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2000

Link to publication in VU Research Portal

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Does Size Matter? Disentangling Consumers' Bundling Preferences

ABSTRACT

Previous marketing literature has focused to a large extent on the effect of bundle characteristics on a consumer's decision to buy a (fixed) bundle in a non-competitive setting. This study extends this narrow focus in four major ways. First, the authors address bundles that are customizable. Second, they distinguish between a consumer's decision of whether to bundle (bundle choice) and the decision of how many goods or services to include in a bundle (bundle size). Third, they extend the focus on bundle characteristics towards the impact of consumer and supplier characteristics on both bundle choice and bundle size. Fourth, they do so in a competitive context. They find that bundle, consumer and supplier characteristics differentially influence bundle choice and bundle size decisions. For instance, consumer socio-demographics were found to significantly affect the decision to obtain a bundle, but had no significant effect on the preferred size of the bundle. Further it was found that heavy users prefer to bundle fewer services compared to light users. This study has important managerial implications towards a successful bundling strategy. Strategies to encourage consumers to bundle should focus on different segments than strategies to encourage consumers to buy larger bundles.

INTRODUCTION

Would you like the combo plate special or would you prefer a la carte? Were you ever asked this question other than in a restaurant? Telecommunication provider Southwestern Bell asks college students this question. The firm offers college students the opportunity to bundle their choice of telecom services in the "Southwestern Bell College cafe". Either a consumer chooses a combo such as 'the WORKS@' or 'the BASICS@' or s/he buys individual telecommunication services (http://www.swbell.com/college/sbcc.html, 2000). Similarly, Sprint offers a customizable package called It's Your Internet[SM] (http://csg.sprint.com/internet/, 2000) in which consumers can choose to bundle Internet services either with their domestic long distance service, international long distance service or both. Also in other markets, firms increasingly use customizable bundles to attract customers from competitors and to maximize sales revenues. Consequently, managers seek an answer to several questions. Do consumers prefer to bundle products or to buy them separately? How many products do they wish to include in a bundle? Do bundle discount and bundle presentation affect consumer preferences for bundling? Which consumers are more likely to buy bundles? And if they prefer bundles, which consumers are more likely to buy bigger bundles? Although marketing academics have partially addressed some of these intriguing questions, their efforts fall short in four major ways.

First, present literature focuses solely on fixed bundles. Fixed bundles include a predetermined set of goods or services. Thus previous research ignores the possibility that consumers can customize the bundle they obtain (see Ben-Akiva and Gershenfeld 1998, for an exception). Still, the offering of customizable bundles is highly relevant in view of its pervasive application. Theatres or opera houses offer customizable packages in which consumers can customize the number of performances they wish to attend. In executive education programs,

managers can often customize the modules they take. Online music retailers let consumers not only choose which songs they want on a CD but also how many.

Second, authors have overlooked the role of bundle size (Yadav and Monroe 1993). Although also relevant in the case of fixed bundles, this shortcoming is particularly apparent and relevant in the case of customizable bundles. When consumers are confronted with customizable bundles, they face two different decisions. First, should they buy a bundle or not? We call this the *bundle choice* decision. Second, how many products should they include in the bundle? We term this the *bundle size* decision. Although the literature has addressed bundle choice, it has overlooked bundle size. This is a serious limitation of past research. Analogous to literature on brand choice and purchase quantity (Krishnamurthi and Raj 1991), we expect bundle choice and bundle size to be differentially affected by bundle, consumer and supplier characteristics. Identifying such differences is highly relevant for managers to market customizable bundles in an effective way. This is especially important in view of the growing relevance of customizable bundles (Swartz 2000).

Third, the extant literature on bundling primarily focuses on how characteristics of the bundle, such as discount level and bundle presentation, affect consumer's bundle preference. (Harlam et al. 1995; Johnson, Hermann and Bauer 1999; Venkatesh and Mahajan 1993). A few limited studies have addressed the influence of consumer characteristics - such as consumer evaluation processes (Yadav and Monroe 1993; Yadav 1994), consumers' purchase plans (Suri and Monroe 1995), and buyers' knowledge (Gaeth et. al 1990) – and supplier characteristics – such as brand attitude (Simonin and Ruth 1995) - on consumers' bundle choice decision. Insight into the influence of consumer and supplier characteristics on both bundle choice and bundle size is a valuable extension.

Fourth, previous research largely focused on bundling preferences in a monopolistic context (Guiltinan 1987). This approach ignores the competitive context that consumers face. In everyday life, consumers frequently make choices not only between different bundles and products from the same firm, but also increasingly between *different* bundles and products from *different* firms. Ignoring the competitive context endangers the external validity of previous findings.

Considering the above shortcomings with respect to bundling research, the objectives of this paper are to:

(1) Address consumer choice of customizable bundles;
(2) Disentangle and contrast consumers' bundle choice and bundle size decision;
(3) Examine the influence of consumer and supplier characteristics – in addition to bundle characteristics – on both decisions;
(3) Do so in a competitive context where consumers are confronted with offerings from multiple   suppliers.

We test the developed theory in a study on customizable bundles of telecommunication services by national and local suppliers within the United States. We develop two models related to consumers' bundle preference, one for bundle choice and one for bundle size. We use discrete choice methods to analyze the preferences. By considering a similar set of explanatory variables for both bundle choice and bundle size decisions, the present study enables us to examine and contrast the differential impact of these factors. Such findings can have important consequences for the marketing of customizable as well as fixed bundles.

In the next section we formulate research hypotheses concerning the effect of bundle, consumer and supplier characteristics on bundle choice and bundle size. We address the design of the study in the third section. The fourth and fifth sections present the model specification and

results of the bundle choice and bundle size models. Then, we discuss our findings and its managerial implications. We also address limitations and possible extensions of the present study.

