

**Balancing Acquisition and Retention Resources
to Maximize Customer Profitability**

by

W. Reinartz

J. Thomas

and

V. Kumar

2004/28/MKT

Working Paper Series

Balancing Acquisition and Retention Resources to Maximize Customer Profitability

Werner Reinartz,
Jacquelyn S. Thomas,
and
V. Kumar

Revised: January 2004

Werner J. Reinartz is Associate Professor of Marketing at INSEAD, Boulevard de Constance, F-77305 Fontainebleau Cedex, France, Phone +33-1-6071-2648, Fax +33-1-6074-5000, E-mail werner.reinartz@insead.edu

Jacquelyn S. Thomas, Associate Professor, Northwestern University, McCormick Tribune Center, 1870 Campus Drive, Evanston, IL 60208, Phone: 847-491-2196, Fax: 847-491-5925, E-mail jakki@northwestern.edu

V. Kumar is the ING Chair Professor and Executive Director, ING Center for Financial Services, School of Business, University of Connecticut, Storrs, CT 06269-1041. Phone 860-486-1086, Fax 860-486-8396, Email vk@sba.uconn.edu

The authors thank the editor and the reviewers, Hubert Gatignon and the participants of the 2003 Marketing Science Conference for their valuable comments on the earlier version of the manuscript. We also thank the high tech firm for providing us access to the data without which this study would not have been possible.

Balancing Acquisition and Retention Resources to Maximize Customer Profitability

Abstract

This research presents a conceptual framework that is used to address two key questions: 1) how much marketing spending to allocate to customer acquisition and retention and 2) how to distribute that allocate across communication channels. Extending the conceptual framework, this research applies a statistical model that links acquisition, retention, and long-term customer profitability in a unified framework to empirically investigate the how and how much questions. By simultaneously modeling these three facets of the customer-firm relationship, our framework not only captures their interrelationship, but can also be used to make informed resource allocation decisions, which require tradeoffs between these key elements. A key finding for our empirical context is that there are decreasing returns to both acquisition and retention investments. In this study, we also find that misallocating investments (i.e., over spending or under spending by the same amount) has an asymmetrical effect in terms of customer profitability and ROI. An additional finding of this research is that the profit maximizing strategy does not maximize the acquisition rate nor the relationship duration. Further, any suboptimal allocation of resources on either retention or acquisition affects profitability. Specifically, we find that it is more detrimental to underspend than overspend from the optimal budget. Managers can use the proposed integrated framework not only for better understanding of profitability, but also know how to maximize profitability through optimal allocation of resources.

Balancing Acquisition and Retention Resources to Maximize Customer Profitability

Introduction

Customer lifetime value analysis has been at the center stage of much research in the marketing domain in recent years (Hogan, Lemon, and Rust 2002). Consistent with this focus, Hanssens (2003) points out that marketing spending should be driven by the maximization of long term customer profitability. However measuring, managing, and maximizing customer profitability is not an easy task. It requires firms to consider both the benefits and costs of their marketing and sales activities and customer interactions. At a tactical level this means optimally allocating resources to customers, not categories or brands (Blattberg et al. 2001; Rust, Lemon and Zeithaml 2004). Thus, setting a marketing budget is the task of balancing how much to spend on customer acquisition and customer retention, and determining how the expenditures are allocated. Blattberg and Deighton (1996) address the question of how much to spend on customer acquisition, and how much to spend on customer retention. Specifically, they demonstrate that the relationship between acquisition expenditures and acquisition rates, and retention expenditures and retention rates can be modeled, assessed, and optimized via a decision calculus approach. This approach necessitates that acquisition and retention expenditures can be separated, which is the case in many B-to-B or direct marketing contexts. Further, Bolton, Lemon, and Verhoef (2004) show conceptually how marketing instruments can affect customer lifetime value. Thus the importance of focusing on marketing spending is critical and it is all the more important to concentrate on how to spend and how much to spend.

However, as Mantrala (2002) points out, Blattberg and Deighton's (1996) approach is only a first step and there is great scope for more research into customer profitability-based decision modeling of marketing resource allocations. However, this is not straightforward, as Hanssens (2003) highlights,

"The more challenging task is to assess long run marketing effectiveness and to allocate the overall marketing budget across the key activities that generate customer equity. [...] For any given set of business and customer response parameters, there is an optimal level of customer acquisition and retention which translates into optimal acquisition and retention spending levels." (p. 16)

Even though Blattberg and Deighton (1996) focus on how much to spend, they stop short of simultaneously considering acquisition and retention spending. This is a notable limitation of that work given that conceptually these two decisions are inextricably linked. Therefore with regards to the issue of how much to spend, a logical extension should *simultaneously* consider acquisition and retention expenditures and their impact on the customer-firm relationship. Berger and Nasr-Bechwati (2001) suggest, on the basis of the Blattberg and Deighton approach, how such a simultaneous model could look like. A simultaneous framework is beneficial for resource allocation because it accounts for the tradeoffs involved in profitably acquiring and retaining customers. In other words, which *balance* of acquisition and retention spending maximizes long-term customer profitability? In this research we propose an integrated framework, which sheds *statistical* insight on this issue and thus goes beyond the *deterministic* approach by Berger and Nasr-Bechwati (2001).

Another opportunity for an extension is the need to consider how the expenditures are allocated. In this research we focus on how resources are allocated to acquisition versus retention expenditures and also examine how those resources are allocated across different customer contact channels. The issue of customer-firm interactions across channels is an important topic given today's multi-channel environment. In this business environment, marketing managers routinely decide which contact channels they should employ and to what extent. A key factor affecting this decision is the cost-effectiveness of each channel. In practice, the issue of channel choice often involves a tradeoff between choosing a contact mode that ranks high on an interpersonal dimension but is often more costly (e.g., face-to-face interaction) versus a mode of contact that is less interpersonal and less costly (e.g., email interaction).

An additional consideration in the firm's communication strategy is the synergies between their communication channels. "Are there synergies between the channels that the firm can leverage to make the communication objective more effective?" Today, a frequently used practice amongst sales and marketing professionals is to utilize email communications with another form of

communication. For example, DSW , a discount shoe retailer, combines email and direct mail to inform existing customers of promotions or the receipt of new inventory. Thus in addition to the main effect of contact channels, it is important to also examine the potential synergies between contact channels.

Thus, based on these issues the specific objectives of this paper are to:

1. present a resource allocation model that addresses the questions of how much to invest in customer relationships and how to invest at different points of the customer-firm relationship.
2. illustrate the model with an empirical application
3. show via a simulation how varying different inputs of the model (e.g., expenditures, number of communication contacts) impact acquisition rates, retention rates, customer profitability, and the magnitude of the firm's return on investment.

Requirements for Making Resource Allocation Decisions in the context of CRM

Integrating acquisition, retention, and profit in a unified modeling framework

In order to answer the questions of how much to spend on customer relationships and how to allocate expenditures, one must understand the key drivers of customer profitability¹. While there are a number of attempts to shed light on the drivers of customer profitability (see Berger et al 2002, p. 47 for a review), these analyses have looked at isolated components. In this research we seek to advance our understanding of the interrelatedness of acquisition, retention, and long-term customer profitability.

We acknowledge that investigations focusing on the processes that govern customer acquisition and customer retention are not new to marketing. For example, Fornell and Wernerfelt

¹ The terms “customer profitability” and “customer value [to the firm]” are used interchangeably in this research. Both expressions represent a multi-period measure of the economic value of a customer to the firm, expressed in contribution margin terms. While the term “customer lifetime value” has been abundantly used in that context, we refrain from doing so. Conceptually, one could have reservations against using the term “customer lifetime value” because it would imply that one would have complete knowledge (i.e. past and future) about a customer’s value to the firm. We do not take such a viewpoint.

(1987) coined the terms *offensive marketing* and *defensive marketing*. Offensive marketing has been defined as strategies that are designed to obtain additional customers and encourage brand switching whereas defensive marketing has been defined as strategies that are designed to reduce customer exit and brand switching. The process of offensive marketing has been studied in isolation in many contexts such as for example promotion effectiveness (Pauwels, Hanssens and Siddarth 2002), brand switching (Sethuraman and Srinivasan 2002), and market share studies (Buzzell and Gale 1987). Likewise the process of defensive marketing has been investigated from a number of perspectives, such as for example, retention (Reichheld and Sasser 1990), satisfaction (Rust and Zahorik 1993), and word-of-mouth (Fornell and Wernerfelt 1988). Naturally, the multitude of these studies reflects the variety of dependent variables that can be linked to the acquisition and retention processes (Fornell and Wernerfelt 1987). Consistent with the literature, this research uses this offensive-defensive framework to examine the interaction between the processes of customer acquisition and retention and to derive the optimal allocation of resources with respect to long-term customer profitability.

While our model clearly differentiates between offensive and defensive processes, it also integrates them into a single framework (as shown in Figure 1) for measuring customer profitability. We also demonstrate the simultaneous estimation of these integrated relationships later.

[Figure 1 about here]

The conceptual link between the offensive process and the defensive process is important for two reasons. First, only by linking the two, one can see a complete and unbiased picture of the drivers behind customer selection/acquisition, relationship duration, and customer profitability (Heckman 1979). Prior research has specifically shown that a failure to link acquisition and retention can lead to biased results and incorrect inferences (Thomas 2001). This is due to the selection bias resulting from the omission of information on non-acquired prospects. Secondly, offensive processes and defensive processes compete for the same resources. Making the necessary

tradeoff requires a full specification of the key dimensions of the customer-firm relationship. Thus, a more complete model specification allows us to address a key managerial question – “Does the maximization of the respective objective functions (a.k.a. acquisition likelihood, lifetime duration, and customer value) lead to convergent or divergent resource allocation recommendations?”

Although an appropriate resource allocation model links acquisition, retention, and customer profitability, in terms of operationalizing this model it is important to be able to distinguish acquisition efforts from retention efforts. This distinction is much more feasible in industries that have direct-to-customer interactions, e.g. direct mail industry or business-to-business marketing.

Managing communications at the individual level

The allocation of a budget across different contact channels is a classic problem that has gained heightened attention in today’s multi-channel environment. However, the typical media planning investigation has been conducted on the firm level. For example there have been investigations focused on , optimal levels and possible synergies of say TV and print advertising (Aaker 1975, Rust 1986). Two aspects are new to our study with respect to contact channel strategies. First, we can address the question of marginal efficiency of contact channels with respect to two longitudinal performance measures, customer retention and customer profitability. Secondly, while previous research has been conducted on the firm or market level, our unit of analysis is the individual customer account. According to Tellis (2003, p. 45), the use of the most disaggregate measure – the individual – is probably the most appropriate for allocating media expenditures. This is because persuasion is created at the individual level and also because media can be increasingly targeted at the individual level. Thus, the individual level investigation is another contribution of our study.

Thus, this research addresses the fundamental question of “How should the firm distribute resources across different communication channels?” Given our model specification, we explore the optimal contact frequency that maximizes acquisition likelihood, relationship duration, and

customer profitability, respectively. Investigating the allocation decision relative to each of these dimensions is critical because it demonstrates whether it is necessary to change the communications strategy at different stages of the customer lifecycle. For example, customer acquisition might be optimized using more (highly involving) personal sales calls but once customers are acquired, their retention strategy may be most effectively managed by less obtrusive or less interpersonal communication such as email or Internet-based interactions. The idea that different types of communication channels play varying roles in the acquisition vs. the retention process has been discussed conceptually so far (Dwyer, Schurr, and Oh 1987). This research investigates this assertion empirically in a business-to-business setting.

