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ABSTRACT

The advent of sponsored search advertising raises many interesting questions regarding consumer's search and purchase behavior, seller's advertising strategy, and ensuing market dynamics. This study employs theories from marketing and economics to understand the impact of sponsored search advertising on consumer behavior in a market that exhibits information asymmetry. Specifically, we focus on the availability of relative advertising expenditure as the external cue -- observed by the position of the sellers on the sponsored search listings, and examine how consumers use this cue to make search and purchase decisions. We integrate the literature on advertising and search to model consumer behavior and conduct experiments to empirically test the proposed model.

Keywords

Advertising signal, pricing Signal, sponsored search advertising, consumer search experiment

INTRODUCTION

Internet enabled digital media have revolutionized every aspect of today's socio, economic and political environment, and spawned a variety of new business models and opportunities. Online advertising is one such business model that exploits the capabilities of the new digital media to provide value to consumers, advertisers, as well as content providers (Kluth 2006). According to recent reports Internet advertising revenues (U.S.) for the first six months of 2005 were approximately $5.8 billion, an increase of 26% over the first half of 2004 (Interactive Advertising Bureau 2005). Of the various online advertising formats, sponsored search advertising has emerged as the dominant format for advertisers. An industry survey estimates that sponsored search advertising accounts for 40% of all advertising spending online (PricewaterhouseCoopers 2005). Sponsored search (also known as "paid search" or "pay-for-placement" or "keyword") advertisements are text-based advertisements that are displayed alongside the organic search results (i.e., the algorithm-based results generated by a search engine's web crawlers) when a user submits a search query. The sponsored search model employs an auction mechanism for pricing the position of the advertisements in the sponsored search listing for each keyword. Advertisers bid in these auctions on keywords relevant to their product or service, for enhanced placement (i.e., higher position) of their advertisements in sponsored search results. The higher the bid, the higher the advertiser's message appears in the sponsored search list, which should typically lead to more sales leads (click-throughs) and consequently greater sales.

Despite the phenomenal growth in sponsored search advertising, research on the implications of this new form of advertising is scarce. Further, current research in this field focuses primarily on the strategies and behavior of the sellers and advertising intermediaries (Feng et al. forthcoming; Sundararajan 2003). The impact of information technology on the way in which consumers' search when confronted with sponsored advertising is largely unexplored. My dissertation, examining the impact of online sponsored search advertising on consumer behavior, seeks to fill this gap.

RESEARCH QUESTIONS

Recent studies show that consumers primarily tend to focus on the top results in the search listings and click primarily on sellers that appear higher on the list (DoubleClick 2006). However, a vast majority of consumers (62%) are unaware of the distinctions between sponsored search and organic (algorithm-based) search results (Fallows 2005). In addition, a large proportion of consumers believe that that a seller listed higher in the search results is of higher quality than those listed lower (iProspect 2006). It is not clear how consumer behavior would change if they are aware of the fact that a seller appearing higher on the list pays more than the seller appearing lower in the search listings. This question becomes especially

important in the markets where all the sellers on the list are *a priori* similar (i.e. similar brand recognition/ awareness and no brand loyalty) and consumers cannot easily distinguish the quality of the sellers. This essay focuses on such markets that exhibit information asymmetry, and studies the impact of sponsored search advertising on consumer behavior. Specifically, I investigate the impact of quality signals (i.e. informational cues about the relative advertising expenditure of the firms) on consumers' search behavior, as well as purchase decisions in online settings.