RESEARCH HYPOTHESES

In order to empirically explore possible differential drivers of bundle choice and bundle size decisions by consumers, we test a common set of potential determinants on both types of decisions as is graphically depicted in Figure 1. These determinants consist of bundle, consumer and supplier characteristics. Also presented in Figure 1 is the focal theoretical foundation of both models.

[Insert Figure 1 about here]

Bundle *choice* involves the choice of newly formed combinations of existing and/or new products. Thus, bundles are likely to be perceived as new by consumers and, therefore, can be considered to be innovations (Eppen, Hanson and Martin 1991; Rogers 1995). We thus treat the bundle choice decision as akin to an innovation adoption decision, and develop our framework based on bundling and innovation adoption literature.

Bundle size involves the number of products that consumers wish to include in a bundle. Thus in examining the bundle size decision we can analogize with purchase quantity literature (Gupta 1988; Krishnamurthi and Raj 1991; Wansink, Kent and Hoch 1998). Extending insights from bundling theory and purchase quantity (i.e. sales promotions and economics) literature, we formulate hypotheses on the potential effect of bundle, consumer and supplier characteristics on the bundle size decision.

We also raise the question as to what extent bundle, consumer and supplier characteristics may have a *differential* impact on bundle choice and bundle size preference. Below, we develop hypotheses pertaining to the different relationships that are depicted in Figure 1.

Bundle Characteristics

Previous research provides support that bundle characteristics, such as bundle discount and bundle presentation, significantly affect bundle choice (Harlam et al. 1995; Johnson, Herrmann and Bauer 1999; Venkatesh and Mahajan 1993; Yadav and Monroe 1993). We incorporate both bundle discount (high-low) and bundle presentation (discount – cash back – freebie) in this study. Although they are not the main focus of our research, we can provide further validation for these effects previously accounted for, by examining them in a competitive context. The literature has not yet provided such validation.

In contrast, no study has investigated the impact of bundle characteristics on the bundle size decision. However, findings from different studies on purchase quantity decisions in marketing suggest that such an effect may indeed exist. Price discounts are found to have a positive effect on purchase quantity (Bucklin, Gupta and Siddarth 1998). This implies that the discount levels offered in a bundle plan have a positive effect on the number of services a consumer prefers to include in the bundle. Also, Simonson and Winer (p. 138, 1992) find that "consumers are likely to be more receptive to trying a new product variant if it is packaged with existing product variants." Thus the characteristics of the bundle offered, such as the discount level, may stimulate the consumer to include more services in the bundle. Bundle presentations have a similar effect since they lead to differences in valuations of the bundle discount (Yadav and Monroe 1993). In conclusion, it can be expected that higher discounts and appealing

presentations both lead to higher purchase probability and to consumers selecting more services to be included in the bundle. Thus, we hypothesize that:

Hla: Bundle characteristics (level of discount and bundle presentation) have a significant effect on the likelihood of purchasing a bundle.

Hlb: Bundle characteristics (level of discount and bundle presentation) have a significant effect on the preferred size of the bundle.

Consumer characteristics

Different consumer characteristics can be identified as possibly valid predictors of bundling preferences. Building upon bundling and purchase quantity research, we focus on the possible impact of single sourcing preference (Nanji and Parsons 1997), extent of usage (Kim and Rossi 1994) and the number of products a consumer currently uses (Harlam et. al. 1995) as possible drivers. New product adoption literature points to product usage behavior and consumer socio-demographics, such as age, income, education, and household size (Gatignon and Robertson 1985; Rogers 1995) as potential explanatory variables.

Single sourcing preference. Research on organizational buying behavior has repeatedly examined firms' single sourcing preference. Single sourcing preference is the preference to obtain multiple products from a single supplier. The construct has not received the same attention in a consumer setting. Reasons for a high single sourcing preference among organizational buyers include reduction of the complexity and amount of buying activities (Stump 1995; Swift 1995). Similar convenience issues play an important role in a consumer setting. In the consumer telecommunications market, for example, 74% of consumers indicate that they would bundle all their telecom services to benefit from receiving a single bill (Nanji and Parsons 1997). In addition, the cost of collecting information on (new) goods or services may be high, discouraging

consumers from collecting information on, and evaluating brands that they have no previous experience on (Laparsonne, Laurent and Le Goff 1995). In order not to incur such costs, consumers may prefer to obtain multiple products from a single source (e.g. brand, manufacturer or retailer) they are familiar with.

Bundling effectively leads to the use of fewer suppliers, because different products, which could have been purchased separately, are now purchased as a package. Therefore, we can expect that consumers who prefer to single source are more prone to purchase bundled offers and to include more services in a bundle. Bundling thus minimizes the cost related to information acquisition, processing and evaluation. We hypothesize that:

H2a: Consumers with a higher single sourcing preference are more likely to purchase a bundle.

H2b: Consumers with a higher single sourcing preference prefer larger bundles.

*Extent of usage (total **bill**).* Economics literature suggests that the proportion of an expenditure in the entire consumer budget is an important determinant of consumer price elasticity (Kim and Rossi 1994). Thus, consumers are generally more sensitive to price changes of products that consume a relatively large fraction of their income. Therefore, heavy users are more sensitive to the discount that is generally offered in a bundle, compared to light users. Hence, we expect a positive relationship between an individual's expenditure on the bundled products and his or her bundling propensity.

