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What drives consumers' online information search behavior? Evidence from England

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ABSTRACT

This paper examines the factors determining consumers' online information search behavior in the context of buying laptop and mobile phone. We measure, how search behavior is perceived in terms of total search, number of search and cognitive ability. Using survey data on 643 respondents from London and Birmingham we test several hypotheses. The result of both OLS and generalized estimating equation portray that search efforts are directly related with education and internet experience and inversely related with income and internet cost. Moreover, analysis of the proportion of online search to total search signifies the substitution of online for offline information sources. The obtained result provides an improved understanding of the determinants of search behavior and important implications for seller of laptop and mobile phone who are seeking to expand their online customer base.

1. Introduction

Over the past three decades, consumer's information search has received considerable attention in economics and marketing literature. The theory of consumer search was introduced by Stigler (1961) to analyze the price dispersion in market. The problem of price dispersion is ubiquitous in imperfect markets even for homogeneous goods. In fact, the price of an identical product can be quoted differently by different sellers. As for example, the prices of an Apple 13-inch. Macbook-Air laptop and iphone 5 are charged differently by different sellers (Table 1); where average price is £957.66 and £511 as well as standard deviation £15 and £15.15 respectively. In both the cases, the standard deviation is significantly large for a consumer. The upshot of above is that a buyer who wishes to ascertain the most favorable price must survey various sellers; this phenomenon of survey is termed as 'search'. Stigler's theory states that consumers' search for pre-purchase information until the perceived marginal benefit of search equates with perceived marginal cost. Put differently, a consumer searches the highest discount rate in the market through which he can maximize his utility.

The internet is primarily considered as a source of information, communication and entertainment, but in modern periods it is also used as dynamic medium of commercial transactions. Internet commerce involves buying and selling of goods and services over website. Prior to final purchase, consumers search the information of price and attributes of the product that are displayed on seller's website. In recent years, internet has a remarkable effect on search technologies by making it easy for consumers to compare prices online. Though internet diffusion has made the information collection seemingly easier than ever, still consumers have to make purchase decision without full information because there are some cost of search and information processing (Chen and Sudhir, 2004). Given this circumstances, it has become increasingly important to understand consumers' optimal search strategy for information. In purchasing situation, consumers collect information for the purpose of deciding whether to make a purchase in order to obtain maximum utility from updated product information. In this regard, early pioneering theoretical approaches have been developed by (Hey, 1974; Manning, 1976; Wilde, 1977; Wilde and Schwartz, 1979) who explicitly relate individual search effort to market price dispersion.

There are some studies (Abrams et al., 2000; Anderson and Palma, 2012; Anderson and Renault, 1999; Armstrong et al., 2009; Mc Breen et al., 2010) which are theoretically and empirically concerned about the traditional pattern of search. A few studies have been conducted to capture the factors that drive consumers to adopt internet as medium of information search for shopping (Clemes et al., 2014), buying automobile (Klein and Ford, 2003; Srinivasan, 1990; Srinivasan and Ratchford, 1991)and looking for health information (Park et al., 2009). Empirical examination of online search for laptop and mobile phone are still unexplored. Prior researches have studied the phenomenon of searching for lowest price (Diamond, 1971; Stahl, 1989, 1996) and for the best-fitted alternative price (Bakos, 1997; Weitzman, 1979;

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Table 1
Asking price of two products.

(a) Price of a 13-inch. Macbook Air (128 GB)		(b) Price of a iphone 5 (16 GB)	
Apple	£949.00	Apple	£529.00
Amazon	£975.00	Amazon	£507.00
Curry	£949.00	Carphone warehouse	£499.95

Note: Prices are quoted from the official website of Apple, Amazon, Curry and Carphone warehouse. Information are accessed on 26th August 2013.

Wolinsky, 1986). Moreover, in the past researches, the time cost of consumer has been regarded as the main indicator of search effort. But in this digitalized era when time spent for search is lessened by the speed and efficiency of diffused internet usage; time cost alone may not be the prime component of search cost. Instead, the search cost may be significantly driven by the cognitive cost incurred from integration of alternative sources and comparison among collected information. In this backdrop, this study intends to empirically investigate the economic and personal factors that influence the key dimensions of information search behavior related to two specific consumer electric products (laptop and mobile phone) in England.

England is one of the world's largest countries in terms of internet usage and about 91.6% people uses internet (Internet World Stats, 2016). At present, people of this country spend twice as much time online compared to ten years ago. The estimated time British young and adult spend on each week is about 21 hours in 2014 which was about 10 hours in 2005 (Ofcom, 2016). London and Birmingham are two important international business hubs for buying and selling electronic and electrical products. Endowed with higher internet usage behavior and proximity to ICT appliances, how consumers of these cities search for pre-purchase information in online is therefore an appealing topic of research.

