Four Essays on the Integration of Revenue Management and Customer-Centric Marketing

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Certificate of authorship/originality

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Christine Mathies

Abstract

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The concurrent use of customer centric marketing (CCM) and perishable asset revenue management (RM) practices in capacity constrained service firms can negatively influence customer demand because the contradictory outcomes of the two systems might be perceived as unfair. This thesis establishes why and how the simultaneous employment of CCM and RM practices causes fairness concerns, negatively affects customer demand, and hinders the aim of revenue maximisation.

We propose a conceptualisation embedded in expected utility theory and develop a model of customer choices which accounts for fairness judgements. According to this model, purchase decisions for services are based on the utility evaluation of service offerings and their prices. This evaluation is, in turn, influenced by fairness coding of these service offerings relative to attribute-specific reference points. The rationale underlying this coding phase is anchored in the justice and fairness literature and theories of behavioural decision making.

Findings from focus group research and stated-preference choice experiments with airline passengers and hotel guests empirically confirm the existence of a reference-dependent fairness adjustment component in customers' utility assessments in addition to utility directly generated from product attributes. Fairness related comparisons to reference points and resulting gains or losses apply not only to price, but also to product attributes induced by RM and CCM induced attributes. In accordance with prospect theory, we confirm that losses generally weigh more than gains. Customers who are exposed to comprehensive CCM practices, represented as members of frequent traveller

programs, are most susceptible to perceived fairness, and have a lower willingness to pay than their counterparts. The preference coefficients for CCM and RM attributes obtained from conditional logit choice models, as well as the preference coefficients for attribute specific fairness adjustments, are then applied to predict how the attractiveness of flight or hotel options changes if a firm adapts its RM strategy to customer segments with differing levels of profitability. Predicted changes to choice probabilities, and subsequently demand and revenues, demonstrate the superiority of an integrated CCM-RM approach with segment-specific RM and suggests potential revenue increases of up to 33.15%.

Für miine Familie – für önsch

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I INTRODUCTION

Since November 2006, the Miles & More frequent flyer program offers their Senator members the option to reserve the last available seat on heavily booked flights in return for double the award miles required for a standard award booking. By the same token Velocity Rewards applies their revenue management rate structure to award bookings. These two examples illustrate the recent trend of airlines' attempts to harmonise their revenue (yield) management with their main customer-centric marketing initiative, namely their frequent flyer programs.

Industry is gradually responding to the potential conflicts customers perceive as a result of simultaneous yet unintegrated customer-centric marketing and revenue management. Service firms with fixed capacities, in particular airlines and hotels, face the double-challenge of maximising revenues from their most profitable customers and fixed perishable capacity units. They employ a customer-centric marketing (CCM) orientation to attain profitable relationships with customers to maximise lifetime values of current and potential customers (Rust, Lemon et al. 2004). Concurrent revenue management (RM) addresses the aim of revenue maximisation by allocating perishable inventory units to existing demand using price discrimination (Kimes 2000). The contradictory nature of their respective revenue maximisation targets lies at the core of perceived conflicts. More recent research on revenue management increasingly focuses on these customer conflicts, specifying inconsistent customer experiences, reduced loyalty, and perceived unfairness as the core issues (McMahon-Beattie, Yeoman et al. 2002; Noone, Kimes et al. 2003; Wirtz, Kimes et al. 2003).

Most identified conflicts instigate the existence of perceived unfairness on behalf of the customer. Kahneman, Knetsch and Thaler (1986) demonstrate that individuals generally prefer to avoid businesses acting in an unfair manner, and are prepared to incur extra cost to do so. Baumol and Fischer (1986) support this viewpoint and state that economic optimal allocation mechanisms lead to suboptimal results in terms of perceived fairness. This assigns a crucial role to fairness in customers' purchase decisions, as perceived fairness poses the risk of decreased demand for a firm's offerings. In this thesis, starting from the framework of expected utility theory, reference-dependent preference theory (Tversky and Kahneman 1991; Sugden 2003) is

incorporated into customer choice models to show how fairness-induced adjustments to utility alter customers' purchase decisions. The justice and fairness literature as well as reference price research are incorporated to identify determinants of reference points, dependent on which individuals make their fairness judgements (Baumol 1982; Kahneman, Knetsch et al. 1986; Briesch, Krishnamurthi et al. 1997; Konow 2003). Customers are expected to form reference points not only for purchase price, but a whole range of CCM and RM induced service attributes.

The fairness issues of RM are well documented (Kimes 1994; Kimes and Wirtz 2003; Choi and Mattila 2004), and have promoted integration of RM with CCM to avoid negative demand effects for new and existing customers. Research on the usefulness and feasibility of an integrated approach to CCM and RM is still in its infancy, and the existing body of literature is limited to endorsing the need for integration, as well as conceptual work and individual case studies on some early-adopting firms (cf. Libert and Cline 1996; Cox 2001; Noone, Kimes et al. 2003). A rising number of industry trials especially amongst airlines, similar to the ones presented earlier, also attest the need for integration. The main benefit of an integrated solution is the expected positive impact on customer loyalty or repurchase behaviour (Noone, Kimes et al. 2003; Shoemaker 2003).

RM assumes that the allocation of fixed capacity units to the highest paying existing demand is the best approach to maximise revenues. Demand for service products is however not independent of the changes RM inflicts on the price and other features of the service product. In acknowledgement of the interconnectedness between RM activities and the demand for resultant offers, the most recent studies on RM call for a choice based-approach to RM which would employ allocation heuristics built around customer utility (Talluri and van Ryzin 2004).

In this doctoral thesis I develop a case for the necessity and benefits of integrating CCM and RM practices and pursue three main objectives. Firstly, I introduce a two-staged model of customer choice accounting for fairness judgements to explain how customers react to perceived unfairness due to simultaneous CCM and RM. The model is anchored in expected utility theory, reference-dependent preference theory, the fairness and justice literature, and borrows insights from reference price research. Secondly, I establish how customers of airlines and hotels make purchase choices when they are

faced with the outcomes of simultaneously deployed CCM and RM. In doing so, I provide a rationale for why these two approaches to revenue maximisation should be integrated. Thirdly, I conclude with examining how a service firm's revenues could change if CCM and RM were integrated taking into account the findings of this research.

The core findings from the qualitative and quantitative research carried out assert the suitability of reference-dependent preference theory to accurately explain customer choices. In particular, the purchase choices of airline and hotel customers are influenced by attribute-specific fairness adjustments to utility. These fairness adjustments originate from (positive and negative) reference point deviations, and are particularly strong for frequent traveller program members, who are the main recipients of preset CCM activities. The application of the airline and hotel choice models to a range of prediction scenarios to simulate the choice probabilities and revenue outcomes of a basic integrated CCM-RM approach show revenue improvements of 11-16%.

The agenda of my doctoral research is reported in a series of four independent yet closely related research papers.[1] In the first three papers, the need to integrate simultaneous CCM and RM is established through qualitative focus group research, numerical support from simulated data applied to the proposed customer choice model which includes fairness adjustments, and stated choice experiments to examine choices of airline and hotel customers. The fourth paper builds upon the results, particularly the preference estimates obtained from stated choice experiments and analysis, to simulate how an integrated approach to CCM and RM would alter customer choices.

The first paper discusses how concurrent yet unintegrated CCM and RM can affect customer purchase choice and sketches a framework of customer choice which accounts for the potential impact of perceived unfairness. The key contributions of this qualitative research paper are threefold. Results of qualitative focus group research provide empirical support for the importance of perceived fairness in customers' choices, and establish the main features of RM and CCM that matter to customers of hotels and airlines, as well as the main areas of conflict and dissatisfaction that frequent traveller members have experienced with their program.

[1] The research papers use the plural 'we' as they are submitted for journal publication in co-authorship with my supervisor.

The second, conceptual paper adopts an expected utility framework to examine four different ways of how fairness could manifest in customer choices and introduces a comprehensive choice model incorporating fairness adjustments. The model is subsequently tested with simulated choice data. The results demonstrate that the inclusion of fairness adjustments significantly improves the ability to explain customer choices and numerically confirm the usefulness of extending the basic choice model.

The third paper takes the findings of the qualitative and conceptual paper forward and reports the results of testing the conceptual model with stated preference choice experiments in two industries, namely hotels and airlines. The findings further promote the superiority of a fairness choice model to explain the choices of customers who simultaneously face product attributes determined by RM and CCM. The two studies reported in this empirical paper provide ample support for the direct utility effect of CCM and RM attributes as well as for the reference-dependent fairness adjustments to utility. It was confirmed that fairness losses have a stronger impact than gains, and frequent traveller members react more strongly to fairness matters and do not have a higher willingness to pay than non-members.

The fourth paper brings together the lessons from the first three papers. Upon discussing three different ways of how CCM and RM could be integrated without jeopardising their respective revenue maximisation objectives, the revenue improvements which can be achieved through the simplest integration approach are simulated. Customers' preference estimates obtained from the stated choice experiments reported in the third paper are applied to a range of hypothetical scenarios of service products resulting from an integrated approach. Predictions of changes in utilities, choice probabilities, and subsequent revenues for the service firm provide valuable empirical support for the integration of CCM and RM.

II REVENUE MANAGEMENT AND CUSTOMER CENTRIC MARKETING – HOW DO THEY INFLUENCE TRAVELLERS' CHOICES?

1 INTRODUCTION

The aim of any marketing activity is to influence demand in such a way as to maximise return on marketing expenditures (Rust, Lemon et al. 2004, p. 105). Service firms with capacity constraints, such as airlines, hotels, and car rental companies, face a particular challenge in maximising the returns of their marketing investments, as typically they pursue a customer centric marketing (CCM) focus and revenue (yield) management at the same time. A customer orientation centres around profitable relationships with customers in order to maximise the lifetime values of current and potential customers (Rust, Lemon et al. 2004). In contrast, revenue management (RM) addresses the aim of revenue maximisation by allocating perishable inventory units to existing demand using price discrimination (Kimes 2000).

CCM becomes visible to customers in the form of loyalty programs, special offers for selected customers, and a wide range of beneficial treatments, which are aimed at increasing the value for customers and hence their demand. A frequent flyer member, for example, is offered the opportunity to collect bonus points and enjoy special benefits such as waiting list priority and complimentary upgrades. RM practices manifest themselves as availabilities of different fares, associated restrictions, and special service bundles (cf. Kimes and Wirtz 2003). Both availabilities and rates are constantly adjusted by means of sophisticated demand forecasting (Weatherford and Kimes 2003).

Customers favoured based on CCM practices may however also experience unanticipated consequences originating from RM initiatives. For example, a frequent flyer member might try to redeem points for an award booking for the Easter weekend, a time of peak demand. She is likely to be unsuccessful because the allocation for award bookings has been utilised, although internet booking platforms clearly show her that there are still seats available. While this customer could of course purchase one of the remaining high-priced tickets, the unsuccessful request contradicts not only the promised benefits of CCM programs (i.e., better customer value) but being asked to pay a higher price than anticipated can also result in perceived unfairness. As these

unfavourable consequences of concurrent yet not harmonised RM and CCM practices influence the demand for services, service firms would benefit from a better understanding of how precisely the simultaneous deployment of these practices affects demand. This is particularly important because the main industries which apply RM are also precursors in the use and development of loyalty programs.

The objectives of this paper are to a) illustrate how and why the concurrent use of CCM and RM initiatives has the potential to create customer conflict; b) introduce a framework to explain customer choices in the light of simultaneous CCM and RM use, a practice that has the potential to create conflicting outcomes, lead to perceived unfairness, and impact customers' choices; and c) undertake some preliminary empirical assessment employing focus group research to examine the validity of our theoretically derived framework.

2 THE CONFLICTING NATURE OF CCM AND RM

Literature on CCM and related marketing techniques is rather fragmented and inconsistent, but is built around the core notion of establishing and maintaining profitable customer relationships (Paas and Kuijlen 2001; Parvatiyar and Sheth 2001; Reinartz, Krafft et al. 2004; Zablah, Bellenger et al. 2004). Not all customers have equally desirable lifetime values, and acquisition and retention strategies are tailored accordingly (Blattberg, Getz et al. 2001). This provides the basis for preferential treatment of a loyalty program member with a relatively high estimated lifetime value.

The fundamental idea of RM is to efficiently use fixed, perishable capacities by charging different prices for the same service to different customers in an attempt to balance demand and revenues per capacity unit (Kimes 1989; McGill and van Ryzin 1999). The extensive research in the field of RM is mainly concerned with improvements to forecasting methods, and the heuristics and algorithms to best approximate the optimal allocation of capacity units to existing demand (Weatherford and Bodily 1992).

RM has been shown to create customer conflicts and fairness concerns, by affecting reference prices, the nature or quality of reference transactions, and the negative consequences of inventory control (Wirtz, Kimes et al. 2003). We argue that the

potential to cause conflict is even greater if a service firm simultaneously engages in RM and CCM practices and treats them as competing, not integrated, activities. The main difference between RM and CCM is the time horizon for revenue maximisation. RM aims to maximise the revenue from an individual transaction (i.e., the revenues per capacity unit) but does not take into consideration possible long-term gains from individual customers (Noone, Kimes et al. 2003; Shoemaker 2003). CCM on the other hand is inherently about making necessary short-term trade-offs in light of possible increases in long-term revenues (Lieberman 1993), and focuses on the lifetime revenues per customer. The example of a frequent flyer member unsuccessfully trying to book an award flight during the holiday period can illustrate that allocation optimisation without considering long-term effects on customer relationships might be inappropriate.

Secondly, the basis for customer segmentation in RM is price elasticities and associated willingness to pay (Kimes 1989), while CCM distinguishes customers based on their lifetime profitability (Jain and Singh 2002). Customers with a high lifetime value might however fall into different price elasticity segments for different transactions and therefore receive inconsistent treatment. As an example, imagine a regular business traveller who, for booking the annual family holiday, is very price conscious. Current research does not address how to manage profitable customers in capacity constrained service industries who display different price elasticities in varying service purchasing contexts.

In summary, the consequences originating from CCM and RM initiatives affect a customer's evaluation of service purchasing options and can lead to customer alienation and perceived unfairness, which in turn influences customers' likelihood to purchase (i.e., they can dampen the overall demand). Notwithstanding these implications, the existing body of research, with a few exceptions (cf. Kimes 1994; Kimes and Wirtz 2003; Shoemaker 2003; Wirtz, Kimes et al. 2003), fails to adequately address potential effects of RM on customers' fairness perception and their lifetime values. In the next section, we present a theoretical framework to explain customer choices in the light of unfairness resulting from conflicting CCM and RM practices.

3 A FRAMEWORK OF CUSTOMER CHOICE ACCOUNTING FOR FAIRNESS

Our conceptualisation of customer demand is based on the core notion of expected utility theory, where individuals assess their purchase options and select the alternative with the highest utility resulting from price and product/service attributes (Thaler 1980; McFadden 1986). In the context of simultaneously employed CCM and RM practices, this would mean that a customer is not affected by conflicting messages. Real life consumers however regularly contradict the predictions of expected utility theory, and choose an option that does not have the seemingly highest level of utility. We therefore propose that alternatives undergo some form of coding prior to entering the actual utility maximising evaluation and choice phase. RM techniques, and especially the contradictory nature of CCM and RM activities, implies that offerings are likely to be negatively edited as a result of perceived unfairness (Kimes and Wirtz 2003). Utility judgements therefore result from an evaluation of an alternative's price and (service) product attributes, as well as from the utility changes created by fairness-based coding of these attributes.

3.1 The Role of Reference Attribute Levels

The rationale underlying the coding phase is embedded in a set of theories from behavioural decision making and psychology, and informs the decision making framework illustrated in Figure II-1. Prospect theory (Kahneman and Tversky 1979), and the more general reference-dependent preference theory (Tversky and Kahneman 1991; Munro and Sugden 2003; Köszegi and Rabin 2004), explain why and how alternatives are coded relative to a reference point. Reference price and price fairness research has adopted and elaborated on this notion and informs what determines reference price levels. Findings from pricing research might also be relevant to reference-dependent utility and fairness assessments of product attributes other than price. We therefore argue that fairness adjustments due to concurrent CCM and RM practices result from a comparison of the perceived attribute level for each individual attribute with the corresponding reference level (Kahneman, Knetsch et al. 1986; Frey and Pommerehne 1993; Maxwell 2002; Xia, Monroe et al. 2004).

Adaptation-level theory explains that past and present contexts determine an adaptation-level or reference point relative to which individuals perceive objective stimuli (Helson 1948). It also elaborates on how reference points of human perception are formed, and the fairness and justice literature as well as related reference price research further inform which mechanisms individuals use in setting reference points, and in editing alternatives as fair or unfair (Baumol 1982; Konow 2003). In fact, fairness has been found to explain a large part of deviations from utility maximisation (Konow 2003). The fairness concepts in our framework of customer choice are derived from distributive justice or equity of outcomes (Konow 2003; Xia, Monroe et al. 2004), fair cost-profit distribution and general procedural justice built on the principle of dual entitlement and attribution theory (Kahneman, Knetsch et al. 1986; Maxwell 2002), interactional or transaction justice (Huppertz, Arenson et al. 1978; Bolton, Warlop et al. 2003), and prospect theory (Kahneman and Tversky 1979)[2]. Six plausible determinants of reference points materialise from the fairness and justice literature and research on reference prices. Figure II-1 illustrates our conceptualisation of fairness judgements in decision making based on these reference point determinants. While alternative conceptualisations are equally meaningful, the selected framework draws on extensive reference price research and uses well established constructs to explain the role of fairness in customer choices.

