Organic and Paid Search Advertising: Complements, Substitutes or Neither? [1]

Anindya Ghose
Stern School of Business
New York University
aghose@stern.nyu.edu

Sha Yang
Stern School of Business
New York University
shayang@stern.nyu.edu

Abstract

The phenomenon of sponsored search advertising has now become the most predominant form of online advertising in the marketing world. However, we have little understanding of how consumers respond to sponsored search advertising on the Internet in the presence of organic listings of the same firms, and the effect of organic listings on paid search performance. In this paper, we model and estimate the inter-relationship between organic search listings and sponsored search advertisements using a unique panel dataset collected from a major nationwide retailer store chain that advertises on Google. In particular, we focus on understanding whether the presence of organic listings on a search engine complement, cannibalize or have no effect on the click-through rates of sponsored search advertisements and vice-versa. We first build an autologistic model to estimate the relationship between different metrics such as search volume, click-through rates, conversion rates, cost-per-click and keyword ranks. A Hierarchical Bayesian modeling framework is used and the models are estimated using Markov Chain Monte Carlo (MCMC) methods. This model suggests that the presence of organic listings has a complementary effect on paid search click-through rates and vice-versa. We then extend the analysis to explore asymmetry in this positive interdependence between paid and organic clicks. Using a discrete game specification, we find that this effect is asymmetric such that the effect of organic click on paid click is significantly stronger than vice-versa. Further, keywords containing retailer information tend to weaken the positive effect of paid click on organic click, but strengthen the positive effect of organic click on paid click, compared with non retailer-specific keywords. This positive complementary effect of paid click on organic click is moderated by the length of the sponsored keyword. Using counterfactual experiments, we show that on an average this complementary effect leads to an increase in expected profits for the firm ranging from 4.3% to 6.5% when compared to profits in the absence of this interdependence. We also present a field experiment which shows that total click-through rates, conversions rates and revenues in the presence of both paid and organic search listings is significantly higher than those in the absence of paid search advertisements. Given the increased spending on search engine based advertising, our analysis provides critical insights to managers in both traditional and Internet firms.

Keywords: *Paid search advertising, Organic search listings, Search engines, Hierarchical Bayesian modeling, Autologistic model, Empirical discrete games, Click-through rates, Conversion rates, Electronic commerce, Internet markets.*

---

[1]The authors are listed in alphabetical order and contributed equally. We are grateful to the Editor, Area Editor and two anonymous referees for their extremely helpful suggestions and comments. We would like to thank the anonymous company that provided data for this study. This project was funded by grants from the NET Institute, and the Marketing Science Institute. Anindya Ghose acknowledges the generous financial support of the National Science Foundation through CAREER Award IIS-0643847. The usual disclaimer applies.