In contrast, we expect a negative relationship between extent of usage and bundle size preference. Heavy users of a product wish to limit the risks involved in purchasing high volumes (Stump 1995). In each transaction, a certain amount of perceived risk, or the likelihood of negative consequences, is present. The resulting uncertainty in the transaction can be related to

diverse aspects such as price and quality, or even psychological or social factors (Brooker 1984). It can be argued that heavy users will be more sensitive to such uncertainty, since more is at stake for them. For instance, one uncertainty factor is if the consumer is getting a good deal on the purchase. From economics, one can easily argue that this uncertainty will be more important for heavy users than for light users since a larger amount is at stake. Buyers try to reduce uncertainty in a transaction by buying separate products from different suppliers instead of buying an entire package from a supplier. Research has shown that such an effect indeed exists in diverse settings, such as industrial buying (Walker and Poppo 1991), consumer banking services (Denton and Chan 1991) and consumer legal services (Boze 1987). This is consistent with other risk-reducing strategies such as increasing the number of information sources about a transaction (Murray 1991) and enlarging the consideration set (Lapersonne, Laurent and Le Goff 1995).

In the case of purchasing a bundled offer this implies that, although heavy users favor a bundle plan, they tend to limit the number of services within the bundle. Therefore, we expect that heavy users prefer relatively smaller bundles, while purchasing additional individual services from other suppliers. This implies that heavy users compromise between the economic gain of choosing a bundle and reducing risk by limiting bundle size. Consequently, we hypothesize:

H3a: Heavy users are more likely to prefer bundles compared to light users.

H3b: Heavy users will select smaller bundles compared to light users.

Number of products currently used. A bundled offer consists of a number of individual goods or services. The more of these products consumers presently use, the more familiar they are with them and the more expert they have become on them. The more familiar consumers with the products in a bundle, the more readily they will buy the bundle (Harlam et al. 1995). Also

expert consumers adopt new offerings, such as a bundle, more readily (Gatignon and Robertson 199 1). We hypothesize:

H4a: Consumers that currently use a larger number of products are more likely to bundle.

Also, the broader the range of goods or services a consumer presently uses, the more s/he will benefit from the convenience of obtaining these products in a single bundle. Thus they are more likely to include a larger number of services in the bundle compared to consumers that currently use few of the products in the bundled offer.

H4b: Consumers that currently use a larger number of products are more likely to choose larger bundles.

Socio-demographic variables. The influence of consumer socio-demographics on bundling preference has not yet been explored in previous studies. However, as the bundle choice decision is similar to a new product adoption decision, we expect that socio-demographic variables such as age, education, household size, prior use of technology and income are valid predictors of bundle choice (Gatignon and Robertson 1985; Rogers 1995). Age is generally found to be negatively related to new product adoption (Gilly and Zeithaml 1985; Robertson 1971), whereas the consumer's education level, income, and household size all are positively related to new product adoption (Dickerson and Gentry 1983; Gatignon and Robertson 1985; Labay and Kinnear 1981). Further, Gauvin and Sinha (1993) found that the degree to which potential adopters of a new product previously adopted different technological products is a predictor of new product purchase probability. We thus hypothesize:

H5: Older consumers are less likely to choose a bundle.

H6: Higher educated consumers are more likely to bundle.

H7: Larger households are more likely to bundle.

H8: Consumers using more new technology products are more likely to bundle.

H9(a): Higher income consumers are more likely to bundle.

Concerning the bundle size decision however, there is no theoretical foundation to expect consumer demographics to be good predictors. Previous research has largely invalidated most consumer socio-demographics as predictors for purchase quantity (Bell, Chiang and Padmanabhan 1999).

A possible exception however is income. Income is a driver of purchase quantity decisions through its impact upon wealth and price elasticity. Therefore we expect income to affect bundle size decisions. However, its effect on bundle size may be twofold. First, a larger bundle implies a higher cost. Consumers with higher incomes are more willing and able to afford larger bundles. On this basis, we can expect that income is positively related to bundle size. On the other hand, low-income consumers are more price-sensitive. Thus they will include a larger number of services in the bundle to profit from the bundle discount. This would lead to a negative effect of income on bundle size. Especially since the marginal discount typically increases as consumers include more services in a bundle. In sum, we expect an effect of income on the bundle size decision, but do not formulate a directional hypothesis on this effect.

H9b: Consumer income level significantly affects the bundle size decision.

Supplier characteristics

In this study we use perceived supplier quality as a possible determinant of bundling decisions. As heavy users are likely to be more responsive to suppliers' quality, we also explore the interaction effect between perceived supplier quality and usage intensity.

Perceived supplier quality. Consumers' perception of providers has been found to affect their preference for purchasing a bundle from a particular supplier firm (Gotlieb, Grewal and

Brown 1994; Lazarus 1991; Simonin and Ruth 1995). In most bundling cases, consumers at least partially infer their bundling preferences from their subjective quality perceptions of the different suppliers on a restricted set of services. In essence it is not very likely that consumers have bought all the bundled products from the same source before. Based on the extensive brand equity and brand extension literature (Aaker and Keller 1990; Bottomley and Doyle 1996; Sunde and Brodie 1993), we expect that quality perceptions (either based on actual experience or word of mouth) can relate to other services than the supplier is perceived to have expertise on (Gaeth et al. 1990). As consumers minimize potential negative consequences by obtaining services from known high quality suppliers, we expect that perceived supplier quality has a positive influence on the consumer's propensity to bundle.

We also expect that supplier quality affects bundle size in two different ways. First, consumers will include in a bundle a larger fraction of the products or services they already purchase when they perceive the supplier to be of high quality. Second, we expect that consumers will adopt goods or services they do not already purchase more readily in a bundled offer when they have a high quality perception of the supplier. These expectations are consistent with previous research that found supplier and merchandise quality to increase purchases in a multi-store-retailing context (Sirohi, McLaughlin, and Wittink 1998).

H10a: The higher the perceived quality of the supplier, the higher the probability to bundle from that supplier.

H10b: The higher the perceived quality of the supplier, the larger the preferred size of the chosen bundle.

