Can Purchase Behavior Predict Relationship Perceptions and Willingness to Donate?

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ABSTRACT

As arts organizations frequently seek purchases and donations from the same consumers, one of their challenges is identifying which consumers are likely to become donors in the future. With all of the data currently available, many organizations are looking to their databases to predict future consumer behavior. In the customer relationship management literature, models have been developed that allow organizations to use consumer purchase data to predict future purchase behavior. This goal of this research is to extend this literature to determine whether it is possible to predict consumer willingness to donate using purchase behavior data. It is not expected that purchase behavior data will be nearly as accurate a predictor of future donation behavior as past donation behavior would be. Rather, the goal is simply to determine whether organizations would be able to use purchase behavior data as a proxy for relationship perceptions to improve their ability to identify prospective donors among their consumers. Three commonly used methods of prediction based on past behavior are tested using a combination of purchase behavior data and consumer surveys: a segmentation approach, a recency/frequency/monetary value model, and a Pareto/NBD customer relationship management model. Across all three methods, purchase behavior is found to be a poor predictor of both customer relationship perceptions and willingness to donate to the organization. © 2014 Wiley Periodicals, Inc.

The nonprofit arts industry is one of only a few industries in which organizations are funded through a combination of earned and contributed income. In particular, the unique combination of selling tickets to performances or exhibits and asking for individual donations implies that arts organizations frequently seek both purchases and donations from the same consumers. While many individual donors are likely to be consumers of the organization’s products, most organizations find that only a small percentage of their consumers make donations of time or money to the organization. One of the challenges for arts organizations, therefore, is identifying which consumers are likely to become donors in the future.

With all of the data currently available to arts organizations, many organizations are looking to their databases to try to predict future consumer behavior. In the customer relationship management literature, numerous models have been developed that allow organizations to use consumer transaction data to segment consumers and predict their future purchase behavior (Reinartz & Kumar, 2000, 2003; Verhoef, 2003). Particular focus has been placed on using past behavior to predict the duration or value of consumer relationships (Fader, Hardie, & Lee, 2005; Ho, Park, & Zhou, 2006; Reinartz & Kumar, 2000, 2003; Schmittlein, Morrison, & Colombo, 1987). This approach yields metrics such as customer lifetime value and expected lifetime that may be used by the organization to target consumers and allocate resources. These models have also been applied to donation behavior, and researchers have found that past donation behavior can be used to predict future donation behavior (Fader, Hardie, & Shang, 2010; Netzer, Lattin, & Srinivasan, 2008).

Fundamental to this literature is the assumption that consumers’ observed behaviors are manifestations of their underlying relationships with the organization (Fader, Hardie, & Lee, 2005; Netzer, Lattin, &
CONSUMER RELATIONSHIP PERCEPTIONS AND WILLINGNESS TO DONATE

Consumers may become donors to an arts organization for a variety of reasons. Research on donation behavior has identified several taxonomies of motivations that drive consumers to make charitable donations of money and time. Dawson (1988) measured motivations to donate money to charities that support medical research and identified four motivations: reciprocity, self-esteem enhancement, career motives, and income or tax motives. Omoto and Snyder (1995) examined motivations among AIDS volunteers and found five motivations: a desire to express prosocial or altruistic values, a desire to gain new knowledge or skills, a desire to grow socially and individually, a sense of obligation to or concern about the community, and a desire to feel better about oneself. Clary et al. (1998) identified six motivations for volunteeringism: expressing altruistic values, gaining new knowledge and skills, cultivating or maintaining social relationships, gaining career-related benefits, reducing guilt over being more fortunate than others, and experiencing emotional growth or positive affect. Rioux and Penner (2001) and Finkelstein and Penner (2004) expanded the taxonomy approach to organizational citizenship behaviors, prosocial behaviors directed at an organization by its employees, and found three motivations: organizational concern, prosocial values, and impression management.

Numerous studies have also found that consumers are more likely to donate money or time when they are provided with an incentive or reward. Holmes, Miller, and Lerner (2002) found that in a context in which intrinsic motivation to donate was low, offering an incentive increased both the number of participants who made a monetary donation and the average donation amount. Goette and Stutzer (2008) found similar results when individuals were offered an incentive to donate blood. Bertacchini, Santagata, and Signorello (2011) examined the effectiveness of incentives in a field study of consumer donations to arts and cultural institutions. They found that offering incentives converted between 5.8% and 36.4% of consumers who had previously declined to donate into donors, depending on the type of incentive.

Consumers may also make charitable donations in order to gain social status or social approval. Andreoni and Pietri (2004), Rege and Telle (2004), and Soetevent (2005) all found that making individuals' donation behavior publicly known had a positive influence on donation amounts. Consumers have even been found to make increased donations to avoid social punishments. Ariely, Bracha, and Meier (2009) found that when individuals were exerting effort to support a charity (e.g., participating in a “bike for charity” event in which the total donation received depended on the distance the participant biked), participants who were given an incentive increased their effort when the incentive was

1. Can past purchase behavior be used to predict consumer relationship perceptions?
2. Can past purchase behavior be used to predict consumer willingness to donate?
3. Can combining past purchase behavior with consumer relationship perceptions improve organizations' ability to predict consumer willingness to donate?

These research questions are tested across three approaches commonly used to predict future behavior based on patterns of past behavior: segmentation into categories based on past behavior, prediction based on recency and frequency of purchase, and a Pareto/NBD customer relationship management model that predicts the likelihood of a future relationship with the consumer. These approaches all have the same goal and use essentially the same data as predictors, but they vary in the complexity and sophistication of their prediction approaches. As the goal of this research is to examine the effectiveness of using past purchase behavior to predict willingness to donate among consumers who are not donors, past donation behavior will also be included as a predictor to distinguish between current and prospective donors. Predictions based on these approaches are compared to consumers' self-reported relationship perceptions and willingness to donate to determine if they are able to accurately predict which consumers perceive strong relationships with the organization and are willing to donate to the organization in the future.

