

Jörg Henseler/Ellen Roemer*

“LET’S WAIT AND SEE!” THE REAL OPTION TO SWITCH AS A NEW ELEMENT OF CUSTOMER VALUE**

ABSTRACT

We suggest that a customer’s option to switch suppliers, and to wait and see before switching, adds to customer value in uncertain markets, and affects the customer’s switching behavior. We use a real options model to examine the value of this option and conduct sensitivity analyses based on data collected from the German public health insurance market to support our argument. We elaborate on the customer value construct and show how it contributes to customers’ behavioral loyalty. We also provide guidelines for managers of in-suppliers and out-suppliers on how to use the value of customers’ option to switch, e.g., for pricing decisions and management of customer churn.

JEL Classification: M31.

Keywords: Customer Loyalty; Customer Relationships; Customer Value; Real Options; Switching Behavior; Uncertainty.

1 INTRODUCTION

In the early 1990s, marketing researchers started shifting their focus from the precipitation of exchange transactions to the facilitation of buyer-seller relationships. Together with the conceptual and empirical progress in relationship marketing (Sheth and Parvatiyar (1995)) and the growing empirical evidence of a loyal customer base’s merits (Reichheld and Sasser (1990)), the concept of customer loyalty has undergone rigorous scientific investigation. Marketing researchers have now identified various drivers of customer loyalty, such as customer satisfaction (Fornell, (1992); Ganesan (1994); Gar-

* Jörg Henseler, Institute for Management Research, Radboud University Nijmegen, Thomas van Aquinostraat 3, 6525 GD Nijmegen, The Netherlands; ISEGI, New University of Lisbon, Portugal. Ellen Roemer, Hochschule Ruhr West, Mellinghofer Str. 55, 45473 Mülheim an der Ruhr, Germany; Bradford University School of Management, United Kingdom.

** Both authors contributed equally and are listed in alphabetical order. The authors thank Nina Reynolds, Martin Natter, Thorsten Wiesel and two anonymous reviewers for their helpful comments. We dedicate this article to Mario Rese, who unexpectedly passed away on March 2013. He has strongly inspired this research.

barino and Johnson (1999)), customer trust (Sirdeshmukh, Singh, and Sabol (2002)), switching costs (Morgan and Hunt (1994); Wathne, Biong, and Heide (2001)), service quality (Brady and Robertson (2001); Zeithaml, Berry, and Parasuraman (1996)), and lower prices (Cannon and Homburg (2001)). In particular, the customer value construct plays a pivotal role in explaining the creation of loyalty in relationships (Liu, Leach, and Bernhardt (2005); Nijssen, Singh, Sirdeshmukh, and Holzmüller (2003); Ulaga (2001)) and has demonstrated to mediate the effects of customer satisfaction and customer trust (Sirdeshmukh, Singh, and Sabol (2002)). In accordance with the social exchange theory, Grisaffe and Kumar (1998) argue that as long as the customer's perceived value of the current supplier is higher than that of any other supplier, the customer will stay in a relationship and remain loyal.¹

Although the marketing literature has enlightened the role of value for customer switching behavior, several shortcomings remain. First, research on the nature of customer value has been predominantly empirical/descriptive in nature (cf. Woodall (2003); Ulaga and Eggert, (2006)); it has not been developed from more rigorous mathematical theory. Second, the literature on customer value and customer switching behavior leaves some blank spots. For instance, it fails to explain the frequently observed phenomenon that customers tend to stay in unattractive or unsatisfactory relationships with one supplier, although they could have other, more valuable relationships with other suppliers within the product category. When, for instance, comparing the Belgian, Israeli, German, Dutch, and Swiss social health insurance markets, in their 2004 study Laske-Aldershof et al. found that in Germany, consumers were only moderately inclined to switch even though they could generate higher value by switching health insurance providers. Similarly, Lambrecht, Seim, and Skiera (2007) find a strong preference among customers of high-speed Internet connections to remain with their current provider. A look at the volatile electricity market shows that although "... companies exhibit deficits with regard to corporate reputation and customer satisfaction" (Walsh, Dinnie, and Wiedmann (2006)) very few households switch suppliers (Kranhold (1997); Bundesnetzagentur (2010)). These empirical findings suggest that customer loyalty has antecedents, probably overlooked value components, other than those that have traditionally been discussed in the marketing literature. Third, current models of customer switching behavior are largely static in nature. Static models ignore customers' responses to uncertainty in dynamic markets and cannot represent intertemporal choice. In particular, static models are unable to account for the finding that customers stay in relationships when the benefits of switching outweigh the costs (Schlesinger and Schulenburg (1993)). Finally, research has ignored flexibility as a potential component of customer value. Research disregards the fact that customers can defer their decisions on whether to stay or to switch suppliers. By doing so, customers can learn more about the current and other potential supplier offerings, especially when market prices are uncertain.

In this paper we contribute to filling these gaps in the marketing literature. We follow Schlesinger and Schulenburg's (1993) suggestion of using "... some type of 'option

1 Throughout the paper, we use customer loyalty as an antonym for customer switching behavior.

value' for delaying a switch" by conceptualizing the option to switch as a new component of the customer value construct. This new component reflects the inherent uncertainty in customer value and the customer's flexibility in reacting to it. Hence, we add a dynamic perspective to the customer value construct.

Moreover, to examine this option we use rigorous mathematical modeling from capital market theory. Using an empirical example from the German health insurance market, we illustrate a practical approach to determine the option value and we demonstrate that the option value can be substantial. In this same vein, we also examine the relative influence of several key drivers on the option value.

In addition to these theoretical contributions, we also offer insights for marketing management. Taking into account customers' option to switch helps managers better explain and predict customer value, loyalty, and ultimately, their switching behavior when faced with uncertainty. We demonstrate that managers can exploit customers' appreciation of the value of flexibility and how customers can determine this value. Thus, our approach also lays the foundation for a value-based segmentation of customers, because customers with different planning horizons and perceptions of uncertainty distinguish different values of the option to switch, and therefore differ in their likelihood to exercise the switching option. Since we identify uncertainty as a pivotal driver of customer value, managing uncertainty, e.g., by means of price changes or market communication, should become an integral part of the marketing mix. In contrast to the traditional, predominantly negative view of uncertainty in marketing management, we propose that uncertainty should not, per se, be regarded as negative, but as a potentially valuable tool for incumbent providers to retain customers or to impose higher prices. We intend our paper to serve as a basis for more deliberate and precise managerial decision-making, particularly for pricing decisions and the management of customer churn.