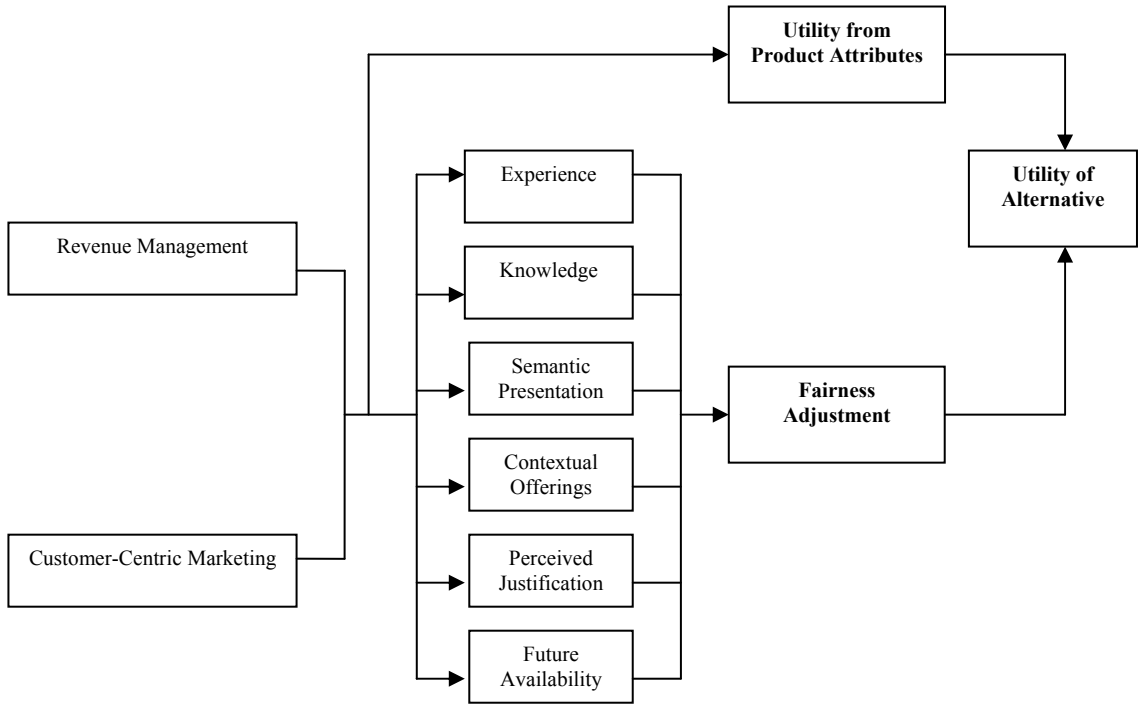
3.1.1 Personal Reference Experiences

Customers' reference points are firstly a result of their personal past purchase experiences, especially within the same product category. A frequent flyer, for example, is well familiar with typical rates and availabilities for regular trips based on past purchases. Reference price research generally summarises past purchases and past observations as temporal or internal reference price effects (Rajendran and Tellis 1994; Mazumdar and Papatla 1995; Niedrich, Sharma et al. 2001). However, the impact of personal, previously chosen and consumed reference purchases, as opposed to observed but rejected options, is particularly strong because they are easier retained in memory (Briesch, Krishnamurthi et al. 1997). This justifies the inclusion of two distinct internal reference concepts. Although most research on reference points generally focuses on price points, (cf. Bolton, Warlop et al. 2003), the role of memory of past purchases and

[2] A brief summary of justice theory and related concepts can be found in Appendix II-1.

concept of mental accounting can be generalised to attributes other than price. Although the influence of past experiences depends on customers' willingness and ability to recall past purchases (Monroe 1973; Briesch, Krishnamurthi et al. 1997), the memory of past experiences does not have to be correct to take effect.

Figure II-1. Conceptual Framework of Customer Choice Accounting for Fairness Effects



The degree of consistency of a customer's experiences is also likely to play a role (Huppertz, Arenson et al. 1978; Burton and Babin 1989). Interactional justice theory denotes that the closeness and frequency of past transactions increases the risk that customers perceive a deviation of an offer from their past experiences as unfair, as customers find inequity particularly unfair in high frequency shopping situations (Huppertz, Arenson et al. 1978). The more consistent experiences a customer has with a service category and/or supplier, the more rigid and narrow becomes her decision frame (see also Burton and Babin 1989). For example, if a frequent flyer always flies from Sydney to Brisbane for $200, her price expectations will have little leeway compared to a passenger who has experienced a range of rates from $100 to $400.

3.1.2 Reference Knowledge

Customers also include offerings that they have not purchased in the past and general knowledge from external sources when forming their reference points (Burton and Babin 1989; Kalyanaram and Winer 1995; Briesch, Krishnamurthi et al. 1997). We

define reference knowledge as indirect knowledge which may stem from past observations of offers that were an available option but were not chosen, offers that were only available to others in the past, information about experiences of peers, and any other indirect information obtained from promotional materials, the internet, etc. This is the second component of temporal or internal reference prices (Rajendran and Tellis 1994; Mazumdar and Papatla 1995), and summarises factors other than personal experience which contribute to customers' internal memory. An airline customer, for example, might have talked to friends and family about their recent flight bookings, and might recall favourable rates advertised in the past. Equity theory substantiates that customers compare the ratio of inputs and outcomes (i.e., the service offerings and prices) available to them with those obtained by other customers (Huppertz, Arenson et al. 1978; Hunt and Kernan 1991) and, as will be discussed later, highlights the need to justify different rates (Xia, Monroe et al. 2004). The use of RM practices, by nature, results in charging different customers different prices for the same offering and varies the availability of offers, hence potentially impedes perceived equity.

3.1.3 Semantic Presentation

Semantic presentation is the way in which objective differences in offerings are presented. Based on the notion of prospect theory that outcomes are coded as gains and losses, the concept of decision framing informs that imposed frames (i.e., the presentation of an outcome as gains or losses) systematically change choices (Thaler 1985; Puto 1987; Tversky and Kahneman 1991). A person's reference point is therefore expected to shift depending on whether differences are explicitly communicated as discounts or surcharges (Kahneman and Tversky 1979; Burton and Babin 1989). For example, a standard rate could be promoted as a spring special, suggesting that it is a bargain buy.

3.1.4 Contextual Offerings

We refer to contextual offerings as all alternatives that might be advertised at the time of purchase choice. Contextual offerings are expected to influence reference points because coexisting stimuli have an effect on human perception (Helson 1948), reference price formation (Rajendran and Tellis 1994), and preference formation (Tversky and Simonson 1993; Cooke, Janiszewski et al. 2004). Reference price research accounts for

the role of contextual offerings by including external or contextual reference prices (Rajendran and Tellis 1994; Mazumdar and Papatla 1995; Niedrich, Sharma et al. 2001), but does not distinguish between available and non-available contextual offerings. Firms employing RM usually advertise a range of price-product combinations with varying levels of availability at the time of purchase choice, some of which are in fact not available to the customer. Airline customers, for example, may search for flights online, and find that the cheaper booking classes listed by a particular airline are no longer available despite being displayed.

3.1.5 Perceived Justification

Service providers can influence how their offerings are perceived by controlling customers' knowledge about how rates (Kachelmeier, Limberg et al. 1991; Maxwell 2002) and their availabilities and restrictions (Kimes 1994) are determined. Distributive justice and equity theory explain that seemingly unequal and hence unfair offerings can be justified (Xia, Monroe et al. 2004), and according to Kimes and Wirtz (2003, p.128) "it is imperative that the reasons for the varying price levels are easily understood by all customers". According to attribution research, consumers make causal inferences to explain inequity or deviations from reference points (Folkes 1988; Hunt and Kernan 1991; Vaidyanathan and Aggarwal 2003). Service firms can preclude negative conjectures about the underlying reasons for price and product variations by providing explanations in line with the principle of dual entitlement, which suggests that price increases are acceptable if they are a means to maintain rather than increase profits. For example, airline customers have difficulties understanding why different passengers pay different fares for the same flight. The service provider can however inform customers why differences occur by advertising a fare as an early bird special or weekend surcharge.

3.1.6 Future Availability

RM allocation heuristics cause price-service bundles and their availability to change constantly. Customers' judgement of whether an offer is a good deal might depend on how experienced they are as a customer, and how ready they are to postpone a decision under uncertainty (Kalyanaram and Winer 1995). Customers compare current and future consumption and are inclined to downgrade the value of delayed consumptions

(Loewenstein 1988), particularly if the future availability is unknown. Speculations about future availability are a special case of determining probabilities of outcomes under uncertainty (Kahneman and Tversky 1979), and should play a role in customers' fairness perception of an alternative. More experienced air travellers, for instance, tend to be more confident about the quality of an offer, for example they can see that an inflated price is still a good deal given that they left the booking for a peak time flight too late.

To sum up, we propose that customers confronted with simultaneous CCM and RM activities assess the value of a purchase option based on service attributes as well as attribute-specific fairness components (Köszegi and Rabin 2004). Reference-dependent preference theories suggest that fairness judgements are a comparison of actual attribute levels to individual reference levels. We argue that customers form reference levels both for price and non-price related service attributes. Based on fairness and justice literature and reference price research, we established six factors that may influence the formation of reference points. In line with reference-dependent preference theory, purchase choices are therefore a result of a decision process where alternatives are coded relative to a reference point prior to evaluation and choice.

4 RESEARCH METHOD

Focus group research was conducted to empirically examine and refine our proposed theoretical framework to explain customer choices of airline passengers and hotel guests when faced with the simultaneous employment of CCM and RM practices, as these industries are the two main users of concurrent RM and CCM initiatives. While the research framework is anchored in the pricing, fairness and justice literature, the qualitative research contributes to a better understanding of the service attributes and fairness concerns that are of greatest relevance to customer choice, the concepts underlying this process, as well as relationships among these concepts.

A total of 54 participants were randomly recruited from an email list of individuals who had indicated an interest in travel. In order to account for any differences in decision making between casual and repeat customers, the sample included a mix of loyalty program members and non-members. All participants had recent (within the last 12 months) domestic and/or international travel experience for business, leisure, or both,

and travel frequency ranged from once a week to once a year. A total of five focus groups were conducted, two for frequent flyer members (Frequent flyer groups I and II), and one each for hotel loyalty program members (Hotel loyalty group), hotel guests that are not member of a loyalty program (Hotel non-loyalty group), and airline passengers that do not belong to a frequent flyer program (Airline non-member group). It is important to distinguish frequent traveller members and non-members in order to investigate any differences in fairness judgements between customers who are subject to the outcomes of simultaneously employed CCM and RM practices, and those who only experience those of RM initiatives.

The semi-structured focus groups lasted approximately 90 minutes and were audio-taped. At the beginning of each session, the group facilitator explained that the purpose of the focus groups is to investigate customers' experiences with loyalty programs and with the pricing and availabilities of flight/hotel rooms, without explicitly mentioning revenue (yield) management. Participants were first asked to report their experiences regarding prices, availability of rates, booking restrictions and, in the airline groups, routing and stopovers. The discussion then moved to the perceived benefits of and problems with loyalty programs. The sessions concluded with a series of questions about participants' typical decision making process aimed at tapping into the role of reference point determinants during information search, evaluation and purchase choice.

Descriptive and pattern coding was used to analyse and identify patterns in the responses (Miles and Huberman 1994). The descriptive coding attributed concepts identified in the research framework to portions of the session transcripts. This applied especially to service attributes resulting from RM and loyalty programs, and to some extent to the factors underlying reference point formation. Secondly, pattern coding was used to group the findings into relevant themes and to establish relationships between identified concepts to gain information about potential customer conflicts and fairness judgements.

5 FINDINGS AND IMPLICATIONS

The discussion of results is structured around three themes. Firstly, we report findings which confirm the assumption of customers as utility maximisers. Secondly, we present those RM and CCM induced product attributes that emerge as having an effect on

customer choice. We conclude the results section with a discussion of those conflicts experienced by participants, and outline how the findings support the key fairness concepts proposed to influence customer choice in light of the simultaneous employment of CCM and RM practices.

5.1 Customers maximise utilities

The majority of participants in all group sessions indicated that they act as utility maximisers, evaluate various attributes of available alternatives, and make trade-offs to obtain the greatest possible utility (Hensher and Johnson 1981; McFadden 1986) ("The most important thing is: What are they going to give me?", Hotel loyalty group, A.). Members in each group unanimously raised price as the most important evaluation criterion, above all in the context of leisure travel, and reported that they are willing to compensate poor performances on non-price attributes, such as travel time in the case of airline passengers, to obtain better rates. Although some of the participants who were airline customers indicated that price also matters in business travel, especially if expenses are billed to the client or if employees get reimbursed after initially paying out of their own pocket, most of them who were business travellers value time, convenience and flexibility most ("For business travel time is more important than price. I am willing to pay more for the flexibility to take a later flight if I need to", Frequent flyer group, C.). Participants in the hotel groups raised other important evaluation criteria and emphasised attributes such as room standards, location, and auxiliary services for holiday travel, and business centre facilities for work related travel. Airline passengers also considered travel dates, such as time of day and day of week[3] when choosing amongst flight options. Reference-dependent preference theory proposes utility as a combination of utility derived from product/service attributes and a reference-dependent utility component (Munro and Sugden 2003; Köszegi and Rabin 2004). These results verify the existence of a utility component unrelated to reference points, as customers unequivocally consider key product and service attributes in their purchase choices.

[3] Please note that we do not elaborate on product features that impact customer choices but are not affected by the conflicting practice of concurrent CCM and RM. Respondents in the airline study consider features such as reputation, safety, in-flight service, and legroom. For hotel respondents, features included the quality of the room, same standard irrespective of location, and expertise and courtesy of staff. Although these other product features play a role in customer choices, the aim of the focus group research is to determine critical CCM and RM features and RM and CCM induced customer conflicts in order to better explain purchase choices.

5.2 RM induced product attributes

As previously argued, several product attributes of flights and hotels are directly influenced by revenue management initiatives. Participants of all five focus groups were collectively aware of the implications of RM practices on price levels, rate restrictions and the availability of special rates, although all but two participants were not familiar with the term revenue (yield) management as a capacity management tool. The employment of RM, by definition, results in varying prices, rate restrictions, and availabilities to maximise revenues per capacity unit (Kimes 1989; Weatherford and Bodily 1992), and focus group respondents did not reveal any additional product attributes that they associated with RM.

5.2.1 Price effects (Price discrimination)

All participants in all five focus groups reported that they observed large price variations and attributed them to a number of factors, such as travel dates including time of day and day of week ("Sometimes you have to travel on certain days to get a special rate", Frequent flyer group II, B.), the booking channel (online and directly with the provider are generally considered the cheapest), and the lead time between booking and travel. The general consensus amongst the participants was that prices increase closer to the travel date, although some respondents noted that cheap rates are advertised at short notice to fill excess capacities.

Respondents in the hotel groups reached consensus that hotels use standard rack rates as the basis for various discounts, but both loyalty program members and non-members noted that the "rack rate is some fantasy price that no one ever seems to pay" (Hotel non-members group, A.). Participants also discussed that the abundance of rates has educated them to extend their search until they know that the seemingly best deal is in fact the cheapest available rate ("The person next to you paid half the price – how on earth did they do that?", Frequent flyer group I, B.).

Hence, the focus group discussions about prices indicate that customers are exposed to a wide range of different prices for the same service product. Consequently, past and present prices influence customers' choices twofold. Firstly, extensive memory of past prices and associated restriction, as well as thorough exploration of current prices show

that past and present prices prevail reference prices formation (Kalyanaram and Winer 1995; Briesch, Krishnamurthi et al. 1997). Secondly, customers observe patterns in the conditions attached to past and present prices and form customers' reference points regarding acceptable rate restrictions.

5.2.2 Availability (Inventory/reservation control)

Respondents in all groups agreed that more attractive rates or special offers are difficult to obtain ("You have to be fast on the internet, sometimes good rates disappear as you are watching", Airline non-members group, J.), often not available at all, or in the case of hotels limited to one or two days, for flights limited to the "really bad times". Some respondents in both the frequent flyer and non-member groups indicated that "no one ever seems to get the special deals". The majority of participants representing airline passengers accepted that favourable fares are usually limited to few seats ("Even if they say they have 2000 seats at a special rate, that can mean two seats on every plane for the next six months", Frequent flyer group II, M.). The propensity of frequent flyers to book with their airline group is also limited, as some frequent flyers are readily searching for better offers of other airlines if an advertised rate is not available. Similarly, participants in both hotel sessions reported that they had reacted negatively in the past when hotels tried to sell a more expensive rate or a higher room category when better rates were sold out. The results imply that customers take special offers into consideration when forming their reference transactions (Kahneman, Knetsch et al. 1986). Special offers lead to lower price expectations, and cause customers to interpret the non-availability of good rates as a promotional hoax rather than the result of high demand for these rates. It also becomes apparent that the causal attribution of lacking availability of good offers is directed toward the service provider, confirming customers' attribution of negative outcomes to the firm (Folkes 1988; Hunt and Kernan 1991)

5.2.3 Restrictions (Rate fences)

In each group sessions, the majority of participants was familiar with restrictions tied to prices for hotel rooms and flight tickets, and reported that they took restrictions into account when evaluating alternatives. Stricter rules are associated with cheaper rates, and this is perceived as a legitimate trade-off. One frequent flyer said: "The better the

conditions the more you pay – that's only fair" (Frequent flyer group II, O.). Participants were in agreement that surcharges and/or strict conditions for time (airlines) and date (airlines and hotels) changes or cancellations, and stringent payment terms are acceptable, and that they had adopted strategies to circumvent these restrictions where possible: "Often as part of the booking restrictions you cannot get a refund. That's why it's best to ask for an upgrade if the room isn't satisfactory" (Hotel loyalty group, B.). Overall, most respondents perceive restrictions as a legitimate reason for price variations. We can hence reconfirm that customers' direct experiences and indirect knowledge determine the individual's reference points for prices as well as product attributes based on rate restrictions.

5.3 CCM induced product attributes

To assess the impact of CCM activities on customer utility, participants in all sessions were asked to name the most important features of frequent flyer and hotel loyalty programs respectively, and then allocated a total of 10 points to rate their importance. While RM induced product attributes are few and clearly identifiable, the abundance of frequent flyer and hotel loyalty program features necessitate identification of those features which are most prevalent in customers minds. The results (i.e. the number of importance points given to each feature) are summarised in Table II-1 and Table II-2.

The importance counts by participants indicate that award flights are the most crucial feature for airline passengers. Hotel loyalty program members, as opposed to non-members, valued most the ability to earn points with airline partners. Participants in the hotel groups also agreed that it is more important to earn flight points and receive a range of other benefits than to redeem points for a free stay. Preferential treatment such as priority check-in, lounge-access, upgrades, and priority baggage handling emerged as the most important benefits for airline passengers. Similarly, hotel guests ranked late and priority check-outs, complimentary services, and exclusive specials highest. Beyond these tangible benefits, frequent travellers wanted to be treated well ("It is very important what sort of treatment we receive once we are at the hotel", Hotel loyalty group, G.).

Table II-1 Importance of Frequent Flyer Attributes - Frequencies

Feature	Importance Members (n=14)	Importance Members II (n=10)	Importance Non-members (n=11)	Total
Point redemption	27	33	8	68
No fees	19	1	22	42
Validity of miles	6	15	18	39
Extra baggage allowance	10	12	14	36
Lounge access	8	5	12	25
Priority check-in	11	8	4	23
Complimentary upgrades	11	3	7	21
Additional bonus miles	6	11	4	21
Priority baggage handling	13	3	n/a [4]	16
Preferred seating	5	4	7	16
Priority waitlist	5	1	5	11
Priority boarding	5	1	2	8
Special offers	1	1	5	7
Priority baggage reclaim	3	2	n/a	5
Number of frequent traveller seats per flight	2	n/a [3]	n/a [3]	8
Priority standby	1	0	0	1
Total	**133**	**100**	**108**	**341**

The most dominant concern for non-members was the practice of charging fees for memberships, and the prospect of being treated worse rather than better if they join a frequent traveller program. Respondents in both non-member groups argued that most benefits are available anyway, and hotels/airlines will take customers for granted if they signal loyalty by joining a program. Respondents representing these kinds of travellers indicated that they value the freedom of choice and characterised themselves as variety seekers. The majority of non-members also found it difficult to see the benefits of membership as there is no real best price guarantees for members, points accumulate too slowly compared to the points required for any rewards, and spending points on rewards is perceived as nearly impossible. Some respondents attributed this to the complex rules of earning and spending points, the expiry of points, and above all the lack of capacities reserved for frequent traveller award bookings. These concerns are a direct reflection of conflicting CCM and RM objectives.

