

## Literature Review

*Research Question: How are firms impacted by the consumer search behavior? A case study of search strategies in U.S. online book retailing*

Since Stigler's (1961) seminal paper, there has been growing literature on consumer search behavior. Stigler's model, known as the fixed sample size search behavior, tries to explain the consumer search behavior in an imperfectly competitive market, assuming that consumers choose between the lowest priced product among a fixed number of stores. While on the other hand, another large strand of the literature argues that when the consumers' marginal benefit of conducting an additional search exceeds the marginal cost, they will commit to a sequential search strategy. Weitzman (1979) introduces a detailed sequential search model by characterizing the solution to the problems when consumers are presented with alternative sources with different properties. In light of these two literatures, this paper considers the consumer behaviors assuming that the consumers are either utilizing fixed sample sized search strategy or the sequential search strategy. Different strategies incur various search costs and sellers can impact search behavior through the pricing.

Based on different models a consumer searches, costs are different in many ways. Many literatures try to investigate the difference between these two dominant models and their relating search costs that incur. For example, Hong and Shum (2006) develop a model to estimate search costs under both fixed sample size method and sequential search method assuming that the companies are identical. They conclude that the search costs in sequential search method is higher than that in fixed sample size method. Honka (2013) also produces similar results by quantifying the search costs for two different searching method using auto insurance industry as a case study. One limitation that Honka has is that Honka does not take the sequence of searches into consideration which could be an important factor when analyzing the consumer search behavior. What's more, Dubois and Perrone (2017) show magnitude and distribution of search cost based on sequential search model using French supermarket as an example.

There is a fairly large literature study the relationship between market price and search cost. Sellers would like to see how the patterns of consumer search can affect their buying decisions. Studies show that the market prices are closely related with search costs. Each of the studies applies different mechanism or using a different model but yields similar results. For example, Anderson and Renault (1999) build a single-product search model and show that prices increase with search cost under regularity conditions. Extending the model to the next level, Zhou (2014) studies multiproduct search and multiproduct firms using a model of single-product search model with differentiated products. Zhou argues that multiproduct search can significantly influence firm's pricing decisions. To be more specific, market price tends to decrease with search costs. While discussed some possible implications of the multiproduct model, Zhou's research is largely theoretically based. Choi, Dai and Kim (2018) also shows a similar result. Choi, Dai and Kim apply Weitzman's (1979) optimal sequential search model to summarize consumers' shopping outcomes and sellers pricing strategies. They analyze the effect of search frictions on the market prices and conclude that a reduction in search costs will raise the market prices. They also build a model to simulate the companies pricing games. One limitation is that admitting that empirical data can be very important for their study, they do not include a data section to assess their model.

With the surging of electronic commerce, consumers' shopping behavior have been largely impacted. Consumers tend to have better pictures of pricing of a product than before. This paper is focused on the era of online shopping and see how consumers search costs can be affected with better price knowledge. There is also an increasing number of literatures discussing the digital economy environment and its impact on consumer search behavior. For example, Baye and Morgan (2001) presents a model examining the market equilibrium between price information and the product. Baye and Morgan mainly discusses about when consumer and sellers participate in the online market and in what kinds of circumstances an information gatekeeper can maximize its profit. However, in this model, the products are assumed to be homogeneous which usually will not be the case in a real-world situation. Dinerstein, Einav, Levin, and Sundaresan (2017) estimate the consumer demand and retail margins using detailed browsing data on search results, consumer purchasing decisions, and product prices. The model is applied to quantitatively analyze a large-

scale redesign of the search process on eBay in 2011. It specifically discusses about the role of search design in reducing consumer search frictions and determining optimal market outcomes.

Most of the papers focus on the theoretical analysis of models due to the difficulty of collecting commercial dataset. More recent studies tend to realize the importance of empirical analysis and apply various data into the model. There are some studies about applications of different search models with data supported. For example, De los Santos, Hortaçsu, and Wildenbeest (2012) tests two classical consumer search theories using online retailing data from Amazon and other dominant book sellers and concludes that fixed sample size search can explain the data better than a sequential search method. Honka and Chintagunta (2013) uses data in Auto insurance industry in the U.S. to compare these two models. The paper shows that the large insurance companies are better off when consumers use a sequential search method, while smaller companies are better off when consumers search with a fixed sample size.

This paper is built on consumer search and price competition model by Choi, Dai and Kim (2018). In particular, this paper focuses on the online retailing industry. Data is a very important factor when evaluating consumer behaviors and data-driven methods are adopted by most companies. The biggest contribution of my paper is to applies empirical data to validify in the real-world scenarios. Moreover, I will extend Stigler's (1961) fix sample size search model and Weitzman's (1979) sequential search model by comparing the search costs incurs and investigate how the search costs can affect the firm's pricing strategies.

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