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Do Satisfied Customers Really Pay More? A Study of the Relationship between Customer Satisfaction and Willingness to Pay

Mannheim 2004

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Abstract

Two experimental studies (a lab experiment and a study involving a real usage experience over time) reveal the existence of a strong positive impact of customer satisfaction on willingness to pay and provide support for a nonlinear functional structure based on disappointment theory (i.e., an inverse S-shaped form). Additionally, the second study examines dynamic aspects of the relationship and provides evidence for the stronger impact of cumulative as opposed to transaction-specific satisfaction on willingness to pay.

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1. Introduction

Customer satisfaction has become an important focus of corporate strategy. In the past, many executives trusted their intuitive sense that higher customer satisfaction would lead to improved company performance. As a consequence, programs for measuring and improving customer satisfaction have been implemented in many companies.

Recent research supports the notion that there is a positive relationship between customer satisfaction and financial performance (e.g., Anderson, Fornell, and Rust 1997; Reichheld and Sasser 1990; Rust and Zahorik 1993). An important study by Anderson, Fornell, and Lehmann (1994) analyzes this link on data obtained from the Swedish Customer Satisfaction Index and finds that "firms that actually achieve high customer satisfaction also enjoy superior economic returns (p. 63)."

However, our understanding of the constructs that *mediate* the link between customer satisfaction and firm profitability is still limited (Szymanski and Henard 2001). The studies that do exist find that higher levels of customer satisfaction lead to greater customer loyalty (e.g., Anderson and Sullivan 1993; Bearden and Teel 1983; Bolton and Drew 1991a, b; Fornell 1992; LaBarbera and Mazursky 1983; Oliver 1980; Oliver and Swan 1989a, b) which, in turn, has a positive impact on profitability (Reichheld and Teal 1996). Others find that satisfied customers can increase profitability by providing new referrals through positive word of mouth (e.g., Mooradian and Olver 1997).

An interesting question is whether customer satisfaction also impacts on the customer's willingness to pay for the product or service. This relationship is of great importance because price is a key element in the profit equation and is therefore directly linked to profitability. Furthermore, the general belief that satisfied customers are willing to pay higher prices is typically based on anecdotal evidence (e.g., Finkelman 1993; Reichheld and Sasser 1990).

Despite the importance of this issue, price-related outcomes of customer satisfaction (like the willingness to pay) have often been neglected in previous research (Anderson 1996). To the best of our knowledge, only one study (Anderson 1996) focuses on the link between customer satisfaction and price tolerance (the maximum price customers are willing to pay or tolerate before switching) and it reports mixed results concerning the assumed linear link between the two variables at the company level.

Our research follows suggestions by Anderson (1996) and Gotlieb, Grewal, and Brown (1994) that future research needs to test links between customer satisfaction and price-related constructs in controlled settings where these variables are manipulated. In this study, we will explore the link between customer satisfaction and willingness to pay in two experimental studies and focus on three research questions.

First, we examine whether there is a (positive) relationship between customer satisfaction and willingness to pay at the individual level. The willingness to pay concept has not been investigated in this context in previous research. In the theoretical domain, answering this research question provides an improved understanding of the link between customer satisfaction and profitability. Managerially, providing an answer to this question can have important implications for pricing practices.

Second, we study the functional structure of the relationship between customer satisfaction and willingness to pay. In this context, it is particularly interesting to determine whether the relationship (if existing) is essentially a linear one or whether there are significant nonlinear effects. Understanding the functional structure of this relationship is especially important for managers in order to determine the aspired level of customer satisfaction. This research question is in line with the growing interest in more complex functional structures of the links in the satisfaction-profit chain (Anderson and Mittal 2000). However, as noted by Ngobo (1999), there has been a lack of a theoretical foundation in examining nonlinear effects between customer satisfaction and behavioral outcome variables. Therefore, in this paper, we provide theoretical development and reasoning for *two* alternative functional structures for the relationship between customer satisfaction and willingness to pay as well as a strong empirical test of these notions.

Third, current research indicates the importance of studying dynamic aspects in the customer satisfaction-outcome variable link (Bolton 1998; Bolton and Lemon 1999). Thus, we investigate how the relationship between customer satisfaction and willingness to pay changes over time. To the best of our knowledge, this has not been examined in prior research.

2. Hypotheses Development

2.1. Definitions of Constructs

Since a key focus of this paper is to examine how customer satisfaction impacts on the customer's willingness to pay, it is important to first define these terms. *Satisfaction* is defined as the result of a post-consumption or post-usage evaluation containing both cognitive and affective elements (Oliver 1997). According to the expectancy-disconfirmation paradigm (Oliver 1980), customers judge satisfaction by comparing previously held expectations with perceived product or service performance. In addition, affect (positive or negative) which arises out of the cognitive process of confirmation/disconfirmation contributes to (dis)satisfaction (Oliver 1993; Oliver, Rust, and Varki 1997).

In the current research, we concentrate on satisfaction with *performance*, which is defined as a postconsumption evaluation of perceived quality relative to prepurchase performance expectations about quality (e.g., Anderson 1994; Anderson and Sullivan 1993; Bitner 1990; Churchill and Surprenant 1982; Oliver 1980; Oliver and DeSarbo 1988; Tse and Wilton 1988). Under this conceptualization, price is not included as part of the satisfaction judgment.

Finally, with respect to dynamic aspects, the literature differentiates between transaction-specific satisfaction and cumulative satisfaction. Transaction-specific satisfaction is a customer's evaluation of his or her experience with and reactions to a particular product transaction, episode, or service encounter (Olsen and Johnson 2003), whereas cumulative satisfaction refers to the customer's overall evaluation of a product or service provider to date (Johnson, Anderson, and Fornell 1995).

The *willingness to pay* (WTP) is the maximum amount of money a customer is willing to spend for a product or service (Cameron and James 1987; Krishna 1991). Economists refer to it as the reservation price (Monroe 1990). Thus, WTP is a measure of the value a person assigns to a consumption or usage experience in monetary units. It has been studied in the marketing literature including areas such as advertising (Kalra and Goodstein 1998), consumer dealing patterns (Krishna 1991), and pre-test-markets (Cameron and James 1987).

2.2. Impact of Customer Satisfaction on Willingness To Pay

In order to theoretically justify the nature of the relationship between customer satisfaction and willingness to pay, we turn to equity theory which focuses on fairness in social exchange

(Adams 1965; Homans 1961; Oliver and Swan 1989a, b). In the current context, this exchange involves the customer receiving a specific level of satisfaction and the seller being given an agreed payment (Lind and Tyler 1988). Equity theory suggests that parties to an exchange will feel equitably treated if the ratio of their outcomes to inputs is in some sense fair (distributive justice). Both positive and negative inequity produce negative affective states that motivate people to change parameters of the exchange to re-establish equity. For example, Bolton and Lemon (1999) find that customers seek to maintain 'payment equity' over time by adjusting items under their control (in this case, usage levels) in response to changes made by the company (i.e., price changes, changes in service quality).