Research Hypotheses

In this research our construct of interest, a customer's profitability to the focal firm, is modeled as a function of *endogenous* factors such as the customer's likelihood of being acquired and the customer-firm relationship duration, as well as *exogenous* factors such as the firm's actions, the customer's actions, and observed and unobserved customer heterogeneity. Consistent with a simultaneous equation framework, our model also *explicitly* models relationship duration and acquisition likelihood. The specific model underlying this research is outlined in Figure 2.

[Figure 2 about here]

H1: Impact of Acquisition expenditures

It has generally been shown in the advertising and sales literature that greater marketing investments will have a positive impact on customer purchasing behavior and thus on revenue. There is substantial evidence from the literature on brand sales models that increased marketing spend is associated with greater sales (Wittink, Addona, Hawkes, and Porter 1988). Likewise, as firms allocate more resources to communicate to potential clients about their products and services, one would expect that, all else being equal, the firm would convert more first-time buyers.

What is of interest to us however is not this main linear effect but the decreasing marginal returns from customer acquisition expenditures. So far, this effect has not been demonstrated in the empirical customer lifetime value literature, except the deterministic (not statistical!) approach by Blattberg and Deighton (1996) and Berger and Nasr-Bechwati (2001). The idea is that as firms increase their acquisition budget, the associated acquisition rate and customer profitability will be less and less responsive (concavity). Even if, for all practical purposes, there were no limit on acquisition expenditure, firms are able to capture only a certain share of the potential targets. This is in line with Blattberg and Deighton (1996, p. 138) who state that, “There is a ceiling [on acquisition] which will vary from industry to industry”. This is because certain potential customers will not or never be persuaded into first time buying, regardless of acquisition expenditure levels. Factors that may cause this non-response may for example be related to a higher pricing or to a mismatch of expectations or extreme loyalty to a competitor. Thus, there is always a threshold beyond which any amount of expenditure will not be enough for the customer first, to buy, and then to buy more. Therefore, we hypothesize that

H1a: Acquisition expenditures will have diminishing marginal associations with the likelihood of customer acquisition.

H1b: Acquisition expenditures will have diminishing marginal associations with customer profitability.

H2: Impact of Retention Expenditures

The fact that resources dedicated to maintaining customer relationships are one of the antecedents of commitment to the relationship is a long-standing finding in the literature (Anderson and Weitz 1992; Morgan and Hunt 1994).² Similar to H1, we expect a diminishing marginal effect of retention expenditures on the resulting duration of the relationship (Blattberg and Deighton 1996). That is, increasing retention expenditures will be associated with increased retention levels,

² It has also been argued that there is likely to be a reverse effect as well (Dwyer 1997), i.e. that more relationship commitment will trigger more resource allocations (endogeneity of marketing communications). In this research we are looking only at the correlation between the two constructs, not the direction of the causal impact. The same caveat holds for the construct of customer profitability.

however, they are subject to increasingly lower returns. This is consistent with the notion that there are firm- and industry- specific optimal retention levels (Anderson and Mittal 2000).

With respect to customer profitability, the link between marketing activities and customer profitability has been explored in research streams such as service quality (Rust and Zahorik 1993) or satisfaction research (Kamakura et al. 2002). It is generally believed that greater marketing investments will have a positive impact on revenue. In terms of profitability, if communications with customers is a continuous investment and those investments are financially accountable then it is inevitable that some of these investments will be evaluated as ineffective. This is tantamount to saying that it is possible to spend too much on communication, which is also in line with Blattberg and Deighton's (1996) idea that there is a natural, industry and firm-specific limit to retention spending because of the non-monotonic link to customer equity. Thus, at one point the decreasing marginal returns to marketing communications will not justify further investments. This suggestion is also supported through the findings from the advertising response models literature which finds in most cases a support for concavity (Lilien, Kotler and Moorthy 1992, p.267). We therefore believe that retention investments are positively linked to customer profitability however, they are clearly subject to decreasing marginal returns (and at some point even negative returns). Thus,

H2a: Retention expenditures will have diminishing marginal associations with relationship duration.

H2b: Retention expenditures will have diminishing marginal associations with customer profitability.

H3: Firm-Initiated Contacts:

Besides the decision of "How much" to spend on acquisition, managers must allocate resources to individual contact channels, thereby making a decision on "How" to spend for acquisition. Organizations typically use several contact channels to communicate and interact with customers. Because all communication modes do not cost the same, the decision is one of determining the degree of usage of the various channels, given the acquisition and retention budget constraint. Contact channels such as personal selling, tele-sales, direct mail, email, etc, can be

classified as being more or less interpersonal. Personal selling, which is at one extreme of the communication continuum, is dyadic in nature, offers the ability for message customization, enables rich interaction and allows for personal relationship building (Moriarty and Spekman 1984; Stewart and Kamins 2002). Another notable aspect of personal selling, which relates to its high level of interpersonal interaction, is the explicit physical nature of the communication. This is in contrast to a telephone interaction, which can be very interpersonal like the sales call but it lacks the face-to-face interaction. On the other extreme of the communication continuum, instruments such as email or direct mail are unidirectional, limited in content, and non-personal. In between these extremes one can locate other communication modes such as Internet, telephone, and mail interactions. Because firms can gain greater understanding of customer needs and/or preferences and respond to those predilections if the communications are two-way, it follows that more interpersonal contact channels are likely to be more effective than less interpersonal contact channels.

Based on the relative effectiveness of the different contact channels, we suggest that contacts via more interpersonal channels have a greater positive impact on customer acquisition (Moriarty and Spekman 1984; Mohr and Nevin 1990). Similarly, we hypothesize that a use of more interpersonal contact channels is associated with greater customer retention as compared to less interpersonal contact channels. This assertion is derived from prior research which asserts that if the buying environment can be described as a high involvement decision-making (such as a b-to-b purchase), a more involving and interpersonal contact channel such as a personal sales call will have on average a much higher conversion rate than a less involving contact channel such as email or telesales (Anderson and Narus 1999, p. 302). Given that, the ability to easily customize the message and to build personal bonds with customers that will lead eventually lead to greater retention through personal selling – especially in B-to-B settings. It has been found that buyers and sellers who have strong personal relationships are more committed to maintaining their relationships than are less socially bonded partners (Mummalaeni and Wilson 1991).

With respect to customer profitability, we do not advance a specific hypothesis. This is because the efficacy of contact channels vis-à-vis customer profitability is much more unclear when compared to the effect on acquisition or retention. In addition, there is little theory that may guide our explanation of effects so that we therefore test this effect empirically.

H3a: Highly interpersonal contact channels have a greater association with the likelihood of customer acquisition than less interpersonal personal contact channels.

H3b: Highly interpersonal contact channels have a greater association with relationship duration than less interpersonal personal contact channels.

H4: Contact Mix Interactions

At the most simple level, different contact channels may be seen as having independent effects on the respective dependent variables, acquisition, duration, and customer profitability. This approach would be reflected in a pure main effects model. However a potential interaction effect between channels is likely to exist. The topic of investigating interaction effects between different promotional vehicles is complex and rarely addressed by researchers (Sethuraman and Tellis 1991). According to Farris (2003), there is a need to develop allocation models that reflect media synergies and interactions. For example, Jagpal (1981) studied radio and print advertising for a commercial bank and was the first to present empirical evidence of synergy in multimedia advertising. Berger and Nasr-Bechwati (2001) account for the possibility of media interaction effects in their deterministic model of customer equity. More recently, Naik and Raman (2003) find empirical evidence for the existence of synergistic effects between TV and print media. Overall, while conceptually appealing, there is surprisingly little empirical research into this effect. In addition, so far research has looked at the impact of sales but there is no empirical evidence for media interaction effects on customer lifetime and profitability.

Interaction effects between contact channels may be either positive or negative and they may be smaller or larger than the main effects. For example, one could argue that contacting a prospect via telesales and via direct mail at the same time may have a stronger effect than the sum of the separate effects administered at different points in time. This is due to the mutual reinforcement of the message delivered through the different contact channels at the same time.

While we do not speculate about the size of the contact channel interaction effects, we hypothesize that they will have a positive synergistic effect on the respective dependent variables, acquisition likelihood, relationship duration, and customer profitability.

H4a: When contact channels are applied at the same time (interaction), they exhibit positive synergy on acquisition likelihood.

H4b: When contact channels are applied at the same time (interaction), they exhibit positive synergy on relationship duration.

H4c: When contact channels are applied at the same time (interaction), they exhibit positive synergy on customer profitability.

Customer Initiated Contacts

At the acquisition stage, customer-initiated contacts are most likely inquiries about products, prices, product applications, etc. It can be argued that the *expected* utility of the first transaction or of a longer relationship drives the amount of customer-initiated contacts. This is in line with Oliver and Winer (1987) who state that customers who enter into commercial relationships seek to maximize their expected utility from the entirety of the exchange. Likewise, from an equity theory perspective (Adams 1965), customers who have more at stake (because they are more likely to buy) are more likely to invest into customer-initiated contacts.

At the retention stage, not only firms but also customers commit and allocate resources to the relationships. As already mentioned, this commitment expresses itself, amongst other indicators, through more frequent communication. There is ample evidence that frequency of communication is positively associated with a partner's commitment (Anderson and Narus 1990; Morgan and Hunt 1994). More specifically, Bowman and Narayandas (2001) find that customers who initiate contact with manufacturers are highly loyal. Similar to the acquisition stage, one would expect that the expected utility derived from the relationship will drive customer-initiated investments. Thus, as the expected utility increases so will the investment in the relationship (in the form of customer initiated contacts) as well as the relationship duration.

Finally, from a utility perspective, customers that have greater expected benefits and utility from an ongoing relationship are more likely to commit to it. Customer-initiated contacts are one

way of signaling this commitment. This argument is consistent with the relationship commitment literature and the social exchange literature. As a caveat, one must be careful to not equate commitment (or retention) with customer profitability (Reinartz and Kumar 2000). Albeit Reinartz and Kumar indicate that the link between these two constructs is not as strong as one might expect, they nevertheless find a positive and significant correlation. Finally, from a communications perspective, Mohr and Nevin (1990) suggest that relational exchange settings (as opposed to transactional settings) are associated more with bidirectional information flow (as opposed to unidirectional). In combination with work that has indicated an association of relational exchange with greater overall performance (Kalwani and Narayandas 1995), we believe that customer-initiated contacts and customer profitability are positively related. In other words,

H5a: The amount of customer's "customer-initiated contacts" is positively correlated with the customer's likelihood of acquisition.

H5b: The amount of customer's "customer-initiated contacts" is positively correlated with the customer's relationship duration.

H5c: The amount of customer's "customer-initiated contacts" is positively correlated with the customer's profitability.

A summary of the hypothesized effects is provided in Table 1.