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Srinivasan, 2008). Differences in consumer–organization relationship perceptions have been found to influence consumer donation behavior (e.g., Bhattacharya, Rao, & Glynn, 1995; Johnson & Grimm, 2010; Sargeant & Lee, 2004; Supphellen & Nelson, 2001). The assumption that consumers' relationship perceptions are manifest in their behaviors suggests that firms could look for patterns of behavior that can predict different types of relationships or lead to different types of future behaviors. If arts organizations could use patterns of purchase behavior to predict consumer relationship perceptions, they might be able to better identify those consumers who are likely to become donors in the future but have not donated in the past.

This goal of this research is to extend this literature to determine whether it is possible to predict consumer relationship perceptions and willingness to donate using purchase behavior data. It is not expected that purchase behavior data will be nearly as accurate a predictor of future donation behavior as past donation behavior would be. Rather, the goal is simply to determine whether organizations would be able to use purchase behavior data as a proxy for relationship perceptions to improve their ability to identify prospective donors among their consumers. This leads to the following research questions:

1. Can past purchase behavior be used to predict consumer relationship perceptions?
2. Can past purchase behavior be used to predict consumer willingness to donate?
3. Can combining past purchase behavior with consumer relationship perceptions improve organizations' ability to predict consumer willingness to donate?

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given in private, but decreased their effort when the incentive was given in front of others. The authors’ explanation was a potential social punishment if others saw the individual accept the incentive and assumed that his or her donation behavior was motivated by the reward. Collectively, this research suggests that there are a variety of self-focused reasons why consumers may donate money or time.

While some consumers may become donors to an arts organization for self-focused reasons, recent research has found that consumers may also become donors because of their perceived relationship with the organization. Supphellen and Nelson (2001) classified donors based on the criteria that they used to make their decisions to donate, and identified three categories of donors: analysts, who are highly involved in the decision and carefully analyze both the organization making the request and the cause behind it; internalists, who have internalized donation norms and values and respond positively to a request without considering either the cause or the organization making the request; and relationists, who are loyal to specific organizations and consider only the organization making the request. For relationists, it is the perceived relationship with the particular organization that drives the decision to donate, not an individual motivation or a perceived benefit to the individual.

Perceptions of a strong consumer–organization relationship have been shown to lead to higher willingness to donate money or time to the organization. Consumers who perceive a greater affective commitment or emotional connection to an organization have been found to be more willing to help the organization by spreading positive word of mouth (Bhattacharya & Sen, 2003; Harrison-Walker, 2001) and volunteering time (Sargeant & Lee, 2004). Consumers’ willingness to donate money and time to an organization has been shown to increase with the consumer’s identification with the organization (Bhattacharya, Rao, & Glynn, 1995), loyalty to the organization (Supphellen & Nelson, 2001), and overall perceived relationship strength (Brown, Barry, Dacin, & Gunst, 2005; Johnson, Thomas, & Peck, 2010).

Consumer willingness to donate has also been shown to increase when the consumer–organization relationship shifts from an exchange relationship to a communal relationship (Aggarwal, 2004; Johnson & Grimm, 2010). Both communal and exchange relationships involve a long-term orientation and ongoing interactions over time. However, the exchange of benefits and help within the relationships are different. Exchange relationships are based on expectations of equity and reciprocity. In exchange relationships, when one relationship partner helps the other, the recipient is expected to reciprocate the help or pay back the helping partner (Clark & Mills, 1993). In contrast, communal relationships are based on an emotional bond between the two partners. An individual in a communal relationship may give his or her relationship partner a gift to demonstrate caring, or may provide assistance when the partner is in need simply because he or she wishes to please the partner (Clark & Mills, 1993). While not all relationships develop into communal relationships, communal relationships are generally viewed to be stronger and more committed than exchange relationships (Clark & Mills, 1993).

Consumers who perceive communal relationships have been found to be more willing to help the organization through spreading positive word of mouth (Grempler, Gwinner, & Brown, 2001) and participating in market research (Aggarwal, 2004) than consumers who perceive exchange relationships, particularly when no reward is offered in exchange. Communal relationship perceptions have also been found to be associated with higher willingness to donate among consumers (Johnson & Grimm, 2010; Johnson, Thomas, & Peck, 2010). Thus, consumers who perceive strong relationships, greater commitment, and especially communal relationships, are frequently found to be the most likely to donate to the organization.

While it would be difficult for an arts organization to infer from a consumer’s behavior the specific self-focused motivations that would be likely to drive the consumer to become a donor, research suggests that behavioral patterns can be used to identify differences in consumer–organization relationships (Fader, Hardie, & Lee, 2005; Ho, Park, & Zhou, 2006; Reineartz & Kumar, 2000, 2003; Schmittlein, Morrison, & Colombo, 1987). Thus, while not all consumers who become donors will do so because of their perceived relationships with the organization, identifying those consumers who do perceive stronger relationships with the organization would better enable organizations to find consumers who are likely to become donors based on their relationship perceptions. Predicting consumer relationship perceptions using purchase behavior would therefore bring arts organizations one step closer to being able to identify prospective donors among their customer bases.

RESEARCH METHODOLOGY

The research questions were addressed using a combination of secondary data analysis and survey methods. A database of purchase behavior data was acquired from a large performing arts center located in a mid-sized southeastern U.S. city. In addition to selling tickets to their performances, the performing arts center is a legal nonprofit, which enables them to accept charitable donations from their consumers. Consumer relationship perceptions and willingness to donate were captured using consumer surveys and matched to the behavioral data in the organization’s database. Data were gathered from consumers of a single organization in order to ensure that equivalent behavioral data were gathered for each consumer and to control for firm-level factors, such as marketing and fundraising strategies. The unit of analysis was the consumer, comparing individual consumers’ survey responses and purchase...
and donation behavior data across different consumer—organization relationships.

**STUDY 1—SEGMENTATION MODEL**

Study 1 tests the simplest approach to predicting consumer relationship perceptions and willingness to donate: classifying consumers into segments based on their past behavior. To test the effectiveness of this approach, customer classifications from the database were used to predict consumers’ relationship perceptions and willingness to donate as reported in a survey.