To summarise, both CCM and RM practices shape the product attributes of flight and hotel options and therefore influence the utility customers obtain from these attributes. The following section discusses RM induced conflicts that participants representing frequent travellers have reported on. These results provide evidence for the second,

[4] Feature was not named in this session.

reference based, utility component and illustrate how alternatives can fall short of customers' expectations due to the contradictory nature of CCM and RM.

Table II-2 Importance of Hotel Loyalty Program Attributes - Frequencies

Feature	Importance Members (n=11)	Importance Non-members (n=8)	Total
Earn points through airline partners	22	n/a[4]	22
Validity of points	15	4	19
Late check-out	11	8	19
Complimentary room upgrades	8	6	14
Special room rate	8	4	12
Free continental breakfast	9	1	10
Best rate guarantee	2	7	9
No fees	n/a[4]	9	9
Retail and travel rewards	1	7	8
Guaranteed room type	1	7	8
Arrival gift	4	4	8
Guaranteed room availability	2	5	7
Discounted/free meals	3	3	6
Hotel rewards/free nights	5	0	5
Priority check-in	5	n/a[4]	5
Personal recognition	2	3	5
Earn points through hotel stays	0	4	4
Express check-out	4	0	4
Weekend discounts	1	3	4
Earn points through credit cards	1	2	3
No black-out dates	1	1	2
Complimentary newspaper	2	n/a[4]	2
Guaranteed lounge access	n/a[4]	1	1
Free local phone calls/fax	1	n/a[4]	1
Free parking	1	n/a[4]	1
Total	**109**	**79**	**188**

5.4 Perceived conflicts

Conflicts became apparent when participants representing frequent traveller program members were asked whether they ever experienced any disappointments with their program. There was general consensus among the participants that frequent flyers in particular see loyalty programs as a "one-way road" and questioned the loyalty of airlines towards them. Program benefits are not perceived as a reward for repeat purchase, but rather as something that customers have indirectly paid for through generating revenue. Participants discussed that any shortcomings regarding program benefits and promises are therefore perceived as service failure. This perception is in

accordance with Shugan's (2005) view of loyalty programs as promises for future benefits in return for current revenue generation.

Firstly, all participants of both focus group sessions argued that they, and other members they know, negatively react to the lack of availability of frequent flyer seats, and they had experienced problems with point redemption ("Frequent traveller seats are always booked out", Frequent flyer group I, S.). Limited availability of frequent flyer seats illustrates how the long-term earning potential of profitable customers is limited by short-term revenue maximisation. The majority of participants representing frequent flyers were also concerned about the expiry of points, frequent changes to the program structure, and the fact that airline alliance partners do not honour members of their alliance partners. The more critical participants labelled frequent flyer schemes as a "scam". Some frequent travellers referred to the extensive data airlines collect about them, and voiced disappointment that their expectations of receiving better and personalised service in return are rarely met. A few of the participants in the focus group comprising hotel loyalty members in this context criticised the inconsistent knowledge of staff. Although hotels seem more successful in adapting their offers for loyal customers, "what you get depends on who you speak to" (Hotel loyalty group, A.) and check-in staff might sometimes have no knowledge of what has originally been agreed on.

As most participants who represented frequent travellers tended to travel mainly for work, they also raised some concerns about hotels and airlines taking advantage of their pressing travel needs. Business travellers are well aware that they are forced into premium-based rates due to their need for short-notice bookings and flexible changes. One participant expressed it like this: "They always know that people have different needs, and there is always someone who will take the fare because they have to fly" (Frequent flyer group II, M.).

The discussion of participants' perceived disappointments with frequent traveller programs revealed that loyal repeat customers experience some consequences of RM as unfair, and confirmed existing research on fairness perceptions of RM which identifies price variations, rate fences, and lack of availability as key concerns (Kimes 1994; Wirtz, Kimes et al. 2003; Choi and Mattila 2004). Frequent travellers build their expectations on promised benefits, and show little understanding if the airline/hotel fails

to deliver. Shugan (2005) argues that promises of future benefits do not constitute a sincere approach to loyal customers. The results therefore substantiate the importance of fairness in customer choices, and justify the inclusion of a fairness adjustment component in choice models.

5.5 Fairness concepts

The aforementioned conflicts manifest themselves in fairness adjustments to utility. Fairness, which refers to the judgement of an outcome and/or the process to arrive at this outcome as reasonable, acceptable, or just (Bolton, Warlop et al. 2003; Xia, Monroe et al. 2004) has been found to explain a large part of deviations from objective utility maximisation (Konow 2003). Fairness judgements are always comparative to a standard, norm or reference point, and rule-based (Kahneman, Knetsch et al. 1986; Frey and Pommerehne 1993; Maxwell 2002; Xia, Monroe et al. 2004). This section summarises focus group results which support the role of the six proposed concepts in the formation of these rule-based, comparative fairness judgements. Empirical insights into the six fairness concepts was obtained by asking participants to describe their standard decision making process upon deciding to take a leisure or business trip. Members of frequent traveller programs (i.e. the main recipients of CCM activities) showed different decision making behaviours than non-members.

Our framework of customer choice assumes that evaluation and choice is preceded by a coding phase relative to a reference point, where product offerings are assessed as fair or unfair comparative to the customer's individual norm (Kahneman, Knetsch et al. 1986). All five focus groups reached consensus about the importance of reference points in customer decision making. One participant expressed it as follows: "I generally have a good idea of what to look for, what to expect, and compare offers to that" (Airlines non-members, J.). In the absence of prior experience, participants reported that they draw comparisons from similar transactions ("What's a good deal in Sydney won't get you anything in New York", Hotel loyalty member, G.), or in absence of sufficient previous experience conduct an initial information search, most likely online, until offers converge. This information gathering is a special case of searching for comparable transactions (Kahneman, Knetsch et al. 1986). The results confirm that customers use internal and external information sources to form reference points (Mazumdar and Papatla 1995).

Regarding the key determinants of reference points, personal travel experiences and reference knowledge, such as "previous quotes" and the experiences of others, were frequently mentioned to play an important role. The discussions suggested that direct experiences are the strongest determinant of reference points, and act both as information sources and evaluation criteria. In all focus groups, consulting friends, family and colleagues emerged as a crucial source of information. Online sources were also considered as being essential, followed by travel agents and print media. One frequent flyer participant explained that he also "use[s] feedback that others leave on travel sites" (Frequent flyer group II, O.), further illustrating the importance of reference knowledge. Participants in the airline groups consented that passengers have detailed knowledge about airlines' pricing practices, and that they use this in their fairness assessment. As one frequent flyer states, "you can easily have 100 different fares on exactly the same flight" (Frequent flyer group II, C.). In order to restore perceived equity, some participants reported that they would like to see seats allocated according to fares, for example "cheap tickets in the back near the toilets" (Frequent flyer group I, V.). Please note that the alleged role of frequency and consistency of past travel experiences was not explicitly mentioned. The results highlight the importance of two proposed fairness concepts, namely past personal experiences, and past and present observations, in explaining reference point formation. Reference price research classifies both these influences as internal, or temporal, reference points (Rajendran and Tellis 1994). The results support our conceptualisation, which distinguishes between purchased and observed temporal references points, and also considers external information sources such as friends and family as important. The distinctive roles of personal experiences and observed past options suggests reconsideration of the traditional concept of temporal reference prices/points.

Most participants indicated that they considered offers advertised at the time of purchase, labelled contextual offerings in our framework, during the evaluation of alternatives, even if they were no longer available for purchase. Discussions in the focus group sessions provided support for existing research that contextual offerings play an important role in reference point formation (Biswas and Blair 1991; Rajendran and Tellis 1994), especially as the majority of participants used the internet and/or travel agent for comprehensive comparisons. The extensive use of internal and external reference points highlights the importance to avoid perceived inequity, where the ratio

of inputs and outputs is inconsistent either between transactions or between individuals (Huppertz, Arenson et al. 1978; Hunt and Kernan 1991).

Limited support was found for the concept of semantic presentation, meaning the effects of intentionally framing an offer as a discount or surcharge from a standard rate did not affect participants' choices as expected. Frequent reference to the importance of special offers, discounts, and the acknowledgement of a "fantasy rack rate" can however be interpreted as customers' awareness of deliberate semantic presentation of offerings as gains. The influence of rack rates on reference prices may be weakened because travellers assume that it is a "fake" rate to shift reference prices. Overall, the findings suggest that customers use their own decision frames in absence of credible frames from the service provider (Elliott and Archibald 1989). Firms therefore need to learn how to effectively communicate standard rates to benefit from the effects of positive framing.

Regarding the concept of future availability, most participants in the sessions were well informed about the effect of the time between booking and travel on the likelihood that rates are still available if they delay their purchase decision. A longer lead time is generally associated with cheaper prices, and "means we have more time to search for a good deal" (Frequent flyer group I, Y.). Conjectures about the future availability of an offer and postponement of the purchase decision is comparable to a decision under uncertainty (Kahneman and Tversky 1979), as the following quote illustrates: "It can be worth the risk of waiting to see if there are specials coming up" (Frequent flyer group II, M.). If customers judge current offers also as future prospects (Kahneman and Tversky 1979), the utility of an alternative is assessed relative to both all other current and future (discounted) alternatives. Customers' appraisal of future availabilities is therefore likely to affect their reference points, where a high likelihood of future availability leads to a depreciation of reference points. This further implies that customers' choices are the result of tradeoffs between alternatives and fairness judgements at different points in time (Loewenstein 1988).

To probe the role of perceived justification of variations in prices, availability, and restrictions, participants were asked why they think airlines charge different rates and impose restrictions. Landing rights and legal restrictions, distribution channels ("travel agencies buy in bulk"), positioning strategy, multi-itineraries, competitive pressure, and the firm's cost-profit structure came to mind first as the main reasons. Some

participants were also aware of the hotels' and airlines' aim to maximise capacity utilisation, but associate it mainly with filling excess capacities. One participant representing airline passengers expressed it as follows: "If they have many empty seats left, they are likely to give better prices. An empty seat is lost money." The causal attribution of gains (i.e., cheaper rates) mainly to causes external to both the firm and the customer are an interesting finding in light of attribution theory, which proposes that positive inequity tends to be attributed to oneself (Folkes 1988; Hunt and Kernan 1991). Frequent flyer group II however confirmed attribution research and immediately attributed price and availability variations, and booking restrictions to airlines' revenue management. One participant said: "They are all using sophisticated yield management systems, they are sitting in front of screens that get constantly updated; they know exactly how to price and allocate seats to maximise profits" (Frequent flyer group II, O.). Both hotel focus groups were not explicitly aware of yield management. Discussions in those two groups also revealed that they see the purpose of price discrimination not so much in capacity utilisation, but as a vehicle to attract customers who subsequently spend on auxiliary services: "Cheap rates are to encourage you to spend more money on other services and meals. If the room is a total bargain, I may as well splurge on other things" (Hotel loyalty group, M.). The variations in reasoning to justify prices and restrictions suggest that travellers seem to have developed their own set of justifications in absence of formal explanations. Firms can justify variations in their offerings to avoid potential negative attribution (Choi and Mattila 2006) and thereby exert some control over customers' reference point formation. In brief, customers seem to credit external factors or, in some cases, the service firm, for positive RM outcomes (i.e., favourable rates and offers), while service providers are held responsible for negative RM outcomes unless they provide a plausible justification.

In summary, focus group sessions provided support for the conceptualisation of customer choices as complex decision process comprising of an evaluation of service attributes irrespective of reference point, and a reference-dependent fairness evaluation. The findings also supported the importance of four proposed constructs in reference point formation and subsequent fairness judgements, namely personal travel experience, indirect knowledge, contextual offerings, and perceived justification of offers. The different opinions of frequent traveller program members as opposed to non-members indicate that exposure to CCM activities alters customers' expectations resulting from

personal experience and indirect knowledge. The conclusions with respect to the concepts of semantic presentation and future availability are less clear. While some participants revealed that semantic presentation and conjectures about future availability mattered, their role in fairness judgements and decision making could not be conclusively identified from the focus group sessions.

6 CONCLUSION

We presented a framework of travellers' choice behaviour when confronted with the fairness implications of the simultaneous employment of CCM and RM practices. Focus group research confirmed the relevance of a two-staged decision making process, where the actual utility assessment is proceeded by fairness coding relative to a reference point. The findings supply additional empirical support for the pertinence of reference-dependent preference theory to account for customer choices, and demonstrate the applicability of this theory beyond price perceptions to a range of service attributes other than price.

We identified a range of CCM and RM induced service attributes which directly contribute to an alternative's utility, and also play a role in reference point formation. With regards to RM attributes, we can conclude that customers are well-informed and accustomed to large price variations, associated restrictions, and limited availability of favourable rates. However, customers negatively perceive promotions of special deals that are hardly ever available, as well as high rack rates which are meant to increase customers' reference prices. While customers are well aware and accepting of the *effects* of RM on service offers, they are not conscious of RM as a capacity management tool and resent any attempts to deviate from the accepted patterns of prices, restrictions, and availabilities.

Respondents also identified the most important CCM program features for current members and non-members, where the main differences lie in the higher sensitivity of non-members concerning fees, and the lower interest in point redemption. Both airline and hotel customers, regardless of their membership status, value possibilities for point redemption, unlimited validity of points, and exemption from fees.

Participants in the hotel and airline groups provided support for the six concepts proposed to influence customers' fairness judgements. Personal past experiences and indirect knowledge from others, the presentation of an offer as a discount, and contextual offers advertised at the time of purchase have a strong influence on what customers perceive as their reference point. The justification of variations in offerings, and the expected availability of similar or better deals in the future also enter customers' evaluation of an offer as fair or unfair. As the value of an offer is partly dependent on customers' reference points, hotels and airlines can leverage this effect by manipulating one or more of the reference point determinants, and by utilizing knowledge about customers' past experiences.

We were also able to determine some important customer conflicts arising from concurrent CCM and RM. The underlying cause of these conflicts mainly lies in the incompatible nature of CCM and RM, where available seats are withheld from award bookings, and data collected about loyal customers is not used for personalised offers. The focus group research provides rich insights into the underlying causes of perceived fairness and decision making, but has limited power in demonstrating how precisely they affect customer choices. The composition of focus group participants ensured that information from customers from a range of travel backgrounds was obtained. Generalisability of results may however be restricted due to the limited number of subjects. In order to reconfirm and quantify the demand implications of customer conflicts and fairness adjustments presented here, the findings need to be applied to the study of customer choices in airlines and hotels. Appropriate ways forward could be to employ the conceptual framework to analyse real market choices, and to utilise the qualitative results for designing a series of stated choice experiments to examine the effect of simultaneous CCM and RM and fairness on purchase choice.

7 APPENDIX

Appendix II-1 Summary of Justice Theory and Related Concepts

Concept	Core Idea	Theoretical Substantiation
Distributive Justice	Are outcome allocations perceived as being fair?	**Distributive justice** refers to the equality of give and take, which means "a person compares an outcome with a comparative other's outcome" (Xia, Monroe et al. 2004, p.1). **Equity theory** augments this principle and includes different comparative others, including one self's past experiences (Huppertz, Arenson et al. 1978). Comparison to others is proposed to have a greater effect (Xia, Monroe et al. 2004). **Social judgement and comparison** adds that the more similar transactions are, the easier it is to compare them, and different prices are more easily judged as unfair (Kimes and Wirtz 2003).
Procedural Justice	Are the procedures used to make allocations perceived as being fair?	**Procedural justice** deals with fair cost profit distribution and the process leading to outcomes. It is based on the notion of **dual entitlement**, i.e. customers' belief that they are entitled to a fair price and suppliers are entitled to a fair profit (Kimes 1994). Price increases are therefore only justified as a result of cost increases not due to a firm's aim to achieve higher profits, for example during time of high demand, which contradicts the basic concept of PARM. **Attribution theory** argues that the "seller is responsible unless evidence indicates otherwise" (Weiner 1985 cited in Xia, Monroe et al. 2004). Not only the outcome plays a role in fairness judgements, but also the rules applied to achieve this outcome (Maxwell 2002; Kimes and Wirtz 2003). In PARM, these rules are pricing and allocation rules.
Interactional Justice	Is interpersonal treatment during the implementation of procedures perceived as being fair?	**Asymmetrical Power** generally favours the seller in commercial interactions. If consumers feel dependent, they are more likely to assume that the seller is taking advantage of this asymmetry (Maxwell 2002). The **Buyer-Seller Relationship and Trust** of repeat customers with transaction experience plays a role because the trustworthiness of suppliers is assessed based on interpersonal exchange and information about the supplier (Xia, Monroe et al. 2004). The chances of perceived unfairness increase with closeness and frequency of the transaction relationship (Huppertz, Arenson et al. 1978). **Transaction Justice** overlaps with the idea of distributive justice. Bolton, Warlop et al. (2003) note that customers are likely to compare their transaction with the prices paid by other customers. These reference points become particularly relevant in the presence of price discrimination

III CUSTOMER CENTRIC MARKETING AND REVENUE MANAGEMENT – THE ROLE OF FAIRNESS IN MODELLING CUSTOMER CHOICE

1 INTRODUCTION

Two of the most prevalent marketing investments in service firms are revenue (yield) management and customer centric marketing (CCM). CCM relies on anticipated beneficial consequences of customer relationships in order to maximise the lifetime value of current and potential customers (Rust, Lemon et al. 2004) and usually takes shape in customer recognition programs and other forms of favourable customer treatments. Perishable asset revenue management (RM), on the other hand, allocates perishable inventory units to existing demand to maximise revenues using price discrimination (Kimes 1989). RM practices become visible to service customers as availabilities of different fares or rates, restrictions associated with these fare or rate classes, and overbooking policies (cf. Kimes and Wirtz 2003).

The main difference between RM and CCM is the time horizon for revenue maximisation. RM maximises the revenue from a single transaction, but neglects possible long-term gains from individual customers (Noone, Kimes et al. 2003; Shoemaker 2003). CCM however is based on the premise that "revenue management is fundamentally about making the right short-term trade-offs to increase long-term revenues and profits" (Lieberman 1993, p. 105) and focuses on the lifetime revenues per customer. As a result, the basis for customer segmentation is also fundamentally different. Customer segmentation in RM is based on customers' price elasticities (Kimes 1989), while CCM distinguishes customers based on their lifetime profitability (Jain and Singh 2002). The respective aims and procedures of RM and CCM, when employed separately, represent noteworthy approaches to maximise revenues. Customers' utility assessment of service alternatives and subsequent choices however result from judging the entirety of all price and product attributes, which are influenced by both RM and CCM practices. The incompatible aims of RM and CCM are also likely to create conflict, confusion and fairness concerns for customers, and thereby alter their utility judgements. To attain maximum revenues, managers of service firms can benefit from understanding how precisely CCM and RM practices affect customer

judgements and choices, and how these practices account for possible conflicts that can originate when customers experience them concurrently.