[Table 1 about here]

Data

Data for the study comes from a large multinational computer hardware (servers, workstations and PCs) and software manufacturer (integration and application). The company's database includes firms who function in b-to-b and b-to-c markets. The product categories in the database represent different spectrums among high technology products. Even though these products are durable goods, they require constant maintenance, and frequent upgrades; this provides the variance required in modeling the customer response. The choice of vendors for these products is normally made after much deliberation in the buyer firm. For these product categories, it is the choice of the buyer and seller to develop their relationships and there are significant benefits to maintaining a longstanding relationship for both buyers and sellers.

The data used in the study covers a four-year period from the beginning of 1998 to the end of 2001. For our analyses we use two cohorts of customers – Cohort 1 and Cohort 2. Customers were assigned to the Cohort 1 (Cohort 2) if their first purchase with the manufacturer was made in the first quarter of 1998 (second quarter of 1998). For Cohort 1, a total of 12,024 prospects were contacted for potential acquisition and for Cohort 2, a total of 11,452 prospects were contacted for potential acquisition. Of the 12,024 contacted, 2,908 actually made at least one purchase in the first quarter of 1998. Similarly, of the 11,452 contacted, 2,817 customers made at least one purchase in the second quarter of 1998. The acquired customers are new to the company and have not been customers before. The average inter-purchase time for an individual customer (across purchases) in Cohort 1 ranged between 1.5 months and 21 months and for Cohort 2 it ranged between 1 month and 18 months.

In order to help the manager³ make a decision, he/she has under his/her disposal for each prospect before acquisition and for each customer after acquisition the following: date of each purchase, number of proactive manufacturer initiated marketing campaigns until that date, type of campaign (face-to-face, telephone, and email), and the number of customer initiated contacts with the supplier firm (through the web). From this information the variables FACE TO FACE, TELEPHONE, EMAIL, and WEB were constructed to measure the number of contacts that the firm had with the customer via the specific contact mode. In the acquisition equation these variables represent the total number of pre-acquisition contacts in each channel up to the first purchase. In the duration equation these variables measure only the total number of contacts in each channel following the first purchase. In the profitability equation these variables are operationalized as every contact (pre and post acquisition) that the customer had with the firm. If any two modes of contact with a customer or a prospect occurred in a given month, then an interaction term between those two contacts was formulated. Specifically, the interaction terms are operationalized as the number of times any two communication modes occurred in the same month.

³ The manager here refers to the manager at the firm who supplied the data.

This helps us to assess whether the use of two⁴ different contact modes (e.g. telephone and email) in a given period provides added effectiveness.

Additional decision variables under the firm's control were the amount of acquisition dollars spent for each prospect (ACQUISITION DOLLARS), and the amount of retention dollars spent for each customer (RETENTION DOLLARS). These dollar expenditures are allocated solely to the four different communication channels. Thus, the expenditure amounts cannot change without making adjustments to the allocation of effort to the communication channels.

In addition to linear terms for the expenditures, we also include quadratic terms for acquisition dollars (ACQUISITION DOLLARS²) and for retention dollars (RETENTION DOLLARS²). These quadratic terms do not necessarily *impose* a curvature but will help uncover non-linear effects (such as diminishing marginal effects) of the relationship between the expenditure and the dependent variables.

Customer profitability (PROFIT) is calculated by subtracting direct (product-related) cost, total retention costs, and acquisition cost from the total revenues the customer has generated for the firm during the observation period.

Control Variables

We introduce a number of covariates to control for exchange and for customer characteristics. Since these variables are introduced for control purposes, we do not develop specific hypotheses. Exchange characteristics that may have important bearings on the different dependent variables are the linear effect of resource allocation, the degree of cross-buying (e.g., Verhoef, Franses and Hoekstra 2001; Verhoef, Franses and Hoekstra 2002), the frequency of transactions (e.g., Reinartz and Kumar 2003), a customer's share-of-wallet with the focal firm (e.g., Verhoef 2003, Venkatesan and Kumar 2003), and the relationship duration (Bolton 1998, Bolton and Lemon 1999, Reinartz and Kumar 2000).

⁴ In these data, there are no incidences of more than two contact modes used in the same month.

One of our hypotheses (H1) revolves around the diminishing marginal impact of resource allocations on acquisition likelihood, duration and profitability. The hypothesis is tested via a quadratic specification. The associated linear effects are introduced for control purposes.

Cross-buying, which is an indicator of stronger relationships (Kamakura et al. 2003), is assumed to have a potential impact on both relationship duration and customer profitability. A variable called CROSS BUY is operationalized as the number of different categories that the customer buys from.

Frequency of transactions is also sign of the quality of a relationship (Anderson and Weitz 1992; Kalwani and Narayandas 1995) and therefore believed to have an impact on both relationship duration and customer profitability. A variable called FREQUENCY is operationalized as the number of purchase occasions for each customer.

The firm's share-of-wallet with a particular customers captures the competitive aspect. As the customer allocates relatively more category purchases with a focal vendor, competitors have less access to the customer. Firms that own a greater share-of-wallet of their customers are at a strategic advantage over their competitors. A larger share-of-wallet allows (and requires) greater learning about customer requirements, it allows (and requires) more communication between the parties, and justifies greater relationship-specific investments (Anderson and Narus, 2003). Thus, a larger share-of-wallet is believed to have an impact on relationship duration and on customer profitability. A variable called SOW is operationalized as the percentage of the customer's IT budget that is spent with the focal firm.

Finally, we introduce the length of the relationship as a covariate for modeling customer profitability. The expectation with respect to relationship duration and customer profitability is that as the length of the customer tenure rises, it allows for more transactions (volume and frequency). If transactions are profitable, this should lead to overall greater relationship profitability. (Reinartz and Kumar 2000; Kamakura et al 2002).

In order to control for observed heterogeneity across customers, additional determinants are included in the specification. The three available variables include the following characteristics of

the potential targets: type of industry, annual revenues, and number of employees. A variable called INDUSTRY TYPE classifies customers as either business-to-business firms or business-to-consumer firms. Additionally, ANNUAL SALES REVENUE (\$ millions) and SIZE OF FIRM (number of employees) are used in this analysis.

Right Censoring

Given the non-contractual nature of the relationship, customers are subject to silent attrition. Since our model includes an estimate of the customers' relationship duration, we need to account for the possibility of right-censoring. This was established using Allenby, Leone, and Jen's (1999) approach. According to their approach, right-censoring occurs if the expected (predicted) interpurchase time exceeds the time since the last purchase at the right window. If that situation occurs then the relationship duration of that customer is assumed to be terminated at the last purchase. If the predicted interpurchase time has not exceeded the time elapsed since last purchase then the account is still alive at the right window and the duration is computed as right-censored with a length of 48 months (i.e. observation window).

Descriptive statistics regarding each cohort is provided in Table 2. The unique strength of the dataset lies in the availability of individual level marketing mix contacts/communications, costs associated with the channel contacts, and profile data. This allows us to use individual level models and derive optimal marketing guidelines for each individual customer or at the segment level.

[Insert Table 2 About Here]

Research Methodology

Statistical Model

In order to test our hypotheses, we use a system of equations known as a probit two-stage least squares model. The model is mathematically represented in equations (1-3).

$$(1) \quad z_i^* = \alpha'_s v_i + \mu_{is} \quad (\text{Acquisition equation})$$

$$z_i = 1 \quad \text{if } z_i^* > 0$$

$$z_i = 0 \quad \text{if } z_i^* \leq 0$$

$$(2) \quad \begin{aligned} y_{Di} &= \beta'_{Ds} x_{Di} + \varepsilon_{Dis} & \text{if } z_i = 1 \\ &= 0 & \text{otherwise} \end{aligned} \quad (\text{Duration equation})$$

$$(3) \quad \begin{aligned} y_{Li} &= \beta'_{Ls} x_{Li} + \gamma'_s y_{Di} + \varepsilon_{Lis} & \text{if } z_i = 1 \\ &= 0 & \text{otherwise} \end{aligned} \quad (\text{Cumulative profitability equation})$$

where:

z_i^* = a latent variable indicating customer i 's utility to engage in a relationship with the firm

z_i = an indicator variable showing whether the customer i is acquired ($z_i = 1$) or not ($z_i = 0$)

v_i = a vector of covariates impacting the acquisition of customer i

y_{Di} = the duration of customer i 's relationship with the firm

x_{Di} = a vector of covariates impacting the duration of customer i 's the relationship with the firm

y_{Li} = the cumulative profitability of customer i

x_{Li} = a vector of covariates impacting customer i 's lifetime value

$\alpha_s, \beta_{Ls}, \beta_{Ds}$ are segment specific parameters

Specifically, this is a recursive simultaneous equation model in which a probit model determines the selection or acquisition process and two distinct regression equations (in this context these will be censored regressions) characterize duration and long-term customer profitability. Logically, the duration and customer profitability are observed only if the customer is acquired. Thus, the duration and profitability equations are conditional regressions determined partly by the acquisition likelihood of a customer⁵.

The linkages between the three equations in a probit-two stage least squares model are captured in the error structure of the model. Specifically, this model assumes that the error terms

⁵ Although on first sight, equation 3 does not seem to part of the system of equations, a selectivity correction term will be specified for the estimation of equation 1 and 2 in order to correct for selection bias due to non-acquired prospects. Thereby, equation 3 will become part of the system.

$(\varepsilon_{Lis}, \varepsilon_{Dis}, \mu_{is})$ are multivariate normal with mean vector zero and the covariance matrix which is specified in (4) (Roberts, Maddala and Enholm 1978 ,Lee, Maddala, and Trost, 1980)

$$(4) \quad \Sigma = \begin{pmatrix} \Sigma_{LL} & \Sigma_{LD} & \Sigma_{L\mu} \\ & \Sigma_{DD} & \Sigma_{D\mu} \\ & & 1 \end{pmatrix}$$

Because of the recursive structure of the system of equations (equations (1)-(3)) this model can be estimated in stages (Roberts, Maddala, and Enholm 1978). Amemiya (1974) and Heckman (1976) have established precedence for multi-stage estimation methods for these types of models. The first step is simply estimating the probit model on all of the data (i.e., acquired and non-acquired prospects). Using the estimated parameters from the probit, a selectivity variable, *lambda* (λ_{is}), is constructed for the acquired customers and is included as an independent variable in the duration and cumulative profitability equations. Mathematically, the selectivity variable is an artifact of the correlation between the error term in the acquisition equation, equation (3), and each of the errors in the conditional regression equations, (1) and (2). Given this correlation, unbiased parameter estimates are obtainable only by taking conditional expectations of the error terms. The result of this process is the specific functional form of the selectivity variable represented in equation (5)

$$(5) \quad \hat{\lambda}_{is} = \frac{\phi(\hat{\alpha}_s v_i)}{\Phi(\hat{\alpha}_s v_i)}$$

Equation (5) is referred to as the inverse mills ratio where $\phi(\cdot)$ is the standard normal density function and $\Phi(\cdot)$ is the cumulative standard normal function. This ratio is a monotonically decreasing function of the probability that a customer is acquired or selected into the sample (Heckman 1979; Roberts, Maddala, and Enholm 1978). While this method for estimation and bias correction in selection models has its basis in econometrics (Heckman 1970), similar bias correction approaches have also been applied in marketing contexts (Winer 1983; Krishnamurthi and Raj 1988).

Step two of the process is to estimate the duration model with regressors including the estimated lambda in equation (5) and the relevant covariates that impact duration. Estimation in step two distinguishes between the non-censored and the right-censored observations. It is performed using a standard right-censored Tobit model. Using the estimated parameters and the data on the acquired sample, a forecast is made about the expected relationship duration for each individual. This forecast is used as a covariate in step three.