To provide a foundation for customer switching behavior driven by the option to switch we develop three propositions. Based on these propositions, we offer suggestions to managers who either strive to generate customer loyalty or who want to make pricing decisions that are based on their assessments of the whole value delivered to customers. The paper proceeds as follows. In Section 2 we provide a brief literature review of the customer value construct and how it impacts customer switching behavior. In Section 3 we introduce the real options framework to model uncertainty in the customer's switching calculations. Thus, we demonstrate the effect of this option by using a switching model. This model draws from Margrabe's (1978) initial model to exchange one risky asset for another, in which we use the suppliers' offerings as the risky assets. In Section 4 we apply the model to the German health insurance market and illustrate the impact of the option to switch suppliers on the customer value. A sensitivity analysis shows how the different option parameters can influence the option value. Section 5 concludes with the theoretical and managerial implications and a discussion of the study's limitations and possible extensions.

2 LITERATURE REVIEW

2.1 CUSTOMER VALUE

The relationship marketing literature is increasingly focused on the customer value construct. In business and services marketing, the customer value construct has emerged as a major key determinant of customer relationships (Agustín and Singh (2005); Nijssen, Singh, Sirdeshmukh, and Holz Müller (2003); Ulaga, (2003)). Researchers such as Anderson and Narus (2004), Kumar and Grisaffe (2004), Ravald and Grönroos (1996), Ulaga and Eggert (2006), Woodruff (1997), and Zeithaml (1988) define customer value as the outcome of an evaluation in which the customer weighs a relationship's perceived benefits against the sacrifices.² Usually, scholars view customer value as a multidimensional construct. Chiu, Hsieh, Li, and Lee (2005) differentiate between utilitarian and hedonic value in the customer value construct. In contrast to other researchers, they focus solely on the customer value's benefit dimension. Woodall (2003) considers a "rational value for the customer" as a construct of an essentially utilitarian nature. As a starting point, customers use a price benchmark, which could be a price band, a maximum price, and/or a market price. By taking the perceived benefits as well as the price benchmark into account, customers form an idea of a "fair" price.

After an extensive literature review, Woodall (2003) also provides an overview of the components of benefits and sacrifices. Not only do benefits consist of product attributes, which represent product and service quality, core product and added service features, and customization, but they also comprise product outcomes, which represent strategic, personal, social, practical, and financial benefits. Sacrifices can be monetary or nonmonetary. Monetary sacrifices inevitably incur costs (i.e., price, and also search, acquisition, opportunity distribution, learning, use, maintenance, and disposal costs), but nonmonetary sacrifices include not only relationship and psychological costs, but also costs in time and effort.

Ulaga (2001) finds that the customer value construct is an important antecedent of customer loyalty in relationships. Drawing on social exchange theory, Nijssen, Singh, Sirdeshmukh, and Holz Müller (2003) develop the satisfaction-trust-value-loyalty model, in which value serves as the ultimate explanatory variable of loyalty. On the whole, empirical evidence shows that customer-perceived value has a significant influence on customer loyalty (see, e.g., Agustín and Singh, (2005); Lam, Shankar, Erramilli, and Murthy, (2004)). Chiu, Hsieh, Li, and Lee (2005) find that the utilitarian value component has a higher impact on loyalty than does the hedonic. Spiteri and Dion (2004) find that in business markets, customer value correlates significantly with end-user loyalty.

2 We use the term customer value in the sense of value *for* the customer throughout this manuscript (cf. Sinha and DeSarbo (1998); Ulaga and Eggert (2006); Woodruff (1997); Zeithaml (1988)). It should not be confused with customer value as a short form of customer lifetime value, which is the value *of* the customer from the seller's perspective (cf. Palmatier (2008)).

2.2 SWITCHING OPTIONS

In the real options literature, researchers have studied switching options as a combination of options to sell a real asset (put option) and to buy a real asset (call option). Based on entry-exit models (Brennan and Schwartz (1985); Dixit (1989)) academics have developed various switching models. Switching options investigate the question of when it is optimal to switch production inputs (Kulatilaka (1993)) or outputs (Kulatilaka and Trigeorgis (1994)), markets (Dasu and Li (1997)), or relationship partners (Kamrad and Siddique (2004)).

Complementing the customer value and customer loyalty literature, marketing scholars focus on customer switching behavior. For example, academics identify different antecedents of customer switching behavior in empirical studies (e.g., Heide and Weiss (1995) for organizational customers in uncertain high-technology markets or Keaveney (1995) for customers in services industries). In addition, a major portion of marketing literature investigates switching costs (Jackson (1985); Heide and John (1988); Heide and John (1990); Weiss and Anderson (1992); Morgan and Hunt (1994); Heide and Weiss (1995); Wathne, Biong, and Heide (2001)). These costs can be split up into costs of exit and entry. To exit a current relationship, a partner may have to incur transaction costs (Stewart (1998)), contractual costs (Weiss and Anderson (1992)), costs of negative feedback (Weiss and Anderson (1992)), and the loss of specific assets (Wathne, Biong, and Heide (2001)). To enter into a new relationship, the buyer may incur transaction costs such as search and evaluation costs (Stewart (1998); Wathne, Biong, and Heide (2001)). In addition, the buyer may have to dedicate set-up investments to the new partnership. These investments might include investments in lasting physical assets, human assets, and/or business procedures (Jackson (1985); also Harrigan (1980)). Switching costs make customers stay in relationships and prevent them from switching to outside suppliers. At the same time they reduce the value of the option to switch suppliers.

In the literature on the customer value construct, the value of the option to switch has received scant attention. However, scholars acknowledge that customers prepare for the future and utilize an anticipated customer value in their decision-making. For example, Bolton, Kannan, and Bramlett (2000) highlight that "...customers make repatronage decisions on the basis of their predictions (i.e., expectations) concerning the value of a future product / service." It is precisely this anticipation of future circumstances that makes customers defer their ultimate switching decision if there is uncertainty in the market.

3 THE CUSTOMER'S REAL OPTION TO SWITCH SUPPLIERS

Because real options analysis originates from the field of finance, it has only recently received more attention in the marketing discipline. It has helped to model phenomena such as the offering of perishable goods (Finch, Becherer, and Casavant (1998)), the evaluation of strategic investments (Slater, Venkateshwar, and Zwirlein (1998)). Other studies examine the supplier's perspective on customer-lifetime value (Haenlein,

Kaplan, and Schoder (2006); Hogan and Hibbard (2002); Levett, Page, Nel, Pitt, Berthon, and Money (1999); Roemer (2007)). In this paper we apply real options analysis to investigate the customer value construct from a customer's perspective.