An examination of the quality signaling role of sponsored search advertising becomes important due to the prevalence of large quality variations among the sellers selling seemingly homogenous products on the Internet (Baylis and Perloff 2002). While it has been found that consumers shopping online rely on brand name to infer retailer's quality in non-contractible aspects of the product and service bundle, such as shipping reliability (Smith and Brynjolfsson 2001), the nascence of online markets and the lack of geographical constraints expose consumers to new firms and unknown sellers. The pay for performance and self-service nature of sponsored advertising further aggravates this problem by dramatically lowering the barriers to entry for smaller firms to advertise nationally. This "long tail" of tens of thousands of small businesses, not being served by conventional means of advertising (Anderson 2005), diminishes the role of brand name in consumer decision making, and increases the reliance on other indirect information cues such as advertising and the price charged by the sellers. Consumer search and purchase strategy – manifested in the click-through and conversion rate at various positions in the sponsored search listing -- in such markets with quality uncertainty significantly affects the revenues and strategies of advertising intermediaries and the advertisers in this multi-billion emerging industry. Consumer welfare is also affected as a result of the interaction of sellers advertising strategies and consumer search strategies, which has implications for policy makers.

Given the impact of consumer behavior in these sponsored search online marketplaces, it is important to examine the factors that affect (or might affect) consumer search and purchase behavior. I draw upon theories from Information Systems, Marketing, and Economics to address the following research questions: 1) Can sponsored search advertising serve as a signal of quality and if so, under what circumstances?, 2) How do perceptions about the correlation between a seller's advertising expenditure and quality affect consumers' search and purchase behavior?, 3) How does the price signal influence consumers' reliance on advertising signals in their purchase decisions?, and 4) How does the risk attitude of consumers affect their reliance on indirect cues provided by the online sponsored search format.

RELATED RESEARCH

Two streams of literature that are relevant to understanding consumer behavior in the sponsored search context are those related to *consumer search*, and *quality signaling* in markets with asymmetric information. I integrate these two streams of literature to examine the impact of consumer perceptions of sponsored search advertising on their search behavior as well as purchase decisions.

Consumer Search: Researchers have examined consumer search behavior in markets that exhibit price dispersion (Stigler 1961). Analytical models (Ratchford 1982) and empirical evidence (Ratchford and Srinivasan 1993; Schotter and Braunstein 1981) suggests that consumers searching for a low price adopt a reservation price strategy. According to this strategy, a consumer calculates the reservation price based on the price dispersion and unit search cost, and buys from the first seller who meets this reservation price. Most of this stream of research either ignores quality dispersion or assumes quality to be identifiable prior to purchase. However, in several online purchase situations it is more difficult for consumers to ascertain quality. The importance of informational cues assumes greater importance in such purchase situations. My dissertation focuses on understanding consumers' search behavior in such environments, where consumers cannot ascertain quality attributes prior to the purchase.

Uncertainty and Quality Signaling: Existing research suggests that markets with information asymmetries break down unless there are effective quality-signaling mechanisms. A signaling mechanism refers to cues provided by a seller that reveal her true quality. Researchers have identified various external cues (i.e., cues not directly related to product performance) – such as advertising, warranty, brand name and product price – that can act as quality signals (Grossman 1981; Milgrom and Roberts 1986). Of particular interest in the current context is the role of advertising expenditure in providing quality cues. Studies in traditional settings show that consumers associate higher advertising expenditure with higher quality (Kirmani and Wright 1989). Unlike traditional media, the position of the advertiser in the sponsored search listings by itself provides information about the seller's advertising expenditure (and possibly seller's quality) relative to other sellers in the listing. Since a consumer using sponsored search listing can also choose to search for prices across various sellers, it becomes important to understand how consumer's search behavior may be affected by the presence of the advertising signal. This study is among the first to examine these issues in the online sponsored search context.

In addition to these theories, I also employ insights from the literature on uncertainty and risk to investigate the role that risk attitude plays in consumer's reliance on signals and her search strategy. A consumer faced with uncertainty about price and quality acquires information that may reduce the risk inherent in such an uncertain environment. Since consumers differ in their attitudes towards risk, their information acquisition strategy also varies. Research suggests that risk-averse consumers search less than risk-neutral consumers in a search-with-recall scenario (Nachman 1975; Schotter and Braunstein 1981). Research on role of advertising and price signaling on consumer's perception, on the other hand, overlooks the risk attitude of consumers. However, since advertising and price provide consumers with informational cues in an environment with quality uncertainty, the risk attitude of consumers is likely to influence the importance of these signals for their purchase decision. My research also examines how consumers' risk-attitudes influence not only the salience of these informational cues but also consumers' confidence in these informational-cues as a signal of quality.