**Purchase Behavior Data**

The purchase behavior database included several customer classifications that were used by the organization to target marketing communications to different consumer segments. The definitions and use of these classifications were verified with multiple staff members of the organization to ensure that they were being interpreted accurately by the researchers.

The first classification designated consumers as a member of the organization. This classification was used for consumers who had joined the organization’s customer loyalty program. By paying an annual membership fee, these consumers are entitled to advance opportunities to purchase tickets and better seating at performances. Members also have access to a designated employee that acts as a concierge specifically for members instead of going through the box office, enabling them to speak to the same employee each time that they contact the organization. Consumers who value these benefits are willing to pay the additional membership fee to receive them. These benefits are most likely to be valuable to consumers who attend performances frequently and intend to continue to attend performances in the future.

Once a consumer has made a donation of any type or amount to the organization, he/she is reclassified in the database as a donor. According to the organization’s staff, donors interact directly with fundraising staff and do not often communicate with the box office. Tickets to performances are often given to these consumers as a thank you for their help or ordered through their personal contact at the organization. These consumers are also asked for additional donations or money on a regular basis.

Finally, consumers who did not fall into one of these classifications were considered by the organization’s staff to be single-ticket buyers. These consumers primarily received mass mailings from the organization and ordered tickets through the organization’s box office or Web site with little personal interaction with the organization. They purchased tickets to individual performances, but did not demonstrate any additional behaviors that would indicate commitment to the organization.

These three classifications of single-ticket buyers, members, and donors were used to represent the purchase behavior variable in this segmentation model.

**Consumer Survey Data**

With the organization’s assistance, a mail survey of consumers was conducted to capture their relationship perceptions. A mail survey was selected because at the time, the organization had limited access to their customers’ e-mail addresses and still conducted the majority of their marketing communications through the mail. The organization provided a total of 2311 names, of which 954 were classified as single-ticket buyers, 952 were classified as members, and 405 were classified as donors. Each contact provided by the organization was sent a mail survey with a cover letter explaining that the organization was cooperating with an academic research project and a prepaid reply envelope to return the survey directly to the researchers.

Since a segmentation model is by nature categorical, it was determined that the easiest way to test the accuracy of the organization’s categories would be to compare them to similar categorical data. Consumers were therefore asked to categorize themselves into one of three consumer—organization relationship categories: communal relationship, exchange relationship, or no relationship. The consumers were given the definitions of exchange and communal relationships used by Clark and Mills (1993) and Aggarwal (2004):

An *exchange relationship* is a relationship in which both the person and the firm expect that what they put into the relationship will be equal to what they receive from the relationship. In an exchange relationship, a person will give to the firm because they expect to receive something comparable in return.

A *communal relationship* is a relationship in which the person and the firm give to each other based on their caring for each other. In a communal relationship, a person will give to the firm because the firm is in need, or because the person wants to see the firm succeed.

Consumers were asked to indicate which definition best represented their relationships with the performing arts center. While previous research has found that consumers can perceive a relationship that has elements of both exchange and communal relationships (Johnson & Grimm, 2010), most of the consumers were expected to perceive either the exchange component or communal component of their relationships to be stronger. By asking consumers to categorize themselves based on the dominant component of their relationships with the organization, the segmentation model based on the behavioral data was given the greatest opportunity to accurately identify consumers with different relationship perceptions. Consumers were also given an option that read, “I do not consider myself to have a relationship with [performing arts center].” This was included to capture those consumers who perceived...
themselves to be engaging in discrete transactions, and not a relationship, with the organization. Respondents’ willingness to donate to the organization in the future was measured using a 7-point semantic differential item with endpoints “not at all willing” to “very willing.” Respondents’ attitudes toward being asked for donations were also measured. The results were parallel to those for respondents’ willingness to donate, so for space considerations, only the results for willingness to donate are reported. Finally, respondents reported their age and gender.

RESULTS AND DISCUSSION

Of the 2311 surveys mailed out, 340 were returned as undeliverable, leaving a possible sample of 1971 surveys. Of these, 343 completed surveys were returned, for a response rate of 17.4%. The respondents were 59% female, which is typical of research conducted in this industry, and their ages ranged from under 25 to over 80. Eighty-three percent of respondents were between the ages of 45 and 84, which is representative of both the population of the geographic area and the typical consumer of this performing arts center. No differences in gender or age were found on the respondents’ perception of the relationship, the respondents’ classification by the organization, or the respondents’ willingness to donate. In addition, no differences on these variables were found between respondents who responded immediately and those who responded after some delay. This suggests that nonresponse bias was not a problem for this sample.

The first research question asks whether segmentation based on past behavior can accurately predict consumer relationship perceptions. To address this question, consumers’ self-reported relationship perceptions were compared to the segments based on their classifications in the purchase and donation behavior database. When consumer perceptions were compared to the behavioral segments, the perceptions matched 46% of the time, with the other 54% spanning all possible combinations (see Table 1).

Of the 103 individuals who were classified as donors, 46 (45%) perceived an exchange relationship, 41 (40%) perceived a communal relationship, and 16 (15%) perceived themselves to have no relationship with the organization, but rather to be engaged in discrete transactions. Of the 115 individuals who were classified as members, 41 (36%) perceived an exchange relationship, 26 (22.6%) perceived a communal relationship, and 48 (42%) perceived no relationship with the organization. Finally, of the 125 consumers who were classified as single-ticket buyers, 32 (25.6%) perceived an exchange relationship, 17 (13.8%) perceived a communal relationship, and 76 (61%) perceived no relationship with the organization. This suggests that the consumer segments that were created based on the consumers’ behavior was not representative of the complexity of their relationship perceptions. Indeed, the consumers’ responses suggest that there are consumers who never engage with the organization beyond simply purchasing a single ticket who nevertheless view themselves as engaged in a communal relationship, as well as consumers who regularly make donations to the organization, yet perceive no relationship at all.

The second and third research questions ask whether segments based on past behavior can accurately predict willingness to donate. A 3 (behavioral segments) × 3 (consumer perceptions) ANOVA on consumers’ reported willingness to donate revealed main effects of both behavioral segments ($F(2, 320) = 6.62, p < 0.005$) and consumer perceptions ($F(2, 320) = 24.79, p < 0.001$) with no significant interaction effect (see Table 2).