Extant conceptual and empirical work on CCM, and related marketing techniques such as relationship marketing and customer relationship management (CRM), share the core notion of establishing and maintaining profitable customer relationships (Paas and Kuijlen 2001; Parvatiyar and Sheth 2001; Reinartz, Krafft et al. 2004; Zablah, Bellenger et al. 2004), but generally limit their understanding of CCM or CRM to the importance and management of customer retention (Zablah, Bellenger et al. 2004). The decision as to with which customers relationships should be formed and maintained is based on their lifetime value to the firm, and resource investments in acquisition and retention aim at maximising customer profitability (Reinartz, Thomas, and Kumar 2005). This is the core concept of customer equity management, which views customer lifetime values as a company's assets and also accounts for the measurement of customer lifetime value (Blattberg and Deighton 1996; Hogan, Lemon et al. 2002). Customer lifetime value (CLV) varies across customers due to differences in their expectations, utility assessments of a firm's offerings, and resulting likelihood to (re-)purchase (Hogan, Lemon et al. 2002; Jain and Singh 2002). Service firms tailor their offerings accordingly to maximise customer equity from their most profitable customers (Noone, Kimes et al. 2003). This is for example reflected in preferential treatment of members of loyalty or customer recognition programs, who have been identified as customers with a high lifetime value. Program benefits for repeat customers are aimed at increasing their utility and hence demand for the firm's services, but are not based on a substantiated comprehensive understanding of how customers react to specific CCM activities when choosing service offerings. In particular, little is known to date to explain the effects of concurrent RM and associated price discrimination practices on customers' (re-) purchase probabilities and lifetime value.

In addition to maximising customer equity, service firms face the challenge of managing fixed capacities and perishable inventories, which requires managing the trade-off between high occupancy or utilisation rates and high prices (Kimes 1989). Related management practices are subsumed as either revenue or yield management (Kimes 1989; McGill and van Ryzin 1999; Kimes 2000), and more comprehensively as "Perishable-Asset Revenue Management (PARM)" (Weatherford and Bodily 1992). The fundamental rationale is to charge different prices for the same product to different

customers in an attempt to balance demand and revenues per capacity unit (Kimes 1989; Weatherford and Bodily 1992; Kimes and Chase 1998; McGill and van Ryzin 1999), and to maximise yield or revenue per capacity unit as the target value (Weatherford and Bodily 1992; Kimes 2000). Price discrimination needs to be non-random and substantiated (Weatherford and Bodily 1992), which is achieved by imposing restrictions or making allowances (so-called rate fences). Although price plays a crucial role in customers' demand behaviour, traditional RM is not concerned with price setting and the price sensitivity of individuals as opposed to segments. Consequently, the effects of neither discriminating prices nor artificial rate fences on customers' (re-)purchase choices, including the risk of alienating customers, have been explored comprehensively to estimate future demand that is influenced by of RM practices.

Extensive research in the field of RM is primarily concerned with improvements to forecasting methods, and the heuristics and algorithms to best approximate the optimal allocation of capacity units to existing demand at different price levels (Weatherford and Bodily 1992). The fundamental assumption that such allocation is the best approach to maximising revenues in capacity constrained industries remains unquestioned[5]. In this paper we however argue that allocation optimisation, without considering its impact on customers' purchase decisions and lifetime value, is insufficient. Traditional RM uses a simplified conceptualisation of customer demand, which disregards its inherent effects on customers' utility and fairness perceptions with respect to a service firm and its offerings, and the resulting willingness to (re-)purchase these offerings (McGill and van Ryzin 1999; Talluri and van Ryzin 2004). However, "firms that adopt a customer management orientation need to consider how their activities affect their relationship with different customers" (Reinartz and Kumar 2003, p.7). Service offerings are shaped by all marketing activities, including RM, and customer demand for service offerings is not independent of these practices (Talluri and van Ryzin 2004).

In summary, the consequences of current practices of discrete CCM and RM initiatives which are employed concurrently influence a customer's evaluation of services and can lead to customer alienation and perceived unfairness, which in turn influence customers' likelihood to (re-)purchase. This means that CCM and RM practices can dampen the

[5] See Appendix III-1 for a summary of existing work.

overall demand for a particular service offering. Notwithstanding these implications, research and industry practice only slowly react to the problem. Some innovative service firms in the airline and hotel industry have responded with trials of less stringent RM procedures for customers with high lifetime value (cf. Libert and Cline 1996; Cox 2001), such as ranking waitlists based on CLV. Existing research on the usefulness and feasibility of CCM under capacity constraints is still in its infancy (some exceptions are Kimes 1994; Kimes and Wirtz 2003; Noone, Kimes et al. 2003) and fails to adequately address potential effects of RM on customers' product utility assessments, fairness perceptions, and hence their (re-)purchase choices. This paper intends to fill this void and presents an approach to assess the demand effects of possibly conflicting RM and CCM practices, employing a model of customer choices in the light of fairness issues. The objectives of this paper are threefold.

Firstly, we argue that the marketing activities of CCM and RM are not necessarily consistent and have the potential to create perceived unfairness. The first objective is hence to outline how perceived fairness affects customers' utility judgements. Fairness accounts for the largest part of deviations from expected utility (Konow 2003), and we discuss four different ways in which fairness matters can gain leverage in customer decision making.

More precisely, we introduce and assess a model of customer choices which accounts for fairness adjustments to utility and show how it outperforms the standard utility model. The model allows quantifying the effects of employing simultaneous, potentially contradictive, RM and CCM practices on customer demand. It is not yet established how RM interferes with the aim of CCM to maximise a firm's customer lifetime values, or how perishable assets should be managed in light of CCM efforts. The contribution of this paper is to provide a model that can be employed as a basis for measuring how the current practice of concurrent yet separate RM and CCM is reflected in customers' choices. This provides the foundation to generate important insights to considerably improve current RM conceptualisations and practices in the future.

Thirdly, airlines have started experimenting with choice models to improve the use of RM, but "the only theoretical models and methods that partially address choice behavior issues are dynamic pricing models" (Talluri and van Ryzin 2004, p.16). In this paper we develop a model to explain customers' choice behaviour as a result of RM practices

in combination with CCM. The insights gained allow moving towards an integrated application of CCM and RM.

The remainder of this paper is divided into four sections. Section 2 outlines why and how unfairness caused by discrete CCM and RM practices can affect customers' utility assessments and purchasing decisions. In Section 3, we first introduce a simple choice model to capture the demand effects of product features resulting from CCM and RM practices. We then present two variations of a comprehensive model of customer choice which takes into account fairness adjustments provoked by the simultaneous employment of CCM and RM practices. In Section 4, these models are assessed in the context of choices for flights using simulation data. We conclude with a discussion of theoretical implications and provide managerial recommendations for revenue managers of how to improve current practice.

2 ESTIMATING DEMAND UNDER FAIRNESS CONSIDERATIONS

Expected utility theory makes the assumption that individuals assess their options and select the alternative with the highest utility resulting from price and product attributes x (Thaler 1980). Let A denote the number of brands available to customer n. Customer n obtains a certain level of utility $U_{nj} = v_{nj} + \varepsilon_{nj}$ from each available, mutually exclusive alternative $j \in A=[1;\ldots J]$, where v_{nj} is the systematic and ε_{nj} the random component of utility (Louviere, Hensher et al. 2000), and chooses alternative i if and only if $U_{in} > U_{jn}$ $\forall\ j \neq i \in A$. The probability that customer n chooses alternative i is therefore $P_{in} = P[(\varepsilon_{jn} - \varepsilon_{in}) < (v_{in} - v_{jn})]$ $\forall\ j \neq i$. Assuming independence and identical distribution of the random components, the choice probability can be rewritten as the multinomial logit model (McFadden 1986; Train 2003):

$$P_{ni} = \frac{\exp^{v_{ni}}}{\sum_{j \in A} \exp^{v_{nj}}} \quad , \text{ with } v_{nj} = x'_n \beta_i , \quad P_{ni} = \frac{e^{x'_n \beta_i}}{\sum_{j \in A} e^{x'_n \beta_j}} \tag{III-1}$$

The effects of perceived unfairness on customer behaviour have been found to be decreased perceived utility and negative emotions, and therefore lower current and future willingness to (re-)purchase (Huppertz, Arenson et al. 1978; Bolton, Kannan et al. 2000; Maxwell 2002). Fairness refers to the judgement of an outcome and/or the process to arrive at this outcome as reasonable, acceptable, or just (Bolton, Warlop et al.

2003; Xia, Monroe et al. 2004). We propose four ways in which fairness can influence the level of utility u_{ni} and the choice outcome P_{ni}. Firstly, fairness can act as a pre-screening mechanism, which means seemingly unfair offers will be deleted from the set of considered purchase options. Secondly, fairness can decrease the utility of an offer due to a fairness adjustment resulting from a reference point comparison. Thirdly, fairness might change the decision rules applied to the purchase choice. Finally, fairness can possibly manifest itself as an increase in the random component of utility.

2.1 Fairness in choice set formation

Previous research has shown that customers engage in a two staged decision process, whereby they first form a set of options to be considered, and then make their choice from this consideration set (cf. Swait and Ben-Akiva 1987). Screening can involve the decision as to whether an alternative i should be evaluated at all, and/or whether it should then be considered for purchase choice (Hauser and Wernerfelt 1990; Mehta, Rajiv et al. 2003). Accordingly, customers may consider only a subset $C \subset A$ of all available service providers and their offerings as a purchase possibility, prior to the application of compensatory utility maximising decision rules.

Potentially conflicting outcomes of the simultaneous employment of CCM and RM practices might lead to alternatives being excluded from the consideration set, because customers perceive the practices and/or resultant outcomes as unfair. Similar to brand credibility (Erdem and Swait 2004), fairness perceptions of a specific provider or alternative could affect consideration set formation and subsequent choice conditional on consideration.

The size of the consideration set C results from an economic cost-benefit comparison of the increase in expected utility EU resulting from an enlarged set EU $(C \cup \{i\})$ – EU (C), and the cost c_i of enlarging the set by option i (Roberts and Lattin 1991, p.432; Andrews and Srinivasan 1995). An approach to determine the composition of consideration sets is to develop probabilistic models of consideration set formation which account for captivity effects (Swait and Ben-Akiva 1987; Andrews and Srinivasan 1995).

There are two competing paradigms of how consideration sets manifest in customers' expected utilities and choice. The best part of the literature models consideration as a

distinct step in the choice process (Swait and Ben-Akiva 1987; Roberts and Lattin 1991; Erdem and Swait 2004), and the probability that customer n chooses alternative $i \in C$ once the consideration set $C \subset$ A is formed is expressed as:

$$P_{ni} = \frac{e^{x'_n \beta_i}}{\sum_{j \in C} e^{x'_n \beta_j}} \qquad \text{(III-2)}$$

Horowitz and Louviere (1995) however provide evidence that there is no need to model choice as a two-staged process of consideration and choice conditional on consideration. Any factors or decision rules that influence consideration set formation are fully reflected in the customer's utility functions. The model specification of customer choices under fairness adjustments caused by simultaneous use of CCM and RM presented in this paper thus assumes that consideration manifests in choice preferences.

2.2 Fairness in Preference Formation and Utility Assessment

Random utility theory assumes that individuals assess their options and select the alternative with the highest utility resulting from price and product attributes (Hensher and Johnson 1981; McFadden 1986). Customers' real life choices, however, regularly violate the predictions of expected utility theory (Ben-Akiva, McFadden et al. 1999; Ben-Akiva, McFadden et al. 2002; Fitzsimons, Hutchinson et al. 2002), and fairness explains a large part of these deviations from utility maximising behaviour (Konow 2003). Choices might be better explained by choice theories that account for decision framing and reference points, such as Kahneman and Tversky's (1979) prospect theory, and the more general reference-dependency theory (Tversky and Kahneman 1991; Herne 1998; Munro and Sugden 2003; Sugden 2003) which comprehensively explain these systematic deviations from the principle of utility maximisation, and recognise that a coding phase precedes the actual evaluation and choice phase.

RM techniques, and especially the contradictory nature of concurrent CCM and RM activities, entails that offerings are likely to be negatively edited as a result of perceived unfairness (Kimes and Wirtz 2003). It is therefore proposed that customers' utility assessments and choices are affected by a perceived fairness component, which can be interpreted in two different ways. Firstly, fairness judgements could adjust the objective product and transaction utility by a multiplicative factor. Secondly, fairness judgements could simply add or deduct a fairness utility component to or from the objective utility component. We acknowledge the usefulness of modelling fairness as a

multiplicative effect but assume an additive effect, consistent with existing research on reference price effects (cf. Erdem, Mayhem et al. 2001). The systematic utility component can be rewritten as:

$$v_{ni} = \alpha_{ni} + \beta_{1nik} X'_{nik} + \beta_{2ni} FA_{ni}, \quad \text{III-3}$$

where α_{ni} is a customer and alternative specific constant, $\beta_{1ni}X'_{ni}$ is the utility component derived from the alternative's k price and product/service attributes x_{nik} (some of which are determined by CCM and/or RM), and FA_{ni} captures the utility changes created by fairness-based coding of these attributes x_{ni}.

2.3 The Impact of Fairness on Decision Rules

The conceptualisation of fairness as an adjustment to preferences is consistent with the assumptions of compensatory decision making, and considers fairness as an additional factor in the customer's utility maximisation effort. Fairness concerns may however alter the decision heuristics, with customers diverting from the principle of compensatory decision making and applying different decision heuristics.

Johnson and Payne (1985) highlight that individuals employ a variety of different cognitive processes and strategies to reach a decision, which depend on the characteristics of the choice task. The underlying assumption is that different heuristics require different levels of cognitive effort on the part of the decision maker, but also create varying levels of decision quality or accuracy. The willingness of decision makers to intensively engage in the decision process depends on the ratio and importance of effort versus accuracy, constraints, and factors of the task environment (Payne, Bettman et al. 1992).

Distressing situations or thoughts associated with a decision can be argued to be one of these factors. In fact, individuals change the pattern of their decision process when faced with trade-offs between emotion-laden attributes, such as incompatible service attributes resulting from CCM and RM practices. Luce, Payne and Bettman (1999) found that reference points and associated gain or loss perceptions confirm the emotional trade-off difficulty hypothesis. Fairness matters can trigger emotional strategies which lead customers to "conserve cognitive effort by using non-compensatory choice heuristics" (p. 146) as an avoidance strategy. Possible alterations to customers' decision rules due to perceived fairness are an important aspect to fully

understand the role of fairness in customer choices. However, the issue of non-compensatory decision rules in fairness judgements needs to be explored in a comprehensive research undertaking. For the purpose of this study, we will therefore stay within the framework of compensatory decision making traditionally applied in choice modelling (Swait 2001).

2.4 Fairness and Variability of Choice

Thurstone (1927) introduced the concept of random utility, which reversed the previous conceptualisation of customers as "optimising machines" of strict utilities and preferences and accounted for psychophysical errors. Choice models capture the perceptual errors of customer choices of alternative i in p $\in [1; P]$ stochastic sub-components ε_{1in} , ε_{2in} , …, ε_{pin} , which form the overall random component ε_{in} (McFadden 1986; Louviere 2001). Each of these subcomponents can contribute to the response variability Var (ε_{in}), which is perfectly confounded with the means of the systematic component v_{in}. A larger random component therefore leads to a smaller systematic component and vice versa (Louviere 2001).

Fairness concerns may increase the random component because they taint the perception of choice alternatives and add new facts to customers' learning from experiences. Fairness issues resulting from contradictive CCM and RM attributes of a service product can lead to increased within- and between-subject variability. For fairness-sensitive customers, perceived unfairness complicates the evaluation of alternatives, and some customers experience difficulties in discriminating between better and worse options. It is therefore crucial to distinguish between the effects of simultaneous CCM and RM practices on the mean effects v_{in} and the variability effects Var (ε_{in}) by including a scale parameter λ into the multinomial logit choice model. Assuming independent and identically Gumbel distributed errors,

$$\lambda^2 = \pi^2 / 6\delta_\varepsilon^2 , \qquad \text{(III-4)}$$

where π is the natural constant, δ_ε^2 is the variance of the stochastic component.

To summarize, the choice model proposed in this paper will augment the standard utility model by adding an individual fairness adjustment component, and it is recommended to include a scale parameter λ to capture potential effects of fairness on

customers' response variability. Potential effects of fairness on consideration set formation are expected to manifest in preference estimates, and our proposed model assumes compensatory utility maximisation. While all four approaches to account for fairness in customer decision making are equally valid, it is beyond the scope of this research to empirically test them individually.

3 A MODEL OF CUSTOMER CHOICE UNDER UNFAIRNESS

In section 2 of this paper, we argued that the inconsistent outcomes of employing CCM and RM practices, and associated perceived unfairness of service offerings, affect customers' decision making. We therefore introduce a model of customer choices under unfairness to explain how preferences and utilities are formed in the context of simultaneous use of CCM and RM practices. Our conceptualisation of customer demand follows random utility theory and assumes that the alternative with the maximum utility is chosen. We however distinguish two phases in the choice process, and suppose that the actual utility evaluation phase is preceded by a coding phase, leading to a fairness adjustment to raw utilities (see Figure III-1). During this coding phase, customers compare the actual, perceived attributes x_{njk} of service product alternatives j to the corresponding reference point $\bar{x}_{nk}$ (Kahneman and Tversky 1979; Hempel and Daniel 1993; Munro and Sugden 2003) to assess their fairness. Fairness generally refers to the judgement of an outcome and/or the process to arrive at this outcome as reasonable, acceptable, or just (Bolton, Warlop et al. 2003; Xia, Monroe et al. 2004). Fairness judgements are always subjective but rule-based, and comparative to a standard, norm or reference point $\bar{x}_{nk}$ (Kahneman, Knetsch et al. 1986; Frey and Pommerehne 1993; Maxwell 2002; Xia, Monroe et al. 2004). The term representing the fairness adjustments to overall utility can be specified as follows:

$$FA_{njk} = \sum_{k} \beta_{nk} w_{nkj} \; (x_{njk} - \bar{x}_{nk}) \qquad \text{(III-5)}$$

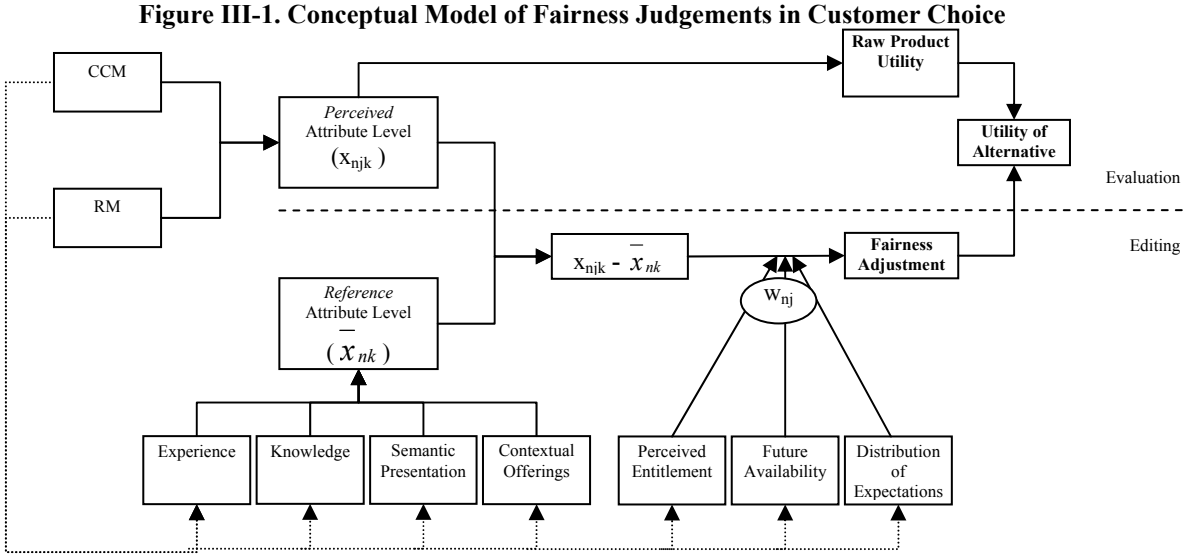
where x_{njk} is the perceived level of attribute k of alternative j, $\bar{x}_{nk}$ is the generic reference attribute level of attribute k for all alternatives i,j $\in [1; J]$, and w_{nkj} is the importance weight that customer n attributes to the difference between x_{njk} and $\bar{x}_{nk}$ for attribute k. We argue that not every deviation from the reference point has the same

bearing for fairness judgements, and its influence depends on the individual and situational context.

