

## Offline and Online Search in Used Durables Markets<sup>☆</sup>

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### Abstract

This study examines how different information sources are used by consumers prior to their purchase of used durable goods, specifically used cars. We examine how online and offline search are related. Categories of online sources are dealer websites and resale websites, and of offline sources are print media and dealer visits. Prior research on new car purchases finds that online sources substitute for traditional, offline sources such as dealer visits. We examine whether this theory extends to used-car purchases and distinguish between dealer websites and resale websites (a distinction relevant to used-goods markets) by collecting data from a sample of used-car buyers. Because search in different sources can be interrelated, and due to data censoring, we build and estimate a simultaneous equations Tobit model. In contrast to existing research, we find that online search on dealer websites is complementary to and not a substitute for dealer visits. This complementary effect highlights the importance of dealers' web presence in used markets.

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*Keywords:* Used goods; Automobiles; Search; Internet; Simultaneous equations Tobit

### Introduction

The automobile category has great economic significance, a large portion of which comes from used car sales. According to the US Bureau of Transportation Statistics ([www.bts.gov](http://www.bts.gov)), the average transaction price was \$8,786 for used vehicles and \$26,850 for new vehicles in 2011, but used vehicles had over three times the sales volume of new vehicles. Thus, transaction values for new and used vehicles each exceeded \$300 billion. However, there has been less investigation of consumer search for used cars, compared to a well-established literature examining consumer search in the new automobile category which finds

for example that individuals differ in their use of the Internet (e.g., Klein and Ford 2003; Ratchford, Lee, and Talukdar 2003; Ratchford, Talukdar, and Lee 2007). Furthermore, while existing studies examine substitution between information sources during search, a drawback is that they employ separable functional forms for the function that relates time with each source to information gained and, thus do not accommodate complementarity between sources.

From the consumer's perspective, search in used car purchases can have additional benefits compared to search in new car purchases by reducing the greater uncertainty in used car purchases, which occurs due to several factors: First, used car transactions involve asymmetric information due to unobserved maintenance, history, and mechanical defects which makes the quality uncertain to the buyer even for the same make and model (Akerlof 1970). Second, the availability of a desired make and model of a used car is more random. While new car dealers provide a dedicated location and inventory for purchasing, used cars are advertised as they become available through different sources and by multiple sellers, including dealers and individual sellers. As a result, consumers search across various offline and online sources to find acceptable used cars (or used goods in general). Greater or less overlap of information in different sources can explain their substitutability or complementarity.

<sup>☆</sup> The authors thank Yuanping Ying the Editor, Shankar Ganesan, and two anonymous referees, and seminar participants at Cambridge University, Governors State University, Ozyegin University, University of Technology Sydney, and the 2011 Marketing Science Conference in Houston for their helpful comments.

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Prior search literature has focused on substitutability, but as we will argue, greater uncertainty about product quality and availability in the used car market likely encourages complementary use of information sources.

Traditional offline information sources such as dealer visits and print (newspapers and magazines) continue to be widely used. Online sources are dealer and manufacturer websites and unaffiliated, third party websites. Some dealers operate websites and list their inventory online, while others do not. Unaffiliated websites are called resale websites (such as Auto Trader, eBay, etc.) While dealer websites list the inventory of used goods from the specific dealer, resale websites list used goods from franchised and nonfranchised dealers as well as individual sellers. These also include sources such as Craigslist, auction websites, newspaper websites, and so forth. Given the wide breadth of information that they provide, resale websites are arguably the most relevant websites for the search for used cars. Thus, this study treats dealer and resale websites as distinct rather than as a combined online source as commonly treated in the new car search literature. This enables us to obtain insights about the interrelationships between the usages of different online sources.

The existence of different types of online sources presents managers with the problem of coordinating a presence in some or all of them. Theory from new car purchase studies suggests that Internet search substitutes for traditional information sources such as dealer visits (e.g., [Ratchford, Lee, and Talukdar 2003](#); [Ratchford, Talukdar, and Lee 2007](#)). If sources are substitutes, dealers should maintain a presence on many sources, or target consumers on selected sources, whereas complementarity between sources suggests the converse. We examine whether existing theory extends to used-car purchases and distinguish between dealer websites and resale websites (a distinction relevant to used-goods markets). Objectives of this study are to investigate:

- How does search on different online sources, namely Dealer websites and Resale websites, affect search on offline sources?
- Within the Internet medium, how does search on Dealer websites and Resale websites affect each other?
- How does the use of different information sources affect the type of seller chosen for the final purchase?

We conducted a survey of used car buyers to answer these questions. Surveys of search behavior may face the problem of recall by consumers; however, since cars are a major purchase, it is likely that consumers accurately recall their behavior. Hence survey methodology has been used extensively. The results of our study are as follows:

- First, search on dealer websites complements offline search (dealer visits and print). This is in contrast to prior findings by [Ratchford, Lee, and Talukdar \(2003\)](#) that online search is a substitute for dealer visits. Conforming to existing results, however, we find that search on resale websites is a substitute for offline search.

- Second, search on dealer websites is positively associated with search on resale websites, but search on resale websites is negatively associated with search on dealer websites.
- Third, several consumer characteristics affect search in the used car market. Higher wage individuals are more likely to search on dealer websites and less likely to search offline. Older consumers are less likely to search online and more likely to visit dealers or search print. Word of mouth negatively affects search on dealer websites.
- Finally, those who purchase from individual sellers tend to be younger, buy in a lower price range, consider more models, and use resale websites; those who purchase from a dealer tend to be older, make more dealer visits, make less use of resale web sites, consider fewer models, and buy in a higher price range.

We next discuss the literature on search across multiple sources of information. Subsequent sections deal with the conceptual framework, data description, and results. Finally, we provide discussions and directions for future research. [Appendix A](#) contains the survey instruments used for this study. [Appendix B](#) presents a detailed derivation of the model used in estimation as an extension of the model employed in [Ratchford, Lee, and Talukdar \(2003\)](#).

## Background

Consumers' prepurchase search for product information from different information sources has received significant attention in the marketing literature. A literature review is provided by [Ratchford \(2008\)](#) who notes that empirical work on search for durable goods emerged over fifty years ago. From the marketer's perspective, obvious benefits in messaging, budgeting, and competitiveness arise from understanding the search process and shaping it toward one's own products.

The durable goods search literature has focused on consumers' search for new cars in offline media. [Table 1](#) presents a summary of the findings. Consumers search for information about functional attributes, expressive attributes, and prices of competing models ([Ratchford, Talukdar, and Lee 2001](#)). In searching, consumers invest time and resources to determine which brands of cars deserve a serious effort to purchase. The size of this feasible set, that is, the number of acceptable makes and models of new cars, is influenced by prior experience and knowledge ([Srinivasan and Ratchford 1991](#)). Consumers with little knowledge or a great deal of knowledge may have less incentive to search, leading to an inverted U-shaped relationship between knowledge and search ([Moorthy, Ratchford, and Talukdar 1997](#)). After the search for acceptable makes and models, the consumer invests effort in trying to get a favorable deal on one such car ([Ratchford and Srinivasan 1993](#)). Once a satisfactory deal has been closed, the search process concludes.

More recent literature looks at search in the online medium. [Klein and Ford \(2003\)](#) use online survey data of automobile shoppers and purchasers to examine how individuals differ in their use of the Internet and the patterns of substitution they exhibit across sources and media. They find that basic economics

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