When customers experience high states of satisfaction, they perceive a high outcome of an exchange and therefore, are willing to pay more (relative to less satisfied customers) because this still results in an equitable outcome/input ratio. This is one way they can maintain payment equity (Bolton and Lemon 1999). Similarly, when satisfaction is low, a low payment will be perceived as being adequate to establish a fair exchange. Thus, willingness to pay should be lower in cases of low satisfaction than in cases of high satisfaction. This leads to the following:

> **H_1**: The price customers are willing to pay increases with the level of customer satisfaction.

2.3. Functional Structure of the Relationship

Most current research addresses nonlinear effects between antecedents and customer satisfaction rather than on outcomes of satisfaction (which is the focus of this study) (Anderson and Mittal 2000; Mittal, Ross, and Baldasare 1998; Oliver 1995). For example, Mittal, Ross, and Baldasare (1998) examine nonlinear effects between attribute performance and customer satisfaction and find support for an S-shaped function which is steep in the middle and flat at the extremes.

There are only a very few studies which find empirical evidence for nonlinear effects in the satisfaction-outcome link (with dependent variables such as customer loyalty and complaining behavior). Among the studies which examine customer satisfaction and *customer loyalty*, there is no consensus about the functional structure for this specific relationship. For example, Mittal and Kamakura (2001) find nonlinear effects in the form of increasing returns for the satisfaction-retention link. Based on anecdotal evidence, Coyne (1989) and Finkelman (1993)

argue for an inverse S-shaped function which is flat in the middle and steep at the extremes. A similar functional structure was found in a study based on a catastrophe model by Oliva, Oliver, and MacMillan (1992). Ngobo (1999) predicts an opposite functional structure (which is steep in the middle and flat at the extremes) and finds partial empirical support for this function. Finally, Singh and Pandya (1991) investigate the link between dissatisfaction and various dimensions of *complaining behavior* and find different nonlinear patterns for these dimensions. However, all the above mentioned studies investigate other behavioral outcomes of customer satisfaction and not the willingness to pay construct which is the focus of this study.

In hypothesizing about the functional structure, two viewpoints are of greatest relevance. The first focuses on disappointment theory (Loomes and Sudgen 1986) and on emotions in the customer satisfaction experience (Oliver 1993; Oliver, Rust, and Varki 1997). There is empirical evidence in the literature that high positive and high negative disconfirmation is much more emotionally charged than confirmation. While positive disconfirmation results in emotions such as delight/elation (Oliver, Rust, and Varki 1997; Rust and Oliver 2000), negative disconfirmation leads to the emotion of disappointment (Oliver and DeSarbo 1988; Oliver and Westbrook 1993; Westbrook and Oliver 1991). On the contrary, mere confirmation adds almost no emotional content to a consumption or usage experience (Oliver 1997). This state has also been described as “cool satisfaction” (Woodruff, Cadotte, and Jenkins 1983).

Disappointment theory, which is rooted in the field of behavioral decision theory, incorporates the emotions of disappointment and elation into the utility formula (Bell 1985; Inman, Dyer, and Jia 1997; Loomes and Sudgen 1986). This theory suggests that disappointment occurs when the outcome of a choice is below prior expectations, whereas elation arises when the outcome of a choice exceeds prior expectations. The greater the disparity between outcome and expectations, the greater one’s disappointment or elation. The theory assumes that both emotions generate additional value (negative or positive) to the basic value of the consumption or usage experience from the process of confirmation/disconfirmation. More specifically, elation (disappointment) is supposed to generate an increment (decrement) of value. A crucial aspect of this theory is that both emotion-values are supposed to increase to a greater degree at the margins, which leads to a *convex* shape for elation-values and a *concave* shape for disappointment-values (Loomes and Sudgen 1986).

Building on these research areas, we now can hypothesize about the structural relationship between satisfaction and the willingness to pay. In the following discussion, CS_0 denotes the satisfaction level that is achieved if customer expectations are exactly met; WTP_0 denotes the willingness to pay that is present if CS equals CS_0. As we argued in justifying H1, satisfaction influences a customer's WTP positively. However, as we mentioned above, simple confirmation does not add much emotion to the consumption or usage experience. Therefore, around CS_0, the functional structure will be relatively flat. Moving away from CS_0, the two research streams mentioned above suggest that the magnitude of changes in WTP produced by changes in satisfaction level will increase substantially due to elation or disappointment. In other words, the function relating customer satisfaction to WTP is suggested to be *convex* for satisfaction levels above CS_0 and *concave* for satisfaction levels below CS_0 (see Figure 1A). Principally, it is possible that diminishing returns to delight/disappointment set in at some point (i.e., there is unlikely to be an infinite WTP for extreme levels of delight). However, it seems that these very extreme levels of delight are unlikely to be reached for most products or services. The above reasoning leads us to the following hypothesis:

> **H_{2a}**: The relationship between customer satisfaction and the price customers are willing to pay follows an inverse S-shaped function (which is first concave and then convex).

The second viewpoint draws on prospect theory (Kahneman and Tversky 1979) and proposes an opposite functional structure (which is steep in the middle and flat at the extremes). In applying this theory, there are two important aspects. First, the judgment of satisfaction would

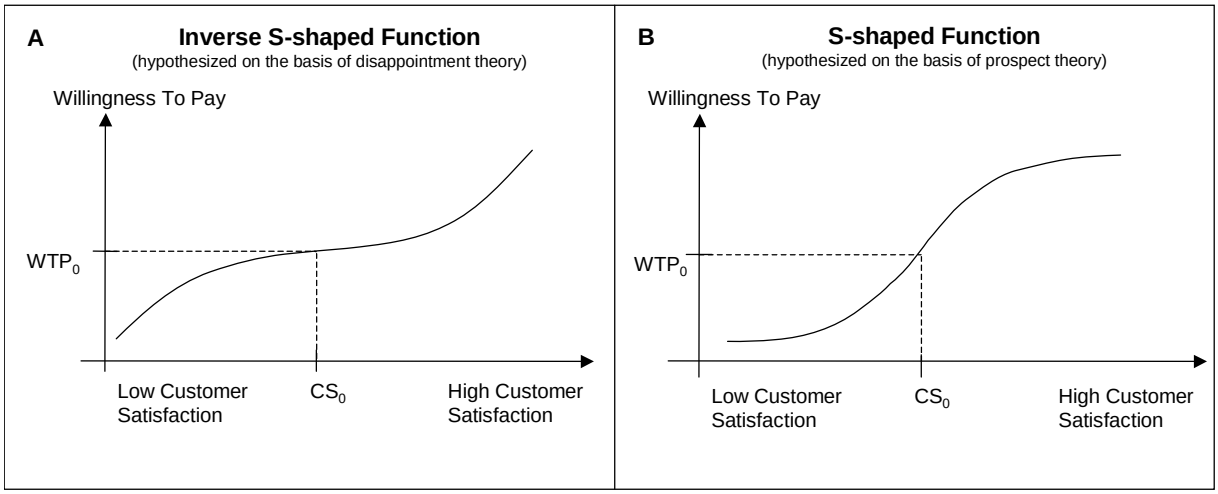

Figure 1: Alternative Functional Structures for the Relationship between Customer Satisfaction and Willingness To Pay

