and
- University of Texas (Dallas).

In 2005, I was invited to give talks at

- University of Pennsylvania,

- Penn State (Experimental Economics),
- University of Arizona,
- University of Maryland at College Park,
- University of Houston and
- University of Colorado at Boulder.

Earlier I have been invited to

- Dartmouth College,
- Emory University,
- Harvard Business School,
- Hong Kong University of Science and Technology
- INSEAD,
- London Business School,
- New York University,
- Northwestern University,
- University of Illinois, Urbana-Champaign
- University of North Carolina, Chapel Hill
- University of Pittsburgh,
- University of Southern California
- Washington University, St. Louis

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Professional Affiliations

INFORMS

Economic Science Association

American Economic Association