RESEARCH MODEL AND HYPOTHESES

The conceptual framework and the specific research model used in this study are shown in Figure 1 and Figure 2 respectively. This section briefly outlines the various hypotheses examined in this study. Detailed explanations are not provided here due to space constraints, but are available upon request.

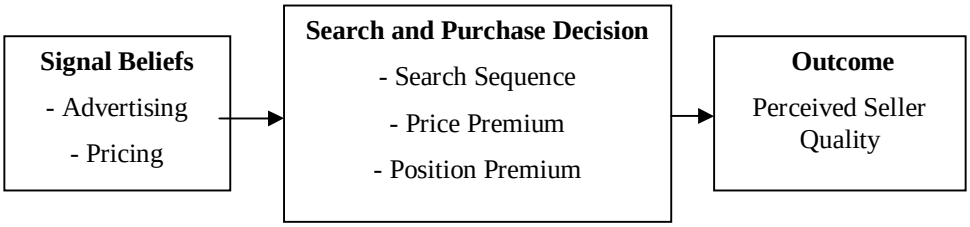

Figure 1. Conceptual Model

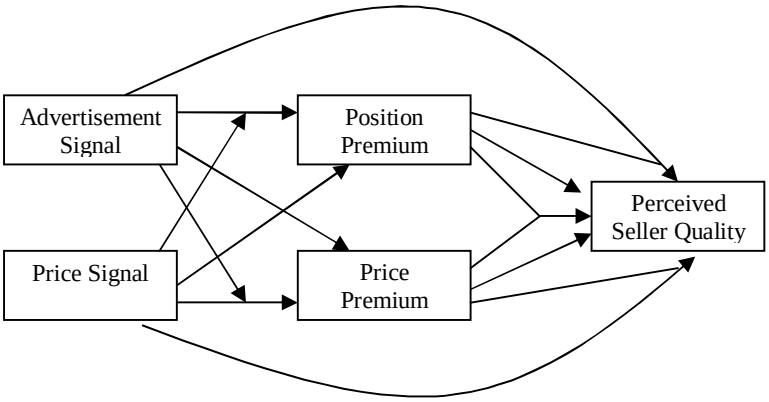

Figure 2. Research Model

H1: Knowledge of the sponsored search advertising mechanism will lead consumers' to perceive a *positive* ***position-quality correlation*** (i.e. sellers shown higher on the list are higher quality sellers).

H2a: Consumers will associate higher price with higher seller quality.

H2b: Consumers who are aware of the sponsored search advertising mechanism will attach lower weight to the price signal in inferring quality.

H3: Given higher quality dispersion vis-à-vis price dispersion, a stronger belief in the advertising signal will be associated with (a) a lower price premium paid by the consumer, (b) a lower consumer's search intensity, and (c) an higher position premium (i.e. consumer preferring to buy from a seller higher on the list) enjoyed by sellers.

H4: Given higher quality dispersion vis-à-vis price dispersion, a stronger belief in price signal will be associated with (a) a higher price premium paid by the consumer, (b) a higher consumer's search intensity, and (c) will not be related to position premium.

H5: Advertising signal will attenuate the impact of price signal on the price premium.

H6: Price signal will attenuate the impact of advertising signal on the position premium.

H7: Consumers' risk attitudes will moderate consumers' belief in a quality signal and its impact on price and position premium paid such that: a) risk-seeking consumers would pay a higher price premium but a lower position premium due to a higher reliance on the price signal rather than the advertising signal, and b) risk-averse consumers would pay a lower price premium and a higher position premium due to higher reliance on the advertising signal compared to the price signal.