be reference dependent. In this case, the reference point is the expected satisfaction level (CS_0 in Figure 1B). Satisfaction above the reference point ($CS > CS_0$) would be considered as a gain, while satisfaction below this standard of comparison would be perceived as a loss ($CS < CS_0$). Second, evaluations of satisfaction would display diminishing sensitivity. That is, marginal values of gains and losses decrease with their size with increasing levels of satisfaction or dissatisfaction.[1] This functional structure is steep in the middle and flat at the margins (see Figure 1B) and was suggested by Ngobo (1999) for the customer satisfaction-loyalty link. This leads to the following alternative hypothesis:

> **H_{2b}**: The relationship between customer satisfaction and the price customers are willing to pay follows an S-shaped function (which is first convex and then concave).

2.4. Transaction-specific versus Cumulative Satisfaction

The third goal of the study is to examine how the nature of the relationship between customer satisfaction and outcome variables can evolve over time (Bolton 1998; Bolton and Lemon 1999). More specifically, satisfaction which is based on repeated experiences (i.e., cumulative satisfaction) is supposed to have a stronger impact on outcome variables than satisfaction with a single consumption experience (Anderson, Fornell, and Rust 1997; Olsen and Johnson 2003; Rust, Zahorik, and Keiningham 1995). The current study extends previous work comparing cumulative to transaction-specific satisfaction by investigating a new dependent variable (willingness to pay) and by considering nonlinear effects.

To support the notion that the relationship between customer satisfaction and willingness to pay changes over time, we draw on research on the attitude-behavior link. A meta-analysis on this link indicates that attitude certainty moderates the relationship between the two variables: the higher the attitude certainty, the stronger the relationship (Kraus 1995). With respect to the present study, we propose that attitude certainty (here certainty with the satisfaction judgment) is stronger for cumulative satisfaction than for transaction-specific satisfaction since customers have had more opportunities to validate their judgment. Additional theoretical support is provided by the Bayesian information updating approach which is used by

[1] Prospect theory also emphasizes loss aversion, which results in an asymmetric functional structure. More specifically, the theory assumes a function that is steeper for losses than for gains. These asymmetric effects are beyond the scope of this study and are therefore not considered.

Boulding, Kalra, and Staelin (1999) and Rust et al. (1999) in order to justify dynamic effects. This leads to the following hypothesis:

> **H_3**: The more the customer satisfaction judgement moves from transaction-specific to cumulative, the stronger is the relationship between customer satisfaction and willingness to pay.

We now present two experimental studies. Study 1 examines how different levels of customer satisfaction increase the willingness to pay (hypotheses 1- 2) in a lab experiment, while study 2 extends the research to a real consumption experience and captures also the dynamic aspects (i.e., cumulative satisfaction) of the situation (hypotheses 1- 3).

3. Study 1 – Methodology

3.1. Research Design

In the first experimental study, participants evaluated written scenarios set in a restaurant context. To induce different levels of customer satisfaction, we first established expectations about the restaurant (which were held constant) and then manipulated the actual experience with the restaurant. The expectations were set up in the introductory section: The restaurant was described as an up-scale Italian restaurant which offered one three course menu. To enhance realism of the experiment, participants had to choose among three options for each course, the price of the menu being independent of the actual choice of the participant. Further, participants were told to imagine that they were going out for dinner with a friend.

The manipulation of the actual experience was analogous to a conjoint design (similar to the approach adopted by Smith, Bolton, and Wagner (1999)). We selected three key attributes of the restaurant: quality of food, ambience, and service (Bernhardt, Donthu, and Kennett 2000). Each attribute was varied at two levels (see Table 1 for the complete wording) resulting in eight different scenarios, which were applied as a within-subjects design. The order of the attributes was randomized across the scenarios.

Attributes	Dimensions	favorable	unfavorable
Quality of Food	Taste, Freshness, Preparation	The food is excellent. All ingredients are fresh. The combination of the food is creative and the preparation is exquisite.	Several ingredients are not that fresh. The combination of the food/dishes is interesting, but some of them are too spicy. The food's quality is medium.
Ambience	Interior Design, Loudness, Temperature	The interior design is neat and elegant. The noise-level is low, and you are able to talk in peace. The temperature is pleasant.	The interior design is simple. The noise-level is high, and it is sometimes quite turbulent. It is too cool in the restaurant, that is why you are freezing.
Service	Timing, Friendliness, Competence	The service gives you competent advice about the offered food and beverages. The period of time between the courses is just right. The service is very friendly and courteous the whole evening.	The period of time between the courses is too long. The service is a little bit rude the whole evening. Moreover, the service can give you merely insufficient advice about the offered food and beverages.

Table 1: Study 1: Customer Satisfaction Manipulation

3.2. Sample Design and Experimental Procedure

Eighty students from a variety of majors at a major German university served as participants. The experiment consisted of ten sections. The first section included the introduction in which expectations were set up. Each of the subsequent eight sections contained one of the eight different satisfaction conditions which manipulated the experience with the restaurant. The order of the satisfaction scenarios was completely randomized across subjects. After reading a scenario, subjects responded to measures of their willingness to pay. It is important to note that willingness to pay was measured after the restaurant experience, not before. Then there was an intervening story which was designed to distract subjects away from thinking about price and toward thinking about the original restaurant experience. Satisfaction with the restaurant experience was then measured. After all eight scenarios had been evaluated, there was a final set of general questions.

3.3. Measurement of Variables

Customer satisfaction was assessed using a four item measure which closely parallels previous approaches to measuring customer satisfaction (e.g., Anderson and Sullivan 1993;

Bearden and Teel 1983; Churchill and Surprenant 1982; Fornell et al. 1996).[2] The satisfaction scale had excellent internal consistency with a composite reliability (Fornell and Larcker 1981) of .98, exceeding the threshold value of .6 suggested by Bagozzi and Yi (1988). For further analysis, the satisfaction score was calculated as the average of the four satisfaction scale-items. Table 2 shows the means of the satisfaction measures for all scenarios.