In step three, customer profitability is estimated with regressors such as a vector of exogenous variables that impact the long-term profitability of a customer, the forecasted relationship duration from step two, and the estimated lambda from equation (5). The cumulative profitability model specified in equation (1) is also estimated using a standard right-censored Tobit model.

Covariance Correction

Although it is computationally simpler to estimate it in stages, proper inference requires that the standard errors of the estimates account for the additional sources of variance introduced by using estimated parameters in steps two and three. Lee, Maddala, and Trost (1980) provide a detailed account of the correct variance-covariance matrix for the parameters of this model. Consistent with their research, we correct the covariances of our estimates to obtain consistent parameter estimates.

Unobserved Heterogeneity

In addition to right censoring, our system of simultaneous equations also accounts for unobserved heterogeneity amongst the customers. In this research, we apply a latent class segmentation approach (Kamakura and Russell, 1989) to account for unobserved heterogeneity at the segment level. Naturally, unobserved heterogeneity can have a distinct influence at each stage in the customer relationship. Stated differently, there can be a different number of segments for the selection/acquisition process and a different number that best characterizes the duration, and/or customer value models. By estimating the model in steps, our model allows for this flexibility.

Consequently, we can choose the appropriate heterogeneity specification for each step in the model.

Discussion of Results

Model Selection

Consistent with the latent class segmentation approach we estimated the model assuming a fixed number of segments. Based on changes in model fit statistics (e.g., AIC, BIC) we either increased the number of segments or made a determination of the appropriate model specification. Beginning with the probability of acquisition we determined that 1 segment best characterized the data for Cohort 1 (AIC is .502 for 1 segment and .508 for 2 segments) and 1 segment best characterizes Cohort 2 (AIC is .501 for 1 segment and .510 for 2 segments). Recall that customers in Cohorts 1 and 2 differ by the time in which the customer's first purchase is made. Thus, one can argue that the acquisition strategy and tactics employed by the firm at different time periods attracted customers with similar preferences, needs, and response profiles. This fact along with the additional sources of variance in the acquisition likelihood that are captured by the firmographic variables can explain why there is negligible unobserved heterogeneity within each cohort. Table 3 shows the likelihoods and the AIC statistics for 1 and 2 segments.

[Insert Table 3 about here]

After assessing the level of unobserved heterogeneity in the pre-selected sample, we estimated the duration model followed by the cumulative profitability model. At each phase of the estimation we considered the possibility that there could be multiple segments in the population. However, the statistics shown in Table 3 indicate that there is very little unobserved heterogeneity in the data for either cohort. This outcome further supports our assertion that the response profiles are likely to be similar for customers who purchase around the same time. The results from the model estimation are reported in Table 4 (standardized parameter estimates).

[Insert Table 4 about here]

Impact of Acquisition Expenditures (H1)

Consistent with H1a, acquisition expenditures have diminishing marginal associations with the likelihood of customer acquisition (Coh. 1: $\beta = -.012$; $p < .1$; Coh. 2: $\beta = -.014$; $p < .1$). Likewise, for H1b, we find that acquisition expenditures have diminishing marginal associations with customer profitability (Coh. 1: $\beta = -.219$; $p < .05$; Coh. 2: $\beta = -.249$; $p < .05$). This finding empirically verifies the proposition of Blattberg and Deighton (1996) which asserted that there are decreasing returns to acquisition expenditures. Thus, there is an optimal acquisition expenditure level that results in an optimal acquisition rate.

Impact of Retention Expenditures (H2)

In hypothesis H2a, we suggested that retention expenditures have diminishing marginal associations with the likelihood of customer retention (Coh. 1: $\beta = -.101$; $p < .1$; Coh. 2: $\beta = -.106$; $p < .1$), which is confirmed in this data context. Likewise, for H2b, we find that retention expenditures have diminishing marginal associations with customer profitability (Coh. 1: $\beta = -.203$; $p < .05$; Coh. 2: $\beta = -.226$; $p < .05$). Thus similar to H1, we find empirical evidence for decreasing returns to retention expenditures with respect to customer duration and profitability – something that has not been shown so far empirically. Stated differently, there is an optimum for retention spendings. To compare the relative effectiveness of acquisition vs. retention expenditures it is not sufficient to look only at the parameter estimates or the marginal effects of these variables. The reason is that *the way the expenditures are allocated across the communication channels will impact the effectiveness of the expenditures*. We will therefore make this assessment in the next section of the paper by considering simultaneously, *how much* is allocated and *how* the expenditures are allocated.

Firm-Initiated Contacts (H3)

Our model yields very consistent results of the association between the number of contacts through the different contact channels and the three dependent variables acquisition, duration, and profitability. For the acquisition stage (H3a), our model indicates that face-to-face interactions have the largest impact (Coh. 1: $\beta = .452$; Coh. 2: $\beta = .431$) followed by telephone (Coh. 1: $\beta = .298$; Coh.

2: $\beta = .287$) and then email contacts (Coh. 1: $\beta = .271$; Coh. 2: $\beta = .256$). Thus, the number of contacts through each of these channels is positively associated with acquisition likelihood, thereby supporting H3a.

When addressing the question of which mode of contact is most effective for increasing relationship duration, our results remain unchanged relative to the acquisition model. Our model indicates that face-to-face interactions have the largest impact (Coh. 1: $\beta = .381$; Coh. 2: $\beta = .357$) followed by telephone (Coh. 1: $\beta = .328$; Coh. 2: $\beta = .333$) and then email contacts (Coh. 1: $\beta = .152$; Coh. 2: $\beta = .116$). This outcome supports H3b.

Finally, with respect to customer profitability, we proposed an empirical test. From that we find that the most interpersonal contact mode (i.e., face to face) is the strongest driver (Coh. 1: $\beta = .396$; Coh. 2: $\beta = .372$) of customer profitability followed by telephone (Coh. 1: $\beta = .356$ Coh. 2: $\beta = .361$) and then email contacts (Coh. 1: $\beta = .255$; Coh. 2: $\beta = .249$). Thus, the effects are similar to acquisition and duration.

Thus, there is a consistent trend across cohorts that contacts through more personalized contact channels have a stronger association with the three dependent variables in comparison to less personal contact channels. However, this finding concerns only the *number of contacts* through the respective channel. It is also important to note that these modes of contact are distinctive in terms of their costs. The cost aspect is captured through the acquisition and retention spendings which is included in the model.

Contact Mix Interactions (H4)

Contact channel interactions exist when a customer is contacted in the same time period through two different contact channels. In H4a, we hypothesized a positive synergistic effect of contact channels with respect to acquisition likelihood. We find evidence for this for telephone x email (Coh. 1: $\beta = .086$; Coh. 2: $\beta = .072$) and for face-to-face x email (Coh. 1: $\beta = .052$; Coh. 2: $\beta = .049$). Similarly, for H4b, telephone x email (Coh. 1: $\beta = .093$; Coh. 2: $\beta = .077$) and face-to-face x email (Coh. 1: $\beta = .077$; Coh. 2: $\beta = .071$) exhibit positive synergy on relationship duration. Finally,

for H4c, the interactions for telephone x email (Coh. 1: $\beta = .063$; Coh. 2: $\beta = .061$) and face-to-face x email (Coh. 1: $\beta = .057$; Coh. 2: $\beta = .052$) are positive for customer profitability. The interaction face-to-face x telephone was not significant in any of the three cases. Thus, we are able to demonstrate some support for H4 that there is positive synergy between contact channels.

Customer-Initiated Contacts (H5)

We hypothesized that the amount of customer-initiated contacts is positively correlated with customer acquisition, lifetime duration, and profitability. This hypothesis is supported for all three dependent variables: acquisition likelihood (Coh. 1: $\beta = .0376$; Coh. 2: $\beta = .0352$), lifetime duration (Coh. 1: $\beta = .0386$; Coh. 2: $\beta = .0369$), and customer profitability (Coh. 1: $\beta = .0301$; Coh. 2: $\beta = .274$). In the data rarely was a customer-initiated contact observed in the same month as any of the firm-initiated contacts. Consistent with this, we found that none of these interaction terms were significant and the model fit statistics (e.g., AIC) did not warrant their inclusion in the model.

Control variables

The control variables that were introduced in the model are for the most part significant at $p < 0.5$ and they show no counterintuitive signs. A key aspect of our selection model approach is the ability to assess the impact of the acquisition stage on later stages – duration and profitability.

Consistent with prior research (Thomas 2001) these data reveal that duration of a relationship is correlated with the likelihood of acquiring a customer (Lambda = .299 in cohort1 and .275 in cohort 2). In addition, we find a marginally significant positive association of acquisition likelihood and profitability (Lambda = .096 in cohort1 and cohort 2). This is an important finding, because it says that a customer who is more likely to be acquired is also more likely to generate higher returns for the company. This underscores the importance of targeting the right prospects as opposed to all potential prospects. It also underscores the need to model these constructs in a simultaneous fashion – as is done here. Of the total variance explained across the three equations, the distribution of the relative weights, on the average, is approximately 24%,

27%, 23%, 5%, and 20% for the acquisition expenditure, retention expenditure, firm-initiated contacts, customer-initiated contacts and the control variables respectively.

Resource Allocation Optimization

Based on our analysis of the parameter estimates there are several key issues, which need to be explored further:

- (A) Given budget constraints, how does the profit maximizing strategy allocate resources between the contact modes that vary in degree of interpersonal interaction and costs?
- (B) Which is more critical for profitability- acquisition expenditures or retention expenditures?
- (C) Does the contact strategy that maximizes customer profitability also maximize acquisition or retention rates?

To explore these issues more concretely, we performed several simulations based on the parameter estimates and the equations for acquisition, duration, and customer profitability (i.e., equations (1)-(3)).

(A) The Profit Maximizing Resource Allocation Strategy

Maximizing customer profitability over the duration of the customer-firm relationship is the goal of this simulation. In scenario one (see Table 5), we determined the levels of acquisition expenditures, retention expenditures, the number of contacts in each channel, and the degree to which the channels should be used at the same time to maximize cumulative profits. Based on our model, an intermediate step in this profit maximization is the estimation of 1) the λ parameter given the expenditure and contact levels and 2) an estimate of the relationship duration given the expenditure and contact levels. All other variables in the model (i.e., share of wallet, cross buying, frequency, and firmographics) are assumed to be at their mean.

To be consistent with the model variables, it is important when conducting this analysis (and all other scenarios) that the expenditures are directly linked to the number and type of contacts. Thus, in each simulation the total expenditure (acquisition plus retention) equals the total cost of contacting the customer via the various modes of communication. This is a necessary

condition that still allows the allocation across channels to be different for the same level of expenditure.

As a comparison to scenario one we simulated a second scenario, scenario two, in which customer profitability is also maximized but only the number of contacts in each channel and the degree of simultaneous usage are allowed to vary. In scenario two the expenditures and all of the other variables are fixed at their means. The results for these two scenarios are presented in Table 5.