The segmentation approach was able to accurately detect significant differences in willingness to donate between consumers who had donated before and consumers who had not. Not surprisingly, the donors segment was found to be significantly more willing to donate in the future than both the members segment ($M_{Donors} = 4.32, M_{Members} = 3.68, F(1, 320) = 7.85, p = 0.005$) and the single-ticket buyers segment ($M_{Donors} = 4.32, M_{Single-Ticket Buyers} = 3.50, F(1, 320) = 12.14, p = 0.001$). However, no differences were found between the members segment and the single-ticket buyers segment ($M_{Members} = 3.68, M_{Single-Ticket Buyers} = 3.50, F(1, 320) = 0.68, p > 0.10$), the two segments who had not donated previously.

However, consumers’ self-reported relationship perceptions were able to distinguish differences in willingness to donate across all three different categories of relationship perceptions. Consumers who perceived a communal relationship were significantly more willing to donate than both consumers who perceived an exchange relationship ($M_{Communal} = 4.69, M_{Exchange} = 3.82, F(1, 320) = 14.64, p = 0.001$) and consumers who perceived discrete transactions ($M_{Communal} = 4.69, M_{Discrete Transactions} = 2.99, F(1, 320) = 48.47, p < 0.001$), and consumers who perceived an exchange relationship were more willing to donate than consumers who perceived discrete transactions ($M_{Exchange} = 3.82, M_{Discrete Transactions} = 2.99, F(1, 320) = 15.05, p < 0.001$). Consumer perceptions were also found to be a stronger predictor of consumer willingness to donate than organization segments (consumer perceptions partial $\eta^2 = 0.13$, organization segments partial $\eta^2 = 0.04$).

These results suggest that a segmentation approach based on simple measures of past purchase and donation behavior is not a good predictor of consumers’ willingness to donate in the future. The behavioral segments were not able to accurately represent differences in consumer relationship perceptions. In addition, not all consumers who were willing to donate perceived strong relationships with the organization, and not all consumers who perceived strong relationships with the organization were willing to donate. This suggests that the behavioral segments approach may be able to identify current donors who are willing to donate again in the future, but will likely not be able to separate
Table 1. Comparison of Organization Segments and Consumer Perceptions Study 1.

<table>
<thead>
<tr>
<th>Consumer perceptions</th>
<th>Organization Segments</th>
<th>Single-Ticket Buyers</th>
<th>Members</th>
<th>Donors</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discrete transactions</td>
<td></td>
<td>76</td>
<td>48</td>
<td>16</td>
<td>140</td>
</tr>
<tr>
<td>Exchange relationship</td>
<td></td>
<td>32</td>
<td>41</td>
<td>46</td>
<td>119</td>
</tr>
<tr>
<td>Communal relationship</td>
<td></td>
<td>17</td>
<td>26</td>
<td>41</td>
<td>84</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>125</td>
<td>115</td>
<td>103</td>
<td>343</td>
</tr>
</tbody>
</table>

Cells on the diagonal indicate accurate classification of the consumer by the organization.

Table 2. Mean Willingness to Donate by Consumer Perceptions and Organization Segments Study 1.

<table>
<thead>
<tr>
<th>Consumer perceptions</th>
<th>Organization Segments</th>
<th>Single-Ticket Buyers</th>
<th>Members</th>
<th>Donors</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discrete transactions</td>
<td></td>
<td>2.68</td>
<td>2.63</td>
<td>3.64</td>
<td>2.99</td>
</tr>
<tr>
<td>Exchange relationship</td>
<td></td>
<td>3.75</td>
<td>3.62</td>
<td>4.09</td>
<td>3.82</td>
</tr>
<tr>
<td>Communal relationship</td>
<td></td>
<td>4.06</td>
<td>4.78</td>
<td>5.23</td>
<td>4.69</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>3.50</td>
<td>3.68</td>
<td>4.32</td>
<td>3.68</td>
</tr>
</tbody>
</table>

Cells on the diagonal indicate accurate classification of the consumer by the organization. All variables are measured on 7-point scales. Pairs with the same superscript are significantly different at $p \leq 0.001$ except for e, which is significantly different at $p < 0.005$.

Prospective donors from consumers who are not willing to donate. The goal of Studies 2 and 3 is to determine whether a more sophisticated behavioral model can provide a more accurate predictor of consumer relationship perceptions and willingness to donate.

Study 2 tests a variation of the recency, frequency, and monetary value model of customer relationship management (Hughes, 1996). This model is more complex than the segmentation model tested in Study 1 and is based on overall patterns of past purchase behavior.

Purchase Behavior Data

Using the same behavioral database, two purchase behavior measures were created representing recency and frequency of purchase: the number of years within the past five years in which the consumer made a purchase (frequency of purchase) and the number of years that have passed since the consumer’s most recent purchase (recency of purchase). These measures were calculated on an annual basis because it is common for a consumer to attend an arts performance only once or twice a year but still consider him or herself to be a repeat attender. As this performing arts center presents a variety of performances at very different price points, it was determined that a measure of monetary value of purchase would more accurately indicate the consumer’s aesthetic preferences rather than his or her relationship with the organization. Therefore, only frequency and recency of purchase were used as behavioral measures to predict consumer relationship perceptions and willingness to donate.

Consumer Survey Data

As some time had passed since the survey was conducted for Study 1, it was determined that a second survey should be used to capture more current consumer–organization perceptions. During the time that had passed since the first study, the performing arts center had engaged in a large campaign to capture e-mail addresses, and had shifted from mail to e-mail communications for the majority of their marketing messages. To be consistent with the shift in the organization’s communications strategies, the second survey was conducted via e-mail. The organization provided access to e-mail addresses for their entire mailing list of 107,346 consumers, and an e-mail invitation was sent out with a link to complete an online survey.