Interaction between perceived supplier quality and extent of usage.

We expect that heavy users will be more responsive to the suppliers' quality than light users, as the impact of potential negative effects of poor quality is higher for heavy users. Thus we expect an interaction effect between perceived supplier quality and the extent of consumer use of (telecom) services for bundle choice. We also expect that the bundle size decision is affected by an interaction between extent of usage and perceived supplier quality. We have argued earlier that heavy users will limit the number of services in a bundle to reduce uncertainty and maintain choice flexibility. However, uncertainty will be lower for a supplier with a high perceived quality compared to a supplier with low perceived quality. Therefore perceived supplier quality will temper the negative influence extent of usage has on bundle size. Or in other words, we expect bundle size decisions of heavy users to be affected more by perceived supplier quality, than those of light users.

Hlla: Heavy users are more likely to be responsive to supplier quality in their bundle choice decisions (i.e., a positive interaction coefficient).

Hllb: Heavy users are more likely to be responsive to supplier quality in their bundle size decisions (i.e., a positive interaction coefficient).

Control Variables

Brand Constant. Supplier quality is only one aspect of a firm. Typically, brand constants are used in choice models to capture residual (unmeasured) supplier characteristics that affect consumers' decisions. We use brand constants in the bundle choice as well as the bundle size model. Note that brand constants cannot be interpreted as an overall measure of brand equity.

Price Consciousness. Price conscious consumers display a sensitivity for paying lower prices (Lichtenstein, Bloch and Black 1988). Previous studies find a positive correlation between

perceived supplier quality and price levels (West Haven and Ong 1994; Wheatley and Chiu 1977), potentially implying that consumers, who perceive suppliers to be of high quality, expect the supplier's products to be highly priced. Tellis (1988) points to potential bias when quality is studied without controlling for price effects or vice versa. Consumer price consciousness effectively controls for this potential bias.

THE STUDY

Design and sample

We conducted a quasi-experiment in the consumer telecommunications market to test the developed hypotheses. We included five telecommunication services in this study. The five services are (1) local telephony, (2) interstate long distance, (3) cellular telephony, (4) local paging, and (5) unlimited Internet access. These services represent the core telecommunication services available to US consumers (Carroll 2000). Respondents could choose between three major national competitors (Nl, N2 and N3) and one local telephone service provider (Ll) to buy these services. We do not reveal their names here for confidentiality reasons.

We varied seven bundle plans across each of the competing firms. These bundle plans varied on two dimensions viz. bundle presentation and discount level. We included three different bundle presentations, namely cash back, discount off total bill and free services. We varied the level of the bundle discount over two levels, high and low. This resulted in six bundle plans. A seventh plan was a null plan (no discount for bundling). In addition, each bundle plan offered three levels of discounts based on how many services (between three and five) the consumer would include in the bundle in the second stage. For example in one of the two cash back plans (level: high), the consumer could get back 15%, 20% or 25% of the total bill

depending on whether they subscribed to three, four or five services in the bundle, respectively. We present the details of the bundle plans in Table 1.

[Insert Table 1 here]

We used discrete choice methodology to capture the respondents' bundling preference. Respondents made two choices represented on a choice card as shown in Figure 2. The top of the choice card showed the four firms, each offering one of the seven bundle plans. A fifth choice of "will not bundle" was also available. After reviewing the promotional offers, respondents first decided whether they wanted to bundle. If they wanted to bundle, they chose among the bundled offers of the four competitors. On the lower half of the choice card they indicated which services (between three and five) they wanted to include in the bundle. The respondent was capable of customizing the bundle by choosing the desired type and number of services.

For the experimental design, we used an orthogonal main effect master design in 49 choice cards from the Addelman and Kempthome (1961) design catalog. We split these 49 cards randomly into seven subsets of seven choice cards each. We showed each respondent seven choice cards from one of the randomly assigned subsets.

[Insert Figure 2 here]

A professional marketing research firm collected the data, in 1996, in a three-phase phone-mail-phone sequence. Random digit dialing was used to call residential telephone customers in a western state in the US. The firm told respondents that this was a research study

dealing with current and new telecommunications services, and solicited their participation. Then a "homework" task was mailed to those that agreed to participate, using priority mail, which included the discrete choice cards, along with instructions on filling out the responses. In these instructions respondents were asked to examine the choices on each of the cards, and indicate which options they would pick if the services were available immediately. Note that at the time of this study, telecommunication companies did not offer bundled offers due to regulatory constraints. The firm called the participants after a few days to obtain their responses to the discrete choice cards, as well as other questions. It made three callbacks, which resulted in a sample of 517 respondents. Respondents typically referred to a lack of time or interest as reasons for not participating in the study. After eliminating cases due to missing values, 495 respondents remained, which resulted in an overall response rate of 38%.

The sample has the following general characteristics. About 55% of the respondents are between 30 and 49 years of age, and two thirds of the households have three members or less. The average monthly bill is $113 with the median being $104. 55% of the respondents have an annual income above $50,000. While all respondents subscribe to local and long distance service, only 32% subscribe to cellular, 29% to paging and 27% to Internet access. On the choice cards, one third of the respondents picked no bundle at all, 47% of the respondents picked a bundle consisting of three services, 13% picked a bundle of four services and 7% picked a bundle of all five services.

Measurement

Consumer characteristics. Single sourcing preference is the sum of two items (Cronbach's alpha=0.71). The first item measures whether the respondent prefers a single supplier or multiple suppliers for their local and long distance telecommunications services. The

second item measures the same, but pertains to all their telecommunication needs. We obtain

extent of usage by summing up respondents' reported local, long distance and cellular bills. We

measure the number of products (in the bundle) currently used by counting the number of

services respondents subscribe to, from among cellular, paging and Internet access. All

consumers have local and interstate long distance. We measure technology usage by counting

how many of eight different products (desktop computer, laptop computer, modem, fax machine,

VCR, answering machine, cordless phone and video game machine) the household currently

uses. For other socio-demographic variables like age, income, education, and household size we

use standard categorical scales. Price consciousness is measured on a 5-point scale by asking

respondents how important price is in their decision to subscribe to a single company for all their

communication services.