Scenario	Attributes*			Customer Satisfaction	WTP**
	Quality of Food	Ambience	Service		
1	-	-	-	1.35 (0.67)	22.67 (12.87)
2	-	-	+	3.36 (1.55)	31.40 (12.96)
3	-	+	-	3.37 (1.88)	32.91 (14.28)
4	+	-	-	4.75 (2.05)	35.20 (14.75)
5	-	+	+	5.89 (2.28)	37.64 (14.09)
6	+	-	+	7.05 (2.20)	41.90 (16.83)
7	+	+	-	7.72 (1.95)	43.90 (16.18)
8	+	+	+	10.77 (0.53)	54.71 (19.92)

Notes: * "+" Attribute favorable; "-" Attribute unfavorable ; ** in German Marks

Table 2: Study 1: Means (Standard Deviations) of Satisfaction and Willingness To Pay (WTP) Measures for the 8 Scenarios

Willingness to pay (WTP) was measured with an open-ended question. Participants were asked the price they would be willing to pay for the restaurant visit. This type of measure has been widely employed in other studies in this area (e.g., Cameron and James 1987; Krishna 1991). Table 2 provides the means of the WTP measures for the eight scenarios.

[2] Satisfaction was measured with the following items: "All in all, I would be satisfied with this restaurant," "The restaurant would meet my expectations," "The earlier scenario compares to an ideal restaurant experience," and "Overall, how satisfied would you be with the restaurant visit just described?" The items were measured on a 11-point Likert-type scale. For the first three items the scale ranged from "strongly agree" to "strongly disagree" and for the last item from "very satisfied" to "very dissatisfied."

4. Study 1 – Results

The first hypothesis predicted a positive relationship between customer satisfaction and willingness to pay. We tested the hypothesis with the following random coefficient regression model, which controls for subjects effects:[3]

$$(1) \qquad WTP_{ij} = b_0 + b_1 \cdot CS_{ij} + u_j + r_{ij}$$

WTP_{ij} is the willingness to pay of the j^{th} individual on the i^{th} scenario, and CS_{ij} is the customer satisfaction of the j^{th} individual on the i^{th} scenario. The individual intercepts are expressed as the sum of an overall mean (b_0) and a series of random deviations from that mean (u_j). The slope is modelled as a constant (b_1) across all individuals, and r_{ij} is the random error associated with the i^{th} scenario of the j^{th} individual. The model has two fixed effects (an intercept (b_0) and a slope (b_1) effect for CS) and two random effects: one for the intercepts (registered by the u_j with variance τ^2), and one for the observations within individuals (registered by the r_{ij} with variance σ^2).[4]

The model was estimated with the maximum likelihood method[5] using the procedure MIXED in SAS 8.02. The estimation results are shown in the left part of Table 3. It can be observed that b_1 is positive and significantly different from zero ($b_1 = 2.839$; $p < 0.0001$). This indicates a statistically significant and positive relation between customer satisfaction and willingness to pay and confirms the first hypothesis that satisfied customers are willing to pay more for the product or service.

Since both satisfaction and WTP are driven by the same manipulation, it is important to demonstrate that satisfaction mediates the relationship between service quality and WTP.

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3 See Cohen et al. (2003) and Snijders and Bosker (1999) for this type of regression.

4 Both error terms are assumed to be uncorrelated, normally distributed, constant, and to have a mean of zero.

5 The maximum likelihood method was used, since the focus of the analysis is on deviance tests and not on the random part parameters for which the restricted maximum likelihood method is preferable (Snijders and Bosker 1999).

Results of a mediation analysis (Baron and Kenny 1986) provide support for the mediating role of satisfaction.[6]

		Linear Model			Cubic Model*		
-2 Log Likelihood		4519.8			4479.7		
Solutions for fixed effects							
Parameter	**Effect**	**Estimate**	**t-value**	**p**	**Estimate**	**t-value**	**p**
b_0	Intercept	37.541	24.190	0.000	37.541	24.250	0.000
b_1	CS	2.839	34.530	0.000	234.590	35.470	0.000
b_2	CS^2				-1.827	-0.270	0.785
b_3	CS^3				42.868	6.440	0.000
Solutions for random effects							
Parameter		**Estimate**	**Z-value**	**p**	**Estimate**	**Z-value**	**p**
τ^2 **(variance of** u_j**)**		187.220	6.140	0.000	186.580	6.160	0.000
σ^2 **(variance of** r_{ij}**)**		43.780	16.730	0.000	40.787	16.730	0.000

Note: * The results are based on orthogonal polynomials.

Table 3: Study 1: Results of Random Coefficient Regression Models

Our second analysis concerned the functional structure of the relation between customer satisfaction and willingness to pay. Hypothesis H2a proposed an inverse S-shaped function, while hypothesis H2b suggested an S-shaped function. We tested these hypotheses with the following cubic random coefficient regression model:

$$(2) \qquad WTP_{ij} = b_0 + b_1 \cdot CS_{ij} + b_2 \cdot CS_{ij}^{\ 2} + b_3 \cdot CS_{ij}^{\ 3} + u_j + r_{ij}$$

The model has four fixed effects (an intercept (b_0) and three slope parameters (b_1, b_2, b_3) for CS) and two random effects: one for the intercepts (registered by the u_j with variance τ^2), and one for the observations within individuals (registered by the r_{ij} with variance σ^2).

6 Three regression equations were estimated to test the mediation. First, the mediator, customer satisfaction, was regressed on quality; this showed a significant effect (b_{qual} = 0.821; t = 36.366; p < 0.0001). Second, the dependent variable, willingness to pay, was regressed on quality; this also showed a significant effect of quality (b_{qual} = 0.489; t = 14.155; p < 0.0001). Third, willingness to pay was regressed on both quality and customer satisfaction. The third equation demonstrated that when customer satisfaction was included with quality in the regression analysis, customer satisfaction was highly significant (b_{sat} = 0.346; t = 5.860; p < 0.0001). The effect of quality remained significant (b_{qual} = 0.205; t = 3.470; p < 0.001), but the effect was much smaller than in the second equation. Thus, customer satisfaction partially mediated the effect of quality on the willingness to pay.

To control for multicollinearity associated with a cubic regression model, we used orthogonal polynomial variables as predictor variables (Kleinbaum et al. 1998, p. 293).[7] The right part of Table 3 shows the estimation results. Most importantly, the coefficient b_3 is positive and significant ($b_3 = 42.868$; $p < 0.0001$) which implies that the effect of customer satisfaction on willingness to pay increases at the margins. This supports hypothesis H2a which states that the relationship between customer satisfaction and willingness to pay can be best described with an inverse S-shaped function. However, the results contradict the prediction of hypothesis H2b which proposes an S-shaped function.