A real option denotes a particular representation of a financial option. Generally, a financial call option on an asset "... gives the right, with no obligation, to acquire the underlying asset by paying a prespecified price (the exercise price) on or before a given maturity" (Trigeorgis, 1996). In contrast, a put option "... gives the right to sell (or exchange) the underlying asset and receive the exercise price" (Trigeorgis, 1996). For financial options, the underlying asset might represent a stock, a bond, or an index. Analogous to financial options, a "... real option is the right, but not the obligation, to take an action ... at a predetermined cost ... for a predetermined period of time" (Copeland and Antikarov (2001)). Investors usually hold many different kinds of real options, since they may be able to defer, expand, contract, abandon, or otherwise modify an investment project at various stages of its life cycle. This flexibility allows them to take advantage of a favorable future and uncertain conditions, or to minimize losses if market conditions deteriorate. Real options capture the value of the flexibility in investment projects.

Investors are interested in assessing the value of their options. Therefore, in the beginning of the 1970s, Black and Scholes (1973) and Myers (1977) developed option-pricing models to measure the value of financial options. These models determine the present value of an option to buy or sell an uncertain asset in future. Since this valuation issue can be transferred to real investments, an investor can also use these option-pricing models to value real investment projects that are affected by uncertainty. (We note that we use the terms "value" and "present value" interchangeably in relation to real options.) Therefore, scholars in finance use option pricing methods to assess real investment projects under uncertainty. This method is known as "real option analysis" (Dixit and Pindyck (1994); Trigeorgis (1996); Trigeorgis and Mason (1987)).

The concept of real options is wholly appropriate for analyzing loyalty in customer-firm relationships. Transferred to the analysis of loyalty in relationships, real options give customers the right, but not the obligation, to switch suppliers when prices in the market are uncertain. Moreover, if a supplier's price for a product or service fluctuates, the customer can wait and see how prices develop. In future, the customer can then make the optimal decision whether to stay with a supplier or switch to a new one. Generally, customers can maximize their customer value by deciding on whether or not to exercise their real options to switch.

Underlying the real options framework, there are some assumptions to observe for our analysis. In real options analysis, individuals act under uncertainty, i.e., they are usually able to foresee a certain set of future states. For each future state, the individual can assign different probabilities, which enables that person to perform a discounted value analysis. Moreover, we assume that the individual will behave rationally and therefore will choose the option that maximizes his or her customer value.

These assumptions about customer behavior have also been used as economic primitives underlying customer behavior. Individuals can be viewed as utility maximizers who evaluate products and services as bundles of characteristics and who act based on expected utilities, taking into account the time value of money. In addition to these assumptions, real options models typically assume ideal market conditions (Schäfer (1997)):

- Prices are common knowledge to all individuals and they are independent of an actor's disposition.
- All individuals have homogeneous expectations and are risk-averse.
- There are no transaction costs of searching, information, and enforcement.
- There are no taxes.
- Risk-free interest rates are known and constant over time.

Although these assumptions may appear to be somewhat abstract, they can be justified for our analysis and application of real options analysis. According to Grewal, Iyer, Krishnan, and Sharma (2003), the transparency of price information available on the Internet obviates the traditional information asymmetry that exists between the buyer and the seller. Therefore, it is plausible to assume that prices, e.g., for health insurance, energy or mobile phone tariffs, are available to everyone and thus are common knowledge. Moreover, these prices are independent of an individual's personal inclinations, since they are a result of market forces. Because information on prices is widely available to all individuals, we can suspect that expectations on prices will be similar³. Moreover, individuals are risk-averse actors, i.e., they regard losses as having more impact than equal-sized gains (Kahneman and Tversky (1979)). Further, we can abstract from taxes for simplification, since taxes seem to be a less important factor in customers' decision-making. And we can assume that transaction costs can either be regarded as switching costs or otherwise are minimal. Apart from switching costs, which we explicitly take into account, we treat markets as frictionless. Because of the efficient distribution of financial information on the Internet, it is also possible that risk-free interest rates are known to individuals (e.g. interest rates on long-term bonds). These interest rates are largely stable over time, although there may be slight variations. In our analysis, we abstract from these variations.

To explore the real options value to switch suppliers (W) as a new element of customer value, in addition to those already identified in the marketing literature, we consider the following findings. According to Cannon and Homburg (2001) and Ulaga and Eggert (2006), the net customer value (NCV) equals the expected difference between the customer's benefits and the customer's costs that result from an exchange with a supplier.

In addition to the traditional conception of NCV, we consider that future benefits and/or costs are uncertain. In particular, we incorporate fluctuating prices into the NCV construct. Therefore, NCV is no longer a static construct, but serves as a net present value (NPV) in which the customer projects different NCV scenarios and discounts them to the present date (Hogan (2001)).

3 We assume that expectations are homogeneous, although in reality they may deviate from each other.

Because NCV is affected by uncertainty, flexibility becomes valuable for customers if they choose to wait and/or switch suppliers. Therefore, in an environment that is affected by uncertainty, the value of the flexibility to switch suppliers is an additional important element of the customer value construct. Therefore, we add an option premium W to the net customer value construct. The total customer value (CV), as perceived by the customer, is then:

$$CV = NCV + W. \quad (1)$$

The option premium W consists of a deterministic component (actual switching value) and a stochastic component (value to defer). The actual switching value is the net profit that a customer could gain from immediately switching suppliers. It represents the intrinsic value of the real option to switch. We calculate the actual switching value as the difference between the new, and the incumbent, supplier's NCV minus switching costs. The value to defer represents the time value of the real option to switch. The time value stems from the customer's possibility to wait before deciding to switch suppliers and thus gather new information on the market and learn how prices develop. This new information is valuable to the customer since he or she can make better, value maximizing decisions with the new information than without the information. The unique time value is also captured in real options to defer. To account for the two components of W , we alter Equation (1) to

$$CV = NCV + \text{actual switching value} + \text{value to defer} \quad (2)$$

Although the actual switching value is relatively easy to determine, the value to defer is a much more complex challenge. Margrabe's (1978) option model for exchanging one risky asset for another is a suitable approach to determine both switching option components. This model provides a solution to assessing a real option to switch between two different suppliers whose delivered net customer values are uncertain. In financial terms, this model represents a combination of a put option, i.e., the abandonment of the incumbent supplier, and a call option, i.e., the start-up of a relationship with a new supplier.

To understand the model, we assume that a customer has a relationship with a supplier A. The prices of the products or services that the supplier provides fluctuate over time. Other customer value elements, such as the customer benefits, remain constant. Consequently, the customer's net value from the relationship with supplier A (NCV_A) is uncertain. We use Margrabe's (1978) switching option model to analyze the customer's value to switch suppliers. The Appendix contains the formal derivation of the formula. *Table 1* summarizes the factors that have an impact on the real switching option's value and their contribution to the option value W .