In cognitive psychology, perception judgements are framed around the point which induces a neutral response (Helson 1948). This notion of adaptation levels infers that customers form separate reference levels for each perceivable product attribute, rather than one overall reference point for the offering (Thaler 1985). Most research is limited to investigating price as the dominating attribute (Frey and Pommerehne 1993; Kimes and Wirtz 2002; Maxwell 2002), but this paper will extend the model to reference points for all relevant attributes k to generalize the fairness concept beyond price issues.

The fairness and justice literature further informs which mechanisms individuals use in setting reference points and prices, and the resultant editing of alternatives. Distributive justice is concerned with whether outcomes are perceived as fair, and is intrinsically tied to equity theory and social judgement (Konow 2003; Xia, Monroe et al. 2004). Procedural justice explains issues of fair cost-profit distribution and the process leading to outcomes, and rests upon the principle of dual entitlement and attribution theory (Kahneman, Knetsch et al. 1986; Maxwell 2002). Interactional or transaction justice refers to fairness judgements of interpersonal treatment, including issues of asymmetrical power and trust (Huppertz, Arenson et al. 1978; Bolton, Warlop et al. 2003).

Figure III-1. Conceptual Model of Fairness Judgements in Customer Choice



3.1 The Role of Reference Attribute Levels $\bar{x}_{nk}$

Fairness adjustments are a result of a comparison of the perceived attribute level x_{njk} for each of the k attributes, with the corresponding reference level $\bar{x}_{nk}$ (Kahneman, Knetsch et al. 1986; Frey and Pommerehne 1993; Maxwell 2002; Xia, Monroe et al. 2004). This is the core idea of decision framing, where alternatives are coded relative to a reference point (Kahneman and Tversky 1979; Munro and Sugden 2003). Reference points are based on consumer expectations (Helson; Kimes and Wirtz 2003), which are a function of a current expected reference point, a firm's marketing signals and anticipated macroeconomic variables (Oliver and Winer 1987; Puto 1987). Munro and Sugden (2003) model a person's reference point as her recent expectations about outcomes. Our proposed model encompasses four factors which influence customer n's reference levels $\bar{x}_{nk}$ for each service product attribute k:

$$\bar{x}_{nk} = \gamma_1 * X_{\exp\, nk} + \gamma_2 * X_{know\, nk} + \gamma_3 * X_{cont\, nk} + \gamma_4 * X_{s\tan d\, nk} + \varepsilon_{nk} \;\forall k = 1 \qquad \text{(III-6)}$$

where $X_{exp\ nk}$ are the customer's past experiences with the service regarding the k-th attribute, $X_{know\ nk}$ is the customer's indirect knowledge about x_k, $X_{stand\ nk}$ is the semantic presentation of x_k, and $X_{cont\ nk}$ are the values of x_k for unavailable options that are presented at the time of purchase choice.

Reference experiences $X_{exp\ nk}$ reflect a customer's past purchases i up to purchase situation t, and are defined as the weighted average of these past experiences (Rajendran and Tellis 1994; Briesch, Krishnamurthi et al. 1997):

$$X_{\exp nkt} = \mu_{\exp}\, \bar{x}_{nik\,t} + (1 - \mu_{\exp})\, \bar{x}_{nik\,t-1} \quad 0 \le \mu_{\exp} \le 1. \qquad \text{(III-7)}$$

Customers rely on their personal experiences with a specific product/service category and/or supplier to adapt their reference points, because customers' memory for chosen as opposed to rejected options is particularly strong (Briesch, Krishnamurthi et al. 1997). Reference point research assumes customers' willingness and ability to recall past transactions (Monroe 1973; Briesch, Krishnamurthi et al. 1997), and generally focuses on price points, such as past prices, past and present competitors prices, and supplier's cost (cf. Bolton, Warlop et al. 2003). While some reference point literature assesses individuals' limited ability to accurately recall past transactions (cf. Monroe

1973; Thaler 1985), reference points are subjective measures and do not rely upon objectively exact memory (Biehal and Chakravarti 1986).

Reference Knowledge $X_{know\ nk}$ measures the customer's knowledge at time *t* about past offerings *j* that she has not chosen ($\forall$ j≠i), and about past offerings available to customers *m* ($\forall$ m ≠ n), and is exponentially smoothed (Kalyanaram and Winer 1995; Briesch, Krishnamurthi et al. 1997).

$$X_{know\,nkt} = \mu_{know}\,\bar{x}_{nik\,t} + (1-\mu_{know})\,\bar{x}_{nik\,t-1} \quad 0 \le \mu_{know} \le 1 \qquad \text{(III-8)}$$

This indirect knowledge stems from past observations and personal experiences of peers (Kalyanaram and Winer 1995; Briesch, Krishnamurthi et al. 1997). Equity theory, and the concept of distributive justice, substantiate that customers consider their own past experiences and those of comparable others to assess equality of outcomes relative to the expended inputs (Huppertz, Arenson et al. 1978; Hunt and Kernan 1991; Xia, Monroe et al. 2004). RM by nature results in charging different customers different prices (inputs) at different times for the same offering (outcomes) and might therefore interfere with perceived equity.

Semantic Presentation $X_{stand\ nk}$ accounts for the manner in which the price attribute x_{ni1t} (k=1 represents price) is presented as a discount (gain) or surcharge (loss) in relation to an initial attribute level x_{ni1t-1}, such as a rack rate, which is communicated to customers (adapted from Erdem, Mayhem et al. 2001)

$$X_{s\tan dnkt} = \mu_0 + \mu_1 * GAIN_{ni1t} + \mu_2 * LOSS_{ni1t}\text{, where} \qquad \text{(III-9)}$$

$$GAIN_{ni1t} = \max\{x_{ni1t-1} - x_{ni1t};0\} \text{ and } LOSS_{ni1t} = \max\{x_{ni1t} - x_{ni1t-1};0\}$$

Prospect Theory and other work on reference-dependent preferences found that the presentation of alternatives alters whether they are perceived as gains or losses, and demonstrate that choices are not independent of the communication process (Kahneman and Tversky 1979; Tversky and Kahneman 1991; Munro and Sugden 2003). The deliberate presentation of offerings as discounts/add-ons or surcharges/restrictions can be expected to shift a person's reference point.

Contextual Offerings $X_{cont\ nk}$ refer to the mean of all other offerings j (j≠i) that are available to the customer at purchase occasion t, and those offerings that are known to customer n but not available to him, but only to customers m≠n.

$$X_{cont\,nk} = \frac{1}{(J-1)} \sum_{i} x_{njkt} + \frac{1}{(N-1)} \sum_{m} x_{mjkt} \qquad \text{(III-10)}$$

Firms employing RM practices might offer a range of price-product combinations at any given time, some of which might not be available and hence not be part of the choice set. Although other present stimuli alter perception (Helson 1948) and reference price formation (Rajendran and Tellis 1994), the effect of non-available alternatives has been neglected in previous reference price studies. Talluri and van Ryzin (2004, p. 16) remind that RM models assume that "the likelihood of receiving a request for any given fare product does not depend on which other fares are available at the time of the request", and model choice behaviour only as a function of the available fare options. In line with Rajendran and Tellis' (1994) finding that contextual stimuli have indeed an effect on reference prices that is distinct from those of past experiences, we argue that any price-product combination that is presented to the customer at t, whether or not it is actually available for purchase, has an impact on reference points and choice.

3.2 Importance of Perceived Differences w_{nik}

Not every difference between the actual attribute level and the reference attribute level x_{njk} - $\bar{x}_{nk}$ is equally prevailing in an individual's fairness judgements. Due to the subjective nature of fairness (Maxwell 2002), the difference is subject to an importance weighting w_{njk} which comprises of three elements.

$$w_{njk} = \beta_{1t} * x_{just\ nk} + \beta_2 * x_{avail\ njk} + \beta_3 * x_{range\ nk} + \varepsilon_{nik} \qquad \text{(III-11)}$$

where $x_{just\ nk} \in [0;1]$ is the level of perceived justification as a function of justification of availability, price, and bundling, $x_{avail\ njk} \in [0;1]$ is the probability with which customer n expects better alternatives to be available at t+1, and $x_{range\ nk} \in [0;1]$ is the dispersion of past reference levels.

Perceived Justification x_{just}, defined as a firm's perceived entitlement to charge a given price and manipulate availabilities and restrictions of different fares or rates resulting from the firm's justification of these variations, influences how a customer perceives an offering (Kachelmeier, Limberg et al. 1991; Maxwell 2002). Implications of distributive justice and equity theory are that seemingly unequal and potentially unfair offerings can be justified (Xia, Monroe et al. 2004). According to Kimes and Wirtz (2003, p.128) "it is imperative that the reasons for the varying price levels are easily

understood by all customers". Procedural justice shows that the knowledge of how an outcome has been determined has a significant effect on the perception of this offering. Customers believe in the closely related concept of dual entitlement, which states firms are entitled to achieve a reasonable profit based on their cost structure (Kimes 1994). This means that price increases are perceived as fair if they compensate cost increases, but as unfair if they increase profits. Attribution theory illustrates that any deviation from this rule is attributed to the service provider unless evidence indicates otherwise (Weiner 1985 cited in Xia, Monroe et al. 2004).

Future Availability $x_{avail\ njk}$ encapsulates the fact that RM by its very nature brings about constant variations of prices and availability of service offerings. Customers differ in both their willingness to postpone decisions under uncertainty, and their knowledge and experience about whether an offer is still likely to be available in the near future (Oliver and Winer 1987; Kalyanaram and Winer 1995). Speculations about future choice sets, a special case of determining probabilities of outcomes under uncertainty (Kahneman and Tversky 1979), are expected to affect customers' perception of current choice sets and the decision regarding the ideal purchasing time. Customers' perceived probability of changes in choice sets and their resulting readiness to speculate will therefore alter how (un)fair they perceive a current offering that might deviate from the reference point.

Distribution of Expectations $x_{range\ nk}$ is defined as the degree to which a person's reference points are dispersed around a mean. The probability of perceived unfairness increases with the closeness and frequency of transactions (Huppertz, Arenson et al. 1978), as argued in interactional justice theory. Interactional or transactional justice informs that customers compare their transactions over time and with other customers' transactions to assess consistency (Bolton, Warlop et al. 2003). The more consistent experiences a customer has with a product/service category and/or supplier, the more stable and narrow become his reference points (see also Burton and Babin 1989). The frequency of transaction determines the stability of a reference point, but does not determine the location of reference expectations.

To sum up, our conceptualisation of fairness in customers' utility assessments is built around four determinants of an individual's reference points for each product attribute, namely reference experiences, reference knowledge, semantic presentation, and contextual offerings. The reference points are then compared to the actual attribute

levels, and any deviation is weighted according to its importance for the individual. The importance weight depends on the justification of price and availability fluctuations, the perceived likelihood that an offer is still available in the future, and the degree to which an individual's expectations are dispersed around a mean.

4 MODEL ASSESSMENT

This section provides numerical results to illustrate the suitability of the extended utility model which accounts for fairness adjustments. We compare the performance of a main-effects-only, basic utility model (Baseline Model), with two versions of the proposed extended model (Fairness Models I and II), based on analyses of simulated data. The use of simulation data is effective to demonstrate the performance of our proposed model in explaining customer choices and provides a basis for drawing conclusions about the appropriateness of our proposed model (Talluri and van Ryzin 2004). Drawing inferences about explicit fairness and demand effects of specific CCM and RM attributes, however, would require real stated or revealed preference data. As the preference estimates β cannot be interpreted, they will also not be separated from the scale parameters λ.

Two different kinds of data were simulated to undertake our analysis, namely choice data and covariates related to the fairness adjustment components proposed in this paper. A 32-profile 2^3 x 4^7 fractional factorial orthogonal experimental design was created based on a orthogonal main effects design (Sloane 2006). Choice data for 94 hypothetical respondents was simulated by applying randomly selected alternative specific constants α_{in} for each individual n, preference parameters β, and error terms ε_{in} to determine utilities for the four alternatives in each choice set:

$$U_{in} = \alpha_{in} + \beta x_i + \varepsilon_{in} \quad , \qquad i=4 \tag{III-12}$$

where α_{in} is a (1×4) vector of alternative specific constants, x_i is a (1×8) vector[6] of k=8 attributes determining alternative i, β is a (8×1) vector of preference estimates measuring the relative importance of the 8 attributes, and ε_{in} is an i.i.d. random error

[6] Two of the attributes included in the design were necessary to specify the brand and the fairness construct 'future availability', i.e. the likelihood that the same or a better offer will still be available at t+1. No preference parameters are estimated for these two attributes.
The eight RM and CCM attributes are price, routing, cancellation and changes, ticketing and payment, frequent flyer program fees, award upgrades, award free flights, and validity of frequent flyer points.

component with an Extreme Value Type I distribution. The dependent choice variable captures the most preferred ($U_i > U_j \ \forall j \neq i$), the least preferred ($U_i < U_j \ \forall j \neq i$), and the second most preferred alternative ($u_l > u_j \ \forall l \neq i, j$) to obtain maximum information from the simulated data[7]. This generated a total of 48128 observations.

A set of covariates are required to compute the proposed fairness adjustments. Information on the covariates was obtained from a) attribute information from the experimental design, to account for the future availability of an alternative (x_{avail}), the semantic presentation of price as a gain or loss (x_{stand}), and contextual offerings (x_{cont}); b) information conditions of the experiment to simulate the presence or absence of justification of the different prices and availabilities (x_{just}); and c) in absence of purchase histories, reference experiences (x_{exp}) and reference knowledge (x_{know}) were approximated with randomly chosen answers to survey items about the most common, best and worst value encountered for each attribute.

4.1 The Baseline Model

In the baseline model, the probability that customer n chooses alternative $i \in J$ is

$$P_{ni} = \Pr\left(U_{ni} > U_{nj} \ \forall j \neq i\right) = \Pr\left(\alpha + \beta_{ni} x_i + \varepsilon_{ni} > \alpha + \beta_{nj} x_j + \varepsilon_{nj} \forall j \neq i\right) \quad \text{(III-13)}$$

where x_i is a vector of the k=8 attributes reflecting RM and CCM activities.

Assuming independence and identical distribution of the random components, the choice probability can be rewritten as the logit choice probability (Train 2003):

$$P_{ni} = \frac{e^{v_{nj}}}{\sum_j e^{v_{nj}}} \quad \text{with } v_{nj} = x_i \beta_{ni}, \quad P_{ni} = \frac{e^{x_i \beta_{ni}}}{\sum_j e^{x_j \beta_{nj}}} \quad \text{(III-14)}$$

In order to estimate how the eight observed factors captured in vector X_i influence customer's choices, unidentified parameters θ are estimated with the log-likelihood estimator. The log-likelihood function to maximise is

$$\ln L(\theta) = \sum_{n=1}^{N} \sum_{j=1}^{J} y_{nj} \ln P_{ni} \quad \text{(III-15)}$$

[7] The dependent variable was coded as a binary yes/no variable, with a weighting factor for best (7), second best(3), second least(1) and least(0) to account for the asymmetric nature of these choices.

where y_{nj} takes the value 1 if alternative j is chosen, and equals 0 for all other alternatives. We estimate a conditional logit, which is also known as McFadden's multinomial logit. The eight RM and CCM attributes were recoded as orthogonal polynomials, resulting in a total of 18 parameters (5 3-level attributes and 3 2-level attributes, with no intercept) being computed. Please note that the parameter estimates are not reported, as the relative importance of attributes cannot be assessed using simulated data.

4.2 Fairness Model I

The Baseline Model is extended to Fairness Model I by adding eight fairness adjustment components for each of the k attributes. In this fairness model, the probability that customer n chooses alternative $i \in J$ is

$$P_{ni} = \Pr\left(U_{ni} > U_{nj} \; \forall \, j \neq i\right) = \Pr\left(\alpha + \beta_{1ni} x_i + \beta_{2ni} FA_i + \varepsilon_{ni} > \alpha + \beta_{1nj} x_j + \beta_{2nj} FA_j + \varepsilon_{nj} \forall \, j \neq i\right) \text{ (III-16)}$$

where x_i is a (1 × 8) vector of the k=8 attributes reflecting RM and CCM activities, β_1 is a (8 × 1) vector of the preference estimates of the attributes, FA is a (1 × 8) vector of the fairness adjustments for each attribute, and β_2 is a (8 × 1) vector of the preference estimates for each fairness adjustment.

The fairness adjustment components are calculated as the difference between the actual attribute level x_{nik} and customer n's reference level $\bar{x}_{nik}$, multiplied by an importance weight w_{ni} (refer to Equation III-5 for more detail). Reference levels and importance weights are calculated based on the covariate data outlined in a previous section. Computing reference levels for attributes other than price poses some challenges, as previous research on the effects of reference levels on customer utility judgements are limited to price, and employ algorithms based on adaptation levels developed by Helson (1948). In our case, seven out of the eight attributes are categorical in nature and do not allow this approach.

Instead, reference levels are treated as latent constructs which are formed by the four fairness constructs identified earlier, namely reference experience, reference knowledge, contextual offerings, and (in the case of price) semantic presentation. Recent research includes a number of approaches of how to include latent constructs into random utility theory and customer choice models (Ben-Akiva, McFadden et al. 1999; Ashok, Dillon

et al. 2002; Ben-Akiva, Walker et al. 2002). The underlying rationale of these approaches is to include 'softer' attributes, such as attitudes, perceptions, expectations, etc. into choice models. Reference points represent such soft factors which influence people's choices.

Ashok, Dillon & Yuan (2002) and Ben-Akiva et al. (2002) discuss a number of approaches of how latent constructs could be incorporated both conceptually and computationally. A common approach is the so-called sequential, or two-staged limited information, estimation, which includes factor analysis followed by a multinomial choice model. The main limitation of the sequential approach is that it does not account for measurement errors in latent variables and treats the latent construct as a fixed effect. Latent variables however per definition have a random effect and it is therefore necessary to take its expectation $E(\bullet)$, which requires integration over the domain of the latent variable. Such a full information approach accounting for measurement errors would typically require integrating factor analytical measurement models with the general framework of multinomial choice models (Ashok, Dillon et al. 2002).