[Insert Table 5 about here]

Scenario one shows that the profit maximizing strategy for the firm is to invest 78.9% of its budget on retention and 21.1% on acquisition. This allocation is slightly different from the firm's current mean allocation of 74.8% on retention and 25.2% towards acquisition (Scenario two). However the dramatic difference between the profit maximizing solution (Scenario one) and the mean level of spending (Scenario two) is in the amount spent. Specifically, the analysis shows that assuming an optimal allocation of contacts across channels in both scenarios, a 68.31% *decrease* in spending from the mean level will *increase* the cumulative profitability of a customer by 41.52%. Thus, currently the firm is overspending on its customers. This overspending is apparently increasing the customer acquisition rate (0.2234 in scenario one vs 0.2579 in scenario two) and is increasing the expected relationship duration (1490 days in scenario one vs 1514 days in scenario two). However the long-term profitability of a customer is declining. This suggests that overspending can result in inefficient resource allocation and more importantly a negative return on investment. A more detailed discussion on return on investment is detailed later. From a measurement perspective this result supports the claim that firms should not simply use a single measure to assess their performance. Measuring acquisition rates, retention rates, and long-term profitability are all important for understanding customer behavior and accurately identifying potential problems in the firm's customer management practice.

In terms of the effort allocation and number of contacts, the profit maximizing solution (Scenario one) suggests that the dominant form of communication should be email

communications. Specifically email should comprise 80.4% of the total communication effort. Telephone communications is a distant second and should receive 11.0% of the total effort allocation. From the parameter estimates alone this may appear erroneous because email communications are the least effective in terms of all three dimensions of the relationship (acquisition, duration, and profitability). One rational for this effect could be that budget constraints are a reality for almost all firms and factor into the simulation but are not taken into account when the parameters are determined from estimation. In the simulation, we allow expenditures and /or number of contacts to vary within the range of the data that was used to estimate the model. Under budget constraints and these conditions, *cost effectiveness* not just efficiency must be a consideration and compared across alternatives.

Given the cost-effectiveness considerations of the email communication channel, an obvious question that arises is, “To what extent should email be used in conjunction with other modes of communication?” This question is addressed in our analysis through the “interaction” terms. Specifically, the “interaction” terms measure the number of times that any two communication modes should occur in the same month. It is important to note that they do not represent an increase to the total number of communication contacts. Thus in the optimal scenario we find that when telephone communications are used an email should accompany it during that same period on 1.6 occasions. Said differently, this means that 37% of the telephone contacts should be accompanied with an email. We regard to face to face communications the optimal scenario is to accompany the face to face interaction with an email interaction in the same period 67% of the time that a face to face interaction occurs.

While the firm cannot directly control the degree of customer-initiated contacts, the simulation suggests that 7.1% of the firm’s resources should be directed towards communicating with customers via the web channel. In practice this can be achieved by making basic product, usage, and pricing information available through the web for first time users and experienced users and or making ordering available via the web for more experienced repeat buyers.

As a contrast to the profit maximizing effort and expenditure allocation (Scenario one) we also examine the profit maximizing communication strategy given the mean level of expenditures (Scenario two). At the mean level of expenditure, which is a higher level of expenditure, the profit maximizing contact strategy is to increase the total number of contact by nearly 61% (from 39.68 to 63.37). The distribution of those contacts is split more evenly with 50.3% directed towards email communications and 43.9% directed towards telephone communications. Compared to the email and telephone channels the emphasis on Web and face-to-face channels is minimal.

Thus, comparing the differences in budget and channel emphasis across scenarios one and two, the conclusion is that overspending tends to lead to greater investments in more costly and interpersonal communications which do not pay out in terms of customer profitability. This is a key practical insight that firms can use when faced with the need for cutbacks on expenditures.

(B) Which is more critical: Acquisition Expenditures or Retention Expenditures?

The goal of this analysis is to demonstrate the impact of not optimizing acquisition expenditures versus not optimizing retention expenditures. To demonstrate this impact, we focus on how our key variable of interest, customer profitability, is affected. Profits are predicted using unstandardized estimates and the model represented by equations 1-3. As in part (A) of the simulation, prior to predicting profits the lambda and relationship duration are estimated and used in the profit prediction and all other necessary but non-relevant variables are fixed at their means.

To mimic the current economic environment in which firms are reevaluating their budgets, in this part of the investigation we allow the expenditure change to be either 10% or 25% and driven by a change in either the acquisition and/or the retention budgets. In Table 6⁶, we show how the per customer profitability changes at different expenditure levels and for reference Table 7 reports the total expenditure change as acquisition and retention expenditures deviate from their optimal levels. When interpreting Table 7 it is important to recall (see Table 5) that acquisition and retention expenditures represent different proportions of the total budget. Thus a 10% deviation in

⁶ In Tables 6 and 7 all dollar amounts are rounded to the nearest whole number and all percentages are rounded to two decimal points.

the acquisition budget (which is a significantly smaller portion of the total budget), from its optimal level only represents a 2.11% deviation from the optimal total budget.

The profit projection in Table 6 show that the percent changes in profit are small, particularly at the level of a 10% change to the total budget. Thus suggest that there may be a flat maximum. That is, relatively substantial deviations from optimal expenditures are associated with relatively modest changes in the dependent variable. However despite the modest changes in the profits for a single customer, on an absolute basis and for multiple customers, the loss in profitability is significant. For example the smallest difference is seen when the acquisition budget is .90 of optimal and the retention budget is optimal⁷. At this expenditure level a firm with a portfolio of 200,000 customers⁸ will save approximately 2.69 million dollars due to reduced marketing expenditures but will lose approximately 39.3 million in long term customer profitability due to sub optimal budget allocations. These figures only become more magnified as the budgets deviate further from the optimal level.

[Insert Tables 6 and 7 about here]

Probing further reveals several important insights regarding return on investment when the budgets deviate from the optimal level. To compute the return of investment (ROI) we use the approach described in Rust, Lemon and Zeithaml (2004), which focuses on the size of the investment and the change in customer equity that is a result of the investment. In this context, we measure the change in customer equity as the deviation in the long-term profitability from the optimal level. Thus the change in customer equity and all of the resulting ROI calculations are negative. These exact numbers are reported in Table 8. The first insight from the ROI analysis is with regard to acquisition spending:

Acquisition Spending: Assuming retention spending is optimal and contacts are optimally allocated, the misallocation (i.e., deviation from the optimal acquisition expenditure) is

⁷ Due to rounding increasing and decreasing the acquisition budget by 10% appear to give the same result. However through our analysis we find that reducing the budget results in profits that are slightly lower than increasing the acquisition budget by the same amount. The absolute difference between the 10% increase versus a 10% decrease is \$0.42

asymmetric- under spending on acquisition is worse than over spending on acquisition by an equal amount. For example, over spending the optimal acquisition budget by 25% results in an ROI of -2.83 while under spending by 25% results in an ROI of -3.032. A similar insight can be drawn with regard to retention spending.

Retention Spending: Assuming acquisition spending is optimal and contacts are optimally allocated, overspending on retention is better than under spending on retention by the same amount. This is most significant at the 25% level. At this level under spending on retention results in an ROI of -55.286 while overspending by 25% results in an ROI of only -4.27.

[Insert Table 8 about here]

The results on the diagonal of Table 8 also provide insight about the acquisition retention trade-off. Specifically, the diagonals help to answer the question of, “When faced with the need to make a budget change, how should that change be made?” In most cases, firms consider this question not as an “either or” (e.g., either cut acquisition or cut retention spending) but rather as how much to pull from or add to each budget. The diagonals provide insight to this question.

Diagonal 1: Consider the case of increasing one expenditure amount while simultaneously decreasing another. In this instance, neither the acquisition nor the retention budgets are at their respective optimum. The effect of this can be seen by examining the highlighted Diagonal #1. At comparable absolute total budget changes (see Table 7 for budget changes) the results in Table 8 show that increasing acquisition expenditures while decreasing retention expenditures results in lower ROI’s than decreases to acquisition and increases to retention. This is an important outcome that is not obvious from the parameter estimates. The reason is because the ROI metric that is used in this analysis taps deeper into a firm’s performance than just profitability. Here the ROI measure focuses on the *incremental* change in customer value and compares the size of that change for different levels of investment. Thus consistent with our prior assertion, multiple metrics are useful when assessing firm performance.

Diagonal 2: The highlighted Diagonal #2 provides insight about the impact of jointly increasing or decreasing the acquisition and retention budgets. At comparable absolute

⁸ 200,000 is representative of the size of this firm’s customer base.

changes in the total budget the results indicate that under spending decreases the ROI more than overspending. This effect becomes significantly more magnified the greater the deviation is from the optimal expenditure levels. This result has important implications for customer portfolio management. Specifically, it suggests that firms must invest sufficiently to acquire and maintain relationships. Although the investment in the customer may become less efficient past the optimal expenditure level, the decreased efficiency does not outweigh the lost value that the firm would incur if the customer's potential was not fully realized.

(C) Does the Optimal Contact Strategy Maximize Customer Profits, Acquisition Likelihood, and Relationship Duration?

Intuitively, one might assume that an optimal strategy should maximize the customer's profitability, the acquisition likelihood, and the relationship duration. However, the relative magnitude of the parameter estimates across the three equations suggests that this may not be the case. To investigate this proposition, we vary the number of contacts and the "interaction" level between the contacts while fixing all of the other variables (including expenditures) at their means. Then, we used the estimates from each equation of the model to determine the number and distribution of contacts that would either maximize customer profitability (Scenario two), the probability of acquisition (Scenario three), or the length of the customer-firm relationship (Scenario four). Table 5 shows this comparison.

Key items to note in Table 5 are that the contact strategy, which maximizes customer profitability, results in a 0.2579 probability of acquisition, and relationship duration of 1514 days. In contrast, the contact strategy that maximizes the acquisition likelihood results in a probability of acquisition of 0.2996. The contact strategy that maximizes relationship duration results in duration of 1587 days. Thus, the profit maximizing contact strategy neither maximizes acquisition likelihood nor relationship duration. It is important to note that the communication budget is fixed in this scenario and that it is therefore appropriate to talk in terms of maximization and not in terms of optimization. The maximization of acquisition and retention rates results from various channel usage scenarios, given the budget restriction.

A reason for this outcome could be that when profits are the objective, cost-benefit tradeoffs are considered and reflected in the relative magnitude of the parameters. However, when either acquisition or retention rates are the objective, the costs of the contact method are not a consideration but only the effectiveness of the mode of contact. In other words, the profit equation parameters reflect the cost-effectiveness of each contact mode while the acquisition and duration equation parameters reflect the effectiveness of each contact mode only. This leads to a difference in the relative magnitude of the parameters when profit is the response objective versus when acquisition likelihood or relationship duration are the response objectives. Due to this difference, the optimal solution for acquisition or duration will not necessarily be the optimal solution for a profit objective.

Another interesting finding from this analysis is the strategy for allocating resources across the contact channels. Note that in scenarios three and four the total number of contacts are not being determined, only the acquisition or retention contacts. Thus, when using scenario two as a comparison for scenario three or four, it is important to look at the percent of either the acquisition or retention effort and not the percent of total effort.