Table 1: Option Value Components

Parameters	Element of W
NCV from the existing insurer (A)	Actual Switching Value
NCV from the new insurer (B)	Actual Switching Value
Switching costs (K)	Actual Switching Value
Time to maturity (t^*)	Value to defer
Volatility premium rates current insurer A (σ_S)	Value to defer
Volatility premium rates new insurer B (σ_R)	Value to defer
Correlation between σ_A and σ_B (ρ_{AB})	Value to defer

4 A CASE ANALYSIS OF SWITCHING OPTIONS IN THE GERMAN PUBLIC HEALTH INSURANCE MARKET

4.1 GENERAL

In this section we use a numerical example to answer the questions of what the value is of the option to switch suppliers in a real market setting, how substantial the value is of the option to switch suppliers, and how the input factors influence the value of the option to switch suppliers, and to illustrate the real options approach.

We also use a sensitivity analysis to demonstrate the option value's behavior when input factors vary. The sensitivity analysis consists of seven different scenarios, including a base case (Scenario 1) and variations of this base case (Scenarios 2 to 7). Furthermore, the sensitivity analysis indicates the extent to which variations in the parameters, such as different suppliers' net customer values, time to maturity, volatilities, and switching costs, can lead to differences in customer value when compared to the base case.

Different markets, such as the mobile telephone, electricity or insurance markets, are suitable for computing the two components of the customer's value to switch suppliers by using Margrabe's (1978) option model. However, there are some conditions that should be met. Several characteristics make the German public health insurance market a particularly suitable example for modeling the customer's value to switch suppliers (Laske-Aldershof et al. (2004)). First, health insurance is a typical example of a continuously provided service (Bolton (1998)). The continuous nature of the service creates long-term customer-firm relationships. Such relationships continue automatically unless the customer explicitly terminates the relationship. Second, the market has a limited product differentiation. Optimally, the services supplied should offer homogeneous benefits, but they should differ in price. Third, the services' premiums vary strongly, ranging from 12.2% to 15.7% of an employee's gross income (data from 2004 as reported by Aldershof et al. (2004)). Fourth, consumers have the right, but not the obligation to switch insurers.

Although we choose health insurance for our analysis, we note that the model is applicable to a wide range of industries. For example, relationships between mobile phone service

providers and their customers comply with conditions similar to those mentioned above, e.g., mobile phone services are continuously provided and relationships are long-term, services are relatively homogeneous in nature, prices are transparent and vary constantly, and customers have the right to switch suppliers despite incurring switching costs. Our health-care case study can also be applied to the relationships between utilities (e.g., electricity, gas) and their customers, since their products and services are homogeneous and delivered on a continuous basis. The relationships can also be cancelled, but are mostly long-term in nature; and prices fluctuate constantly and are transparent to the customer.

By applying the switching option model to the example of the German public health insurance industry, we compute the base case.

4.2 BASE CASE

The point of departure for our base case is a health insurance customer whose gross monthly income is €3,000. Public health insurance companies in Germany charge a premium as a percentage of this income. The employee pays half of the premium, and the employer pays the other half. If the employee is a customer of the Allgemeine Ortskrankenkassen (AOK) Mecklenburg-Vorpommern, which charges a 14% premium (August 2005), the customer's monthly premium amounts to €210 ($€3,000 \times 0.14 \times 0.5$). The customer has a choice of several alternative suppliers. The Techniker Krankenkasse (TK) is an insurer that the customer believes offers similar services and coverage. TK charges a premium rate of only 12.8%, which equals a monthly premium of €192. Thus, the customer might see TK as the most attractive alternative, and use it as a benchmark. Since the value dimension is easier to trace than are pure cost savings, examining the net customer values is preferable to prices or cost savings arguments. If the benefits of the insurance service are quantifiable and amount to €1,000 for both insurers, then the net customer value of AOK Mecklenburg-Vorpommern equals €790 and that of TK €808. However, in our base case we do not consider switching costs.

The volatility of the premiums originates from factors that are inherent in the common market, such as the economic (e.g., unemployment rate) and political (e.g., regulation) situations, and from provider-specific factors, such as the insurer's contingency risk due to its customer base and pricing policy. As our proxy for the volatility in the premium rates of different health insurers in Germany for n months we use the standard deviation, which we define as

$$s = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (u_i - \bar{u})^2} \quad \text{with } u_i = \ln \frac{NCV_i}{NCV_{i-1}}. \quad (5)$$

We use monthly premium rates from January 1996 to December 2004 to estimate s . The premiums' volatilities per year are then s times $\sqrt{12}$. Deflating the premium rates by using the German Verbraucherpreisindex (VPI) leads to the estimated volatility

of real premiums. For the base case, the volatility of the current insurer AOK between January 1996 and December 2004 is very low ($\sigma_{NCV_A} = 1.52\%$), but TK's premium rates fluctuate more significantly ($\sigma_{NCV_A} = 4.36\%$). The correlation ρ_{NCV_A,NCV_B} between the premiums is 0.419.

If the AOK customer considers switching to TK in three months' time, so that $t^* - t = 0.25$, the value of the real option to switch W equals €19. W represents the customer's option to switch insurers and increases the total customer value. This value needs to be added to the customer's NCV to deliver the total customer value of €809. The actual value of switching is €18 in this case, which is the difference between the insurers' premiums and the customer's difference in net customer value. Moreover, W results from the customer's option to defer switching in the future and from the insurance premiums' uncertainty. In this case, the customer values the flexibility to wait and see how the different insurers' premiums will develop at €1 (value to defer), which is the difference between €19 and €18. *Table 2* presents an overview of the results of the base case, including its variations, Scenarios 2 to 7.

Table 2: Scenario Summary

Scenario	Parameter Values	Option Value
Base case		
1)	Expected NCV* from current insurer $A = € 790$ (premium rate 14.0%) Expected NCV from new insurer $B = € 808$ (premium rate 12.8%) Switching costs (K) = 0 Time to maturity = 3 months (0.25 year) Volatility of current insurer's rates (σ_{NCV_S}) = 1.52% Volatility of new insurer's rates (σ_{NCV_R}) = 4.36% Correlation between σ_S and σ_R (ρ_{NCV_S,NCV_R}) = 0.419	€ 19.02
Variations		
2)	Increased Time to Maturity Time to maturity = 12 months (1 year)	€ 23.64 ($\Delta = € 4.62$)
3)	Increased Volatility of Out-Supplier R Volatility of new insurer's rates (σ_{NCV_R}) = 7%	€ 21.77 ($\Delta = € 2.75$)
4)	Increased Volatility of In-Supplier S Volatility of current insurer's rates (σ_{NCV_S}) = 7%	€ 21.77 ($\Delta = € 2.75$)
5)	Increased Value of Out-Supplier R Expected NCV from new supplier $R = € 820$ (premium rate 12.0%)	€ 30.19 ($\Delta = € 11.17$)
6)	Increased Switching Costs Switching costs (K) = € 10	€ 11.08 ($\Delta = € -7.93$)
7)	Reduced Correlation between σ_{NCV_S} and σ_{NCV_R} Correlation between σ_{NCV_S} and σ_{NCV_R} (ρ_{NCV_S,NCV_R}) = -0.419	€ 19.61 ($\Delta = € 0.59$)