As Study 2 was not limited to categorical data, in the second survey, consumer relationship perceptions were measured using the two-step approach used by Johnson and Grimm (2010) and Johnson, Thomas, and Peck (2010). Consumers first responded to a single item that read, “To what extent do you perceive yourself to have a relationship with [performing arts center]?” that was followed by a 7-point scale with endpoints not at all/very much. This was used to identify those consumers within the survey who perceived any relationship with the firm (any response greater than “not at all”). These consumers then completed the measures of communal and exchange relationship perceptions developed by Johnson and Grimm (2010). In order to more fully capture...
consumers’ relationship perceptions, three additional measures of relationship strength were included in the survey: Noordewier, John, and Nevin’s (1990) measure of expectation of relationship continuity, Gruen, Summers, and Acito’s (2000) measure of affective commitment, and Bhattacharyya, Rao, and Glynn’s (1995), measure of organizational identification. A complete list of the measures used can be found in Appendix A.

As in Study 1, respondents were asked about their willingness to donate to the organization as well as their attitudes toward being asked for donations by the organization. Once again, the results were parallel, so only the willingness to donate results are reported. In order to gain a more accurate measure of donation behavior than the categorical classification of “donor” in the database, respondents were also asked whether they had made a donation to the organization within the past year and whether they had made a donation to the organization prior to the past year. Finally, respondents again reported their age and gender, as well as their income, as income is often viewed as a predictor of purchase and donation behavior. These demographic variables were included in each of the regression analyses discussed below and were found to have no significant effects. Results excluding the demographic variables are therefore reported.

RESULTS AND DISCUSSION

Of the 107,346 surveys sent out, 1475 completed surveys were received, for a response rate of 1.4%. The respondents were 59% female, and their ages ranged from under 25 to over 75. Eighty-seven percent of respondents were between the ages of 35 and 74. It would have been ideal to match responses from Studies 1 and 2, but the small degree of overlap between the samples made such analysis impossible. Thus, the samples across Study 1 and Study 2 are different, but both are reflective of the population of audience members at the time that the surveys were conducted.

The measures of communal and exchange relationship perceptions were checked for reliability and scale structure. A principal components analysis of the eight-item communal relationship scale (α = 0.92) revealed a single-factor solution that explained 65% of the variance with all factor loadings greater than 0.70. The five-item exchange relationship scale (α = 0.87) also had a single-factor solution that explained 66% of the variance with all factor loadings greater than 0.70. The items of each scale were averaged to create composite scores.

The three additional measures of relationship strength were combined into a single overall measure. In keeping with the approach used by Noordewier, John, and Nevin (1990), the measures were combined using a second-order factor model in which each scale’s items loaded onto a latent factor representing that construct, and the three latent factors were subsequently loaded onto a single, second-order latent factor representing the underlying relationship construct. The model exhibited acceptable fit (χ2 = 678.03, df = 79, p < 0.001, GFI = 0.94, NFI = 0.96, CFI = 0.97, RMSEA = 0.07). The first-order factor loadings for all three scales were all greater than 0.7 and significant at p < 0.001. The second-order loadings on the latent relationship factor were all greater than 0.6 and also significant at p < 0.001. Averaged composite scores from the three scales were also significantly positively correlated with each other at p < 0.001. Collectively, these results suggest that these three scales can be treated as dimensions of an underlying construct capturing the consumers’ perceived relationship strength. The composite scores from the three scales were averaged to create the overall composite measure of relationship strength.

The first research question asks whether past purchase behavior can predict consumer relationship perceptions. Consumers’ self-reported relationship strength was first regressed onto the two purchase behavior variables and the two donation behavior variables (R2 = 0.15, see Table 3). The only significant predictor of relationship strength was whether the consumer had donated this year (β = 1.01, p < 0.001), suggesting that current donors perceived a stronger relationship with the organization than nondonors. Parallel results were found when consumers’ exchange and communal relationship perceptions were regressed onto the two purchase behavior and two donation behavior variables. Donating in the current year was the only significant predictor of consumers’ exchange relationship perceptions (β = 1.39, p < 0.001, R2 = 0.09, see Table 3) and consumers’ communal relationship perceptions (β = 1.62, p < 0.001, R2 = 0.12, see Table 3). However, the low R2 values combined with the earlier findings from Study 1 suggest that while donation behavior is correlated with relationship perceptions, using this as the sole predictor loses valuable information and misses consumers who may perceive a strong or communal relationship but have not donated recently.

The second research question asks whether past purchase behavior can predict consumers’ willingness to donate in the future. Consumers’ reported willingness to donate was first regressed onto the two purchase behavior variables (R2 = 0.04, see Table 4), and frequency of purchase was found to be a significant predictor (β = 0.32, p < 0.005). However, once the two donation behavior variables were included in the model (R2 = 0.26, see Table 4), both purchase behavior variables became nonsignificant and both donating this year (β = 1.23, p < 0.001) and donating prior to this year (β = 1.05, p < 0.001) were significant predictors of willingness to donate in the future.

The third research question asks whether the combination of past behavior and consumer relationship perceptions can effectively predict willingness to donate in the future. Consumers’ self-reported willingness to donate was regressed onto all of the behavioral variables and the consumer relationship perception variables (R2 = 0.36, see Table 4). Once again, the purchase
Table 3. Prediction of Consumer Relationship Perceptions by Purchase and Donation Behavior Study 2.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Predictors</th>
<th>β</th>
<th>Significance</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship strength</td>
<td>Frequency of purchase</td>
<td>0.08</td>
<td>n.s.</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>Recency of purchase</td>
<td>0.12</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Donated this year</td>
<td>1.01</td>
<td>$p &lt; 0.001$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Donated prior to this year</td>
<td>0.32</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Exchange relationship perceptions</td>
<td>Frequency of purchase</td>
<td>0.09</td>
<td>n.s.</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>Recency of purchase</td>
<td>0.07</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Donated this year</td>
<td>1.39</td>
<td>$p &lt; 0.001$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Donated prior to this year</td>
<td>0.02</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Communal relationship perceptions</td>
<td>Frequency of purchase</td>
<td>0.05</td>
<td>n.s.</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>Recency of purchase</td>
<td>0.08</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Donated this year</td>
<td>1.62</td>
<td>$p &lt; 0.001$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Donated prior to this year</td>
<td>0.39</td>
<td>n.s.</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Prediction of Willingness to Donate by Consumer Relationship Perceptions and Purchase and Donation Behavior Study 2.