Supplier characteristics. We obtain perceived supplier quality by asking respondents to

rate each of the firms (on a five-point scale) on service quality, telecommunication expertise, and

customer service. Service quality refers to hardware aspects of the telephone service • such as

voice quality and coverage. Telecommunication expertise refers to the supplier's ability in

providing telecommunication services — such as reliability and knowledge of technical service

representatives. Customer service refers to pure service elements — such as the responsiveness

and courtesy of customer service representatives. Cronbach's alpha coefficient for the three-item

scales for the four firms ranged between 0.84 and 0.93 which indicates high construct validity

(Nunnally 1967). We used the sum score from the three items as an overall measure of quality.

We present the correlations between the consumer and supplier related variables in Table

2.

DETERMINANTS OF BUNDLE CHOICE (MODEL 1)

We formulate a multinomial logit model to represent the respondent's choice of a particular option on the choice card (ignoring the choice card subscript):

$$U_{hk} = V_{hk} + \varepsilon_h \tag{1}$$

$$V_{hk} = b_k + \beta_1 X_{1hk} + \beta_2 X_{2hk} + \ldots + \beta_n X_{nhk} \tag{2}$$

$$P_{hk} = e^{V_{hk}} / \Sigma (1 + e^{V_{hk}}) \tag{3}$$

Where:

U_{hk} is the utility of consumer h for supplier k

ε_h is the error in the utility measurement, distributed Weibull

V_{hk} is the deterministic part of the utility of consumer h for supplier'k .

$X_{1hk} \ldots X_{nhk}$ are the variables describing the bundle, supplier and consumer characteristics

P_{hk} is the probability of consumer h choosing a bundle from firm k

b_k is the coefficient representing the brand constant for firm k

$\beta_1 \ldots \beta_n$ are the coefficients for the set of X_{nhk} variables.

Remember, we include three groups of variables in the model: bundle, supplier and consumer characteristics (see measurement section). Six dummy variables represent the seven bundle plans.

We estimated the multinomial logit model using LIMDEP's (Greene 1996) maximum likelihood procedures. In order to test for potential brand effects, we tested three different models. For brevity, we do not fully report all three models. The first model estimated the same brand constant for all firms. This implies no differential effects of the brand on bundling

probability. The second model included brand constants, which we allow to differ over the four suppliers. The chi-square test showed that the second model fitted the data better than the first. The third model tested whether the impact of the bundle plans was different for each brand by estimating brand specific coefficients for the six promotion dummy variables. The log likelihood of the second model did not differ significantly from the one of the third model. Thus we retained the second model. We show the results of this second model in Table 3. The model fit is significant (Chi Squared = 2022, p=0.00).

[Insert Table 3 here]

Bundle characteristics. We find that all six plans significantly affect bundling probability (H1a). The plan giving 15%, 20% and 25% cash back is the most effective bundle plan in this study. As mentioned above, the coefficients of the six bundle plans are not significantly different across suppliers. This implies that the impact of bundle characteristics on bundle choice is the same across suppliers.

Consumer characteristics. Most of the consumer characteristics are significant in the hypothesized direction. Single sourcing preference (H2a), and number of services currently used (H4a), are significant with a positive impact on bundling propensity. Age (H5) has a significant negative effect, as hypothesized. Education (H6), household size (H7), technology usage (H8), and income (H9a) all have a positive influence on bundling preference. Only extent of usage (H3a) was not found to be significant. The price consciousness control variable is positive and significant (at the .10 level), suggesting that price conscious consumers tend to bundle more often.

Supplier characteristics. The brand constants represent the residual strength of firms in attracting consumers to a bundle plan. We tested the differences between the brand coefficients using the asymptotic t test suggested by Ben Akiva and Lerman (p. 161, 1985). The pair-wise tests indicate that there is a difference between Ll and N1&N3 (p<.05) and N2(p<0. 10). There is no difference in the coefficients of Nl ,N2 and N3. The local telecom supplier, L1, has the highest (least negative) brand constant amongst all. Previous research in fast moving consumer goods found that consumers perceive national brands to be better than local (store) brands. We observe the opposite in the telecom market. This is probably due to a higher familiarity with the local telecom provider, which translates into a higher preference. Further, perceived supplier quality (H10a) is significant in the hypothesized direction. Also the interaction effect between extent of usage and perceived supplier quality (H1 la) is significant and positive as hypothesized. The interaction between perceived supplier quality and price consciousness that we controlled for was not significant.

DETERMINANTS OF BUNDLE SIZE (MODEL 2)

Similar to the bundle choice model, we include three groups of variables in the bundle size model, viz. bundle, consumer and supplier characteristics.

Since bundle size can only take discrete values in the range of three to five services, regression analysis is not appropriate as it assumes that the dependent variable is continuous. Consequently, we specified an ordered **probit** model to analyze bundle size. Ordered **probit** assumes that there is a latent (unobserved) variable (bundle size) with unknown cutoff points. The independent variables are linearly related to this latent variable. On the basis of the discrete bundle sizes we observe, the model estimates the cutoff points and regression weights. The

model assumes that the error term is normally distributed. One of the cutoff points is arbitrarily set to zero for identification purposes.