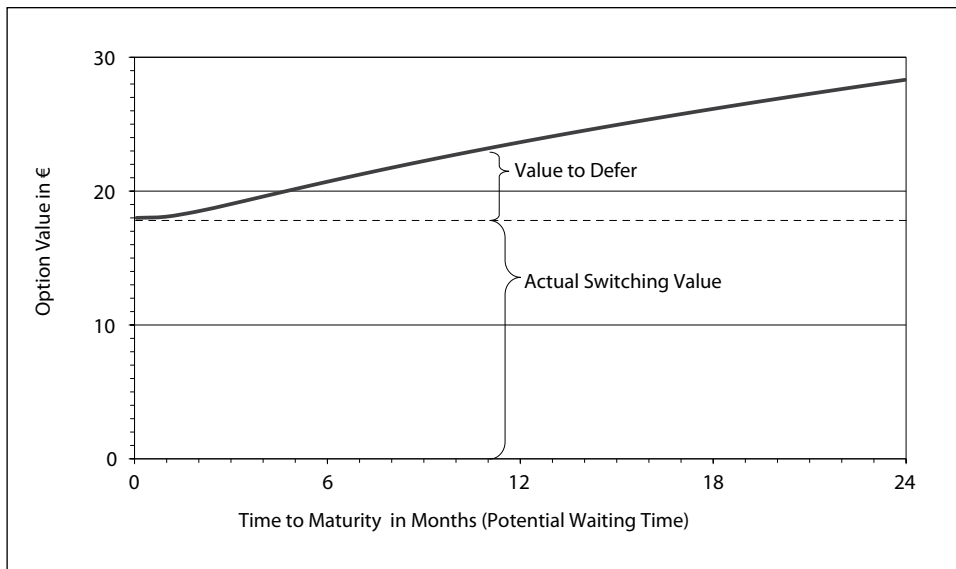
* NCV = Net Customer Value

4.3 TIME TO MATURITY

To study the impact of the different parameters on the option value and the customer value, we present six scenarios that differ from the base case. One input factor of the real options value is the time to maturity, which is the time the customer has to wait before being able to switch. Either the option holders themselves can determine the time to maturity by defining a future point in time at which they want to switch, and thus determine what period of time that they choose to wait, or factors outside the customer's control, such as legal constraints or contractually accorded periods of notice.

If the customer is prepared to wait a whole year before switching instead of three months, then the option value W increases to €24 (Scenario 2). This effect is typical of volatile markets. The longer the time that is available before switching to a new insurer, the more time there is for customers to observe the health insurance market and different insurers' premium rates. This waiting time provides customers with the opportunity to see how premium rates develop and to gather new information on competitive offers. This opportunity, in turn, adds to the value to defer switching to a future point in time. For a reduced time to maturity, for instance, zero, the option value declines to €18, which is exactly the difference between the two insurers' premiums. With increasing time to maturity to exercise the option, the value of the option to defer switching increases degressively. *Figure 1* shows the impact of increasing time to maturity on the real options value.

Figure 1: Option Value as a Function of Time to Maturity

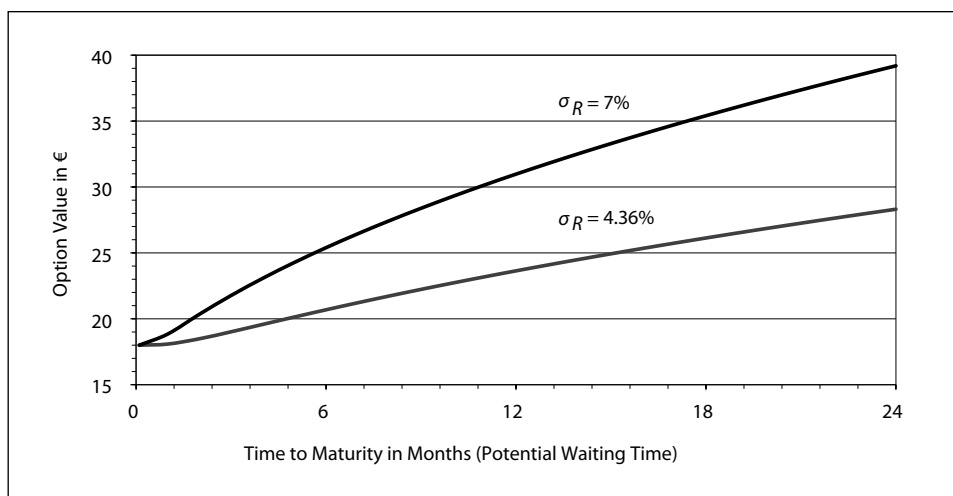


4.4 VOLATILITY OF INSURERS' PREMIUM RATES

Volatility represents the changes in insurers' premium rates. This volatility contributes to the customer's option value to defer switching and to see how the market develops before deciding to switch insurers. To illustrate these results, we present two scenarios with different levels of volatility. Scenario 3 illustrates a situation in which the new insurer's premium rates are more volatile than are those in the base case. When the new insurer's volatility reaches the level of 7% compared to the lower level of 4.4% in the base case, the value of the option to switch insurers increases to €22, compared to €19 in the base case. In Scenario 4, the incumbent insurer's premium volatility increases to 7%. Again, the option value W increases to €22 compared to €19 in the base case. In both cases, increased volatilities contribute to the value of deferring switching in W .

This positive association between volatilities and the option value is typical of real options analysis. Real options theory suggests that as long as a customer remains flexible, he or she can react and thus make use of this price uncertainty by responding to it. This argument is linked to the time-to-maturity argument, since the longer a customer's waiting time is, the higher the downside potential of the premiums will be. *Figure 2* illustrates the behavior of the real options value in relation to the increasing time to maturity of the new insurer B's different volatilities (base case volatility equals 4.4% and Scenario 3 equals 7%).