<table>
<thead>
<tr>
<th>Model</th>
<th>Predictors</th>
<th>β</th>
<th>Significance</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase behavior only</td>
<td>Frequency of purchase</td>
<td>0.32</td>
<td>$p &lt; 0.005$</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>Recency of purchase</td>
<td>0.10</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Purchase and donation behavior</td>
<td>Frequency of purchase</td>
<td>0.07</td>
<td>n.s.</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td>Recency of purchase</td>
<td>0.04</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Donated this year</td>
<td>1.23</td>
<td>$p &lt; 0.001$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Donated prior to this year</td>
<td>1.05</td>
<td>$p &lt; 0.001$</td>
<td></td>
</tr>
<tr>
<td>Behavior and relationship perceptions</td>
<td>Frequency of purchase</td>
<td>0.05</td>
<td>n.s.</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>Recency of purchase</td>
<td>−0.004</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Donated this year</td>
<td>0.76</td>
<td>$p = 0.005$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Donated prior to this year</td>
<td>0.90</td>
<td>$p &lt; 0.001$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relationship strength</td>
<td>0.23</td>
<td>$p = 0.005$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exchange</td>
<td>−0.04</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Communal</td>
<td>0.19</td>
<td>$p &lt; 0.005$</td>
<td></td>
</tr>
</tbody>
</table>

behavior variables were not significant predictors of willingness to donate, but both donating this year ($\beta = 0.76$, $p = 0.005$) and donating prior to this year ($\beta = 0.90$, $p < 0.001$) were significant predictors of willingness to donate in the future. As expected, consumers’ perceived relationship strength was also a significant predictor of willingness to donate ($\beta = 0.23$, $p = 0.005$), as were consumers’ communal relationship perceptions ($\beta = 0.19$, $p < 0.005$). Consumers’ exchange relationship perceptions did not significantly predict willingness to donate, which is not surprising since these perceptions are more related to reciprocal exchanges than to donations.

These results confirm that past donation behavior can be a good predictor of willingness to donate in the future, as has been found in previous studies (Fader, Hardie, & Shang, 2010; Netzer, Lattin, & Srinivasan, 2008). However, recency and frequency of purchases were not found to be a good predictor of either consumer relationship perceptions or willingness to donate, again suggesting that purchase behavior may not be a good indicator of prospective donors who are willing to donate for the first time.

STUDY 3—PARETO/NBD CUSTOMER RELATIONSHIP MANAGEMENT MODEL

Study 3 again increases the complexity of the prediction model to determine if a more sophisticated approach can effectively identify prospective donors. Study 3 tests the most complex approach to predicting willingness to donate, a Pareto/NBD customer relationship management model. Study 3 uses the same consumer survey data as Study 2, but employs a more detailed analysis of past purchase behavior from the behavioral database using a model designed to predict ongoing consumer relationships.

Estimates of future behavior can be derived from extant marketing models that allow for a customer’s latent transition to inactivity. The most popular of these models is the Pareto/NBD (Schmittlein, Morrison, & Colombo, 1987), which has been used extensively in the analysis of customer bases. Previous research has linked the Pareto/NBD to customer lifetime value (e.g., Fader, Hardie, & Lee, 2005) and suggested employing the model results as a means of segmenting customers (e.g., Reinartz & Kumar, 2000). Given the discrete
nature of the observations, the beta-geometric/beta-Bernoulli (BG/BB) model (Fader, Hardie, & Shang, 2010) was employed for this study, which is a discrete-time analog to the Pareto/NBD.

Paralleling analyses that have been conducted using the Pareto/NBD, two key metrics were considered that result from the BG/BB. First, “P(Alive)” is the probability that a customer will conduct a transaction with the organization in the future. Second, “CE5” is the conditional expectation for the number of years in which a customer is expected to conduct transactions over the next five-year period, given their previously observed behavior. Details on the estimation of these metrics can be found in Appendix B.

RESULTS AND DISCUSSION

Once again, the first question was whether past purchase behavior can predict consumer relationship perceptions. The two purchase behavior metrics, P(Alive) and CE5, were found to be significantly correlated with each other (r = 0.53, p < 0.001) and with consumers’ perceived relationship strength (P(Alive) r = 0.07, p < 0.05, CE5 r = 0.17, p < 0.001). Only CE5 was found to be significantly correlated with consumers’ exchange relationship perceptions (r = 0.07, p < 0.05) and communal relationship perceptions (r = 0.13, p < 0.001). This suggests that the conditional expectations of future activity (CE5) may offer a better approximation of consumers’ relationship perceptions than P(Alive). However, these correlations are still very low, suggesting that while CE5 is related to consumers’ perceptions, there may still be considerable variation between the approximation it yields and consumers’ actual perceptions.

To further examine if the purchase behavior measures could predict consumers’ relationship perceptions, self-reported perceptions were regressed onto purchase behavior. CE5 was found to be a significant predictor of perceived relationship strength (β = 0.19, t = 5.50, p < 0.001), but P(Alive) was not (β = −0.03, t = 0.92, p = 0.36), and the R² of 0.03 suggests that there was not much explanatory power in the purchase behavior metrics (see Table 5). Parallel patterns were found for exchange relationship perceptions (CE5 β = 0.09, t = 2.10, p < 0.05, P(Alive) β = −0.03, t = 0.63, p = 0.53, R² = 0.01, see Table 5) and communal relationship perceptions (CE5 β = 0.14, t = 3.27, p = 0.001, P(Alive) β = −0.02, t = 0.38, p = 0.71, R² = 0.02, see Table 5).

Again, this suggests that CE5 is the better predictor of the two purchase behavior metrics, but it is still a weak predictor of consumer relationship perceptions.

The second research question asks whether past purchase behavior can predict willingness to donate in the future. Consumers’ self-reported willingness to donate was then regressed onto the purchase behavior metrics. CE5 was found to be a significant predictor of willingness to donate (β = 0.18, t = 5.12, p < 0.001, see Table 6), but the model R² was again only 0.03. This indicates that even a sophisticated model of past purchase behavior alone is not sufficient to predict consumer willingness to donate.