Because of the particular measurement model underlying reference points in the conceptualisation proposed in this paper, we however apply an approach that is similar to the theoretically equally valid two-staged limited information approach as opposed to a random utility choice modelling approach that contains latent attributes such as those proposed by Ben-Akiva et al. (2002), Ashok, Dillon & Yuan (2002), and Walker (2001). Firstly, we argue that a sequential estimation is the only feasible option, because the latent variable scores (i.e., reference level) are subject to two further algebraic transformations prior to entering the choice models (see Equation III-5). Secondly, our conceptualisation of reference levels implies that they are formed by the underlying constructs (i.e., based on a formative measurement model), whereas the existing integrated full information methods are assuming reflective measurement models (Ashok, Dillon et al. 2002) and have not been developed for the context of formative measurement models.

As stated earlier, the categorical nature of the data on past experiences and knowledge lead to modelling reference points for each attribute as a latent construct formed by measured indicators (Bollen and Lennox 1991; Diamantopoulos 1999):

$$\bar{x}_{nk} = \gamma_1 \overline{X}_{\exp\, nkt} + \gamma_2 \overline{X}_{know\, nkt} + \gamma_3 \overline{X}_{standi1t} + \gamma_4 \overline{X}_{cont\, nkt} + \xi \quad \text{for k=1 (price) and}$$

$$\bar{x}_{nk} = \gamma_1 \overline{X}_{\exp\, nkt} + \gamma_2 \overline{X}_{know\, nkt} + \gamma_3 \overline{X}_{cont\, nkt} + \xi \quad \text{for } k \neq 1 \qquad \text{(III-17)}$$

where γ_i is the expected effect of the particular fairness construct on the reference attribute level, and ξ is a stochastic term with Cov (x_i, ξ) = 0 and E (ξ) = 0. The expected effects γ_i were estimated using a partial least squares algorithm to accommodate the formative nature of constructs, and the sum of unstandardised path coefficients γ_i was set to one (Anderson and Fornell 2000). Please note that $\overline{X}_{\exp\, nkt} = 0$ in cases where personal previous experience is absent. The measurement models for reference experiences, reference knowledge, and contextual offerings are specified as follows:

$$\bar{x}_{\exp nkt} = \omega_{11} \bar{x}_{\exp\, nkt1} + \omega_{12} \bar{x}_{\exp\, nkt2} + \ldots + \omega_{15} \bar{x}_{\exp\, nkt5}$$
$$\bar{x}_{know\, nkt} = \omega_{21} \bar{x}_{know\, nkt1} + \omega_{22} \bar{x}_{know\, nkt2} + \ldots + \omega_{25} \bar{x}_{know\, nk5}$$
$$\bar{x}_{cont\, nkt} = \omega_{31} \bar{x}_{cont\, nkt1} + \omega_{32} \bar{x}_{cont\, nkt2} \qquad \text{(III-18)}$$

where ω_{1i} is the expected effect of personal past experiences with brand $i \in [1;5]$, ω_{2i} is the expected effect of indirect knowledge of brand $i \in [1;5]$, and ω_{3i} is the expected effect of two contextual offerings. The path coefficients are again assumed to add up to one.

Importance weights were computed in a similar manner, as a latent construct formed by the future availability of an alternative (obtained from the experimental design) $x_{avail\, njk} \in [0.1, 0.4, 07, 1.0]$, the justification price and availability $x_{just\, nk} \in [0,1]$, and the dispersion of reference experiences and reference knowledge $x_{range\, nk} \in [0;1]$ (see Equation III-11).

Following a limited information approach, reference levels for each of the eight RM and CCM attributes as well as importance weights were computed and then treated as error free values in two subsequent transformations. The attribute levels of each alternative were subtracted from the corresponding reference level, and the results multiplied with the attribute specific importance weight to obtain eight fairness adjustment components. These were then entered as error-free explanatory predictors into the multinomial choice model, extending the Baseline Model to form Fairness Model I.

4.3 Fairness Model II

Finally, we included a simplification of Fairness Model I, which adds one summative fairness adjustment for all k=8 attributes to the Baseline Model, instead of the eight attribute specific adjustment terms of Fairness Model I. The likelihood of alternative i being chosen in this case is

$$P_{ni} = \Pr\left(U_{ni} > U_{nj} \; \forall \, j \neq i\right) = \Pr\left(\alpha + \beta_{1ni} x_i + \beta_{2ni} FA_i + \varepsilon_{ni} > \alpha + \beta_{1nj} x_j + \beta_{2nj} FA_j + \varepsilon_{nj} \forall \, j \neq i\right) \text{ (III-19)}$$

In the case of Fairness Model II, FA_i is the sum of all element of the (1×8) vector included in Equation III-16, and β_2 is the preference estimates for the summative fairness adjustment component.

5 RESULTS AND DISCUSSION

All three models were estimated using multinomial logit, assuming ε_{nj} ~ i.i.d. type I extreme value. As we used simulated data, we cannot interpret the relative importance of any of the parameters. Instead the focus is on the goodness of fit of the three alterative models in order to assess their suitability in predicting customer choices. The goodness of fit statistics are reported in Table III-1.

Table III-1. Goodness of Fit Statistics for MNL Model Estimations

Model	Latent Constructs	No of Parameters	Log-Likelihood	LR Chi²	AIC	BIC
Baseline	0	18	-42132.647	3791.970	84301.294	84476.711
Fairness I	8	26	-42064.106	3929.052	84180.212	84433.593
Fairness II	1	19	-42127.131	3803.002	84292.262	84477.425

The Baseline Model is a main-effects model with a total of 18 parameters representing the relative effect of concurrent RM and CCM attributes on customers' choices. This model reflects the simplified conceptualisation of customer demand in traditional RM. It captures customers' trade-offs between RM and CCM attributes, but fails to account for the proposed effects of concurrent RM and CCM on customers' fairness perceptions.

The model of customer choice under unfairness presented in this paper is estimated in two different ways, as Fairness Models I and II. The results show that the Baseline Model is outperformed by both the simplified summative Fairness Model II and the comprehensive Fairness Model I. As both fairness models are nested within the baseline model, their relative performance can be compared to the basic model using the

log-likelihood ratio test (LLRT). However, it does not provide a basis to comment on the performance of Fairness Model I relative to Fairness Model II. The log-likelihood ratio test confirms that incorporating fairness adjustments into a choice model significantly improves its ability to predict customers' purchase decisions. Fairness Model I significantly better explains the simulated customer choices; LRRT = 137.082 > 20.09, p=0.001, 8df. The simplified Fairness Model I is also a significant improvement of the Baseline Model; LRRT = 30.578 > 11.032, p=0.001, 1df. Fairness Models I and II can however be compared based on the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC), where the minimum AIC and BIC indicate the best model fit (Anderson and Burnham 2002). Fairness Model I shows lower values for AIC and BIC than the Baseline Model and Fairness Model II, and is therefore selected as the preferred model.

The analysis supports the notion that concurrent yet separate RM and CCM initiatives lead to a two staged evaluation of offerings comparable to the coding phases of reference-dependent preference models (Kahneman and Tversky 1979; Munro and Sugden 2003). The performance of the summative Fairness Model II compared to the basic utility specification indicates that fairness in general influences purchase decisions. Customers' choices are a result of attributes directly determined by RM and CCM, but adjustments due to perceived (un-)fairness also play an important role. Inconsistent marketing actions, such as RM and CCM, instigate customers to perform fairness coding and adjust the utilities of alternatives accordingly. Utility judgements under unfairness can therefore be understood as a comparison of actual attribute levels of service/product alternatives to a corresponding attribute specific reference level, and as a novel application area for reference-dependent preference theory.

The fairness and justice literature offers a wealth of explanations as to why customers might perceive a process or outcome as unfair (Kahneman, Knetsch et al. 1986; Konow 2003). In our model of customer choice we embed the fairness concepts identified in justice theory into an expected utility framework and show in how far the identified reference point determinants affect utility levels through a reference-dependent fairness adjustment component. This extension of expected utility theory helps better explain choice outcomes which deviate from the predictions of expected utility theory on a regular basis.

The more detailed Fairness Model II goes beyond the argument that fairness in general matters, and provides a means to determine which conflicting RM and CCM attributes customers react to in the most sensitive manner. While the relative importance of any of the eight attribute-specific fairness adjustment components cannot be established from the analysis of simulation data, the performance of Fairness Model II demonstrates the value of assessing fairness effects of each product attribute individually. Existing research on reference prices explores the role and determinants of reference points with regard to prices (Kalyanaram and Winer 1995; Briesch, Krishnamurthi et al. 1997; Maxwell 2002), partially building upon the insights gained from reference-dependent preference models. The initial results presented here show that reference price effects can be translated to any other attribute, using the equivalent constructs to determine non-price reference points.

Given that utility judgements are subject to fairness coding, it is important for managers of capacity constrained service firms to understand how to avoid the negative demand effects of perceived unfairness. The encouraging results of modelling customer choice as a function of both CCM and RM attributes and potential fairness adjustments are an important step towards a customer-centric revenue management approach. Such an integrated application of CCM and RM aims at minimising any negative fairness utility corrections that may emerge. Initial improvements towards an integrated application can aim at decreasing the discrepancy between a customer's attribute specific reference points and the attributes of an alternative, and/or at minimising the importance weight. Hence, RM techniques such as booking restrictions, availability of rates and pricing need to take into account personal experiences and knowledge levels of individual customers or homogeneous customer segments. Firms embarking on a customer centric marketing strategy are in possession of data on customers' purchasing and booking histories which allow tailoring their revenue management strategies accordingly.

6 CONCLUSION AND OUTLOOK

Variations in customer demand in capacity constrained service industries due to perceived unfairness can be explained by adding fairness adjustment components to the expected utility model. We illustrate why customers' perceived fairness matters for service firms which concurrently employ CCM and RM practices, and discuss four

different ways in which fairness can manifest in customer decision making. A comprehensive model of customer choice under unfairness is introduced to better explain how customers react to alienating practices such as simultaneous CCM and RM. In our model, purchase decisions for services are based on the evaluation of alternative offerings and their prices. This evaluation is, in turn, influenced by the coding of these service offerings. Modelling purchasing choice as a two staged process, where the actual utility assessment of alternatives is preceded by a fairness coding of alternatives relative to an individuals' reference point, better predicts (re)purchase choices if fairness perceptions are present. The rationale underlying this coding phase is embedded in a set of theories from behavioural decision making and psychology, and confirms the usefulness of adaptation levels and reference-dependent preference theories to explain how individuals integrate the concepts of fairness and justice theory into their choices. Past purchase experiences, knowledge from external information sources and past observations, contextual offers at the time of purchase, and the semantic presentation of an offer as a surcharge and discounts are presented as determinants of reference points anchored in the justice literature. An estimation of the proposed choice model using simulation data demonstrates that it captures subjective, attribute-specific fairness adjustments to the utility of an alternative made by customers who experience (un)fairness.

For practitioners, it is important to understand that current, non-integrated CCM and RM activities need to be harmonised in their future uses to avoid or minimise negative fairness effects, which might lead to the rejection of an otherwise suitable offer. An integrated application of CCM and RM should build on determining and matching customers' reference points to avoid utility deductions resulting from perceived unfairness. More specific recommendations with respect to an integrated or balanced use of CCM and RM practices could be drawn from applying our proposed model to real customer data. The restricted informative value of simulation data forms the main limitation of our research. Although our findings support the existence of a reference-dependent component in customers' choices, it is essential to seek confirmation with real choice data. An extension of the research reported in this paper could hence be based on estimating this model using stated preference data in the context of service industries that are most affected by the challenge of balancing RM and CCM initiatives, such as airlines, hotels, and car rental agencies. An understanding of the specific trade-

offs customers make between RM and CCM induced product attributes, and their individual fairness effect, is a crucial step towards customer-centric RM. Moreover, this research is based on one particular conceptualisation of reference points as a latent construct formed by four identified determinants. Future research may explore different approaches to estimate reference points, such as calculating different reference points and fairness adjustments for personal experiences, reference knowledge, contextual offerings, and semantic presentation. Prospect theory also suggests that a distinction between gain and loss terms can further add to the model. In addition, only one of the four conceptualisations of fairness issues has been tested in this simulation study. Additional research can for example investigate whether including fairness both as an additive adjustment component to non-reference dependent utility and as a variability of the random component better explains customer choices. Also, further research can assess wether fairness effects could be better captured by a multiplicative adjustment to non-reference dependent utility.

Two other areas for future research are the development of choice based revenue management and the extension of our model to a dynamic choice context. In choice based revenue management, the utility generated for each customer would replace expected revenues per capacity unit as the basis for allocation heuristics. Talluri and van Ryzin (2004) break new grounds in this area and apply a general choice model of customer's behaviour to decide which sets of alternatives are available at any given time. Dynamic choice modelling investigates the sequence of current and future customer choices and accounts for a decision maker's objective to maximise the sum of utilities over time (Erdem and Keane 1996). While past direct and indirect experiences and the likelihood of future availability are included in our model, a dynamic approach to model choices over time can possible contribute to an improved understanding of customer decision making under simultaneously employed CCM and RM practices.

7 APPENDIX

AppendixIII-1 Revenue Management Research Areas

Elements	Descriptors	Research Examples
Resource	Discrete/Continuous	Most studies are on discrete capacity units, but Kimes and Chase (1998) suggest application to Internet services. Bodily and Weatherford (1995) make their heuristics applicable to continuous resources.
Capacity	Fixed/Non-fixed	Examples for (semi-) flexible capacities include restaurants (Kimes and Wirtz 2002) and rental cars (Carroll and Grimes 1995).
Prices	Predetermined/Set optimally/ Set jointly	Pricing tends to be a task separate from RM (Kimes 1989; Pfeifer 1989; McGill and van Ryzin 1999; Weatherford and Belobaba 2002); Feng and Xiao (2000) and Gallego and van Ryzin (1997) introduce dynamic pricing (i.e., joint setting of prices).
Willingness to Pay	Buildup/Drawdown	For hotels and airlines WTP builds up, but retail (Coulter 1999) and package holidays (Klein 2000) show drawdown. Willingness to pay also serves as segmentation criterion.
Discount Price Classes	1/2/3…/i	Early research (cf. Littlewood 1972) uses only two fare classes; established heuristics are then extended to more fare classes (cf. Belobaba 1987)
Reservation Demand	Deterministic/Mixed/Random-independent/Random correlated	RM solutions generally assume deterministic demand (Weatherford and Bodily 1992); Brumelle, McGill et al. (1990) and Botimer and Belobaba (1999) are among those who account for the more realistic case of correlated demand between fare classes.
Show-up of Discount Reservations	Certain/Uncertain without cancellation/ Uncertain with cancellation	Overbooking research (cf. Bodily and Weatherford 1995; Baker and Collier 1999)
Show-up of Full Price Reservations	Certain/Uncertain without cancellation/ Uncertain with cancellation	Overbooking research (cf. Bodily and Weatherford 1995; Baker and Collier 1999)
Group Reservations	No/Yes	Group bookings have not been researched yet; Kimes (1999) studies the forecasting of group bookings, but they are still treated as only one individual booking.
Diversion	No/Yes	Belobaba and Weatherford (1996) and Bodily and Weatherford (1995) extend their widely used EMSRb heuristics to account for high paying customers who divert to lower fare classes in the case of two discount fares.
Displacement	No/Yes	Origin-Destination research for airlines (cf. Talluri and van Ryzin 1999); Length of stay in hotels (Bitran and Mondschein 1995; Weatherford 1995)
Bumping Procedures	None/Full price/ Discount/FCFS/Auction	Decision Rules for overbooking limits (cf. Smith, Leimkuhler et al. 1992)
Asset Control Mechanism	Distinct/ Nested	Distinct categories are unrealistic; nested classes (i.e., no higher fare class booking is rejected if lower fares are still available) (cf. Belobaba 1987; Brumelle, McGill et al. 1990; Brumelle and McGill 1993)
Decision Rule	Simple Static/Advances static/ Dynamic	Weatherford, Bodily et al. (1993) and Gallego and van Ryzin (1997) introduce dynamic decision rules.

Source: Based on the taxonomy of Weatherford and Bodily (1992)

IV THE EFFECT OF CUSTOMER-CENTRIC MARKETING AND REVENUE MANAGEMENT ON CUSTOMER CHOICE – A STUDY IN THE AIRLINE AND HOTEL INDUSTRY

1 INTRODUCTION

Members of frequent traveller programs regularly have difficulties redeeming their award points for free flights, hotel stays or upgrades, because the capacity units made available for reward bookings are limited. A monthly survey on webflyer.com confirms this anecdotal evidence and reports that on average only 53% of frequent travellers were able to redeem their points for a free flight, and 58% succeeded in getting an upgrade (webflyer.com). Given the importance of loyal, profitable customers and the relatively low cost of providing a free flight or hotel room, this is prima facie a surprising practice. At second sight, it becomes apparent that airlines and hotels act on fear of revenue losses if the yield management system indicates that there is possible paying demand for a free capacity unit. This is a typical example of concurrent yet not harmonised customer-centric marketing (CCM) and revenue (yield) management (RM) initiatives, where promised benefits for profitable customers are not delivered in favour of short-term revenue maximisation. Service firms face the challenge of enticing profitable customers with customer centric relationship marketing activities, and at the same time maximising revenues applying yield management to allocate their fixed, perishable capacities to the highest-priced demand.

Several authors (cf.Noone, Kimes et al. 2003; cf.Wirtz, Kimes et al. 2003) acknowledge the potentially detrimental effects of coexisting yield (revenue) management and customer-centric marketing, a term which we use to subsume customer relationship management, relationship marketing, loyalty programs, and other marketing efforts to increase customers' willingness to (re-)purchase and hence their lifetime values for the firm. In our study, CCM is operationalised as frequent traveller program features, because for customers of airlines and hotels, the two industries which most widely use both marketing approaches, it is the most visible outcome of CCM (Brown, Toh, Hu 1995). Regarding the conflicting nature of yield management and customer-centric marketing, Shoemaker (2003) and Noone, Kimes et al. (2003) for example discuss how poorly used RM can damage customer loyalty, and promote the integration of relationship marketing and revenue management. Kimes (1994), Kimes and Wirtz

(2003), and Maxwell (2002) show that revenue management, and price discrimination in particular, alienates customers and creates perceived unfairness because expectations are not met. A "customer-relationship-management-level approach to revenue management, where availability controls are exerted at the individual customer level" (Talluri and van Ryzin 2004, p.30) can ease these conflicts, and the travel industry trialled considering customers' booking histories and credit card information in capacity allocation decisions. Other examples of airlines avoiding perceived unfairness are Virgin Blue's Velocity Rewards program which promises members: "If there's a seat available on a flight, you can have it!", and Marriott Rewards pioneering hotel loyalty programs by introducing "no block-out dates" for reward stays. Kim, Shi, and Srinivasan (2004) take a very different stand on how to best combine the merits of CCM and RM, and show that service firms can employ reward programs to improve utilisation of excess capacities. In order to advance the meaningful integration of CCM and RM, it is essential to establish how exactly simultaneous CCM and RM practices affect customer choices. Airlines and hotels will benefit from understanding the effects on willingness to (re)purchase their services of both new or casual and existing or regular customers.