We can formalize the ordered probit as follows:

$$S^* = \beta'X + \varepsilon \qquad (4)$$

Where:

S^* is the latent variable

β' is the matrix with the coefficients for the set of X_{nhk} variables

X is the matrix of independent variables, describing bundle, supplier and consumer characteristics

ε is the error term, which is assumed to be normally distributed

We observe:

$$S = 3 \text{ if } S^* \leq 0 \qquad (5)$$

$$S = 4 \text{ if } 0 < S^* \leq \mu_1 \qquad (6)$$

$$S = 5 \text{ if } \mu_1 \leq S^* \qquad (7)$$

We can specify the following probabilities for bundle size:

$$\text{Prob } (S=3) = \Phi(-\beta'X) \qquad (8)$$

$$\text{Prob } (S=4) = \Phi(\mu_1 - \beta'X) - \Phi(-\beta'X) \qquad (9)$$

$$\text{Prob } (S=5) = 1 - \Phi(\mu_1 - \beta'X) \qquad (10)$$

Where:

Φ is the normal probability density function.

Each of the 495 respondents made seven different choices, resulting in 3465 observations. However, the bundle size observations on the second task are only available when the respondent

chose to bundle in the first part of the task. This resulted in a sample size of 2300 observations. We related the number of services consumers picked on each card to the set of explanatory variables. We tested if the brand constants, for which we used three dummy variables, affect bundle size. Table 4 presents the results of this analysis. The model fit is highly significant (Chi Squared= 444.1, p=0.00).

[Insert Table 4 here]

Bundle characteristics. In contrast to the bundle choice model, only three of the six bundle plans have a significant effect on bundle size (Hlb). Higher levels of discount or cash back are significant while the lower ones are not. Paging as a freebie is significant compared to the other freebie plan. A particular supplier can do its own profitability calculation to determine which is the most profitable plan.

Consumer characteristics. Single sourcing preference affects bundle size positively (H2b). In contrast to the choice model, but as hypothesized, the extent of usage (total bill) (H3b) has a significant negative effect on bundle size. Similar to the choice model, the number of services currently used (H4b) is significant in the positive direction. We formulated no hypotheses on socio-demographic variables but we included them in the model for comparison. The results indicate that these variables (including technology use) have no significant effect on the desired size of the bundle, as expected. Similarly, although a significant effect of income on the bundle size decision was expected (H9b), we did not find one. The opposite effects of income and price sensitivity may have cancelled out. We also find that price conscious consumers are likely to choose bigger bundles (at the .10 level) but less likely to choose larger bundles from

higher quality suppliers. In summary, we find that the consumer characteristics affecting bundle size differ substantially from those that affect bundle choice.

Supplier characteristics. Supplier quality is not highly significant (P=0.106), but in the hypothesized direction (H10b). The brand constants are not significant. This suggests that the number of services subscribed to is independent of the firm that is picked. Note that we found a significant effect of these variables in the bundle choice model. Further, the interaction between perceived supplier quality and the extent of telecom usage is found to be significant, supporting H1 lb.

DISCUSSION

We argued that the bundle choice decision is different from the bundle size decision, and that variables will not affect both decisions in a similar fashion. Variables that affect the bundle choice decision do not necessarily affect the bundle size decision. The results suggest that the bundle choice decision has strong similarity to the innovation adoption decision. Our contention that the bundle size decision shows strong similarity with theory on purchase quantity decisions is supported by our findings. We find that some variables have a differential effect on the two choices. In addition, we find single sourcing preference to be a strong driver of both decisions. This variable has been found to be significant in the industrial context, but not in the consumer context. Finally, our study is the first to investigate bundling in a competitive context. Our results show that previous findings from non-competitive contexts on bundle discount and framing (Harlam et al. 1995; Johnson, Herrmann and Bauer 1999) are robust and hold in competitive contexts.

Managerial Implications

This study has substantial managerial implications. A marketing manager faces different market segments: customers that currently buy (bundled or unbundled) services from competitors, his/her own customers that currently bundle, and his/her own customers that buy services unbundled. Bundling can be used to attract customers from competitors, increase the penetration of services among consumers who at the moment buy their services unbundled, and/or increase sales of services to consumers who already buy their services bundled.

Attract customers from competitors or encourage current non-bundling customers to bundle. Firms trying to attract customers from competitors or trying to encourage their own customers to bundle (and thus increase penetration of their products and/or services), should focus predominantly on determinants of bundle choice. In this respect, they should focus their promotion on households that are larger, higher income, and younger. We have shown that such households will buy a bundle more readily. In addition, we have shown that the characteristics of the bundle plan make a difference. Previous research on framing effects suggests that optimally suppliers present these discounts for each service separately, as this enhances the attractiveness of the bundle (Johnson, Hermann and Bauer 1999; Yadav and Monroe 1993). In addition, the convenience of one-stop-shopping should be emphasized. In a question in our survey that asked about what they see as the main advantages of bundling, the majority of respondents mentioned price discounts and single bill as the main benefits.

Increase sales of services to consumers who already buy their services bundled. If a company pursues this objective, their marketing approach should focus on drivers of bundle size. The negative coefficient of telecom bill in the bundle size model counterintuitively implies that these consumers are likely to include a smaller number of services in the bundle. Thus it might

be effective for firms to market aggressively to their present light users, as they will tend to include a larger number of services and/or services in the bundle, compared to heavy users.

Profitability analysis. Using this study, a marketing manager can conduct profitability analyses to assess the potential profitability of different bundle plans. In deciding on which promotion plan is the most profitable, s/he first needs to build a scenario assuming what kind of discount plans competitors will be offering. Then s/he describes the market segments the firm is targeting in terms of their consumer and perceived supplier characteristics. The bundle choice model estimates the percentage of customers likely to choose the focal firm for each of the alternative promotional plans. The bundle size model estimates the number of services bought by consumers under each bundle plan. Multiplying the number of consumers and the number of services with the average profit per service provides the total profits for each plan.