Comparing scenario two (maximizing profits) and scenario three (maximizing acquisition rates) reveals a similar but reverse emphasis. In both scenarios, telephone and email are the dominant forms of communications. Specifically, the results suggest that over 93% of the acquisition effort should be directed to these two channels. However when cumulative profits are the objective, telephone is emphasized more than email and the reverse is true when acquisition is the objective. In contrast to the acquisition scenario, scenario two (maximizing profits) and scenario four (maximizing duration) suggest a similar optimal distribution of communications across the channels. Specifically, the relative ordering of retention communication effort across the channels is the same for cumulative profit maximization and duration maximization. In combination, scenarios two, three, and four suggest an important insight. Specifically they suggest that when the goal is more short term, like customer acquisition, interpersonal interactions are not

as critical. However with objectives which are managed over a longer time horizon (e.g., cumulative profitability) interpersonal interactions aid in the achievement of the objective.

In summary, this simulation addresses three general issues that a practicing manager may readily confront:

- If marketing budgets deviate from their optimal level, what is the impact on customer profitability? (Table 6)
- If managers are mandated to cut their budgets by say a fixed percentage, from which “bucket” should they make the cuts- acquisition, retention, or some from both? (Tables 6 and 7)
- Increasingly marketing managers are assessed based not only on their profits but also their return on investment. Thus, under the assumption of not optimally allocating the budget, this research demonstrates under which allocation scenario is the return on investment more attractive? (Table 8)

Conclusions

Implications

In this study of a 23,476 prospects and 5,725 customers of a single firm we investigated a number of drivers of customer profitability and derived some implications for resource allocations to customers and prospects. A key assertion, which is demonstrated from this analysis, is that both the amount of investment in a customer as well as how it is invested in a customer relates directly to the acquisition, retention and profitability of a customer. Expanding on this basic principle, we arrive at several substantive conclusions for our empirical setting:

Conclusions regarding ‘How Much to Invest’:

- Under spending is more detrimental and results in smaller ROI’s than over spending.
- When trading off between allocating expenditures to acquisition versus retention, a suboptimal allocation of retention expenditures will have a larger impact on long-term customer profitability than suboptimal acquisition expenditures.

- Consistent with prior research (Tull et al. 1986; Chintagunta 1993) there appears to be a “flat-maximum” with respect to acquisition and retention expenditures. Specifically, we find that a 10% deviation in either acquisition or retention expenditures from the respective optimal levels results in less than a 1% change in the long-term profitability of a customer.

Conclusions regarding ‘How to Invest’:

- If the firm initiates the contact, the relative effectiveness of highly interpersonal and interactive communication channels is greater than the less interpersonal and interactive communication channels. However, this generalization does not hold for all response variables if the customer initiates the interaction.
- The customer communication strategy that maximizes long-term customer profitability neither maximizes the acquisition rate nor the relationship duration. Instead, developing a communication strategy to manage long-term customer profitability generally requires a long term and holistic perspective of the relationship. This perspective tends to give more emphasis to more interpersonal and interactive communications than a limited focus on acquisition.

Each of these conclusions can be used as a strategic advantage for a firm and have a potentially large impact on the cost and/or revenue aspect of customer profitability. Despite the fact that these findings are consistent across two distinct cohorts of consumers, we acknowledge that the generalizability of some of the results can only be achieved with further testing on multiple datasets⁹. However, one must acknowledge that many of these conclusions would not have been revealed if our model did not integrate acquisition, retention, and customer profitability into a single framework which accounts for the natural linkages and the endogeneity of these relationship dimensions -- a critical contribution of this research. Specifically, this research presents a decision framework for managing multiple dimensions of a customer-firm relationship, which is based on established statistical models and econometric methods.

⁹ The model presented in this research was also estimated on a dataset for a B-to-C firm who used similar customer contact modes. Albeit this new empirical context was not as rich, the effects that are of focal interest (decreasing returns to acquisition and retention, flat maximum, asymmetric response to acquisition and retention spending changes) was very consistent. These results are available upon request from the authors.

The domain of customer relationship management is increasing in popularity amongst researchers and practitioners. The thrust in interest in this area has led to investigations in multiple areas such as retention and satisfaction. Customer's increasing use of multiple channels of communication has also contributed to the increased interest in customer relationship management. A common objective in all of these investigations is the assessment of individual customer profitability. A key conclusion of this research is that firms can manage their customer base profitably, but it will require resource allocation decisions that involve trade-offs.

Limitations and Suggestions for Future Research

Despite the usefulness of this decision-modeling framework, we do realize that there are certain limitations. As we point out in our conceptual model (Figure 1), competitor's action may have an impact on the focal firm's customer behavior. In this research we account for the competition by including a customer's Share-of-Wallet with the focal firm due to the lack of more specific data on competition. We believe this should be a very fruitful avenue for future research, if such data become available.

A second caveat of this research is the ability to separate out marketing expenditures between customer acquisition versus customer retention. This is more straightforward in a B-to-B context but can become more complex in B-to-C settings and where mass communications are a major part of the marketing expenditure.

Finally, it would be interesting to investigate the relationships between the key constructs in other industries in order to arrive at empirical generalizations that are very much needed in this research domain. The key-limiting factor seems to be the availability of the appropriate data that enable these kinds of tests. However, this research has taken a first step in a more complete understanding of the drivers of customer profitability by using a database that tracks information from prior to acquisition to termination by customer or to the right censoring period.

Table 1: Summary of Hypothesized Effects

Hypothesis	Effect of	on	Customer acquisition	Relationship Duration	Customer Profitability
1	Acquisition expenditures ²		(-) H1a		(-) H1b
2	Retention expenditures ²			(-) H2a	(-) H2b
3	Degree of interpersonal interaction in contact channels		(+) H3a	(+) H3b	empirical test
4	Contact mix interactions		(+) H4a	(+) H4b	(+) H4c
5	Number of customer-initiated contacts		(+) H5a	(+) H5b	(+) H5c

Independent Variables	Table 2				ACQUIRED/SELECTED SAMPLE**			
	PRE ACQUISITION SAMPLE*							
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
	COHORT 1		COHORT 2		COHORT 1		COHORT 2	
Acquisition dollars per person	581	101	569	109	508	77	514	81
Acquisition Dollars ²	342118	10180	329046	11850	269496	5829	273148	6601
Retention dollars per person	n/a		n/a	n/a	1506	209	1491	202
Retention Dollars ²					2281741	43693	2241563	40831
<u>Contact Channel**</u>								
telephone	3.1	1.8	3	1.6	13.4	3.6	13.1	3.5
face to face	0.1	0.1	0.1	0.1	2.4	0.6	2.5	0.6
web	0.2	0.1	0.2	0.1	1.2	0.4	1.3	0.5
email	2.7	2.1	2.9	2	15.1	4.2	13.9	4.1
telephone * email	0.6	0.2	0.5	0.16	3.1	0.4	2.9	0.4
face to face * email	0.02	0.005	0.02	0.007	0.6	0.1	0.5	0.1
Cross-Buy					4.2	1.8	4.7	1.6
Frequency					8.8	3.1	8.6	3
Frequency ²					79.87	72.8	77.9	68.3
SOW					41.6	8.2	39.7	9.1
Lambda					.48-.71 range	0.2	.44-.68 range	0.191
<u>Firmographics</u>								
Industry Type (b to b)	56%	0.5	58%	0.49				
Annual Sales Revenue	40.2	39.6	71.2	40.8				
Size of Firm	212	96	223	101				
<u>Dependent Variables</u>								
Duration (days)					1380	141	1361	121
Predicted Duration (days)					1339	133	1302	129
LTV (\$)					356280	28712	374640	27219
% Right Censored					41		35	

*Note that the data reported in this column refers to the entire pool of acquired and non-acquired people prior to acquisition.

**Note that the data reported in this column refers to only the acquired people.

***In the preacquisition sample these figures only represent acquisition contacts.

In the acquired sample the numbers represent the total number of contacts throughout the customer-firm relationship.

TABLE 3
Model Selection Accounting For Unobserved Heterogeneity

PROBIT ACQUISITION MODEL		
	COHORT 1	COHORT 2
Sample Size	12024	11452
<u>1 Segment Solution</u>		
Log-Likelihood	-704.16	-691.22
AIC	0.502	0.501
<u>2 Segment Solution</u>		
Log Likelihood	-703.98	-691.01
AIC	0.508	0.510
TOBIT DURATION MODEL		
	COHORT 1	COHORT 2
Sample Size	2908	2817
<u>1 Segment Solution</u>		
Log-Likelihood	-73.21	-71.01
AIC	0.093	0.095
<u>2 Segment Solution</u>		
Log Likelihood	-73.13	-70.96
AIC	0.098	0.097
TOBIT LTV MODEL		
	COHORT 1	COHORT 2
Sample Size	2908	2817
<u>1 Segment Solution</u>		
Log-Likelihood	-55.11	-54.21
AIC	0.069	0.065
<u>2 Segment Solution</u>		
Log Likelihood	-55.05	-54.18
AIC	0.073	0.069

Table 4

Model Estimation Results									
Standardized Estimates									
Cohort 1		Cohort 2							
ACQUISITION EQUATION			TESTS OF SIGNIFICANCE				PROFITABILITY EQUATION		
Acquisition Dollars	0.559 **	0.539 **					Acquisition Dollars	0.581 **	0.560 **
Acquisition Dollars ²	-0.012 *	-0.014 *					Acquisition Dollars ²	-0.219 **	-0.249 **
<u>Contact Channel</u>							Retention Dollars	0.458 **	0.491 **
Firm-Initiated:							Retention Dollars ²	-0.203 **	-0.226 **
telephone	0.298 **	0.287 **	-				<u>Contact Channel</u>		
face to face	0.452 **	0.431 **	a	-			Firm-Initiated:		
email	0.271 **	0.256 *	a	b	-		telephone	0.356 **	0.361 **
telephone * email	0.086 *	0.072 **	a	b	c	-	face to face	0.396 **	0.372 **
face to face * email	0.052 *	0.049 **	a	b	c	-	email	0.255 **	0.249 *
Customer-Initiated:							telephone * email	0.063 *	0.061 **
web	0.376 **	0.352 **					face to face * email	0.057 *	0.052 **
<u>Firmographics</u>							Customer-Initiated:		
Industry Type	0.306 *	0.276 *					web	0.301 **	0.274 **
Annual Revenue	0.414 **	0.401 **					Frequency		
Size of Firm	0.370 **	0.346 **					Frequency ²	0.322 **	0.339 **
<u>DURATION EQUATION</u>							Estimated Duration	-0.074 *	-0.085 *
Retention Dollars	0.501 **	0.511 **					Cross-Buy	0.301 **	0.292 **
Retention Dollars ²	-0.101 *	-0.106 *					SOW	0.338 **	0.349 **
<u>Contact Channel</u>							Lambda	0.296 **	0.300 **
Firm-Initiated:									
telephone	0.328 **	0.333 **	-						
face to face	0.381 **	0.357 **	a	-					
email	0.152 **	0.116 *	a	b	-				
telephone * email	0.093 *	0.087 **	a	b	c	-			
face to face * email	0.077 *	0.071 **	a	b	c	-			
Customer-Initiated:									
web	0.386 **	0.369 **							
Frequency	0.417 **	0.399 **							
Frequency ²	-0.079 *	-0.091 *							
Cross-Buy	0.288 **	0.297 **							
SOW	0.335 **	0.303 **							
Lambda	0.299 **	0.275 **							

**: p < .05

*: p < .10

a - denotes that the coefficient is significantly different (at p < .05) from that of the telephone contact channel
b - denotes that the coefficient is significantly different (at p < .05) from that of the face to face contact channel
c - denotes that the coefficient is significantly different (at p < .05) from that of the email contact channel