The foundation for the disaccord of CCM and RM is multifaceted. Firstly, the time horizon for revenue maximisation is inherently different for RM and CCM. The underlying strategy of RM is to maximise the revenue from a single isolated transaction, that is to allocate each capacity unit to the highest paying customer. Long-term gains from individual customers are not considered. CCM on the other hand is built around the notion of lifetime revenues per customer, and readily makes necessary short-term trade-offs in favour of possible increases in long-term revenues (Lieberman 1993). The allocation of capacity units without considering long-term effects on customer relationships is insufficient as it potentially repels customers with high lifetime values that are disadvantaged by a single optimisation decision. Short-term revenue maximisation also insinuates that customers receive inconsistent offers at different purchase situations. Closely related are the findings of Kahneman, Knetsch and Thaler (1986) that individuals perceive the economically most efficient allocation of capacity units via an auction mechanism as the most unfair compared to less efficient allocation procedures. RM is comparable to an auction as it attempts to sell each capacity unit to the highest paying customer, and bears the same risk to create unfairness. Thirdly, RM

classifies customer segments solely by price elasticities and associated willingness to pay (Kimes 1989), while customer segmentation in CCM is based on lifetime profitability (Jain and Singh 2002). Customers with a high lifetime value might however fall into different price elasticity segments across transactions and therefore receive inconsistent treatment. Current research does not address how to manage profitable customers that show high price elasticity for a particular transaction. Fourthly, Shugan (2005) argues that loyalty programs are not an upfront investment in customers' future purchases (lifetime values), but rather a promise of "future benefits/rewards in return for current revenues". Customers are expected to trust that the service firm will deliver on the promise, and simultaneous use of RM and CCM (along with changes to the rules of the program etc) often means that this is not the case.

The fairness and justice literature (cf. Baumol 1982; Konow 2003) and reference price research (Winer 1989; Putler 1992; Rajendran and Tellis 1994; Kalyanaram and Winer 1995; Briesch, Krishnamurthi et al. 1997) indicate that customers perceive the likely conflicts experienced when confronted with simultaneous CCM and RM as unfair or losses. We propose and test a model of customer choice accounting for fairness considerations to better understand customer decision making in situations where firms convey conflicting messages that are also inconsistent over time and across customers. Applying an expected utility framework, we assume that customers choose the option which creates the highest level of utility for them. We then proceed to show how unfairness alters customers' utility assessments beyond the direct effects of product attributes, and extend the basic utility model by a fairness adjustment component for each attribute. These adjustments reflect the premise that customers judge the fairness of an offer by comparing its performance on a number of attributes to their respective reference points. In an effort to ensure distributional, procedural and interactional justice, customers form reference points based on past personal experiences, knowledge obtained from other customers and various media sources, other offers advertised at the time of choice, and the presentation of an offer framed as a gain or loss. We also show that not every deviation from an attribute-specific reference points is equally profound.

The objectives of this paper are fourfold. Firstly, we assess how selected product attributes affected by CCM and RM influence customer choices. Secondly, we show how perceived unfairness caused by these two marketing activities affects choice and offer an extension to basic choice models to capture fairness effects. Thirdly, in the

proposed fairness choice model we assess the impact of reference point comparisons on customer decision making for price, but also a range of product attributes other than price, and extend the concepts of reference price research. Fourthly, we show how frequent traveller program members, representing the recipients of more CCM activities, differ from non-members in their fairness adjustments and willingness to pay.

The key findings verify that incorporating reference-dependent fairness adjustments into a model of customer choice better explains choices in light of simultaneous CCM and revenue management. More specifically, the results demonstrate that fairness considerations for price and non-price attributes play a role in customer choices of flights and hotels. Frequent traveller program members react more strongly to reference-point deviations, and tend to have a lower willingness to pay for product attributed shaped by CCM and RM.

This paper is divided into six sections. Following the introductory Section 1, Section 2 describes two variations of a model to explain customer choice under unfairness, which can be tested using stated choice experiments. The model conceptualises fairness adjustments as a comparison of actual attribute levels of an alternative with their respective reference points. Section 3 summarises the analytical approach and method of data collection and describes the characteristics of the data sample. The estimation results of the proposed models compared to a basic expected utility model are presented and discussed in Section 4. In Section 5, we draw implications for decision making theory and the CCM activities of capacity constrained service firms. Section 6 concludes with closing remarks and recommendations for further research.

2 MODELLING FAIRNESS JUDGEMENTS IN CUSTOMER CHOICE

In order to estimate the impact of simultaneous CCM programs and RM on purchase decisions, we need to understand how customers evaluate offerings. Lemon, Rust et al. (2001, p.22) note that "value is the keystone of the customer's relationship with the firm. If the firm's products and services do not meet customer's needs and expectations, […] the strongest retention and relationship marketing strategies will be insufficient". The value perceived by customers is their utility assessment of (service) product attributes of an alternative (Thaler 1980). Random utility theory assumes that individual n assesses the utility of all product alternatives j from a set of j = 1,2,…,J

alternatives and selects alternative i if and only if $U_{in} > U_{jn} \ \forall \ j \neq i$, where the utility this customer derives from the purchase of this alternative is the linear function of product attributes $U_{nj} = v_{nj} + \varepsilon_{nj}$. In this function, $v_{nj} = x'_n\beta_i$ is the systematic component of the utility specification, and ε_{in} is an i.i.d. error term. The probability that customer n chooses alternative i is therefore $P_{in} = P[(\varepsilon_{jn} - \varepsilon_{in}) < (v_{in} - v_{jn})] \ \forall \ j \neq i$. Assuming independence and identical distribution of Extreme Value Type I of the random components ε_{jn}, the choice probability can be rewritten as the multinomial logit model (McFadden 1986; Train 2003):

$$P_{ni} = \frac{\exp^{v_{ni}}}{\sum_{j \in A} \exp^{v_{nj}}} \quad , \quad \text{with } v_{nj} = x'_n \beta_i , \quad P_{ni} = \frac{e^{x'_n \beta_i}}{\sum_{j \in A} e^{x'_n \beta_j}} \tag{IV-1}$$

Customers however do not always select the alternative associated with the highest utility, that is they do not always behave according to the predictions of normative decision rules and expected utility theory. Their purchase decisions might be better captured by choice theories accounting for the importance of customer expectations and ensuing reference points (Thaler 1980; Burton and Babin 1989; Sebora and Cornwall 1995). Kahneman and Tversky's (1979) prospect theory and the more general reference-dependent preference theory (Tversky and Kahneman 1991; Munro and Sugden 2003; Sugden 2003; Köszegi and Rabin 2004) imply that people evaluate outcomes relative to a neutral reference point, and that an editing or coding phase precedes the actual evaluation and choice phase.

We suggest that service firms applying RM techniques run the risk of having their offerings negatively edited during the coding phase as a result of perceived unfairness (Kimes and Wirtz 2003). We further assume that this particularly applies to members of frequent traveller programs, who are most exposed to CCM activities of airlines and hotels, and are likely to have the most extensive purchase experience. The recipients of CCM are therefore operationalised as members of frequent traveller programs for the purpose of this study. Fairness has been found to explain a large part of deviations from objective utility maximisation (Konow 2003). Kahneman, et al. (1986) show that perceived unfairness encourages individuals to take their business elsewhere, and customers are willing to incur extra cost (willing to pay a premium) to avoid unfairness. Fairness refers to the judgement of an outcome and/or the process to arrive at this

outcome as reasonable, acceptable, or just (Bolton, Warlop et al. 2003; Xia, Monroe et al. 2004). Fairness judgements are subjective by nature, but always comparative to a standard, norm or reference point, and clearly rule-based (Kahneman, Knetsch et al. 1986; Frey and Pommerehne 1993; Maxwell 2002; Xia, Monroe et al. 2004). Following the propositions of reference-dependent preference theory, we conceptualise utility as a combination of a utility component independent of reference points, and a reference-dependent utility or fairness adjustment component (Sugden 2003; Köszegi and Rabin 2004). Thaler (1985) makes a similar distinction between acquisition utility derived from the actual consumption of a product, and reference-dependent transaction utility based on the merits of the deal:

$$v_{ni} = \beta_{1nik} X_{nik} + \beta_{2ni} FA_{ni}, \qquad \text{(IV-2)}$$

where X_{ni} is (1 × k) vector of the k price and product/service attributes x_{nik} describing alternative i which are influenced by CCM or RM, β_{1ni} is a (k × 1) vector of preference parameters, FA_{ni} is a (1 × k) vector capturing the utility changes created by fairness-based coding of attributes x_{ni}, and β_{2ni} is a (k × 1) vector of response parameters.

We generalise the reference point and fairness concept beyond price evaluations and consider reference levels for non-price attributes ensuing from CCM and RM. As customers form separate reference levels and decision frames for each relevant product attribute (Thaler 1985; Biehal and Chakravarti 1986; Janiszewski, Silk et al. 2003), we will apply the findings of reference price research to model reference points for price and attributes other than price. The measurement of judgements of categorical non-price attributes relative to a reference points can only be operationalised with the assumption that the difference between any two attribute levels is equally spaced.

The utility model from Equation IV-2 can be summarised into the following three hypotheses:

H 1) Utility assessment of customers experiencing CCM and RM encompasses both attribute-derived utility and fairness adjustments.

H 2) Customers derive utility a) directly from attributes induced by RM and CCM, and b) through comparisons to a reference point.

H 3) Customers form separate reference points and fairness judgements for each attribute influenced by CCM and RM.

2.1 Fairness gains and losses

The specification of fairness adjustments can depend on both the direction of and the extent to which an observed attribute level differs from a reference point. Individuals assess outcomes as either gains (above reference point) or losses (below reference point) and react more strongly to perceived losses than gains (Kahneman and Tversky 1979). Reference price studies confirm this pattern and found that customers respond more to price increases than to price decreases relative to reference prices (Kalyanaram and Winer 1995). Individuals are expected to prefer advantageous to disadvantageous deviations, which necessitates two separate terms for positive and negative deviations. Expanding the reference-dependent fairness component, we can rewrite the systematic utility component as follows:

$$v_{ni} = \beta_{1nik} X_{nik} + \beta_{2ni} FAGAIN_{ni} + \beta_{3ni} FALOSS_{ni}, \qquad \text{(IV-3)}$$

$\beta_{2ni}FAGAIN_{ni}$ and $\beta_{2ni}FALOSS_{ni}$ capture the utility changes created by positive or negative deviations of the k attributes x_{nik} relative to their respective reference points ($\bar{x}_{nk}$). Please note that we approximate these fairness utility changes as a linear effect (Erdem, Mayhem et al. 2001), although reference dependency generally shows decreasing marginal increases and assumes non-linear decision weights (Sebora and Cornwall 1995). Each of the k FAGAIN terms is the difference between the actual attribute of that alternative (x_{nik}) and customer n's reference attribute ($\bar{x}_{nk}$), given that $x_{nik} < \bar{x}_{nk}$ for price and $x_{nik} > \bar{x}_{nk}$ for all other attributes. FALOSS terms are the difference given that $x_{nik} < \bar{x}_{nk}$ for price and $x_{nik} > \bar{x}_{nk}$ otherwise. The composition of $\bar{x}_{nk}$ will be specified subsequently.

$$\begin{aligned} &\text{FAGAIN}_{njk} = \min\left\{(x_{njk} - \bar{x}_{nk});0\right\} \text{ and } \text{FALOSS}_{njk} = \max\left\{(x_{njk} - \bar{x}_{nk});0\right\} \forall k = 1 \text{ and} \\ &\text{FAGAIN}_{njk} = \max\left\{(x_{njk} - \bar{x}_{nk});0\right\} \text{ and } \text{FALOSS}_{njk} = \min\left\{(x_{njk} - \bar{x}_{nk});0\right\} \forall k \neq 1 \end{aligned} \qquad \text{(IV-4)}$$

where k=1 denotes the price attribute. The magnitude and direction of fairness adjustments are hypothesised to conform to the following rules:

H 4) A positive (negative) deviation of the attribute level from the reference point will lead to a positive (negative) adjustment to utility.

H 5) The relative size of a negative utility adjustment is larger than the relative size of a positive adjustment, assuming equal absolute deviations from the reference point.

2.2 Determinants of reference points

Literature on preferences given a certain reference point is extensive, but far less has been done to identify the determinants of reference points (Köszegi and Rabin 2004). Köszegi and Rabin (2004), Munro and Sugden (2003), and Kimes and Wirtz (2003) model a person's reference point as her recent, rational expectations about outcomes. These expectations can be either the overall level of endowments or customary consumption (Thaler 1980; Munro and Sugden 2003; Köszegi and Rabin 2004). For the purpose of this paper, we adopt the conceptualisation of reference points as customary consumption - that is the offerings customers are used to.

Winer (1989) incorporates reference dependency into a multi-staged model of customer choice which includes reference price effects. Reference price research in general investigates the effects of known reference prices (cf. Erdem, Mayhem et al. 2001; cf. Dholakia and Simonson 2005), and determinants of expectations and reference points for prices. Bolton, Warlop et al. (2003) see reference points determined by past prices, competitor prices and vendor costs, while Kahneman, Knetsch and Thaler (1986) note that market prices, posted prices, and the history of previous transactions can serve as a reference price. Generally customers may use both internal and external reference prices, confirming the findings of adaptation level theory that both the past and present context of experiences define adaptation levels (Kalyanaram and Winer 1995; Mazumdar and Papatla 1995; Erdem, Mayhem et al. 2001). Internal or temporal reference prices are based on previous experiences with a brand and/or product category, and past exposure to other price information. Briesch et al. (1997) found that a brand specific reference price of the brand's past prices is the best operationalisation of internal reference prices. External or contextual reference prices are current observed prices and suggested list prices, usually at the point and time of purchase. Marketers can manipulate reference prices through advertising to make customers perceive a price as a gain (Biswas and Blair 1991; Lowengart, Mizrahi et al. 2003).

The determinants of reference prices are summarized into four constructs. Reference points are a function of 1) past personal experiences X_{exp}, 2) indirect knowledge of past experiences through peers, promotional messages, the media, etc X_{know}, 3) contextual offerings at the time of purchase X_{cont}, and 4) the semantic presentation of the price variable as a gain or loss relative to a suggested standard rate X_{stand}. We distinguish two separate constructs for experienced and observed temporal reference points, because customers' memory for chosen as opposed to observed options is particularly strong (Briesch, Krishnamurthi et al. 1997).

Employing the work of Rajendran and Tellis (1994), we suggest that customers can integrate the four reference point components into their utility assessment in two different ways. Firstly the can evaluate attribute levels relative to a single reference point:

$$v_{ni} = \beta_{1nik} X_{nik} + \beta_{2ni}(\overline{X}_{nk} - X_{nik}) \qquad \text{(IV-5)}$$

The reference point is modelled as a latent construct formed by measured indicators of the four determining constructs (Bollen and Lennox 1991; Diamantopoulos 1999):

$$\begin{aligned} \bar{x}_{nk} &= \gamma_1 * X_{\exp\, nk} + \gamma_2 * X_{know\, nk} + \gamma_3 * X_{cont\, nk} + \gamma_4 * X_{s\tan d\, nk} + \varepsilon_{nk} \;\forall k = 1 \\ \bar{x}_{nk} &= \gamma_1 * X_{\exp\, nk} + \gamma_2 * X_{know\, nk} + \gamma_3 * X_{cont\, nk} + \varepsilon_{nk} \;\forall k \neq 1 \end{aligned} \qquad \text{(IV-6)}$$

where γ_i is the expected effect of the particular fairness construct on the reference point of customer n for attribute k, and ε_{nk} is a stochastic term with Cov (x_i, ε_{nk}) = 0 and E (ξ) = 0. Please note that for computational simplification, the latent reference point variable enters the choice model as a fixed effect. This two-staged limited information approach is theoretically equally valid to the full information approach accounting for measurement error (Ben-Akiva, McFadden et al. 1999; Ashok, Dillon et al. 2002; Ben-Akiva, Walker et al. 2002)

Secondly, customers could make independent comparisons for each reference point component, meaning they enter the utility function as separate comparison terms.

$$\begin{aligned} v_{ni} &= \beta_{1nik} X'_{nik} + \beta_{2ni}(X_{know_{nk}} - X_{nik}) + \beta_{3ni}(X_{\exp} - X_{nik}) + \beta_{4ni}(X_{cont} - X_{nik}) + \beta_{5ni}(X_{s\tan d} - X_{ni1}) \;\forall k = 1 \\ v_{ni} &= \beta_{1nik} X'_{nik} + \beta_{2ni}(X_{know_{nk}} - X_{nik}) + \beta_{3ni}(X_{\exp} - X_{nik}) + \beta_{4ni}(X_{cont} - X_{nik}) \;\forall k \neq 1 \end{aligned} \qquad \text{(IV-7)}$$

The two approaches to include reference-dependent fairness adjustments in customer choice models are theoretically equally valid. Rajendran and Tellis (1994) emphasise

that the model in Equation IV-7 would allow investigating the specific role of different reference point components. Both models will therefore be tested empirically. If modelling customer choice with separate reference point components is superior to a single reference point per attribute, existing reference price research suggests that the effect of X_{exp} is largest, followed by X_{cont}, and the indirect X_{know} is expected to have the smallest effect.

2.3 The weighting of deviations

Assimilation-contrast theory and reference price research show that individuals have a potential zone of indifference or latitude of acceptance (Kalyanaram and Little 1994; Kalyanaram and Winer 1995). We therefore argue that not every deviation from an individual's reference point has the same bearing on fairness judgements, and its influence depends on several factors. However, instead of modelling reference points as a range, we introduce a weighting factor which reflects the importance of a deviation. This means that the fairness effect of a deviation of any size can be discounted depending on the size of the importance weight. The introduction of an importance weight is based on the assumption that the ratio of an acceptable range to the reference point is represented by a constant of proportionality ($\Delta P/P=K$) (Monroe 1973). This can be rewritten as $\Delta P=K*P$, and expanded to $(XP- \Delta P)=(XP-P)*K$. The value of ΔP is unknown, and K approximated with the importance weight.

Monroe and Lee (1999), in the context of prices, discuss how the width of an acceptable range reflects the confidence of a customer as to what the value of a certain product attribute should be. Consistent and frequent experiences with a (service) product category and/or supplier increase customers' confidence and lead to more rigid and narrow reference points (see also Burton and Babin 1989). The dispersion of past experiences is therefore expected to influence the importance of a deviation.

Secondly, expectations about future developments of prices and other product attributes may also affect customers' reaction to a deviation from their current reference point (Kalyanaram and Winer 1995). RM causes service offerings and their availability to change constantly, and customers' knowledge and experience about whether the same or a better offer is likely to be available in the near future may abate the impact of deviations.

Thirdly, the amount of information a firm provides to justify variable pricing and the availability and conditions of special offers, and the attribution of these practices to the firm, changes the magnitude of (un-)fairness perceptions. Providing full or at least partial information improves fairness perceptions (Choi and Mattila 2006). According to the concept of procedural justice, the knowledge of how an outcome has been determined has a significant effect on the perception of this offering (Kimes and Wirtz 2003).

Fairness judgements based on the difference between actual attribute level and reference level are therefore likely moderated by an importance weight w_{njk}:

$$w_{njk} = \beta_1 * x_{just\ nk} + \beta_2 * x_{avail\ njk} + \beta_3 * x_{range\ nk,} + \varepsilon_{nik} \quad \text{(IV-8)}$$

where $x_{just\ nk}\ \varepsilon\ [0;1]$ is the level of justification of availability, price, and bundling, $x_{avail\ njk}\ \varepsilon\ [0;1]$ is the probability with which customer n expects the same or better alternatives to be available at t+1, and $x_{range\ nk,}\ \varepsilon\ [0;1]$ is the dispersion of past reference levels.