Limitations, extensions and conclusion

There are some limitations to this study. First, we use data on behavioral intentions rather than actual behavior. Although such data were not available when conducting the study, it would be interesting to use actual data on bundling to see if our findings can be replicated. Second, we only take a limited set of explanatory variables into account. Third, some of our measurements are limited and could be improved upon. Fourth, although the data analysis in the present study is in line with the models in promotion literature (Gupta **1988**), developing a model that takes the interdependence of bundle choice and bundle size into account, seems appropriate.

In the literature to date, bundle size is fixed. Our results give a clear indication of the extra insight we can gain by disentangling the bundle choice and bundle size decisions. Furthermore, our findings suggest that both decisions are rooted in different theoretical foundations and should be studied accordingly. Although our approach has some weaknesses due

to its exploratory nature, the distinction between bundle choice and bundle size is very promising and should receive more attention in the future. We have further shown that scholars do not only need to study bundle characteristics, but that they should also devote more attention to consumer and supplier characteristics in 'bundled' exchanges. In addition to the question 'when are bundles profitable?', marketing academics should address questions such as 'which bundles are profitable for which suppliers?' and 'which consumer segments should be targeted with which bundle?'. The answers to these questions will determine who will win 'the battle of the bundles'.

FIGURE 1
FRAMEWORK AND HYPOTHESES

| *Antecedents* | *Consumers' Bundle Decisions* | *Theoretical   Foundation* |

BUNDLE CHOICE DECISION		BUNDLE SIZE DECISION	
Bundle Characteristics			
Discount level	Hla: **+**	Hlb: +	
Bundle presentation	Hla: +	Hlb: +	
Consumer Characteristics			
Single sourcing preference	H2a: +	H2b: +	
Extent of usage (telecom bill)	H3a: +	H3b: **-**	
Number of products currently used	H4a: +	H4b: +	
Sociodemographics:			
Age	H5: **-**	N/A	
Education	H6: **+**	N/A	
Household size	H7: **+**	N/A	
Technology use	H8: +	N/A	
Income	H9a: +	H9b: **+/-**	
Price consciousness	control	control	
Supplier Characteristics			
Supplier quality	H10a: +	H10b: +	
Brand constant	control	control	
Interaction			
(supplier quality * extent of usage)	Hlla: +	Hllb: +	
(supplier quality * price consciousness)	control	control	

     N/A: No formal hypothesis developed.

FIGURE 2
EXAMPLE OF BUNDLING CHOICE TASK

Step 1: Check one of the five boxes

Telecommunications Packaging Plans

	L1 Cash Back At End of Year Plan			**N1** Free Services Plan			**N2** Discount Off Total Bill Plan			**N3** Cash Back at End of Year Plan			
	3 Services	4 Services	5 Services	3 Services	4 Services	5 Services	3 Services	4 Services	5 Services	3 Services	4 Services	5 Services	No Package
	10% cash Back	15% cash Back	20% cash Back	Free: Voice Mail	Free: Basic local service	Free: Both Voice mail and Basic local service	5% Discount	10% Discount	1% Discount	10% Cash Back	15% Cash Back	20% cash Back	I wish to purchase my services from multiple providers as I do now
	☐			☐			☐			☐			☐

Step 2: Check off at least 3 services

Services in the plan

Check the boxes of the services you wish to purchase

Local Telephone Service	☐
Long Distance Telephone Service	☐
Cellular Telephone Service	☐
Local Paging	☐
Unlimited Internet Access	☐

TABLE 1
BUNDLE PLANS USED

Number	Promotion	Description		
		Buy 3 services	Buy 4 services	Buy 5 services
1	Discount Level Low	Get 5% off total bill	Get 10% off total bill	Get 15% off total bill
2	Discount Level High	Get 10% off total bill	Get 15% off total bill	Get 20% off total bill
3	Freebie Level Low	Free Call Waiting and Call Forwarding	Free Local Service	Free Voice Mail and Local Service
4	Freebie Level High	Get Free Voice Mail	Get Free Paging	Get Free Internet
5	Cash Back Level Low	10% cash back	15% cash back	20% cash back
6	Cash Back Level High	15% cash back	20% cash back	25% cash back
7	No Discount			

TABLE 2
CORRELATIONS BETWEEN CONSUMER AND SUPPLIER CHARACTERISTICS
(n=495)