TABLE 5*

Simulation Results										
SCENARIO 1			SCENARIO 2				SCENARIO 3		SCENARIO 4	
Maximize <u>Customer Profitability</u> by Objective: Optimizing Spending			Maximize <u>Customer Profitability</u> by Optimizing Total Contacts				Maximize <u>Acquisition Rate</u> by Optimizing Acquisition Contacts		Maximize <u>Relationship Duration</u> by Optimizing Retention Contacts	
Constraints:			spending fixed at means				spending fixed at means		spending fixed at means	
Acquisition Spending	\$134.55	21.1%	\$508.00	25.2%			\$508.00			
Retention Spending	\$503.77	78.9%	\$1,506.00	74.8%					\$1,506.00	
Total Spending	\$638.32		\$2,014.00							
Cumulative Profits	\$754,087.56		\$441,015.03							
% Change in Profitability from Optimal			-41.52%							
% Deviation in Budget from Optimal			215.51%							
Probability of Acquisition	0.2234		0.2579				0.2996			
Expected Relationship Duration	1490.51		1514.76						1587.55	
% Change In Relationship Duration									4.8%	
	Total Contacts	% of Total Effort	Total Contacts	% of Total Effort	% of Acquisition Effort	% of Retention Effort	Acquisition Contacts	% of Acquisition Effort	Retention Contacts	% of Retention Effort
Number of Contacts										
telephone	4.38	11.0%	27.80	43.9%	50.9%	42.1%	4.05	24.9%	21.37	41.5%
face to face	0.60	1.5%	0.87	1.4%	0.3%	1.6%	0.50	3.1%	1.54	3.0%
web	2.80	7.1%	2.80	4.4%	3.7%	4.6%	0.60	3.7%	2.33	4.5%
email	31.90	80.4%	31.90	50.3%	45.1%	51.6%	11.10	68.3%	26.20	50.9%
telephone*email	1.60		1.60				1.40		1.29	
face to face* email	0.40		0.40				0.04		0.39	
Total Contacts	39.68		63.37				16.25		51.44	

* All numbers are per customer

TABLE 6
LONG TERM CUSTOMER PROFIT PREDICTIONS AND PERCENT CHANGE FROM OPTIMAL PROFITS * **

		RETENTION EXPENDITURES					
ACQUISITION EXPENDITURES		.75 * Optimal	.9* Optimal	OPTIMAL	1.1 * Optimal	1.25* Optimal	
	.75 * Optimal	\$698,676 (-7.35%)	\$752,459 (-0.22%)	\$752,859 (-0.16%)	\$752,459 (-0.22%)	\$750,359 (-0.49%)	Diagonal 1
	.9* Optimal	\$727,163 (-3.57%)	\$753,491 (-0.08%)	\$753,891 (-0.03%)	\$753,491 (-0.08%)	\$751,392 (-0.36%)	
	OPTIMAL	\$726,273 (-3.69%)	\$753,688 (-0.05%)	\$754,088	\$753,688 (-0.05%)	\$751,588 (-0.33%)	
	1.1 * Optimal	\$736,623 (-2.32%)	\$753,491 (-0.08%)	\$753,891 (-0.03%)	\$753,491 (-0.08%)	\$751,391 (-0.36%)	
	1.25* Optimal	\$750,358 (-0.49%)	\$752,458 (-0.22%)	\$752,858 (-0.16%)	\$752,458 (-0.22%)	\$750,358 (-0.49%)	Diagonal 2

* Assumes a optimal communication allocation

** All number are per customer

TABLE 7
% CHANGE IN TOTAL BUDGET FROM OPTIMAL TOTAL BUDGET

		RETENTION EXPENDITURES					
ACQUISITION EXPENDITURES		.75 * Optimal	.9* Optimal	OPTIMAL	1.1 * Optimal	1.25* Optimal	
	.75 * Optimal	-25.00%	-13.16%	-5.27%	2.62%	14.46%	Diagonal 1
	.9* Optimal	-21.84%	-10.00%	-2.11%	5.78%	17.62%	
	OPTIMAL	-19.73%	-7.89%	0.00%	7.89%	19.73%	
	1.1 * Optimal	-17.62%	-5.78%	2.11%	10.00%	21.84%	
	1.25* Optimal	-14.46%	-2.62%	5.27%	13.16%	25.00%	Diagonal 2

TABLE 8
RETURN ON INVESTMENT *

		RETENTION EXPENDITURES					
ACQUISITION EXPENDITURES		.75 * Optimal	.9* Optimal	OPTIMAL	1.1 * Optimal	1.25* Optimal	
	.75 * Optimal	-116.74	-3.94	-3.03	-3.49	-6.10	Diagonal 1
	.9* Optimal	-54.97	-2.04	-1.31	-1.88	-4.59	
	OPTIMAL	-55.29	-1.68	n/a	-1.58	-4.27	
	1.1 * Optimal	-34.21	-1.99	-1.30	-1.85	-4.47	
	1.25* Optimal	-7.83	-3.62	-2.83	-3.26	-5.67	Diagonal 2

* Assumes a optimal communication allocation

Figure 1: Conceptualization of Relation of Customer Acquisition, Relationship Duration, and Customer Profitability

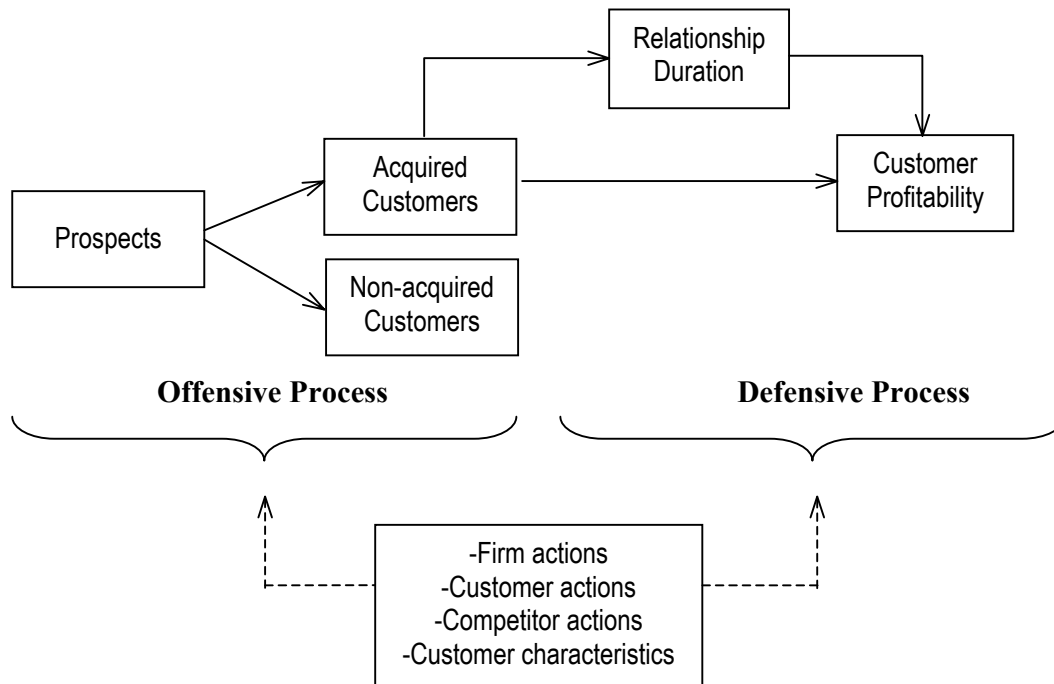
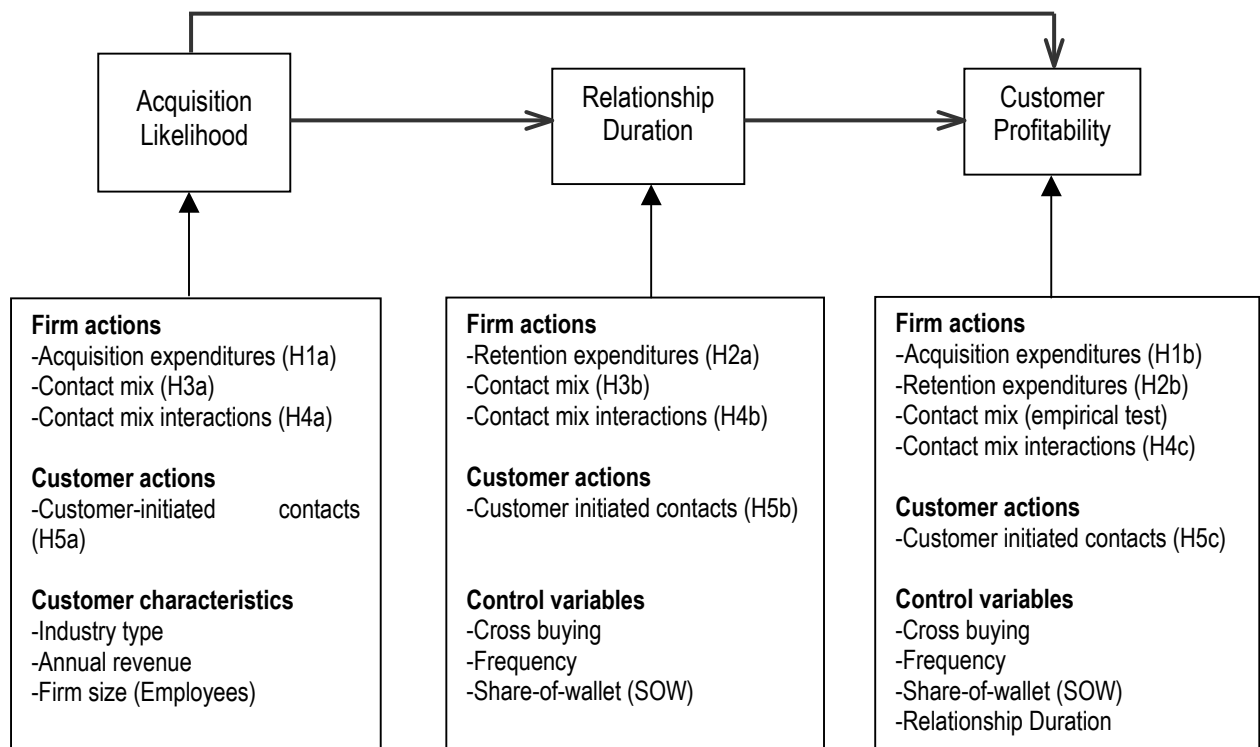