Further, the cubic model contributes significantly more to the explanation of WTP than the linear model which is indicated by a hierarchical likelihood ratio chi square test.[8] The null hypothesis, that the additional predictors of the cubic model does not exceed the contribution of the linear model, could be clearly rejected ($p < 0.001$). Hence, the cubic model significantly improves prediction. In addition, the fit of the models was compared using Akaike's Information Criterion (AIC statistic) of model evaluation (Akaike 1974; Homburg 1991). The results support the cubic model because the corresponding AIC value (4491.7) is smaller than the one for the linear model (4527.8). Using the Schwarz Bayesian Criterion (Burnham and Anderson 2002; Schwarz 1978) instead of AIC leads to similar conclusions (BIC cubic model: 4506.0 < BIC linear model: 4537.3). This supports the results obtained via the likelihood ratio test statistic.

Overall these findings support hypothesis H2a as illustrated in Figure 2. The function is concave for low satisfaction levels and convex for high satisfaction levels as there is an inflection point where the function switches from concave to convex.

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7 Orthogonal polynomial variables are linear combinations of the simple polynomials and are pairwise uncorrelated, which completely eliminates any collinearity. The orthogonal polynomial variables were calculated with the ORPOL function using the interactive matrix language (IML) in SAS 8.02.

8 The hierarchical likelihood ratio chi square test is performed analogously to the multiple-partial F test in OLS regression (Kleinbaum et al. 1998, p. 650). This test compares two nested models. The null hypothesis states that the contribution of the additional predictors of the more complex model (i.e., the cubic model) does not exceed the contribution of the predictors of the simpler model (i.e., the linear model). Here, the hierarchical likelihood ratio test with 2 degrees of freedom is 4519.8 – 4479.7 = 40.1.

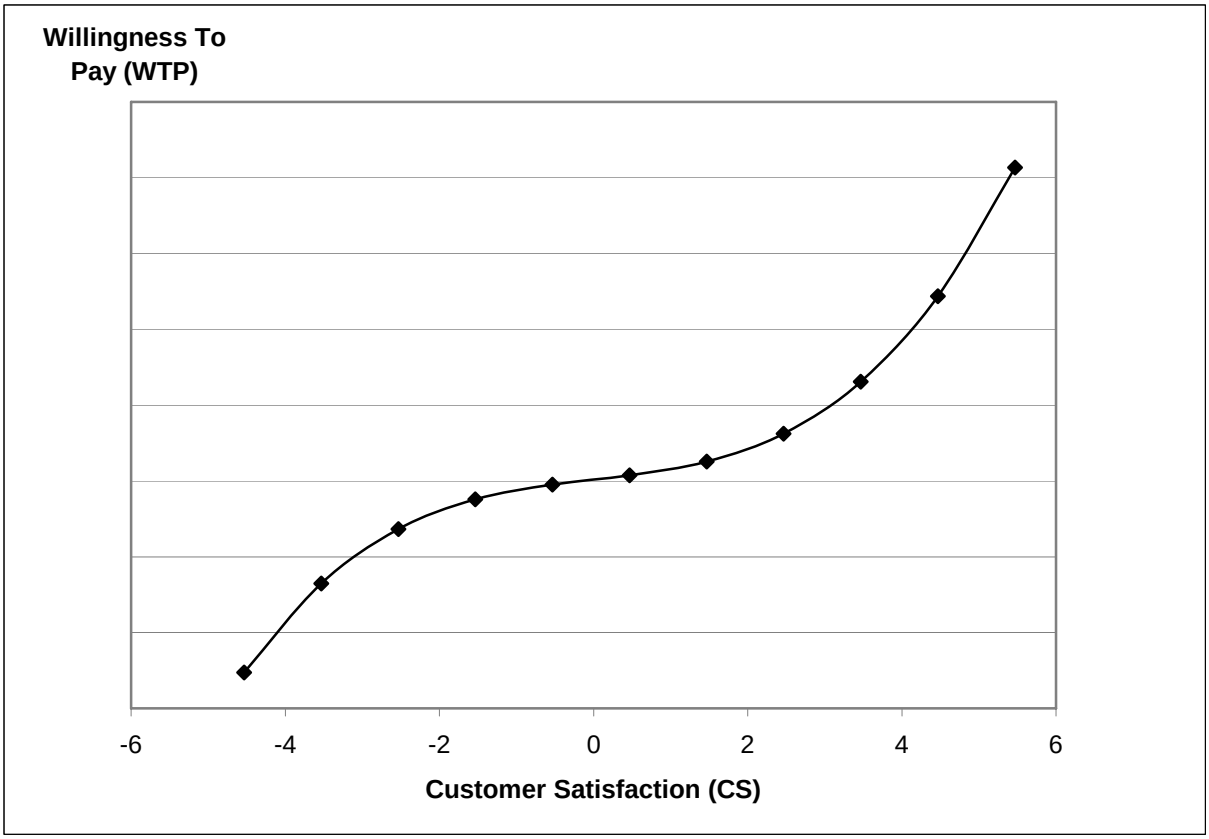

Figure 2: Study 1: Empirical Relationship between Customer Satisfaction and Willingness To Pay

We now turn to study 2 which extends the investigation in three important aspects. First, study 2 is carried out in the context of a real consumption/usage experience and uses a behavioral outcome variable. Second, it captures the dynamic aspects of the customer satisfaction and willingness to pay relationship (hypothesis 3). Third, study 2 investigates the hypotheses in a product setting, while study 1 was conducted in a service setting.

5. Study 2 – Methodology

5.1. Study Overview

The study was designed around the evaluation of a newly created product – a CD-Rom tutorial – which could be used to provide academic assistance in a very difficult pricing class and which the customers (students who were taking the pricing class) could actually buy. Participants were given three sample chapters (trials) of the CD-Rom tutorial over time in a computer-based format and were asked to solve a sample pricing problem related to the

sample chapter. Performance feedback on the pricing problem was then provided and key measures were obtained.

5.2. Research Design

Study 2 employed an 8 (levels of satisfaction) X 3 (trial) full factorial design. Satisfaction was a between-subjects factor, while trial was a within-subjects factor. To manipulate customer satisfaction, expectations about the CD-Rom tutorial (which we held constant across the experimental conditions) were first established. In the introductory section, the purpose of the study guide was described (i.e., to help course participants to understand difficult material in the class) and an overview of the content was provided. Subjects were informed that the CD-Rom tutorial contained 73 chapters which would be similar to the ones they received in the testing phase, but covered different pricing topics.

Second, the actual consumption experience was manipulated. Participants were given a sample chapter and were asked to solve a related pricing problem. To manipulate a *high* satisfaction evaluation, the content of the CD-Rom sample chapter made it easy to understand and to solve the pricing problem. Further, subjects received positive feedback on the pricing task after their solutions were checked by a team of the instructor's assistants. To manipulate a *low* satisfaction evaluation, the content of the CD-Rom chapter was difficult to read and provided almost no information related to the pricing problem. In addition, the participants were given negative performance feedback.