H8: Higher price premium paid by the consumer who believes in price signal will be associated with higher perceived quality of the chosen seller, compared to those who do not believe in the price signal.

H9: Higher position premium paid by the consumer who believes in advertising signal will be associated with higher perceived quality of the chosen seller, compared to those who do not believe in advertising signal.

RESEARCH DESIGN

Extant research on quality-signaling as well as consumer search behavior has primarily used an experimental approach as it is the most appropriate method for achieving a clean test of theory (Lynch and Ariely 2000; Schotter and Braunstein 1981; Srivastava and Lurie 2001; Zwick et al. 2003). This study employs an experimental methodology to examine the above-mentioned research questions.

The experiment employs a one factor (knowledge of sponsored search mechanism) between-subjects factorial design where one group of subjects is informed that sellers are ranked in descending order on the sponsored search listing according to how much they pay per consumer click (treatment group), and other group of subjects is informed that all sellers in the market are randomly assigned a position on the directory listing (control group). Subjects in control group only have information about different price sellers are charging thus they may rely on price as a quality signal. Subjects in treatment group, on the other hand, are aware of the advertising expenditure of the sellers in addition to the different price that they charge. Thus, these subjects may potentially use price signal and/or advertising signal to infer seller quality. The subjects are presented one set of general instructions and a set of specific instructions for their assigned experimental condition[1]. I also conduct manipulation checks to ensure that subjects read and understood the instructions about the mechanism to create the sponsored listing.

Experiment Overview: Students participate for course credits. In addition they are also provided performance-based monetary incentives. The experiment consists of 3 parts: (1) A Shopping Task in which subjects make search and purchase decisions (refer Appendix 1 for details), and (2) A Follow-Up Survey in which subjects are asked questions about their perceptions and strategies regarding the assigned shopping task. (3) A Lottery Selection Task to assess their risk attitude (Holt and Laury 2002).

POTENTIAL CONTRIBUTIONS

Internet technology has enabled online markets, and an important aspect of these markets is sponsored search advertising, which helps both consumers and the search engines that use advertising to fund their business models. Overall, the findings of this study (refer Appendix 2) will have significant implications for the sellers/advertisers on online sponsored search mechanisms, as well as for the online intermediaries managing these sponsored search auction markets. The preliminary results highlight interesting dynamics between advertising and price as signals of quality, as well as the importance of understanding consumers' attitudes towards risk. It appears that though the overall click through rate might not change as more consumers become aware of the sponsored search mechanism, the click through and conversion rate at higher positions may increase. Insights from this thesis will also enable practitioners to develop appropriate advertising strategies and to choose effective and efficient position allocation mechanisms for the sponsored listings. Sellers would benefit from a better understanding of the interactions between their advertising and pricing strategies in online settings. Online intermediaries, on the other hand, would benefit from a better alignment of their sponsored search allocation mechanisms with consumers'

[1] Detailed instructions for the task and questionnaire items are available on request.

beliefs and behaviors. Investigation of consumer behavior in online sponsored search markets will enable researchers to develop more realistic normative models.

The key theoretical contributions of this study are as follows. This is among the first studies to examine whether knowledge of the sponsored search advertising mechanism affects consumer perceptions about the quality of sellers, and their subsequent purchase behavior. The study is also among the first to integrate theories on advertising and consumer-search to understand outcomes in the context of online sponsored search. In contrast to extant research investigating the role of adverting as a signal of quality, this study measures the effect of advertising expenditure not only on the perceived quality but also on observed behavioral outcomes such as search intensity, price sensitivity and consumers' purchase decisions. Finally, to the best of my knowledge, this is the first study to examine the influence of consumers' risk attitudes on their use of informational cues.