		Single Source Pref	Exent of usage	Nr. of serv. Curr. used	Age	Educ.	Hhld Size	Income	Tech use	Suppl. Qual. L1	Suppl. Qual. N1	Suppl. Qual. N2	Suppl. Qual. N3
Extent of usage	Pearson Cot-r.	-0.04											
	Sig. (2-tailed)	0.33											
Nr of services currently used	Pearson Cot-r.	0.03	0.44										
	Sig. (2-tailed)	0.53	0.00										
Age	Pearson Corr.	-0.04	-0.09	-0.14									
	Sig. (2-tailed)	0.34	0.05	0.00									
Education	Pearson Corr.	0.03	0.07	0.15	0.06								
	Sig. (2-tailed)	0.52	0.15	0.00	0.06								
Hhld Size	Pearson Corr.	0.00	0.13	0.13	-0.31	-0.07							
	Sig. (2-tailed)	0.94	0.00	0.00	0.00	0.03							
Income	Pearson Corr.	0.03	0.25	0.36	0.10	0.30	0.11						
	Sig. (2-tailed)	0.49	0.00	0.00	0.00	0.00	0.00						
Tech use	Pearson Corr.	0.11	0.31	0.51	-0.10	0.20	0.26	0.46					
	Sig. (2-tailed)	0.02	0.00	0.00	0.03	0.00	0.00	0.00					
Supplier Quality L1	Pearson Corr.	-0.01	-0.11	-0.08	0.04	-0.12	-0.02	-0.04	-0.11				
	Sig. (2-tailed)	0.91	0.01	0.07	0.39	0.01	0.63	0.40	0.01				
Supplier Qualitty N 1	Pearson Corr.	0.02	-0.01	0.05	-0.07	-0.01	0.07	0.03	0.07	0.31			
	Sig. (2-tailed)	0.67	0.86	0.27	0.13	0.80	0.11	0.49	0.14	0.00			
Supplier Quality N2	Pearson Corr.	0.02	0.05	0.08	-0.06	-0.05	0.02	0.00	0.05	0.08	0.14		
	Sig. (2-tailed)	0.70	0.23	0.06	0.21	0.29	0.65	0.93	0.23	0.06	0.00		
Supplier Quality N3	Pearson Corr.	-0.02	-0.05	-0.05	0.11	0.04	0.02	0.03	0.01	0.12	0.01	0.21	
	Sig. (2-tailed)	0.59	0.23	0.30	0.02	0.36	0.59	0.57	0.80	0.01	0.89	0.00	
Price Consciousness	Pearson Corr.	0.06	0.03	0.07	-0.02	0.02	0.02	0.07	0.03	0.02	0.03	0.05	0.01
	Sig. (2-tailed)	0.18	0.48	0.13	0.74	0.61	0.62	0.12	0.49	0.60	0.52	0.27	0.74

TABLE 3
THE BUNDLE CHOICE MODEL (MODEL 1)

Related Hypothesis	Variable	Coeff.	Std.Err.	t-rat is	P-value
	Bundle Characteristics				
HIa	Discount Level Low	1.397	0.152	9.214	0.000
HIa	Discount Level High	2.408	0.143	16.816	0.000
HIa	Freebie Level Low	1.799	0.147	12.194	0.000
HIa	Freebie Level High	1.486	0.151	9.820	0.000
HIa	Cash Back Level Low	1.974	0.146	13.544	0.000
HIa	Cash Back Level High	2.991	0.141	21.162	0.000
	Consumer Characteristics				
H2a	Single Sourcing preference	0.242	0.051	4.726	0.000
H3a	Extent of Usage (Total Bill)	~0.0003	0.001	-0.230	0.818
H4a	Number of Services Used	0.339	0.059	5.764	0.000
H5	Age	-0.226	0.033	-6.880	0.000
H6	Education	0.069	0.029	2.390	0.017
H7	Household Size	0.182	0.035	5.163	0.000
H8	Technology Use	0.205	0.030	6.862	0.000
H9a	Income	0.047	0.021	2.214	0.027
Control Variable	Price Consciousness	0.297	0.166	1.785	0.074
	Supplier Characteristics				
Control Variable	Brand constant for L1	-6.458	0.327	-19.724	0.000
Control Variable	Brand constant for N1	-6.709	0.330	-20.363	0.000
Control Variable	Brand constant for N2	-6.609	0.325	-20.317	0.000
Control Variable	Brand constant for N3	-6.669	0.328	-20.345	0.000
H10a	Supplier Quality	0.187	0.016	11.936	0.000
	Interaction				
HIIa	Supplier Quality x Extent of Usage (Total Bill)	0.0002	0.000	2.465	0.014
Control Variable	Supplier Quality x Price Consciousness	-0.015	0.013	-1.137	0.255

Fit statistics
Log Likelihood   -4365.6
Rho Squared   0.215
Chi Squared (16 df)   2022 P=0.000

TABLE 4
THE BUNDLE SIZE MODEL (MODEL 2)

Related Hypothesis	Variable	Coeff.	Std. Err.	t-ratio	P-value
	Bundle Characteristics				
HIb	Discount Level Low	0.3647	0.232	1.573	0.116
HIb	Discount Level High	0.4547	0.219	2.078	0.038
HIb	Freebie Level Low	0.2647	0.225	1.177	0.239
HIb	Freebie Level High	0.6376	0.223	2.855	0.004
HIb	Cash Back Level Low	0.2933	0.224	1.310	0.190
HIb	Cash Back Level High	0.4339	0.215	2.014	0.044
	Consumer Characteristics				
H2b	Single Sourcing Preference	0.3770	0.042	9.022	0.000
H3b	Extent of usage (Total Bill)	-0.0045	0.001	-3.642	0.000
H4b	Number of Services Used	0.4829	0.037	12.965	0.000
N/A	Age	0.0000	0.029	0.000	1.000
N/A	Education	0.0303	0.022	1.385	0.166
N/A	Household Size	0.0005	0.025	0.020	0.984
N/A	Technology Use	0.0293	0.020	1.465	0.143
H9b	Income	0.0182	0.016	1.120	0.263
Control Variable	Price Consciousness	0.3911	0.219	1.784	0.074
	Supplier Characteristics				
Control Variable	Constant Term (includes brand constant for N3)	-3.6215	1.097	-3.302	0.001
Control Variable	Brand constant for L1	0.0099	0.080	0.123	0.902
Control Variable	Brand constant for N1	0.0820	0.082	0.995	0.320
Control Variable	Brand constant for N2	-0.0307	0.085	-0.361	0.718
H10b	Supplier Quality	0.1425	0.088	1.619	0.106
	Interaction				
HIIb	Supplier Quality x Extent of Usage (Total Bill)	0.0004	0.000	3.715	0.000
Control Variable	Supplier Quality x Price Consciousness	-0.0429	0.018	-2.353	0.019
	Fit statistics				
	μ_1 (Cutoff point)	0.8546	0.038	22.287	0.000
	Log Likelihood	-1602			
	Chi Squared	444.1	p=0.000		

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