

# SPONSORED SEARCH ADVERTISING AND ITS IMPACT ON OPERATIONAL POLICIES

Public Defence Abstract

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## 1. Introduction

Over the past two decades, advertising has evolved from traditional offline to more online. The ease of accessibility and user-friendly nature of the websites has also resulted in many firms opting to sell their wares online. This has further contributed to firms opting for greater presence on the online advertising platforms. As consumers increasingly use the internet to make purchases on the search engines. The topic of interest here is sponsored search. In the United States alone, sponsored search spending reached \$49 billion in 2014 compared to \$42 billion in 2013 [4]. The largest contributors have been retailers, who account for 22% of total sponsored search spending [4]. The predicted growth rates of sponsored search spending are almost 15% CAGR for the coming years.

### *1.1 Mechanism of Sponsored Search*

Search engines have their own algorithms to compute the quality score of websites and list them on the results page. Quality score comprises of multiple factors such as relevance, metadata, landing page quality, click through rate, bid, etc.[5]. Significant customisation is possible in case of sponsored search. The advertisers using sponsored search can accurately track the keywords leading to maximum sales further encouraging usage of sponsored search. Search engines provide more measurability and accountability to the advertisers[6].

On the results page, there are two kinds of listings by any search engine- organic and paid. The top 3 results of a page and the ones on the extreme right of the search page are paid/sponsored listings. Paid listings can be influenced through the bid. The organic listings are generated based on click history, metadata, relevance, etc. The website can be enhanced using Search Engine Optimisation to feature in the organic listings [7]. Among several search engines that are operational, Google is the global leader with almost 70% market share[8][9]. It is observed that the rank (position) of the firm on the results page is directly related to the number of clicks generated[1]. Hence, the



Within a predetermined selling season, at the start of each time period, the retailer observes the inventory level and decides on the promotion level and the order quantity, which is delivered at the start of next time period. I consider the price to be exogenous to the model.  $V_j$  is the willingness to pay is a function of the inventory level  $I$  and the promotion level  $p$ .

I show that the optimal policy is of multi-threshold type, wherein the promotion/ordering decision is determined by the inventory on hand. The managerial insights obtained from this study are that the optimal bid is increasing as the inventory on hand increases. Consequently, the order quantity within a constant bid decreases as the level of inventory increases. When higher bids have a positive

In my thesis, I have analyzed sponsored search advertising in three different contexts- (i) customer willingness to pay as a function of bid when there is fixed inventory available, (ii) customer willingness to pay as a function of bid when there is an opportunity for replenishment, and (iii) portfolio of bids for generic and branded keywords.

When the customer willingness to pay is a function of inventory on hand, in a fixed inventory scenario, my findings revealed that it is optimal for the retailer to use bid as a lever at lower inventories and price as a lever at higher inventories to enhance sales. However, when the customer willingness to pay is a function of bid, and has an opportunity to replenish, the optimal policy is of multi-threshold type, wherein the promotion/ordering decision is determined by the inventory on hand. The managerial insights obtained from this study are that the optimal bid is increasing as the inventory on hand increases. Consequently, the order quantity within a constant bid decreases as the level of inventory increases. When higher bids have a positive influence on the demand generated, it is optimal to stock more inventory as described in the policy.

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