In order to create different degrees of cumulative satisfaction which makes it possible to examine the dynamic relationship between satisfaction and WTP (hypothesis H3), satisfaction was manipulated across three different trials. This involved presenting subjects with three different chapters from the CD-Rom tutorial and the solving of three different pricing problems over time. Table 4 outlines the eight different conditions.

Trial / Experimental Condition	1	2	3
1	High	High	High
2	High	High	Low
3	High	Low	High
4	High	Low	Low
5	Low	High	High
6	Low	High	Low
7	Low	Low	High
8	Low	Low	Low

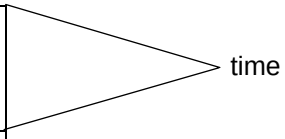

Table 4: Study 2: Manipulation of Satisfaction across three Trials

5.3. Sample Design and Experimental Procedure

The sample consisted of 157 marketing students enrolled in a graduate level pricing class at a large German university. This is an appropriate sample given the nature of the product evaluated. Subjects were aware that previous students had experienced difficulties in this pricing class. To address this problem, they were told that a CD-Rom study guide had been developed to assist participants in solving difficult pricing problems in the course. Further, they would have the chance to test the CD-Rom tutorial before deciding if they wanted to buy it.

Before the first trial, participants were given the introductory section of the CD-Rom in which the expectations were set up (purpose and content of the CD-Rom). Then, they received one sample chapter of the CD-Rom study guide (first trial), after which they solved a problem related to the material. Satisfaction was manipulated in the manner described earlier. Hereafter, the measurement of key variables (WTP and then customer satisfaction) occurred. WTP was obtained as a behavioral outcome variable via the BDM-mechanism (Wertenbroch and Skiera 2002) as described in the next section. Also, subjects were committed to pay their own money. Further, intervening questions were asked to distract participants away from the evaluation situation, after which customer satisfaction was measured. This was followed by an additional intervening task. They read a newspaper article about a recent pricing problem in practice and were asked to answer some open-ended questions in relation to the content of the article. The procedure of the second and the final third trial was analogous to the first trial.

5.4. Measurement of Variables

Customer satisfaction was measured with the four items used in study 1 and two additional emotion items (elation and disappointment). The internal consistency of the satisfaction scale

was excellent across the three trials (Cronbach's alpha = 0.94 (first trial), 0.96 (second trial), 0.96 (third trial)). Thus, for further analyses, the satisfaction scores were calculated as the means of the satisfaction scale-items.

The key dependent variable, willingness to pay (WTP), was obtained using the BDM-method as suggested by Wertenbroch and Skiera (2002). The advantages of the BDM-method are that it is incentive compatible (i.e., customers have an incentive to truthfully reveal their WTP), realistic, transparent to respondents, and operationally efficient. In our study, subjects were told that they would have a chance to purchase the CD-Rom tutorial without investing more money than they wanted to. After using the CD-Rom tutorial and receiving feedback, subjects were asked to indicate a price for the CD-Rom, which should equal the highest price they were willing to pay for the CD-Rom within each trial. They were told that the price for the CD-Rom tutorial was not yet set and would be determined randomly from a prespecified distribution after the testing phase of the CD-Rom tutorial. If the randomly determined price was less than or equal to the subject's bid, the subject had the obligation to buy the CD-Rom tutorial at the randomly determined price. Further, if the randomly determined price was higher than their bid, they would not have a chance to buy the product. This mechanism ensures that subjects had no incentive to indicate a price which is higher or lower than their true WTP.

In addition, several variables were collected as possible covariates: age, gender, income, budget for studying material, perceived pressure to buy the CD-Rom tutorial, price consciousness, value consciousness, and self-confidence. Analyses indicate that none of theses variables had any effects as covariates. Thus, they were dropped from further analysis.

6. Study 2 – Results

The hypotheses H1, H2a and H2b were tested with random coefficient regression models analogous to the ones used in study 1. The analyses were based on the data of the third trial (where satisfaction is the most cumulative). Thus, a random intercepts effect (u_j) was not considered. The results provide strong support for the hypotheses H1 and H2a and are shown in the right part of Table 5.

		WTP TRIAL 1			WTP TRIAL 2			WTP TRIAL 3		
LINEAR MODEL										
-2 Log Likelihood		940.9			916.2			915.4		
Solutions for fixed effects										
Parameter	**Effect**	**Estimate**	**t-value**	**p**	**Estimate**	**t-value**	**p**	**Estimate**	**t-value**	**p**
b_0	Intercept	2.902	2.320	0.022	2.326	2.120	0.036	1.426	1.360	0.177
b_1	CS	0.999	5.190	0.000	1.030	6.020	0.000	1.201	6.990	0.000
Solutions for random effect										
Parameter		**Estimate**	**Z-value**	**p**	**Estimate**	**Z-value**	**p**	**Estimate**	**Z-value**	**p**
σ^2 **(variance of** r_{ij}**)**		25.323	8.800	0.000	22.454	8.770	0.000	21.490	8.800	0.000
CUBIC MODEL*										
-2 Log Likelihood		939.1			910.5			908.3		
Solutions for fixed effects										
Parameter	**Effect**	**Estimate**	**t-value**	**p**	**Estimate**	**t-value**	**p**	**Estimate**	**t-value**	**p**
b_0	Intercept	9.044	22.500	0.000	8.515	22.720	0.000	8.296	22.790	0.000
b_1	CS	26.144	5.220	0.000	28.538	6.120	0.000	32.412	7.140	0.000
b_2	CS^2	-3.045	-0.610	0.545	6.375	1.360	0.175	3.533	0.780	0.438
b_3	CS^3	5.873	1.170	0.244	9.335	2.000	0.047	11.706	2.580	0.011
Solutions for random effect										
Parameter		**Estimate**	**Z-value**	**p**	**Estimate**	**Z-value**	**p**	**Estimate**	**Z-value**	**p**
σ^2 **(variance of** r_{ij}**)**		25.042	8.800	0.000	21.634	8.770	0.000	20.532	8.800	0.000

Note: * The results are based on orthogonal polynomials.

Table: Study 2: Results of Random Coefficient Regression Models Across Trials

First, within a linear model there is a positive and statistically significant relation between customer satisfaction and willingness to pay (b_1 = 1.201; $p < 0.0001$). Second, in the cubic model, the coefficient b_3 was positive and significant (b_3 = 11.706; $p < 0.05$)[9], which supports H2a. These results contradict hypothesis H2b which proposes an S-shaped function with decreasing returns at the margins.