Figure 2: Option Value as a Function of Time to Maturity for Different Volatilities



4.5 INSURERS' PREMIUM RATES AND NCVs

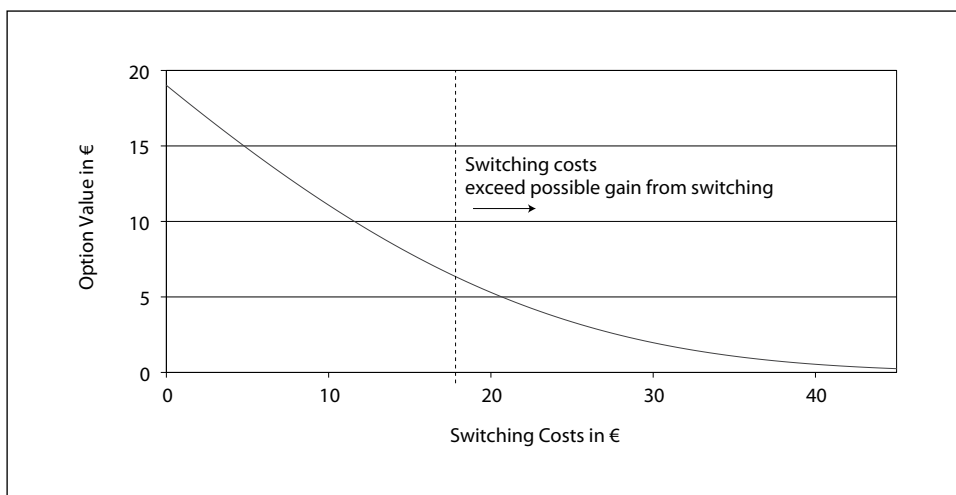
The insurers' premium rates have a direct impact on NCV, since the premium represents the customer's most important sacrifice. Therefore, cutting insurance premiums is equivalent to an increase in NCVs. Because the NCV is the underlying asset of the real option to defer switching, an increase in NCV affects the value of the option to defer switching. In Scenario 5, TK's premium rates might, for instance, fall to 12% compared to the base case. Hence, the expected net customer value from the new insurer will rise by €12 to €820. The value of the customer's real option to switch then equals €30. Further, the growth in one insurer's NCV (€12) results in a slightly smaller increase in option value (€11). Since changes in NCV directly affect the difference in value between the insurers, these effects have an impact on the actual switching value.

4.6 SWITCHING COSTS

We use an extension of Margrabe's (1978) model to investigate the effect of switching costs on the value of the option to switch insurers. If switching costs increase to €10 (Scenario 6), the value of the option to switch insurers is reduced to €11. Therefore, switching costs have an immediate negative impact on the actual switching value, since they directly reduce the attractiveness of switching to alternative insurers.

In *Figure 3*, the solid line shows the value of the option to defer switching and the area to the right of the dashed line in which the switching costs exceed the potential gain from switching insurers. Even if switching costs exceed the possible gain from switching suppliers, the value of the option to defer remains positive due to the value of deferring switching.

Figure 3: Option Value as a Function of Switching Costs



4.7 CORRELATION BETWEEN THE TWO INSURERS' PRICE PREMIUM VOLATILITIES

The correlation between the two insurers' price premium volatilities represents the degree of the insurers' NCV comovements. A high correlation indicates that price fluctuations result from common causes such as market characteristics. A low correlation signifies that price fluctuations depend on circumstances unique to each insurer.

Comparing the base case ($\rho_{NCV_A, NCV_B} = 0.419$) with Scenario 7, in which the correlation of the insurer's premium volatilities is zero ($\rho_{NCV_A, NCV_B} = 0$), highlights the consequences of suppliers' NCVs being uncorrelated. The decrease in correlation results in an increase in the option value (€19.61). A lower correlation has a positive impact on option values, since a customer can benefit most from switching when both volatilities are unrelated, and hence can profit from having exchanged one insurer for another.

5 DISCUSSION

5.1 IMPLICATIONS FOR THEORY

We believe that our paper has important implications for marketing theory, especially for relationship marketing, which deals with customer value and loyalty. We present the value of the option to switch as a new element of customer construct, which has so far received very little attention. Our study shows that two components contribute to this option value: the actual switching value and the value of deferring switching. The actual switching value relates to the difference in net customer value between two suppliers, which could be reduced by switching costs; the value of deferring switching is evoked by uncertainty about future prices. Customers can maximize their value of deferring switching by waiting, which results in behavioral loyalty in a relationship with a supplier. A large body of research, mainly rooted in relationship marketing (cf. Nijssen et al. (2003); Ravald and Grönroos (1996)) emphasizes the pivotal role that customer value plays in creating customer loyalty. Because customer value mediates the effects of all major customer relationship variables on customer loyalty (Sirdeshmukh et al. (2002)), we can deduce that ultimately the value of the real option to switch has a positive impact on customer loyalty. Therefore, we formulate the following proposition:

Proposition 1: *The more a customer values the option to switch, the more loyal the customer is.*

The value of deferring switching enhances the option value, since customers can wait and see how prices develop in uncertain markets. The longer the customer can wait and learn, the higher the value of this option will be. The higher the uncertainty of the suppliers' net customer values, the higher the value of the option to defer switching becomes. *Figure 2* illustrates the positive impact of volatility and time to maturity. These two input factors drive the value of deferring. Thus, the sensitivity analysis gives rise to the following propositions:

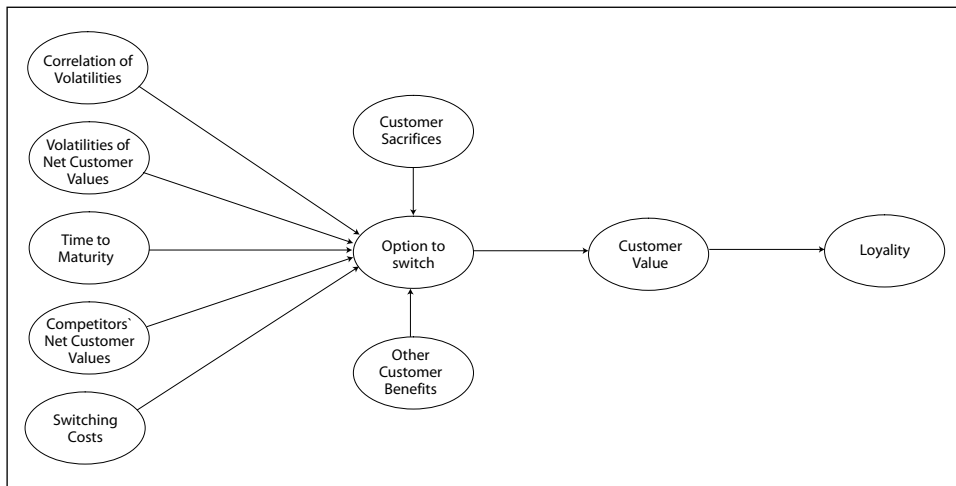
Proposition 2: *The higher the uncertainty about the future market development, the more a customer values the option to switch.*

Proposition 3: *The longer a customer can defer switching to a new supplier, the more the customer values the option to switch.*

These results are essential for the development of the customer value construct and for research on behavioral loyalty. Since the option to defer switching substantially enhances the customer value in the presence of uncertainty, option values need to be included as an additional component in the customer value construct.

