Empirical Generalizations in Search Engine Advertising

Nadia Abou Nabout [a,*], Markus Lilienthal [b], Bernd Skiera [c,1]

[a] *TUM School of Management, Technische Universität München, Arcisstr. 21, 80333 Munich, Germany*
[b] *GfK SE, Nordwestring 101, 90419 Nuremberg, Germany*
[c] *Faculty of Business and Economics, Department of Marketing, Goethe University Frankfurt, Grueneburgplatz 1, 60629 Frankfurt am Main, Germany*

Abstract

This article compares prices per click and search engine advertising (SEA) effectiveness across six countries and 15 industries over four years. We find that prices per click are highest in the United States and United Kingdom, as well as in the financial and Internet services industries, but are lower in retail than in services industries. In highly competitive markets, increases in SEA expenditures may increase prices per click that do not necessarily lead to higher advertising effectiveness, here measured as a higher number of clicks. To analyze and compare advertising effectiveness across industries, we decompose the effect of increases in SEA expenditures on prices per click (price effect) and number of clicks (quantity effect). A cross-country, cross-industry study shows that 44 percent of the increase in SEA expenditures is associated with more clicks and 56 percent with higher prices.
© 2014 New York University. Published by Elsevier Inc. All rights reserved.

Introduction

Search engine advertising (SEA)—also called keyword advertising, sponsored search, or paid search (Bucklin, Rutz, and Trusov 2008; Rangaswamy, Giles, and Seres 2009)—is the most popular online advertising instrument. Its 2012 share of online advertising expenditures reached 46 percent in the United States (US), 59 percent in the United Kingdom (UK), and 45 percent overall in Europe (IAB 2012). SEA expenditures have thus steadily increased over the past five years, with yearly growth rates of up to 25 percent in the US. Comparable yearly growth rates occurred in many European countries, including the UK, Germany, France, Italy, and Spain.

Companies expect that increases in expenditures for SEA lead to higher advertising effectiveness, here measured as a higher number of clicks (Levin and Milgrom 2010). However, because search engine providers use an auction to determine prices per click, higher advertising expenditures might be associated with higher advertising effectiveness, here measured as more clicks, or higher prices for their advertising, here measured as higher prices per click, or a combination of both.

Knowledge about the effects of increases in expenditures on SEA effectiveness is important because these expenditures now constitute a major part of companies' advertising budget and the two effects have different consequences. If an increase in SEA expenditures is only associated with an increase in prices paid per click, advertising effectiveness does not increase and advertisers might be well advised to stop increasing their expenditures. In contrast, if increasing SEA expenditures is associated with more clicks, advertising effectiveness increases, and advertisers might consider further increasing their expenditures.

Unfortunately, these effects are difficult to determine because search engine providers reveal only limited information about an advertiser's competitors. Thus, competitors' bids, numbers of clicks, and the weights used in the auction (in the case of Google, the quality score) are unknown, and changes in these variables can strongly affect an advertiser's success in SEA. Companies are usually also reluctant to exchange information with competitors, and regulatory constraints might also forbid doing so.

The aim of this article is to analyze these effects and prices per click in SEA. More specifically, we aim to (1) develop a method

* Corresponding author. Tel.: +49 (0)89 289 28407.
E-mail addresses: nadia.nabout@tum.de (N. Abou Nabout),
markus.lilienthal@gfk.com (M. Lilienthal), skiera@skiera.de (B. Skiera).
[1] Tel.: +49 69 798 34649; fax: +49 69 798 35001.

to decompose the effect of an increase in expenditures per user on *prices per click* (price effect of increase in expenditures) and *number of clicks per user* (quantity effect of increase in expenditures), (2) empirically compare prices per click, and (3) apply the developed decomposition method to analyze the price and quantity effects in 15 industries and six countries over a four-year period (September 2009 to November 2012).

The literature on SEA has so far only focused on understanding and analyzing the behavior of individual firms (advertisers and search engine providers) and consumers (Ghose and Yang 2009; Rutz and Bucklin 2011; Skiera and Abou Nabout 2013; Wiesel, Pauwels, and Arts 2011). We contribute to this literature by providing market-level estimates for the prices per click and quantity effects in different industries and countries over time. To the best of our knowledge, our article is the first to compare so many industries and derive empirical generalizations about SEA.