Figure 2: Determinants of Focal Constructs



REFERENCES

- Aaker, David (1975): "ADMOD: An Advertising Decision Model." *Journal of Marketing Research*. 8 (February), 37-45.
- Adams, J. Stacy (1965), "Inequity in Social Exchange" in *Advances in Experimental Social Psychology*, Vol. 2, Leonard Berkowitz ed. New York: Academic Press, 267-99.
- Allenby, Greg M., Robert P. Leone, and Lichung Jen (1999), "A Dynamic Model of Purchase Timing With Application to Direct Marketing," *Journal of American Statistical Association*, 94(June), 365-374.
- Amemiya, Takeshi, (1974), "Multivariate Regression and Simultaneous Equation Models When the Dependent Variables are Truncated Normal," *Econometrica*, 42, 999-1012.
- Anderson, Erin and Bart Weitz (1992), "The Use of Pledges to Build and Sustain Commitment in Distribution Channels," *Journal of Marketing Research*, 24 (February), 18-34.
- Anderson, James and James A. Narus (1990), "A Model of Distributor Firm and Manufacturer Firm Working Relationships," *Journal of Marketing*. 54, 42-58.
- _____ (1999), "*Business Market Management*" Prentice Hall, Upper Saddle River: New Jersey.
- _____ (2003), "Selectively Pursuing More of Your Customer's Business" *Sloan Management Review*, 44 (Spring), 42-49.
- Anderson, Eugene W. and Vikas Mittal (2000), "Strengthening the Satisfaction-Profit Chain," *Journal of Service Research*, 3, November, 107-20.
- Berger, Paul D., Ruth N. Bolton, Douglas Bowman, Elten Briggs, V. Kumar, A. Parasuraman, and Terry Creed (2002), "Marketing Actions and the Value of Customer Assets," *Journal of Service Research*, 5 (August), 39-54.
- _____ and Nada Nasr-Bechwati (2001), "The Allocation of Promotion Budget to Maximize Customer Equity," *The International Journal of Management Science*, 29, 49-61.
- Blattberg, Robert C. and John Deighton (1996), "Manage Marketing by the Customer Equity Test," *Harvard Business Review* (July-August), 136-44.
- Blattberg, Robert C., Gary Getz, and Jacquelyn S. Thomas, (2001), *Customer Equity: Building and Managing Relationships as Valuable Assets*, Boston: Harvard Business School Press.
- Bolton, Ruth (1998), "A Dynamic Model of the Duration of the Customer's Relationship with a Continuous Service provider: The Role of Satisfaction," *Marketing Science*, 17 (1), 45-65.
- _____ and Katherine N. Lemon (1999), "A Dynamic Model of Customers' Usage of Services: Usage as an Antecedent and Consequence of Satisfaction," *Journal of Marketing Research*, 36(May), 171-186.
- _____, _____, and Peter C. Verhoef (2004), "The Theoretical Underpinnings of Customer Asset Management: A Framework and Propositions for Future Research," *Journal of Academy of Marketing Science*, Forthcoming.

Bowman, Douglas and Das Narayandas (2001), "Managing Customer-Initiated Contacts With Manufacturers: The Impact on Share-Of-Category Requirements and Word-of-Mouth Behavior," *Journal of Marketing Research*, 38 (August), 281-97.

Buzzell, Robert and Bradley T. Gale. (1987), "The PIMS Principles " New York: The Free Press.

Chintagunta, Pradeep (1993), "Investigating the Sensitivity of Equilibrium Profits to Advertising Dynamics and Competitive Effects." *Management Science*, 38(3), 287-306.

Dwyer, R. Robert, Paul H Schurr, and Sejo Oh, (1987), "Developing Buyer-Seller Relations," *Journal of Marketing*, 51, 11-28.

Dwyer, Robert F. (1997), "Customer Lifetime Valuation to Support Marketing Decision Making," *Journal of Direct Marketing*, 11 (Fall), 6-13.

Farris, Paul (2003) "Getting the Biggest Bang for Your Marketing Buck: A Point of View." In *Measuring and Allocating Marcom Budgets: Seven Expert Points of View*. Marketing Science Institute, January, Cambridge, MA.

Fornell, Claes and Birger Wernerfelt (1987), "Defensive Marketing Strategy by Customer Complaint Management: A Theoretical Analysis" *Journal of Marketing Research* 24 (November), 337-46.

_____ and _____ (1988), "A Model for Customer Complaint Management" *Marketing Science* 7 (Summer), 271-86.

Hanssens, Dominique (2003) "Allocating Marketing Communication Expenditures: A Long Run View." In *Measuring and Allocating Marcom Budgets: Seven Expert Points of View*. Marketing Science Institute, January, Cambridge, MA.

Heckman, J., (1976), "The Common Structure of Statistical Models of Truncation, Sample Selection and Limited Dependent Variables, and a Simple Estimator for Such Models," *Annals of Economic and Social Measurement*, 5, 475-492.

_____ (1979), "Sample Selection Bias as a Specification Error," *Econometrica*. Vol. 47 (January), 153-61.

Hogan, John E., Katherine Lemon, and Roland T. Rust (2002), "Customer Equity Management: Charting New Directions for the Future of Marketing", *Journal of Service Research*, 5 (August), 4-12.

Jagpal, Harsharanjeet (1981), "Measuring Joint Advertisinig Effects in Multiproduct Firms." *Journal of Advertisiing Research* 21 (1), 65-69.

Kalwani, Manohar, and Narakesari Narayandas (1995) "Long-Term Manufacturer Supplier Relationships : Do They Pay Off for Supplier Firms?" *Journal of Marketing*, 59 (1), 1-16.

Kamakura, Wagner and Gary Russell (1989), "A Probabilistic Choice Model for Market Segmentation and Elasticity Structure," *Journal of Marketing Research*. Vol. 26 (November), 379-90.

_____, Michel Wedel, Fernando de Rosa, and Jose A. Mazzon, (2003), "Cross-Selling Through Database Marketing: A Mixed Data Factor Analyzer for Data Augmentation And Prediction," *International Journal of Research in Marketing*, 20, March, 45-65.

Kelley, Harold H. and John Thibaut (1978), *Interpersonal Relations: A Theory of Independence*, New York: John Wiley and Sons.

Krishnamurthi, Lakshman and S.P. Raj (1988), "A Model of Brand Choice and Purchase Quantity Price Sensitivities" *Marketing Science*. 7(1), 1-20.

Lee, Lung-Fei, G.S. Maddala, and R. P. Trost (1980), "Asymptotic Covariance Matrices of Two-Stage Tobit Methods for Simultaneous Equations Models With Selectivity," *Econometrica*. Vol. 48(2), 491-503.

Lilien, Gary, Philip Kotler and K. Sridhar Moorthy (1992), *Marketing Models*, Englewood Cliffs, NJ: Prentice Hall.

Mantrala, Murali K. (2002), "Allocating Marketing Resources" in *Handbook of Marketing*, eds. Barton Weitz and Robin Wensley, London: Sage Publications

Mohr, Jakki and Nevin, John R. (1990), "Communication Strategies in Marketing Channels: A Theoretical Perspective". *Journal of Marketing*. October, 36-51.

Morgan, Robert M. and Shelby D. Hunt (1994), "The Commitment-Trust Theory of Relationship Marketing," *Journal of Marketing*, 58 (July), 20-38.

Moriarty, Rowland, and Robert Spekman (1984), "An Empirical Investigation of the Information Sources Used During the Industrial Buying Process," *Journal of Marketing Research*, 21 (May), 137-47.

Mummalaneni V, and D. T. Wilson (1991), "The Influence of a Close Personal Relationship on the Continued Stability of their Role Relationship." Working paper No. 4-1991, University Park: Pennsylvania State University.

Naik, Prasad A., and Kalyan Raman, (2003) "Understanding the Impact of Synergy in Multimedia Communications." *Journal of Marketing Research*, 40 (November) 375-388.

Oliver, Richard and Russell S. Winer (1987), "A Framework for the Formation and Structure of Consumer Expectations: Review and Propositions," *Journal of Economic Psychology*. Vol. 8, 469-99.

Pauwels Koen, Dominique M. Hanssens, and S. Siddarth (2002), "The Long Term Effects of Price Promotions on Category Incidence, Brand Choice, and Purchase Quantity." *Journal of Marketing Research*, 39 (November), 421-439.

Reichheld, Frederick F. and Earl W. Sasser, (1990), "Zero Defections: Quality Comes to Services," *Harvard Business Review*, (September-October), 105-11.

Reinartz, Werner, and V. Kumar (2000), "On the Profitability of Long-Life Customers in a NonContractual Setting: An Empirical Investigation and Implications for Marketing," *Journal of Marketing*, 64 (October), 17-35.

_____ and _____ (2003), "The Impact of Customer Relationship Characteristics on Profitable Lifetime Duration." *Journal of Marketing*, 67 (January), 77-99.

Roberts, R. Blaine, G. S. Maddala, and Gregory Enholm (1978), "Determinants of the Requested Rate of Return and the Rate of Return Granted in a Formal Regulatory Process," *The Bell Journal of Economics*. 611-621.

Rust Roland (1986): *Advertising Media Models*. Lexington, MA: Lexington Books.

_____ and Anthony Zahorik (1993), "Customer Satisfaction, Customer Retention, and Market Share," *Journal of Retailing*, 69 (Summer), 193-215.

_____, Katherine Lemon, and Valarie Zeithaml (2004), "Return on Marketing: Using Customer Equity to Focus Marketing Strategy," *Journal of Marketing*, 68 (January),

Sethuraman, Raj and Gerry T. Tellis (1991), "An Analysis of the Trade-Off between Advertising and Price Discounting," *Journal of Marketing Research*, 28 (May), 160-74.

Sethuraman, Raj and V. Srinivasan (2002), "The Assymmetric Share Effect: An Empirical Generalization on Cross-Price Effects," *Journal of Marketing Research*, 39 (August), 379-386.

Stewart, David, W. and Michael Kamins (2002), "Marketing Communications" In *Handbook of Marketing*, eds. Barton Weitz and Robin Wensley, Sage Publications, London.

Tellis, Gerald J. (2003) "Econometric Estimation of Media Effectiveness and the Optimal Allocation of Media Expenditures." In *Measuring and Allocating Marcom Budgets: Seven Expert Points of View*. Marketing Science Institute, January, Cambridge, MA.

Tull, Donald, S., Van R. Wood, Dale Duhan, Tom Gillpatrick, Kim R. Robertson, and James G. Helgeson (1986): "Leveraged Decision Making in Advertising: The Flat Maximum Principle and Its Implications." *Journal of Marketing Research*. 23 (February) 25-32.

Thomas, Jacquelyn S. (2001), "A Methodology For Linking Customer Acquisition to Customer Retention," *Journal of Marketing Research*, Vol. 38 (May), 262-268.

Venkatesan, R. and V. Kumar (2004), "A Customer Lifetime Value Framework for Customer Selection and Optimal Resource Allocation Strategy", forthcoming, *Journal of Marketing*.

Verhoef, Peter C., Philip Hans Franses, and Janny C. Hoekstra (2001), "The Impact of Satisfaction on Cross-Buying: A Dynamic Model for a Multi-Service Provider." *Journal of Retailing*. 77, 359-378.

_____, _____, and _____ (2002), "The Effect of Relational Constructs on Customer Referrals and Number of Services Purchased from a Multi-Service Provider: Does Age of Relationship Matter?" *Journal of the Academy of Marketing Science*. 30 (3), 202-216.

_____ (2003), "Understanding the Effects of Customer Relationship Management Efforts on Customer Retention and Customer Share Development." *Journal of Marketing*, 67 (October) 30-45.

Winer, Russell S. (1983), "Attrition Bias in Econometric Models Estimated with Panel Data" *Journal of Marketing Research*, 20 (May), 177-86.

Wittink, D. R., M.J. Addona, W.J. Hawkes, and J. Porter (1988), "SCANPRO: The Estimation, Validation and Use of Promotional Effects Based on Scanner Data", Internal Paper, Cornell University.