Our paper illustrates the applicability of real options analysis as a new method for investigating customer value. By using this approach to assess the value of a customer's real option to switch from one supplier to another, the researcher can further elaborate the nomological network of the real option to switch in relationships. *Figure 4* depicts the nomological network of the real option to switch.

Figure 4: A Nomological Network for the Option to Switch



5.2 IMPLICATIONS FOR MANAGEMENT PRACTICE

The results of our study can have major importance for marketing management practice.

Suppliers can influence the actual switching value by changing the net customer value and/or switching costs. However, suppliers must differentiate between customers who truly appreciate the actual switching value and wish to retain this value, which they

will do by displaying behavioral loyalty, and customers who prefer to cash in on the actual switching value and benefit from switching suppliers rather than staying in the present relationship.

Customers who cash in are more focused on the immediate benefits. For them, the traditional implications hold true. The current supplier's aim is to reduce the customer's actual switching value by, for example, increasing switching costs, thus making switching less attractive (e.g., Morgan and Hunt (1994); Wathne, Biong, and Heide (2001)). For instance, the provider might include switching costs in the contract between the company and a customer by imposing a cancellation fee if the customer were to switch suppliers. Moreover, current suppliers could increase the benefits perceived by the customer by, for example, including new functional or symbolic benefits. The would-be suppliers pursue the opposite aim, increasing the actual switching value and making switching more attractive to this group of customers. Other possible means of achieving this aim are to reduce, or even assume, switching costs. Some service providers, such as banks, assume that the customer's switching costs increase actual switching values, so that customers are more likely to switch. Another method is to increase and communicate the higher benefits available from the would-be supplier, making the offer more attractive to the customer.

There are also other customers who appreciate the flexibility to switch, and who would like to retain this value as a part of their customer value. To preserve this value for these customers, current suppliers will try to increase or retain the actual switching value. Consequently, current suppliers might even reduce the switching costs or slightly increase prices, thus increasing both the actual switching value and the customer value. This implication runs counter to the traditional relationship marketing literature. To make use of this implication, there must be a group of customers who appreciate having the flexibility to choose a supplier. However, the value of this flexibility enhances the current customer value, which encourages customers to remain in relationships rather than switching immediately. Would-be suppliers can persuade such customers over to their side by making them aware of the actual value to be had from switching, which is only valuable in monetary terms if the customer actually switches suppliers. Would-be suppliers might use their communication strategies to stress the benefit of cashing in the actual switching value.

Both the uncertainty of future price developments and the time available to the customer to observe such developments can result in the value of deferring switching. Since the latter is a future value and customers cannot be directly reimbursed for this value, a distinction need not be made between whether customers truly appreciate the actual switching value or not. Price uncertainty benefits current suppliers, since customers who might wish to stay in the relationship would want to observe the market before switching. Current suppliers can use this effect in different ways. For example, they could try to influence and increase customers' perceptions of uncertainty in the market, perhaps by emphasizing uncertainty in their marketing communications. Moreover, they could try to induce uncertainty by frequently changing customer value parameters such as price. Another way of increasing the value of deferring switching would be to extend the customers' planning horizons for example, by increasing notice periods. A longer time to maturity increases a customer's preference for staying in relationships. Moreover, current suppliers should free themselves

from market trends, thus making it possible for them to reduce the correlation with other suppliers' NCV volatilities and to enhance the value of deferring switching.

Would-be suppliers are interested in ways to make customers switch. It is in their interest to camouflage the uncertainty. For instance, they could reduce the customers' *perceived* price uncertainty by communicating that they will not be receiving cheaper offers in future. Alternatively, the would-be supplier could offer a fixed advantage that is better compared to that of their competitor, such as "With us, you always pay x% less than with any competitor." In both these ways, would-be suppliers suggest to their potential future customers that they cannot maximize their value by deferring the switching decision. Moreover, would-be suppliers must communicate that deferring switching to the future is not worthwhile by, for example, limiting the time of special offers. This message will reduce the value of deferring switching and thus make customers switch at an earlier stage.

In addition, suppliers can try to assess customer values in monetary terms. To do so, information is necessary on the input variables to the customer value construct. In a business-to-consumer context, this information is usually not readily available for a large group of different customers. One solution might be to estimate a scope for the input variables and thus a scope for the customer values and switching option values. Another solution might be to estimate maxima for the cost components and minima for the benefit components of customer value so that a lower bound of customer value could be calculated. Such a monetary analysis of customer value might also serve as a basis for value-based segmentation.

In contrast, in a business-to-business context the information on the input variables to the model may be much more precise, since suppliers and customers often have close relationships and share confidential information. In this case, the current supplier can more easily calculate a specific monetary customer value. The supplier can then use that value to retain customers, e.g., by making it transparent to the customer and demonstrating the value of staying with an incumbent supplier (i.e., preserve value to defer switching). Or, if the company is a would-be supplier, it could demonstrate the value to the customer to cash in the actual switching value.

5.3 CONSUMER BEHAVIOR IN THE LIGHT OF THE REAL OPTION TO SWITCH

Customers' decisions to switch providers can be regarded as a specific problem of intertemporal choice. It has generated a substantial stream of research for almost 200 years (c.f. Rae (1834)). Although we use a business-to-consumer context for the simulation study, we take into account only market-level information. We do not explicitly model the consumer's choice. In particular, we model the *objective* value of the real option to switch. However, consumers will more likely base their behavior on the *perceived* value of the real option to switch, which can be different. This difference is attributable to two main reasons. First, consumers rely on available information, which may be imperfect, incomplete, and/or obsolete, to judge whether they can replace their current customer-firm relationship with one that is more valuable (Alba, Hutchinson and Lynch (1991); Kardes, (1994)).

Second, consumers differ substantially from utility maximizers, leading to anomalies in standard economic models. Loewenstein and Prelec (1992) identify four such anomalies: the common difference effect, the absolute magnitude effect, the gain-loss asymmetry, and the delay-speedup asymmetry. The common difference effect says that preferences between two delayed outcomes often switch when both delays are shifted by a constant amount of time. Thaler (1981) illustrates this effect with the following example: While some consumers would prefer to obtain one apple today over two apples tomorrow, no consumer would prefer one apple in one year over two apples in one year plus one day.