The third question asks whether combining past purchase behavior and relationship perceptions can predict willingness to donate. Willingness to donate was first regressed onto CE5 and perceived relationship strength. Both were found to be significant predictors of willingness to donate (CE5 β = 0.09, t = 3.15, p < 0.005, relationship strength β = 0.40, t = 14.70, p < 0.001, see Table 6), and the model R² increased to 0.18, suggesting that the prediction was improved by the addition of the perceived relationship strength measure. Finally, willingness to donate was regressed onto CE5, perceived relationship strength, exchange relationship perceptions, and communal relationship perceptions. Exchange relationship perceptions were not found to be a significant predictor of willingness to donate (β = −0.01, t = 1.32, p = 0.19), which is consistent with the results of Study 2. However, the other three measures were all significant predictors of willingness to donate (CE5 β = 0.09, t = 2.99, p < 0.005, relationship strength β = 0.10, t = 2.47, p < 0.05, communal relationship β = 0.43, t = 10.55, p < 0.001, see Table 6), and the model R² increased to 0.25. Overall, this suggests that perceived communal relationship was the strongest predictor of willingness to donate, perceived relationship strength was the second-best predictor, and CE5 was a distant third in predictive power.

GENERAL DISCUSSION

This research set out to determine whether consumer purchase behavior could be used to identify consumers who perceived strong relationships with the organization, and predict their willingness to become donors to the organization. Across three different commonly used approaches to customer relationship management, purchase behavior patterns were consistently found to be ineffective predictors of willingness to donate. Increasing the complexity and sophistication of the model did not improve the predictive power by much. This suggests that organizations are not likely to be able to accurately identify new or prospective donors based solely on purchase behavior information.

This research did find that new or prospective donors can sometimes be identified through their relationship perceptions. Perceived relationship strength and perception of a communal relationship were found to be indicators of willingness to donate in the future, even when the consumer has not donated previously. Overall, consumers who perceived a strong relationship with the organization and, in particular, those who perceive a communal relationship with the organization, did tend to be more willing to become donors in the future. Thus, organizations may be able to make some cautious predictions about consumer willingness to donate by using purchase behavior to identify consumers with strong relationship perceptions.
Table 5. Prediction of Consumer Relationship Perceptions by Purchase and Donation Behavior Study 3.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Predictors</th>
<th>β</th>
<th>Significance</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship strength</td>
<td>CE5</td>
<td>0.19</td>
<td>$p &lt; 0.001$</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>P(Alive)</td>
<td>−0.03</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Exchange relationship perceptions</td>
<td>CE5</td>
<td>0.09</td>
<td>$p &lt; 0.05$</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>P(Alive)</td>
<td>−0.03</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Communal relationship perceptions</td>
<td>CE5</td>
<td>0.14</td>
<td>$p &lt; 0.001$</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>P(Alive)</td>
<td>−0.02</td>
<td>n.s.</td>
<td></td>
</tr>
</tbody>
</table>

Table 6. Prediction of Willingness to Donate by Consumer Relationship Perceptions and Behavioral Data Models Study 3.

<table>
<thead>
<tr>
<th>Model</th>
<th>Predictors</th>
<th>β</th>
<th>Significance</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase behavior only</td>
<td>CE5</td>
<td>0.18</td>
<td>$p &lt; 0.001$</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>P(Alive)</td>
<td>−0.04</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Purchase behavior and relationship strength</td>
<td>CE5</td>
<td>0.09</td>
<td>$p &lt; 0.005$</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>Relationship strength</td>
<td>0.40</td>
<td>$p &lt; 0.001$</td>
<td></td>
</tr>
<tr>
<td>Purchase behavior and relationship perceptions</td>
<td>CE5</td>
<td>0.09</td>
<td>$p &lt; 0.005$</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Relationship strength</td>
<td>0.10</td>
<td>$p &lt; 0.05$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exchange</td>
<td>−0.01</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Communal</td>
<td>0.43</td>
<td>$p &lt; 0.001$</td>
<td></td>
</tr>
</tbody>
</table>

The accuracy of predicting relationship perceptions was found to increase with improved measures of purchase behavior. The simple segmentation approach used by many organizations, in which consumers are placed into categories such as members, subscribers, loyal purchasers, or donors based on a single behavior, was found to be the least effective at predicting consumer relationship perceptions. Purchase frequency and recency also failed to successfully predict consumer relationship perceptions. It was only when a sophisticated customer relationship management model designed to predict relationship longevity was used that consumer relationship perceptions were predicted successfully.

However, incorporating consumer relationship perceptions into the predictive model still did not explain a great deal of the variance in consumer willingness to donate. Consumer survey responses identified consumers who perceived strong, committed, and communal relationships, but only purchased single tickets from the organization, as well as consumers who were loyal purchasers and regular donors but still perceived no relationship with the organization at all. This suggests that while consumer relationship perceptions are associated with higher willingness to donate, and consumer relationship perceptions can be at least partially predicted by purchase behavior, arts organizations need to be cautious not to assume that all of their donors will perceive strong consumer–organization relationships, or that all of their consumers who perceive strong consumer–organization relationships will become donors.

Rather, given the difficulty of identifying both strong consumer-organization relationships AND prospective donors based on their purchase behavior, arts organizations would benefit from examining consumer behaviors that might more directly communicate their relationship perceptions and willingness to donate. For example, allowing consumers to opt out of incentives or rewards offered for donations might help organizations to identify those consumers who perceive a communal relationship. Allowing consumers to opt out of receiving future donation requests might indicate consumers with low willingness to donate regardless of their perceived relationship with the organization. Finally, arts organizations that are seeking to cultivate strong consumer relationships might consider measuring relationship perceptions directly, through a consumer survey, in order to gain a more accurate perception of their customer base.