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APPENDIX 1: SHOPPING TASK

The shopping task requires subjects to conduct 10 shopping trips using a simulated online yellow pages directory. In each shopping trip, subjects query the directory for a particular product. The online directory presents a list of 10 sellers (identified by fictitious names) along with a link to visit their websites, in a rank-ordered listing. The information provided to consumers about the ordering of the sellers in the directory listing differs across different experimental treatments. The subjects are also informed about the price dispersion and the quality dispersion among the sellers in each market. The quality dispersion (i.e., range of seller quality in a market) is 4 times more than the price dispersion (i.e., range of prices in a market) because higher quality dispersion makes the quality attribute more salient in the decision making process. Subjects can observe the price being charged by a seller but they have to incur a specified search cost to visit a seller's website and obtain the price being charged by that seller. The search cost at any point in time in a shopping trip is displayed on the top panel of the computer screen. Information about seller quality is not revealed to the subjects in any treatment at any time during the experiment. Subjects, however, can use advertising and/or pricing information to infer a seller's quality. Subjects are asked to maximize their payoffs by buying from the highest quality seller at the lowest price while minimizing the total search cost. The payoff function given to subjects is to maximize: U= Q – P – n*s (where "Q" is the quality of the product purchased, "P" is the price paid for the purchased product, "c" is the cost to discover a seller's price and "n" is the total number of sellers searched). This utility function is similar to Diehl, Kornish et al. (2003), except that it explicitly includes search cost in the utility function. Price, seller quality and search cost are all expressed in experimental dollars. The subjects are provided monetary incentives based on their performance in maximizing their payoff function (i.e., utility derived from the purchase).

APPENDIX 2: PRELIMINARY FINDINGS

I have completed a pilot study with 80 subjects split evenly between the treatment and control conditions. Preliminary findings from this pilot provide strong support for the proposed relationships, but also reveal some surprising findings. Results suggest that consumer behavior is significantly influenced by the presence of quality signals. Consumers in a market where seller quality is not known prior to purchase, rely on both price as well as advertising signals. Consumers who believe in a positive correlation between price and quality are willing to pay a price premium in the hope of getting better quality. On the other hand, consumers who believe in the advertising signal, tend to buy from the sellers who incur higher advertising expenditure (i.e. from the sellers who appear higher on the sponsored search listings). Contrary to the findings of earlier studies conducted in traditional settings (Broniarczyk and Alba 1994), I find that advertising can be a stronger signal than price in online sponsored search markets. I also find that risk attitude moderates the relationship between signal beliefs and the behavior of the subjects. An interesting finding in this regard is that risk-seekers ignore the advertising signal (i.e. do not pay position premium) when they also believe in the price signal. Another surprising finding is that the search intensity varies neither with the type of the signal nor with the perceived strength of the signal used by the consumer. Table 1 summarizes key findings from the pilot study.

	Dependent	Relationships with Independent Variables
1	**Advertising as Quality Signal**	• ***Knowledge of Advertising Allocation Mechanism*** leads consumers to use advertising expenditure as quality signal.
2	**Search Intensity**	• Does not vary as a function of ***price and/or ad signal*** beliefs. • However, search sequence differs across various signal beliefs. ***Beliefs in advertising as signal*** leads consumers to search sequentially and focus on the sellers on top.
3	**Price Premium**	• ***High price signal*** leads subjects to pay higher price premium. • ***High advertisement signal*** lowers the price premium paid. This effect is not seen in subjects who are ***risk-seekers***.
4	**Position Premium**	• ***Price signal*** does not affect the position premium. • ***High advertisement signal*** leads subjects to pay high position premium. This effect is not seen in ***risk-seekers*** who believe in price signal.
5	**Perceived Seller Quality**	• ***Higher price premium*** paid leads to higher perceived seller quality, ***irrespective*** of whether subjects had a belief in ***price as quality signal*** or not. • ***Higher position premium*** paid leads to higher perceived seller quality ***if*** the subjects believed in ***advertising signal***.

Table 1: Summary of Findings