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Modeling patronage shift to a new entrant for predicting disproportionate losses for incumbent outlets

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ABSTRACT

In a retail market where market competition is intensifying due to increases in the numbers of outlets, an understanding of patronage-shifting behavior is critical to improving the prediction accuracy of changes in the market shares of existing outlets. Our objective is to understand consumers' patronage shift patterns in response to a new outlet. This study develops a patronage shift model by incorporating outlet characteristics which affect the choice set formation of consumers. Factors of interest to us are the accessibility of the new outlet, outlet awareness, and inter-outlet substitutability. An empirical analysis of the motion picture exhibition industry shows that (i) patronage loss is significantly disproportionate across incumbent movie theaters due to the asymmetric substitution effect, (ii) substitutability is more crucial than accessibility in accurately capturing disproportionate substitution patterns at the market level, (iii) the probability of a consumer being aware of a new theater increases gradually, (iv) modeling the growth pattern of outlet awareness plays a significant role in representing actual market responses more accurately, and (v) patronage patterns estimated by the proposed model from aggregate market share data are consistent with actual consumer responses.

1. Introduction

Understanding store choice behavior is a fundamental step in the process of predicting the effect of the introduction of a new outlet. Bucklin (1967) and Geisel, Narasimhan, and Sen (1993) collect individual-level data to measure the effect of a new store on the market shares of existing stores. Drezner (1994), Ghosh and Craig (1983) and Kaufmann and Rangan (1990) develop normative models based on store choice models in order to provide insights into the best location for a new store. Recently, Singh, Hansen, and Blattberg (2006) analyzed a frequent-shopper database, investigating the effect of a Wal-Mart supercenter on the inter-purchase time and purchase amount of an incumbent store's customers. Pancras, Sriram, and Kumar (2009) develop a dynamic demand model for addressing whether new chain stores just cannibalize sales from the chain's existing stores or bring in additional sales.

While these prior studies draw the insightful conclusion that the impact of a new outlet on the market shares of incumbent outlets is disproportionate, they overlook the patronage-shifting behavior that underlies retail competition. Most of the studies use store choice models which assume that consumers are most likely to visit the store that is most accessible. While this probabilistic nature of spatial behavior is still widely used by studies of retail competition (e.g., Davis, 2006, and Thomadsen, 2007), the models do not guarantee a proper representation of

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patronage-shifting behavior. This assumption, which was proposed by Huff (1964), has the Independence-from-Irrelevant-Alternatives (IIA) property at the consumer level. If the assumption of proportionate substitution patterns at the consumer level is not valid, it may cause the prediction of market-level substitution patterns to be inaccurate. This inaccuracy can be more severe in retail markets where the consumer choice set of the market is a nested structure (Gonzalez-Benito, Munoz-Gallego, & Kopalle, 2005) or spatial competition is asymmetric (Zhu & Singh, 2009; Zhu, Singh, & Manuszak, 2009).

Our research objective is to provide insights into how consumers shift their patronage in a retail market which is facing growing competition. To achieve this goal, the study develops a store choice model that accounts for patronage-shifting behavior. Under the assumption that the store choice set plays a key role in consumers' patronage shift decisions, outlet characteristics which affect the choice set formation of consumers are incorporated into the proposed model. The proposed model is then applied to the motion picture exhibition industry. Movie theater market share data are used for model calibration. Our underlying premise for model assessment is that actual patronage-shifting behavior is represented more closely by a store choice model that more accurately predicts changes in market share and estimates consumer-level store choice patterns. The factors of interest here are accessibility of the new outlet, outlet awareness, and inter-outlet substitutability.

The primary contribution of this study is to expand our knowledge of patronage-shifting behavior. Prior studies only suggest that consumers are more likely to shift their patronage to a new outlet if it is geographically more accessible to them. This study shows that the decreasing rate of patronage of existing outlets is disproportionate because of the asymmetric substitutability of a new entrant for incumbents, which depends on its proximity to the incumbents, their differences in size, and the asymmetric substitution relationship. In addition, this study finds that the probability of a consumer being aware of a new outlet increases gradually over each time period. Our findings are *demand-side* insights into the patronage-shifting behavior that underlies asymmetric spatial competition, which is a *supply-side* implication of the findings of Zhu and Singh (2009) and Zhu et al. (2009).

Another contribution of this study is the identification of the importance of outlet characteristics in improving prediction accuracy at the market level. Most prior studies have presented the disproportionate changing patterns of market share by using store choice models with the IIA property. However, these studies infer a market-level phenomenon from consumer-level data without making any attempt to justify the accuracy of their inferences using actual market response data. The present study empirically demonstrates that the IIA assumption at the consumer level is not valid for representing retail competition at the market level. The proposed model, with both the substitutability and accessibility factors, predicts market share more accurately than the benchmark model, which only has the accessibility factor. In particular, substitutability is more crucial than accessibility in capturing the varying impacts of the new entrant on different existing theaters. In addition, modeling the probability that consumers will be aware of new outlets is important in improving the prediction accuracy. The proposed model with the awareness factor represents these actual market responses more accurately than the benchmark model, which only has the outlet age variable for capturing the dynamics.

Our secondary contribution is to show that the proposed approach using aggregate data can estimate the patronage patterns of consumers properly. Studies of location research generally propose an approach using consumer survey data for building a store choice model, and then use the model to predict market share losses (Geisel et al., 1993; Ghosh & Craig, 1983). However, there are two limitations when utilizing survey data: first, the prediction error is often large due to the responses being biased against behavioral frequency (e.g., Blair & Burton, 1987, and Lee, Hu, & Toh, 2000), or due to inaccurate questions about patronage behavior, without considering store-switching (Leszczyc & Timmermans, 1997); second, it is impractical to conduct consumer surveys frequently when competing stores are entering the market continuously, owing to time and budget constraints. Our empirical study reveals that the patterns of theater patronage estimated from aggregate data are consistent with survey responses from moviegoers. This consistency implies that the proposed approach using aggregate data should enable retailers to predict changes in the patronage patterns of consumers in a timely manner prior to a new entry. Such opportune predictions will allow timely decisions on the part of retail and customer management.

The remainder of this paper consists of four sections. The next section suggests the major characteristics of a new store which will affect consumer choice set formation, and explains the procedure of the model specification. The following sections present the data and the results of an empirical analysis. Finally, the paper concludes with a summary and suggestions for further research.

2. Model

Choice set plays a key role in modeling patronage-shifting behavior. As consumers generally avoid evaluating all of the alternatives in the markets (e.g., Shocker, Ben-Akiva, Boccara, & Nedungadi, 1991; and Roberts & Lattin, 1997), they will only shift their patronage to a new outlet if it is a part of their choice set. In two-stage or hierarchical spatial choice processes (Black, 1984; Fotheringham, 1988; Spiggle & Sewall, 1987), patronage of existing outlets can also change if the new entrant affects the probability that the incumbents are included in the consumers' choice set. This section proposes outlet characteristics that may change consumers' outlet choice set formation, through a review of the literature examining consumer choice processes, store choice behavior, and retail competition.

2.1. Outlet characteristics that affect choice set formation

(i) *Accessibility of a new outlet*. If the location of a new outlet is far from a given residential area, customers