Further, the cubic model contributes significantly more to the explanation of WTP than the linear model which is evidenced by a hierarchical likelihood ratio chi square test ($p < 0.05$). In line with this are the results for the Akaike's Information Criterion: the AIC value is smaller for the cubic model (918.3) than for the linear model (921.4). In sum, the cubic model is significantly stronger in predicting the willingness to pay than the linear model. These results provide strong support for the predicted inverse S-shaped function which is proposed in hypothesis H2a. Only the Schwarz Information Criterion BIC does not provide support for the superiority of the cubic model (938.6) over the linear model (935.6). On an overall basis, however, we feel that there is reasonable support for the inverse S-shaped function, since the rigid statistical likelihood ratio test indicates that the cubic model should be favored over the linear model.[10]

Similar to study 1, we conducted a mediation analysis as described previously which indicated that customer satisfaction completely mediated the relationship between quality and willingness to pay.[11]

Hypothesis H3 predicted that, as the customer satisfaction judgement moves from transaction-specific to cumulative, the impact on willingness to pay is strengthened. Satisfaction becomes more cumulative across the three trials as subjects gain more experience with the CD-Rom

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9 The estimation was based on orthogonal polynomial variables which eliminate the problem of multicollinearity in the cubic regression model.

10 Many researchers have argued that, in the case of nested models, model comparison should be based on the likelihood ratio test and that information criteria should be used in the case of nonnested models (Cohen et al. 2003; Kleinbaum et al. 1998). Since the two models we consider are nested, the result of the likelihood ratio test should be given the strongest emphasis.

11 The first regression analysis showed a significant effect of quality on willingness to pay (b_{qual} = 0.485; t = 6.855; $p < 0.0001$). The second regression indicated a significant effect of quality on customer satisfaction (b_{qual} = 0.843; t = 19.511; $p < 0.0001$). The third equation, in which willingness to pay was regressed on customer satisfaction in addition to quality, showed that customer satisfaction was significant (b_{sat} = 0.279; t = 2.145; $p < 0.05$), whereas the initially highly significant predictive ability of quality was eliminated (b_{qual} = 0.249; t = 1.911; p = 0.058). Thus, customer satisfaction mediated the link between quality and willingness to pay.

tutorial. As can be seen in Table 5, the parameter for the cubic effect becomes stronger over the three trials. However, a statistical test of hypothesis H3 involves an examination of the interaction between customer satisfaction and trial in the pooled model. H3 was tested with two random coefficient regression models – one for the linear and one for the cubic case. The first model tests hypothesis 3 on the basis of a linear relationship between customer satisfaction and willingness to pay:

$$(3) \qquad WTP_{ij} = b_0 + b_1 \cdot CS_{ij} + b_2 \cdot TRIAL_i + b_3 \cdot CS_{ij} \cdot TRIAL_i + u_j + r_{ij}$$

The model has four fixed (b_0, b_1, b_2, and b_3) and two random (u_j and r_{ij}) effects. The significant and positive interaction between CS and TRIAL ($b_3 = 0.076$; $p < 0.05$) provides empirical evidence that the slopes for CS increase substantially across trials. In a second step, we tested hypothesis 3 on the basis of a cubic relationship between customer satisfaction and willingness to pay:

$$(4) \qquad \begin{aligned} WTP_{ij} = {} & b_0 + b_1 \cdot CS_{ij} + b_2 \cdot TRIAL_1 + b_3 \cdot CS_{ij} \cdot TRIAL_1 + b_4 \cdot CS_{ij}^{\,2} + b_5 \cdot CS_{ij}^{\,2} \cdot TRIAL_1 + \\ & b_6 \cdot CS_{ij}^{\,3} + b_7 \cdot CS_{ij}^{\,3} \cdot TRIAL_1 + u_j + r_{ij} \end{aligned}$$

The analysis was based on orthogonal polynomials and provides additional support for hypothesis 3. Most importantly, the interaction between the cubic term of customer satisfaction and trial is positive and significant ($b_7 = 2.491$; $p < 0.05$). This provides empirical evidence that the nonlinear effect of customer satisfaction on willingness to pay is more pronounced in later trials. Figure 3 shows the graphs of the estimated cubic regression models in the second and the third trial (results for the first trial were not significant). These results support hypothesis H3.

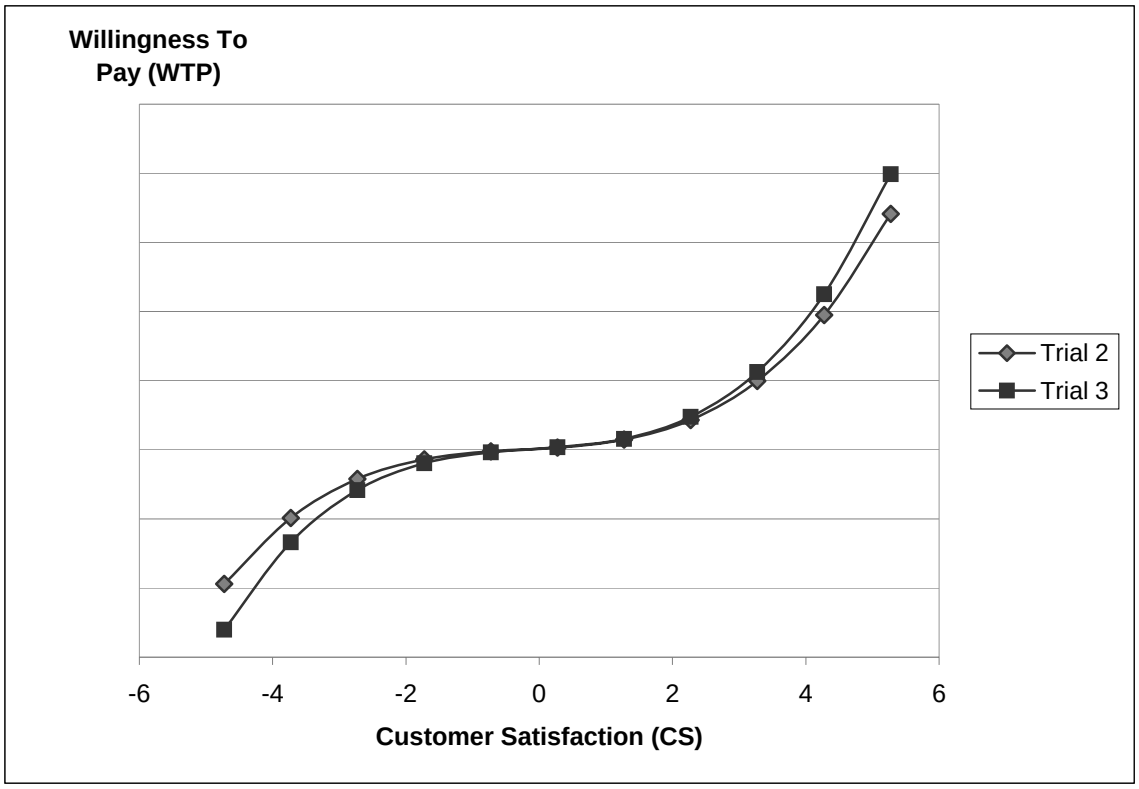

Figure 3: Study 2: Empirical Relationship between Customer Satisfaction and Willingness to Pay

7. Discussion

7.1. Research Issues

The first objective of our study was to examine whether there is a (positive) relationship between customer satisfaction and willingness to pay. Our findings reveal strong support for such an effect. It is interesting to compare the results of the present study to research by Bolton and Lemon (1999) which focuses on the concept of 'payment equity'. Their findings suggest that customers seek to maintain payment equity over time by adjusting items under their control (in this case, usage levels) in response to changes made by the company (i.e., price changes, changes in service quality). The current study extended this work by identifying another aspect under the customer's control which can be used to restore equity – the willingness to pay. Both of these studies illustrate the usefulness of equity theory in understanding the relationship between pricing issues and satisfaction.