This research has several limitations. First, in order to control for firm-level factors, such as marketing and fund-raising strategies, data were collected from consumers of a single arts organization. Future research should examine the effectiveness of customer relationship management models at predicting willingness to donate across multiple contexts and organizations. In addition, this research relied on self-reported willingness to donate, rather than predicting actual donation behavior. It has been well established that behavioral intentions are not necessarily accurate indicators of future behavior. While it would have been preferable to use actual donation behavior as a dependent variable, the organization's donation behavior database was collected and maintained separately from the purchase behavior database, and was organized in a very different manner. After examination by the researchers, it was determined that combining the two databases was impossible. As a result, the researchers were limited to the self-reported willingness to donate measures from the consumer survey. Future research should examine
the effectiveness of customer relationship management models of purchase behavior in directly predicting future donation behavior.

REFERENCES


The authors would like to thank Mark Nerenhausen, Kelley Shanley, Catherine Carter, and the Broward Center for the Performing Arts for their assistance with this project, and faculty and students at Kent State University and the University of Wisconsin-Madison for their feedback and support.

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### APPENDIX A: MEASURES USED IN STUDIES 2 AND 3

**Communal Relationship Perceptions**
*Johnson & Grimm, 2010*
1. I will give to [performing arts center] to see them succeed.
2. I will give to [performing arts center] to support them.
3. I will feel good when I help [performing arts center].
4. I will pay attention to [performing arts center’s] needs.
5. I will give to [performing arts center] if they need my help.
6. I will help [performing arts center] because I want to.
8. [Performing arts center’s] success will make me happy.

**Exchange Relationship Perceptions**
*Johnson & Grimm, 2010*
1. When I give to [performing arts center], I will receive something comparable in return.
2. If I give to [performing arts center], they will give me something back.
3. If I give to [performing arts center], I will receive something from them promptly.
4. I will give more to [performing arts center] if they give more to me.
5. I will keep track of what I give to [performing arts center] and what I receive from them.

**Expectation of Continuity**
*Noordewier, John, & Nevin, 1990*
1. I expect my relationship with [performing arts center] to continue for a long time.
2. The renewal of my relationship with [performing arts center] is almost automatic.
3. It is very likely that I will still be involved with [performing arts center] in two years.

### APPENDIX B: ESTIMATION OF MODELS USED IN STUDY 3

Interested readers should see Fader, Hardie, and Shang (2010) for the complete derivation of the BG/BB model. The resulting equations provided are for the metrics that are of relevance to this analysis.

The underlying assumptions of the BG/BB model are that

1. Each year, customer \( i \) conducts a transaction with a probability \( p_i \).
2. Each year, customer \( i \) permanently ceases conducting transactions with the organization with a probability \( \theta_i \).
3. Customers are assumed to have different probabilities of conducting transactions (\( p_i \)), and this probability is distributed across customers according to a beta distribution with parameters \( \alpha \) and \( \beta \).
4. Customers are assumed to have different probabilities with which they cease conducting transactions (\( \theta_i \)), where the distribution of this probability across customers follows a beta distribution with parameters \( \gamma \) and \( \delta \).
The process by which customers cease conducting activities follows a geometric distribution. Incorporating the heterogeneity via the beta distribution with parameters \( \gamma \) and \( \delta \) results in a beta-geometric “death” process, which has been employed in studies of contractual customer bases (e.g., Fader & Hardie, 2010). Prior to ceasing activity with the organization, a customer’s activity is governed by a Bernoulli process with heterogeneity incorporated via the beta distribution with parameters \( \alpha \) and \( \beta \), resulting in a beta-Bernoulli model that closely resembles a beta-binomial distribution. Like the Pareto/NBD, the model can be estimated via maximum-likelihood estimation.

The metric “\( P(\text{Alive}) \)” is given by Fader, Hardie, and Shang (2010) as

\[
P(\text{Alive}) = \frac{B(\alpha + x, \beta + n - x) B(\gamma, \delta + n)}{B(\alpha, \beta) B(\gamma, \delta)} + \sum_{i=0}^{n-x-1} \frac{B(\alpha + x + t_i - x + i, \beta + \gamma + i)}{B(\alpha, \beta) B(\gamma, \delta)}\tag{1}
\]

where \( x \) is the number of years in which repeat transactions are observed, \( n \) is the number of repeat transaction opportunities, and \( t_i \) indicates the year of the last transaction.

The conditional expectation for the number of years in which a customer is expected to conduct transactions under the BG/BB is given by

\[
\text{CE}(X(n, n^*)) = \frac{B(\alpha + x - 1, \beta + n - x) B(\gamma + \delta)}{B(\alpha, \beta) B(\gamma, \delta)} \left( \frac{\delta}{\gamma - 1} \right) \sum_{i=0}^{n-x-1} \frac{B(\alpha + x + t_i - x + i, \beta + \gamma + i)}{B(\alpha, \beta) B(\gamma, \delta)} + \sum_{i=0}^{n-x-1} \frac{\Gamma(\gamma + \delta + i) \Gamma(\gamma + \delta + n + n^*)}{\Gamma(\gamma + \delta + n + n^*)} \right)
\]

where  \( n \) denotes the length of the observation period through the present and \( n^* \) denotes the end of the period of interest. As such, \( \text{CE}(X(n, n^*)) \) represents the number of years in which a customer is expected to conduct transactions over the course of the next \( n^* - n \) years, conditional on the transactional behavior observed until year \( n \).

To estimate the model, a random 10% sample of customers was selected from the organization’s database. Based on the estimated parameters (\( \alpha = 0.68, \beta = 2.41, \gamma = 0.04, \delta = 4.51 \)), it was concluded that it is rather unlikely that customers will become inactive, as indicated by the parameters \( \gamma \) and \( \delta \). However, the average probability that a customer will conduct a transaction in a given year (\( \alpha/\alpha + \beta \)) is approximately 22%. Thus, while individuals may be active customers for some time, they would not be expected to make purchases each year. From the model results, \( P(\text{Alive}) \) and \( \text{CE}(n) \) were estimated for the full database. Conditional expectations were also calculated over a 10-year and 20-year horizon, which were found to be highly correlated with the conditional expectations over a five-year period. Only the results of \( \text{CE}(n) \) are reported in Study 3.