The major contribution of this research is to provide an improved understanding of the factors that influence consumers' online search behavior. We added 'cognitive score' as a new measure of information search effort with the traditional measure such as number of search and total search hour. As internet usage and online shopping continues to expand, the obtained results from comprehensive empirical analysis will help to understand the implication of internet use in both search and purchase behavior. Additionally, the results have important implications for seller of laptop and mobile phone who are seeking to expand their online customer base.

The remainder of the study proceeds as follows. Section 2 lays out the conceptual background and review of prior literature. Section 3 contains detailed discussion on data and estimation methodology. Section 4 presents the empirical results and consequent discussion. Finally, Section 5 offers conclusion and futher research options.

2. Conceptual background

2.1. The search model

Based on Stigler (1961), we mainly follow the theoretical framework given by Manning and Morgan (1982). We start with the assumption that a consumer is searching information for l number of commodities for purchase. He knows the prices of 2, ..., l with certainty but ignorant about the pricing behavior of commodity 1. Holding this assumption is equivalent to require that the consumer does not initially possesses any quantity of commodity 1, which implies that he has no chance to engage in speculation or arbitrage. Also assumed that each seller of commodity 1 charge definite price which is generally different from other sellers.

Searching for information incurs money cost to the consumer. This cost (both time and cognitive) is assumed to be proportional to the number of search. Assuming that the consumer's initial wealth is known with certainty, the consumer will purchase the quantities of commodity that will maximize his benefit or utility subject to the wealth left after bearing the search cost. Therefore, the main problem of the consumer is how much money to spend in search cost.

Thus, his budget constraint takes below form:

$$\lambda_m p_1 x_1 + p_2 x_2 + \ldots\ldots\ldots + p_l x_l = w \tag{1}$$

Here, p_i is the price of commodity $i = 1, \ldots\ldots\ldots, l$. Except commodity 1, the list of price of 2, ... , l is selling price. However, the sellers offer a discount $\lambda > 0$ for commodity 1 and thus the selling price becomes λp_1. From the consumers perspective λ is a random variable with probability density function (p.d.f.) f. x_i is the amount of purchase and w is wealth net of search cost of n number of search at unit cost c.

$$w = \omega - cn \tag{2}$$

where ω is initial wealth of a consumer. λ_m is minimum discount factor offered by seller of commodity 1. That is

$$\lambda_m = \min\{\lambda_1, \ldots, \lambda_n\} \tag{3}$$

Let consumer's utility function is

$$u(x_1, \ldots\ldots, x_l) \tag{4}$$

Now, the consumer's problem is to maximize utility function subject to two budget constraint (1) and (2). The solution of this maximization problem is the set of demands for all commodities

$$x_j^*(\lambda_m p_1, p_2 \ldots\ldots, p_l, \omega - cn) \quad where, \; j = 1, \ldots\ldots\ldots, l$$

Substituting $x_j^*(.)$ into the direct utility function (4), gives the indirect utility function.

$$I(\lambda_m p_1, p_2 \ldots\ldots, p_l, \omega - cn) \tag{5}$$

Before any final decision for purchase is made, I can be calculated by the consumer for every possible value of λ_m, which is the minimum of a sample of n independent and identically distributed observation from a population with p.d.f, f *is*

$$g(\lambda_m|n) = n(1 - F(\lambda_m))^{n-1} f(\lambda_m)\; n \geq 1 \tag{6}$$

Here, F is the cumulative density function (c.d.f.) of f.

Eqs. (5) and (6) give the expected utility from a fixed sample size search from n number of search.

$$E[n|p_1, \ldots\ldots p_l, c, \omega] = \int_R I(\lambda_m p_1, p_2, \ldots\ldots, p_l, \omega - cn) g(\lambda_m|n) d\lambda_m \tag{7}$$

where $R \subseteq (0, \infty)$, the range of f which implies discount factor is greater than zero but less than infinity.

Here, we can say no purchase of commodity 1 is made without any search, that is if $n = 0$, the demand for commodity 1 must also be zero. Let λ^* be any solution of

$$x_1^*(\lambda p_1, p_2, \ldots\ldots\ldots, p_l, \omega) = 0 \tag{8}$$

Then, supplementing (6), require that

$$g(\lambda|0) = \begin{cases} 1, & \lambda = \lambda^* \\ 0, & \lambda \neq \lambda^* \end{cases} \tag{9}$$

Finally, the consumers search problem is to identify the number of search (n) which maximizes his expected utility.

2.2. Empirical implementation

To employ the theoretical framework in our empirical problem, we define n in three different ways such as total search hour, number of search, and cognitive score. We also define the independent variables related to cross-sectional variation in n and impact of those variables on n. On the basis of prior literature, we measure number of search (often referred as breadth of search) by counting consumer's attempt to look for information about price and attributes conveyed in online and