The second objective was to investigate the functional structure of the relationship between customer satisfaction and willingness to pay. Our findings provide support for the function predicted by research on emotions in the customer satisfaction experience and disappointment theory (Bell 1985; Loomes and Sudgen 1986; Oliver, Rust, and Varki 1997; Rust and Oliver 2000) which suggests that the functional structure should have an inverse S-shaped form being concave for low satisfaction levels, convex for high satisfaction levels, and relatively flat for medium satisfaction levels. While the first experimental study found empirical evidence for the inverse S-shaped function based on a within-subjects design, the second study replicated it relying on a between-subjects design.

From an academic perspective, it is interesting to find that the strongest impact of customer satisfaction on willingness to pay is at the extremes of the satisfaction distribution. This finding is important because most of the previous research implicitly or explicitly assumed a linear relationship between customer satisfaction and behavioral outcomes. More specifically, the results offer an advanced analytical understanding of the relationships in the satisfaction-profit chain and give additional insights into the positive impact of customer satisfaction on profitability.

Such insight is important for future research which might look at optimal levels of customer satisfaction (Kamakura et al. 2002) and which might develop analytical models related to this issue (i.e., develop a "customer satisfaction calculus"). Such modelling approaches would need to integrate the effects of customer satisfaction on loyalty and willingness to pay as well as the cost implications of increasing customer satisfaction. The focal point of such models would then be to identify optimal satisfaction levels in terms of the benefit-cost relationship. It is obvious that a precise understanding of the functional form of the relationship between customer satisfaction and its outcomes is crucial for developing such models. In addition, it would be interesting to examine the possibility that at an upper level threshold or point WTP could level off. However, as mentioned earlier, in most situations, it seems very unlikely that products and services reach the very extreme levels of delight or disappointment needed to produce this effect.

Our study's third objective was to investigate the impact of transaction-specific and cumulative satisfaction on willingness to pay. The results indicate that the relationship between customer satisfaction and willingness to pay is stronger, the more the customer satisfaction

judgment moves from transaction-specific to cumulative. These findings show the importance of building up cumulative customer satisfaction (Olsen and Johnson 2003).

One potential limitation of study 1 could be that of "common method bias" (i.e., all measures are acquired with the same instrument). However, in study 2, we reduced this problem substantially by employing the BDM-method to assess WTP (Wertenbroch and Skiera 2002). The BDM-method has the advantage that it measures WTP as a behavioral outcome variable and that customers have an incentive to truthfully reveal their WTP. This should lessen the common method bias problem substantially.

Clearly, our study represents only a first step into the study of relationships between customer satisfaction and price-related constructs. A number of suggestions for interesting future research can be drawn from this initial study. A first issue is whether there are potential moderators which could strengthen or weaken the relationship between customer satisfaction and willingness to pay. For example, one might hypothesize that the relationship is weaker in highly competitive markets as opposed to situations of low competitive intensity.

Additionally, future research should explore the relationship between customer satisfaction and other price-related constructs. As an example, it would be interesting to study the impact of customer satisfaction on customers' reactions to price changes. One might hypothesize that negative reactions to price increases will be weaker for highly satisfied customers as opposed to moderately satisfied customers. It would be also interesting to examine customers' perceptions regarding price changes. For example, customers may infer different types of motives (both positive and negative) whenever they encounter a price change (Campbell 1999). An interesting topic for research would be whether the level of customer satisfaction influences the degree to which positive or negative motives are inferred.

Furthermore, future research could analyze the nature of the flat part of the functional relationship between satisfaction and willingness to pay in more detail. It seems plausible to argue that this area is centered around a point of zero disconfirmation. Future research might test this assumption by conducting a study which specifically has a no disconfirmation condition.

7.2. Managerial Implications

Our research supports the managerial belief that "satisfied customers – those receiving higher quality service or who feel better about the product – are, in fact, willing to pay more for it" (Finkelman 1993, p. 25) and that this relation is nonlinear. These findings have important implications for setting prices and for investments in customer satisfaction.

Our findings suggest that the satisfaction level of the customer could influence a company's pricing strategy. Specifically, companies may be more able to charge a premium price for their product or service if they have a high level of satisfaction in their customer base. It is important to note that this does not mean selectively charging more satisfied customers a higher price; rather, that having a large segment of highly satisfied customers may enable a company to charge higher prices in general.

Moreover, there are situations where companies may be able to charge higher prices to highly satisfied customers. While this is typically not applicable in consumer goods marketing it certainly constitutes an option in markets where prices are not standardized, but negotiated with individual customers. This is the case, for example, in the marketing of customized products or professional services. Applying our findings to these environments tells managers that high levels of satisfaction gives them a stronger position in price negotiations with their clients.

Moreover, the specific functional structure found in our study is also relevant for managers. More specifically, the finding that marginal payoffs from increasing customer satisfaction *increase* if satisfaction is above the inflection point implies that (unlike in situations where we have decreasing marginal returns) it may be suitable to aim at very high levels of customer satisfaction.

It is worth emphasizing though that generating high levels of customer satisfaction often involves significant costs. Managers therefore need to consider whether it is financially viable to strive for very high levels of customer satisfaction for certain customers or customer segments. A possible consequence of such considerations is that firms differentiate with respect to the aspired level of customer satisfaction. More specifically, companies might strive for very high levels of customer satisfaction (i.e., satisfaction levels in the steep part of the curve) among their highly valuable customers but accept a lower level of satisfaction (possibly in the left part of the flat area of the curve) for their less valued customers.

Finally, our results suggest that approaches to measuring and enhancing customer satisfaction should focus on cumulative satisfaction rather than transaction-specific satisfaction. In business practice, many companies measure customer satisfaction based on specific transactions (i.e., the most recent purchase or service encounter). Our findings suggest that longer term cumulative satisfaction is more relevant since it is the stronger driver of customer behavior (which in this case was willingness to pay).

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