The absolute magnitude effect is that "... large dollar amounts suffer less proportional discounting than do small ones" (Loewenstein and Prelec (1992)). The gain-loss asymmetry refers to Thaler's (1981) finding that discount rates are much smaller for losses than for gains, and in many instances may even be negative. According to Zauberman (2003), "... [o]ne of the most established research findings on inter-temporal choice is that individuals behave as if they have high discount rates." Future gains have a much lower value than current gains, and must be relatively large in order to overcome current losses.

According to the delay-speedup asymmetry, consumers exhibit an asymmetric preference between speeding up and delaying consumption (Loewenstein (1988)), i.e. when people choose between immediate and delayed consumption, the reference point used to evaluate alternatives is likely to influence choice.

These asymmetries may have complex and interacting effects on the antecedents of the value of the real option to switch, such as time to maturity, discount rate, switching costs, and the value gained by switching providers. For instance, the switching costs and the value gained by switching providers may be affected by the common difference effect and the absolute magnitude effect. The discount rate is most probably subject to the gain-loss asymmetry; the time to maturity might be influenced by the delay-speedup asymmetry. Because of the compound nature of the real option to switch, it is not possible to predict the impact of all the consumer anomalies on the real options value as perceived by consumers. Empirical research is needed to disentangle the various, partially conflicting, effects to fully understand how the objective value of the real option to switch relates to consumers' evaluation of the option to switch.

5.4 LIMITATIONS AND EXTENSIONS

There are a few limitations to this study, which open up avenues for future research. We apply Margrabe's (1978) switching option model to the real options model for the value of a customer's option to switch suppliers in uncertain markets. Although the model fits well with the situation in which the customer switches suppliers, we note some limitations. First, the stochastic process assumed in Margrabe's model may be different from the uncertain NCV, which means that NCV may develop differently than we assume in our model. Second, although we have carefully derived the three propositions, empirical testing is desirable. Therefore, an interesting and necessary next step in this research could

be to empirically examine how customers perceive the value of the option to switch – including the two option value components of actual switching value and value of deferring switching – and how this value causes loyalty.

Future analyses could include different types of real options in relationships, and subsequently extend the range of applications of real options analysis in marketing and beyond. In business research, there are also other types of real options that are worth exploring in more detail, such as the option to expand or contract relationships, or to defer investments in relationships. Thus, future work in business research might strongly benefit from real options analysis as a tool that supports the analysis of both companies' and consumers' decision-making in the face of uncertainty.

APPENDIX

To model the uncertainty of health insurance premiums and thus uncertainty in the net customer value in the relationship with supplier A (NCV_A), we use a stochastic process that moves up and down in continuous time with an upward trend, since it is likely that health insurance premiums grow in the long run due to increasing price levels of medical services and pharmaceutical products and because of a higher average age of patients. A stochastic process that reflects these characteristics is a geometric Brownian motion with drift, which is typical of the modeling of uncertainty in real option analysis:

$$dNCV_A = \mu_{NCV_A} NCV_A dt + \sigma_{NCV_A} NCV_A dz_{NCV_A}. \quad (3)$$

In this formula, μ_{NCV_S} denotes the expected growth rate of NCV_S . The standard deviation of NCV_S , which is σ_{NCV_S} , characterizes the expected volatility of NCV_S , and dz_{NCV_S} is the increment of a standard Wiener process with $dz_{NCV_S} \sim N(0, dt)$. When the process starts, the net value from supplier S is known as of day 1. However, future values are lognormal distributed so that supplier S 's value can never be negative. Otherwise, the customer would exit the relationship. Moreover, the variance of NCV_S grows linearly over time, thus reflecting higher variance of forecasts the further forecasts are projected into the future.

Furthermore, we assume that there is at least one alternative supplier, so that the customer has the option to switch to a new supplier R whose price is also affected by uncertainty. The customer perceives that supplier R 's offering is identical except for the prices, which may differ. As the price of the product/service fluctuates, we can model the net customer value from the new supplier R (NCV_R) in analogy to Equation (3) with μ_{NCV_R} as the expected growth rate of NCV_R , σ_{NCV_R} as the expected volatility in NCV_R , and dz_{NCV_R} as the increment of a standard Wiener process with $dz_{NCV_R} \sim N(0, dt)$. The correlation between the two Wiener processes dz_{NCV_S} and dz_{NCV_R} is ρ_{NCV_S, NCV_R} . The option to switch, which entails exchanging one supplier for another, is a European option that can only be exercised at a certain point of time in the future (t^*).

If the customer switches from supplier S to the new supplier R , he or she will be likely to incur switching costs K (Burnham et al., 2003). In real options terms, this implies that K increases the exercise price of the option to switch. If the customer wants to exercise the option to switch, then he or she needs to pay K as switching costs (exercise price). This in turn reduces the actual switching value, since the switching costs reduce the difference in customer value between two suppliers.

A straightforward way to include switching costs in the model is to add a lump sum to the exercise price. By modifying Margrabe's (1978) option model to take switching costs into account, the value of the customer's option to defer switching from incumbent supplier S to the new supplier R equals

$$W(NCV_R, NCV_S, K, t) = NCV_R N(d_1) - (NCV_S + K) N(d_2) \quad (4)$$

$$\text{having } d_1 = \frac{\ln(NCV_R/(NCV_S + K)) + \frac{1}{2} \sigma^2(t^* - t)}{\sigma \sqrt{t^* - t}} \quad \text{and } d_2 = d_1 - \sigma \sqrt{t^* - t}.$$

- W = the value of the option to switch from one risky supplier S to a new risky supplier R
- NCV_R = the expected net value from the new supplier R
- NCV_S = the expected net value from the current supplier S
- K = switching costs
- $N(\cdot)$ = the cumulative standard normal density function
- t^* = the date of the exercise of the option (date of switching from supplier S to supplier R)
- σ^2 = the variance of $\sigma_{NCV_R}^2 - 2\sigma_{NCV_R} \sigma_{NCV_S} \rho_{NCV_S, NCV_R} + \sigma_{NCV_S}^2$
- σ_{NCV_S} = volatility of NCV_S
- σ_{NCV_R} = volatility of NCV_R
- ρ_{NCV_S, NCV_R} = correlation between σ_{NCV_S} and σ_{NCV_R}

The first part in Equation (4) indicates the current customer's NCV , which is a present value affected by uncertainty in the price premiums. The second part in Equation (4) relates to the present value of an alternative supplier's NCV , which is also affected by uncertainty, plus switching costs K that the customer needs to take into account when he or she wants to switch. The value of the option to switch suppliers is either positive or zero. In the latter case, the customer would not consider the option of switching to an alternative supplier, since the alternative supplier would provide a much lower value than the current relationship. Thus, even a better competing offer in the future appears very unlikely. Due to the very nature of an option, i.e., that it is a right, not an obligation, its value can never be negative.

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