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Consumer spending patterns across firms and categories: Application to the size- and share-of-wallet



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ABSTRACT

Predicting share-of-wallet and size-of-wallet (i.e., category expenditure) of customers requires a firm to have, in addition to its own sales, an estimate of customer spending at competing firms. Given data on competitive spending from a sample of customers, this study considers the problem of predicting consumer expenditures at competing firms when data is unavailable. The proposed methodology, designed for multi-category firms, is a simultaneous equations Tobit model with latent classes which can handle three complicating factors: (i) heterogeneity in spending patterns; (ii) interrelationship of expenditures across firms and categories, called simultaneity; and (iii) data censoring, which occurs when consumers have zero expenditure in a category. The model is estimated on credit card data using Bayesian estimation. Two segments are revealed. One comprises 76% of consumers and is characterized by habitual spending patterns. The other 24% of consumers spend based on income allocation. Segments show different interrelationship of expenditures across firms and categories. Thus, this paper contributes a methodological tool for more accurate prediction of size-of-wallet and share-of-wallet and better targeting of customers when expenditures at competing firms are unavailable. This is accomplished by considering consumer heterogeneity and asymmetric complementary and substitute interactions between expenditures.

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1. Introduction

Share-of-wallet is defined as the percentage of a customer's total category expenditure (i.e., size-of-wallet) captured by the firm. It is an informative metric for untapped customer potential, effectiveness of marketing activities, and competitive benchmarking. It has been used as a loyalty measure (e.g., Bowman & Narayandas, 2004), as a segmentation criterion (e.g., Reinartz & Kumar, 2003), and is known to have a positive impact on profits (e.g., Reinartz, Thomas, & Kumar, 2005). However, as Du, Kamakura, and Mela (2007) emphasize, calculating share-of-wallet requires information about customers' expenditures at competing firms as well as one's own firm; information that is often unavailable. In the absence of such information, a model to predict it is needed. This issue motivates the present research.

The purpose of this paper is to study the interrelationships of consumer spending across categories and firms and utilize this knowledge to predict the size- and share-of-wallet when expenditure at competitors is not available. Information about how much the customer spends on different categories and at competing firms is gleaned from looking at expenditures across multiple

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categories, because studies show that consumer purchases in a given category are related to their purchases in other categories (e.g., [Iyengar, Ansari, & Gupta, 2003](#); [Li, Sun, & Wilcox, 2005](#)). In existing share-of-wallet literature, either a single category is considered (e.g., [Chen & Steckel, 2012](#); [Glady & Croux, 2009](#)) or, given multi-category data, the relationship between inter-category expenditures has been examined by looking at the relationships between factor loadings related to unobserved individual-specific factor scores ([Du et al., 2007](#)).

We use a model of budget allocation that handles situations of zero consumption for some categories and strictly positive consumption for other categories (i.e., multiple-discreteness) within a utility maximizing framework. We focus on the interrelationship of expenditures across firms and categories, using current and past expenditures in multiple categories at a focal firm and, when available, competing firms. We allow for the possibility that spending patterns can differ for different consumers and control for unobserved heterogeneity using a latent class approach.

Estimating this model presents methodological challenges because of simultaneity and censoring. Simultaneity occurs because expenditures across firms and categories are interrelated due to complementarity or substitutability between categories under consumers' budget constraints. Censoring occurs when consumers do not spend in all categories at all firms. We resolve the simultaneity and censoring problems by developing a Bayesian estimation method.

Share-of-wallet has been investigated in several contexts including banking services ([Du et al., 2007](#); [Glady & Croux, 2009](#); [Kamakura, Wedel, de Rosa, & Mazzon, 2003](#)), credit cards ([Chen & Steckel, 2012](#)), and retailing ([Mägi, 2003](#)). The substantive application of our method, in common with several papers in the literature, deals with credit card usage. We have credit card data for a focal bank and a composite of all other competing banks. There are two categories of expenditures, viz., making purchases and taking cash advances on the credit card. We refer to these two categories as *purchases* and *cash advances*, respectively. Given this data, we examine the following research issues:

- Can we improve over benchmark share-of-wallet models by incorporating interrelationships between expenditures in categories and firms?
- How many consumer segments exist and how can they be characterized based on different consumption patterns?
- What guidelines do the results allow for targeting customers?

The findings can be summarized as follows: First, our model improves over benchmark models in predicting the size- and share-of-wallet. A reason for this is that we consider the interrelationships between expenditures within and across banks. Within a bank, expenditures on different categories are positively related, but across banks, they are negatively related. However, we also find that expenditures in the cash advance category are positively related across banks. This implies that consumers can regard competing services as substitutes or complements depending on the category.

Second, analysis uncovers a large segment (75.6% of the sample) whose expenditures are based primarily on past expenditures, and a smaller segment (24.4%) whose consumers determine their expenditures by allocating income to each firm and category. We call these the *habitual* segment and the *allocating* segment, respectively. Finally, it leads to better targeting of potentially profitable customers for sales growth, for example, customers who presently deliver a small share-of-wallet but who have a large size-of-wallet.

The main contribution of the paper is methodological. Specifically, the advantages of the proposed simultaneous equations Tobit (SET) model are as follows:

- SET captures interrelationships between product expenditures, which allow complementary and substitute product interactions. The interactions can be asymmetric whereas some literature has examined only symmetric effects. This advantage allows us to show finer theoretical results—that complementary and substitute as well as asymmetric product interactions exist in the use of credit card purchases and cash advances.
- SET shows better performance in prediction of the size- and share-of-wallet and targeting by utilizing the interrelationships. In our case, it had better performance in size-of-wallet predictions for both categories (purchases and cash advances) and had similar performance in share-of-wallet prediction for the cash advances category without the requirement of additional data unlike other benchmark models. As a result, we can target more profitable potential customers.

Thus, the SET approach provides a new tool for share-of-wallet calculations and applications.

2. Literature review

This study is related to several research areas: (i) budget allocation across or within product categories, (ii) the multiple-discreteness model, (iii) the size- and share-of-wallet, and (iv) financial decision-making focusing on credit card usage. We consider each in turn.

First, budget allocation across categories has been studied in the context of cross-selling. [Kamakura et al. \(2003\)](#) show relationships among purchases of 22 financial services at a focal bank and its competitors, and predict the possibility of customers purchasing services that they do not yet own. [Li et al. \(2005\)](#) find an order in the purchase of financial products and predict opportunities for cross-selling products based on it. Similarly, [Iyengar et al. \(2003\)](#) present a model to understand and predict consumers' purchases in a category given their purchases in other categories. In contrast to these papers, we consider multiple firms rather than single firms and cross-category usage rather than cross-selling.

Second, given multiple related categories available to them, it is quite common for consumers to choose from more than one, though not necessarily from all categories. Thus, expenditure on one or more categories can be zero while expenditure on other categories is positive and continuous. Thus, consideration should be given to multiple discrete choices and continuous aspect of choices. [Wales and Woodland \(1983\)](#) propose two alternative approaches to model those observations. The first approach is based on Kuhn-

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