Although advertisers operating in specific industries might know the prices per click and quantity effects in their respective industries, they typically lack knowledge about how their industry relates to other industries. This knowledge, however, is important if an advertiser from one industry wants to learn from an advertiser in another industry or if an SEA campaign manager changes jobs and moves to another industry. In addition, SEA agencies benefit from this knowledge because they typically manage campaigns for advertisers operating in different industries. Our results should help them better understand the differences between industries. Moreover, advertisers might operate globally (e.g., in the US and Europe or Southern and Western European countries). In these cases, our results provide advertisers with better knowledge of how prices and quantity effects differ across countries, which then might enable them to manage their SEA campaigns differently.

Unfortunately, these price and quantity effects are difficult to determine because search engine providers reveal only limited information about an advertiser's competitors. Thus, we develop a method that decomposes the effect of an increase in expenditures on prices per click (price effect) and number of clicks (quantity effect). Finally, we contribute to the advancement of the field of SEA by making our unique data set publicly available and allowing other researchers to further exploit or enrich this data set.

The remainder of this article proceeds as follows: We briefly summarize the most important characteristics of SEA and then review related work. Then, we illustrate the developed decomposition method using a numerical example and outline the empirical study on prices per click and quantity effects in SEA, including a description of the data and the results. We conclude with a summary of our findings and implications for SEA managers.

Search engine advertising (SEA)

A consumer types a keyword such as "credit card" (i.e., the keyword may consist of more than one word) into a search engine (e.g., Google, Bing, Yahoo, Baidu) and receives two types of results. The lower, left-hand portion of the page shows unsponsored search results, whose ranking reflects the relevance assigned to these different results by a search algorithm. On the top and right-hand side, sponsored search results appear. The display of unsponsored search results is free of charge, whereas advertisers pay for each click on their ads that appear among the sponsored search results.

The price per click and the rank of the ad are the result of a continuous, generalized, second-price, sealed-bid auction. The auction designs of the two market leaders, Google and Bing (and, respectively, Yahoo), are similar: Advertisers submit a bid for each keyword with the price they are willing to pay for each click on their ads. The search engine provider weights the submitted bids by a quality score and ranks the ads accordingly (Abou Nabout and Skiera 2012; Ghose and Yang 2009). In general, the leading ranks draw the most searcher attraction and are most preferable, so they go to the ads with the highest (weighted) bids.

Prices in SEA are determined in a dynamic fashion, and the ranking of the sponsored search results immediately reflects higher bids of competitors. As a consequence, advertisers might find themselves engaged in bidding wars so that, in some markets, increased SEA expenditures are associated with higher prices per click instead of more clicks—a highly undesirable outcome for the advertiser. In this article, we reveal markets (i.e., countries and industries) in which these undesirable outcomes occur.

Related work

Most existing SEA research deals with auction designs (for a review of the literature please see Edelman and Schwarz 2010), addresses click fraud (for a review of the literature please see Wilbur and Zhu 2009), or uses empirical data to analyze real market conditions and actual behavior. These results are valuable for both advertisers, which can derive conclusions about their optimal strategy (Abou Nabout et al. 2012; Skiera and Abou Nabout 2013; Wiesel, Pauwels, and Arts 2011), and search engine providers, which can use them to determine how to optimize their offerings (Chen, Liu, and Whinston 2009; Yao and Mela 2011). Empirical studies often use data obtained from an SEA campaign by one advertiser that allows analyzing the data in depth but frequently limits the generalizability of the results.

Our study differs from previous studies in its focus on the comparison of prices per click across countries, industries, and time. It shares some similarities to Goldfarb and Tucker (2011), in that it exploits the same data source (i.e., the Google Keyword Tool), abstracts from individual firm behavior, and focuses on a market-level phenomenon. Yet, while Goldfarb and Tucker (2011) explore substitution patterns across advertising platforms (between mail and SEA), we investigate prices per click in SEA and their determinants. In doing so, we are the first to quantify and compare prices and SEA effectiveness across a large number of industries and countries over time.

Illustration of decomposition method

An increase in SEA expenditures can have two effects: It can increase the number of clicks or the prices per click. The