The application of importance weightings to any comparison of observed attribute levels to their respective reference points changes Equations IV-4 and IV-7 as follows:

$$FAGAIN_{njk} = \min\left\{w_{njk} * (x_{njk} - \bar{x}_{nk});0\right\} \text{ and}$$
$$FALOSS_{njk} = \max\left\{w_{njk} * (x_{njk} - \bar{x}_{nk});0\right\} \quad \forall k = 1((1)$$

$$v_{ni} = \beta_{1nik} X'_{nik} + \beta_{2ni} w_{nik} (X_{know} - X_{nik}) + \beta_{3ni} w_{nik} (X_{exp} - X_{nik}) + \beta_{4ni} w_{nik} (X_{cont} - X_{nik}) + \beta_{5ni} w_{nik} (X_{stand} - X_{ni1})$$
$$v_{ni} = \beta_{1nik} X'_{nik} + \beta_{2ni} w_{nik} (X_{know} - X_{nik}) + \beta_{3ni} w_{nik} (X_{exp} - X_{nik}) + \beta_{4ni} w_{nik} (X_{cont} - X_{nik}) \quad \forall k \neq 1 \quad \text{(IV-9)}$$

The role of attribute specific importance weights in customer's fairness judgements can be summarised in the following hypothesis:

H 6) Customer responses to reference point deviations will be weaker (stronger) the smaller (larger) their individual attribute-specific importance weight.

2.4 Fairness perceptions of frequent traveller program members

The core objective of this paper is to explain the choices of customers who are exposed to CCM activities and RM simultaneously. While the previous section introduced four different models to measure fairness effects resulting from simultaneous CCM and RM,

this section investigates the underlying causes of perceived unfairness. In the airline and hotel industry, the potential conflicts are most noticeable for members of frequent traveller programs, who are the primary recipients of CCM efforts aimed at increasing their willingness to (re-)purchase and hence their lifetime value for the firm. Participation in a 'loyalty' program, such as a frequent traveller program, is positively related to relationship duration (Reinartz and Kumar 2003). Relationship duration, in return, has a weak but continuous link to profitability (Reichheld and Teal 1996; Reinartz and Krafft 2001), which suggests that frequent traveller status is directly linked to profitability. The frequently cited willingness of loyal customers to pay a price premium to purchase their preferred brand has however been disproved (Cox 2001, Xia, Monroe et al 2004). We will investigate the willingness to pay for product attributes resulting from RM and for frequent traveller program features for non-members, and compare it to the supposedly more profitable frequent traveller members.

Regarding the formation of reference points and the importance of reference-dependent fairness adjustments to utility, Rajendran and Tellis (1994) found that past personal experience as opposed to external reference points, are most important for customers with extensive purchase history and higher brand loyalty, such as frequent traveller members. The reverse findings of Mazumdar and Papatla (1995) indicate that more loyal customers use mainly contextual reference prices of their preferred brand. According to their findings, less loyal customers rely more heavily on their memory of past personal experiences. The chances of perceived unfairness increase with the closeness and frequency of transactions, because reference points become more robust the more previous experience a customer has. Huppertz, Arenson et al. (1978) for example show that customers find inequity particularly unfair in high frequency shopping situations. Assuming that frequent traveller members have a higher purchase frequency than most non-members, the expected fairness adjustments of frequent traveller members can be summarised in two hypotheses:

H 7) The willingness to pay of frequent traveller program members for service attributes and the program's brand is lower than the willingness to pay of individuals who do not belong to any frequent traveller programs.

H 8) Negative and positive fairness adjustments are larger for frequent traveller program members than for non-members, given the same magnitude of deviation from their reference point.

3 RESEARCH DESIGN

This section describes our study to test the suitability of fairness adjustments in modelling customer choices in light of concurrent CCM and RM for the airline and hotel industries with stated choice experiments. We decided to apply our proposed model to airlines and hotels because their customers' choices are most likely influenced by both revenue management effects (e.g. price, availability, booking restrictions) and loyalty program features (e.g. free rewards, upgrades). Airlines and hotels are the main industries to employ revenue management. Choice between different flight/hotel options is analysed using McFadden's logit (conditional logit) model where choice is a function of attributes describing the alternatives (McFadden 1976). The choice probability is specified in Equation IV-1. In order to estimate how observed attributes influence respondents' choices, unidentified parameters θ are estimated by maximising the following log-likelihood function:

$$\ln L(\theta) = \sum_{n=1}^{N} \sum_{j=1}^{J} y_{nj} \ln P_{ni} \qquad \text{(IV-10)}$$

where y_{ni} takes the value 1 if alternative j is chosen, and 0 for all other alternatives.

Data collection involved a qualitative and a quantitative stage. In the qualitative stage, we studied 19 hotel guests and 35 airline passengers in a total of 5 focus group sessions. Separate groups were conducted for members and non-members of frequent traveller programs in both industries to account for potential differences. Although the literature and industry practice provide detailed records of the attributes influencing service choices, qualitative research was necessary to extract those decision-relevant attributes that are directly related to RM and loyalty programs. Another reason for conducting focus groups was to obtain levels for the attributes in language used by customers to design discrete choice experiments. Focus group participants discussed the most noticeable consequences of RM and features of loyalty programs from the customer's point of view, as well as any conflicts that they have experienced. The results advocate five RM attributes (price, availability, restrictions for cancellations and changes, payment terms, routing) and four loyalty program attributes that can potentially conflict with RM objectives (free flights/stays, membership fees, validity of points, upgrades). We also found support for the four reference point determinants identified earlier.

The quantitative stage comprised of recording customers' responses to a set of survey questions about personal experience and knowledge about specific travel, and stated preference choice experiments administered online[8]. The specific travel context was a flight to Bangkok from Sydney, Melbourne or Brisbane[9] for the Airline Study, and a hotel stay in Sydney or Melbourne[6] for the Hotel Study. A combined survey invitation was emailed to 6110 individuals randomly selected from a panelof people who live in the east of Australia and travel for work and/or leisure. They were offered a small cash incentive to complete the survey. Respondents were then screened to a) limit the sample to those who have travelled at least once during the last 12 months, and to b) get an equal split of frequent traveller program members and non-members for the airline and hotel study. We assume that the quantity and accuracy of recollected past personal travel experiences and knowledge from others is higher for respondents with recent travel experience, and want to test for potential preference differences between members and non-members.

Congruent unlabelled discrete choice experiments for hotels and airlines were designed using the results of the focus group research, and included a tenth attribute to account for the association of an alternative with a specific frequent traveller program. A 32-profile fractional experimental within-subject design was obtained by selecting 32 profiles from the $4^7 \times 2^3$ complete factorial based on an orthogonal main effects design (Sloane 2006). The choice profiles were presented in randomised order to control for order effects. Attribute levels correspond to actual market situation and are summarised in **Error! Reference source not found.**. In order to create four alternatives per choice set, we systematically varied the orthogonal main effects plan of the profiles in the first alternative by applying a set of generators modulo to the number of levels of each attribute in order to obtain, consistent with theoretical descriptions of D-optimal choice design (Street, Burgess et al. 2005), a 100% efficient main effects choice experiment. The respondents had to choose their most preferred, least preferred and second least preferred alternative for a flight to Bangkok, and a hotel stay in Sydney or Melbourne respectively, from each of the 32 choice sets, and were also asked whether they would a) book their most preferred option now, and b) join the associated frequent traveller program if they were not already a member. The within-subject design was nested

[8] see Appendix VII-1, VII-2 and VII-3 for screenshots
[9] Depending on the respondent's residence

within a $2^4 + 2^5$ full factorial between-subjects design, leading to 24 different conditions of the same choice experiment. Up to five factors were manipulated in both (airline and hotels) experiments: whether each choice set included two additional non-available alternatives[10] that could not be chosen (context); b) whether price was displayed as a dollar amount only, or as dollar amount and % discount or surcharge of a standard rate (semantic presentation); c) whether respondents received an explanation why prices and availability might vary (justification); d) whether the scenario was a holiday or business trip; and in the case of business trips (trip purpose); and e) whether the company paid for travel cost upfront or reimbursed the expenses later (payment method).

Table IV-1. Attributes and Their Levels for Airline and Hotel Studies

Airline Study		**Hotel Study**	
Attribute	**Levels** [11]	**Attribute**	**Levels** [7]
Price	AU$ 770 AU$ 990 AU$ 1210 AU$ 1430	Price	AU$ 175 AU$ 225 AU$ 275 AU$ 325
Routing	via Hong Kong (15hr) via Kuala Lumpur (13hr) via Singapore (11hr) Direct	Location	directly next to it 15 min walk 15 min by public transport 15 min drive
Cancellation	Non-refundable 10% fee	Cancellation	10% fee Non-refundable
Ticketing and Payment	within 24hr of booking 60 days prior to departure 30 days prior to departure 14 days prior to departure	Payment	upon arrival 1 night deposit 30 days prior to arrival within 24h
Future fare availability	10% 40% 70% 100%	Future rate availability	10% 40% 70% 100%
Frequent flyer program	Oneworld Star Alliance Velocity Skyteam	Hotel loyalty program	IHG Priority Club Hilton HHonors Marriott Starwood
Free award flights	If frequent flyer seats are still available If economy seats are still available	Free award stays	if standard room still available if frequent traveller room still available
Fees	AU$ 50 joining fee No fee	Fees	AU$ 50 joining fee No fee
Validity of miles/points	2 years 3 years as long as one flight per year is purchased points never expire	Validity of points	points never expire as long as one stay per year is purchased 3 years 2 years
Upgrades	in exchange for award points ad-hoc decisions at check-in free for gold and above free for platinum	Upgrades	ad-hoc decision at check-in free for platinum free for gold and above in exchange for reward points

[10] The context alternatives were generated with the same approach as the experimental design.
[11] Non-price attributes are effects coded, with the last attribute level used as base level.

4 RESULTS AND DISCUSSION

This section summarises the results from data collected on airline passengers/flight scenarios and hotel guests/hotel scenarios. We describe the conditional logit model fit statistics for the Baseline Model and the proposed Fairness Models where the binary dependent variable measures whether an alternative was chosen as the most preferred alternative.

6110 randomly selected travellers received an email invitation to complete an online choice survey, and were allocated to the hotel or airline study depending on their recent travel and frequent traveller program memberships. A total of 1996 individuals (32.7%) attempted the survey out of which 797 were screened out because of insufficient travel experience or because the matching response category was already filled (60.1% eligibility rate), and a further 221 did not complete the survey, leaving 978 completions (490 airlines, 488 hotels). The relatively large number of incomplete responses can be attributed to the overall length of the survey and choice tasks, which take up to 30 minutes to complete. The response rate was therefore 26.6% (Kviz 1977). Table IV-2 reports the sample composition of the 490 respondents of the airline study and the 488 respondents of the hotel study. 25 and 42 responses respectively were outliers (i.e., they consistently chose the first alternative across all 32 choice sets) and subsequently eliminated from the analysis.

A chi-square test (and t-test for the age variable) was conducted to test for potential biases in non-responses and incomplete responses, and to test for random assignment of the respondents to the four response groups. The chi-square and t-test results showed that all measured demographic variables unrelated to travel (age $t=2.737$; gender $Chi^2=2.169$, 2df; state $Chi^2=8.935$, 4df) were independent ($p<.05$) for non-respondents, screened out, incomplete and completed responses[12]. Three travel-related variables (frequent flyer membership $Chi^2=9.647$, 2df; frequency of overseas travel $Chi^2=12.306$, 6df; and purpose of travel $Chi^2=14.945$, 4df) were obviously not independent, because

[12] Please note that this information was available for respondents and non-respondents.

they are strongly correlated with the screening criteria to select only respondents with recent travel experience and an equal mix of airline (hotel) frequent traveller program members and non-members.

Table IV-2. Sample Composition

	Airline Study			Hotel Study		
N	465			446		
Age	33.4 (std 9.59)			33 (std 10.115)		
Gender	male	223	47.93%	male	228	50.67%
	female	242	52.07%	female	218	48.43%
Frequent Traveller Member	no	220	47.31%	no	216	48.4%
	yes	245	52.69%	yes	230	51.6%
Program(s)	Oneworld	141	57.55%	IHG	28	12.2%
	Star Alliance	61	24.90%	Starwood	79	34.3%
	Velocity	82	33.47%	Hilton	50	21.7%
	Skyteam	1	0.41%	Marriott	58	25.2%
	Enrich	14	5.71%	Others	80	34.8%
Flown to Bangkok/ Stayed in Sydney or Melbourne	no	295	63.44%	no	110	24.7%
	yes	170	36.56%	yes	336	75.3%
Provider	Oneworld	100	58.82%	IHG	59	17.6%
	Star Alliance	84	49.41%	Starwood	88	25.6%
	Velocity	5	2.94%	Hilton	76	22.3%
	Skyteam	2	1.18%	Marriott	86	25.6 %
	Enrich	3	1.76%	Others	155	44.3%
Mainly work travel		67	14.41%		62	13.9
Mainly leisure travel		148	31.83%		230	51.57
Int'l business (private domestic)		124	26.67%		40	8.97
Domestic business (private int'l)		103	22.15%		99	22.2
Both equally		23	4.95%		15	3.36

4.1 Model Selection

The first step is to determine which model best accounts for the choices of respondents. If fairness judgements affect customer choices, adding fairness adjustment components will better explain choices in light of simultaneous CCM and RM. We also test different approaches to model fairness adjustments to establish the best alternative. We estimate the baseline model, as well as fairness models employing gain and loss terms for each service product attribute (Fairness Model Ia, Equation IV-4) and separate parameters for experience, knowledge, and context based fairness adjustments for each product/service attribute (Fairness Model IIa, Equation IV-8). We also test whether the introduction of an attribute specific importance weight further improves the models (Fairness Models Ib and IIb, given in Equation IV-10).

Table IV-3and Table IV-4 present the goodness of fit statistics of the five models for the hotel and airline studies. In both studies, Hypothesis 1 is well supported as the inclusion of attribute-specific fairness adjustment components significantly improves model fit. The log-likelihood ratio tests (LLRT) are significant ($p<0.01$). Unweighted constructs (Fairness Models Ia & IIa) are consistently superior to weighted constructs (Fairness Models Ib and IIb). Unweighted gain/loss constructs (Fairness Model Ia) fit the data best for both studies. The introduction of importance weights, to reflect the hypothesis that some deviations from a reference point bear more heavily on fairness perceptions than others, does not better explain customer choices. Hence, Hypothesis 6 is not supported, and we base the remainder of the data analysis on Fairness Model Ia, which best explains choices in light of simultaneous CCM and revenue management.

Table IV-3. Model Fit Statistics – Airline Study

Model	Parameters	LL	Pseudo R^2	LLRT*	Chi² critical value (p=.01)
Baseline	19	-18400.348	0.108		
Fairness Ia	35	-17851.208	0.1346	1098.28 (16df)	32.00
Fairness Ib	35	-17904.91	0.132	990.876 (16df)	32.00
Fairness IIa	43	-17809.041	0.1367	1182.614 (24df)	42.98
Fairness IIb	43	-17902.183	0.1321	996.33 (24df)	42.98

Table IV-4. Model Fit Statistics - Hotel Study

Model	Parameters	LL	Pseudo R^2	LLRT*	Chi² critical value (p=.01)
Baseline	19	-17901.403	0.0952		
Fairness Ia	35	-17785.798	0.1011	231.21 (16df)	32.00
Fairness Ib	35	-17798.892	0.1004	205.022 (16df)	32.00
Fairness IIa	43	-17819.256	0.0994	164.294 (24df)	42.98
Fairness IIb	43	-17832.267	0.0987	138.272 (16df)	42.98

* relative to baseline model

However, the comparatively low pseudo-R^2 indicates a poor overall model fit and suggests the existence of preference heterogeneity. An a priori approach to cluster respondents based on socio-demographic and travel-related variables (Salomon and Ben-Akiva 1983), the experimental information conditions, or their individual choice behaviours (Johnson, Ringham et al. 1991) did not yield the desired improvement. In addition, including information condition variables as covariates failed to provide significant results. Heterogeneity cannot be easily explored in random utility models because an individual's characteristics are constant across choices. We therefore adopt

latent class segmentation analysis which simultaneously estimates choice probabilities and latent segment membership probabilities (Swait 1994, Boxall and Adamovicz 2002). Assuming the existence of S segments, and that customer n belongs to segment s $\in$ [1;S], and substituting v_{ni} based on Equation IV-3, we can rewrite the probability that customer n chooses alternative i $\in$ J with segment specific parameter row vectors β_s [13]:

$$P_{ni/s} = \frac{e^{x'_n \beta_{1is} + FAGAIN'_n \beta_{2is} + FALOSS'_n \beta_{3is}}}{\sum_{j \in J} e^{x'_n \beta_{1js} + FAGAIN'_n \beta_{2js} + FALOSS'_n \beta_{3js}}} \quad \text{(IV-11)}$$

The unconditional choice probability that customer n chooses i is

$$P_{ni} = \sum_{s=1}^{S} \alpha_s P_{ni/s} \quad \text{(IV-12)}$$

where α_s is the size of segment s, that is the probability of finding a respondent in segment s. Please note that in our case the probability of segment membership is determined by customer n's utilities (Desarbo, Ramaswamy et al. 1995; Verma, Thompson et al. 2001) rather than socio-demographic and psychographic variables (Gupta and Chintagunta 1994; Swait 1994; Boxall and Adamowicz 2002), or information condition covariates. We will proceed with reporting the segmentation and preference estimation results for the Airline and Hotel studies.

4.2 STUDY 1: AIRLINES

The most common approach to determine the correct number of latent classes is an iterative test of the goodness of fit of models with 2,3,...n latent classes. We calibrated latent segmentation models for different numbers of latent classes ranging from two to six. Following the recommendations of Swait (1994), Boxall and Adamowicz (2002) and Verma, Thompson et al. (2001), the best segment solution was determined based on the minimum Bayesian Information Criterion (BIC), the minimum Akaike Information Criterion (AIC), and McFadden's pseudo R^2. In absence of specific rules, the authors encourage to apply judgement and simplicity in using these criteria. We therefore also consider the sizes of resulting segments in our decision. The results clearly confirm the assumption of preference heterogeneity, as the pseudo R^2 almost doubles from the basic to the 2-segment solution. The goodness of fit statistic summarized in Table IV-5

[13] Please note that all β_s are subject to a scale factor μ,, which is set equal to one to allow empirical estimation.

support a 3- or 4-segment solution. While the continuing decrease of AIC and BIC and the further improvement of the log-likelihood and pseudo R^2 from a 3- to a 4-segment solution suggests the suitability of four segments, it should be noted that the improvement is noticeably smaller than moving from a 2- to 3-segment solution. It is difficult to derive a clear-cut decision from the model fit statistics as to whether a 3- or 4-class solution should be preferred. We therefore, for both the 3- and 4-segment solution, compare the preference estimates, and investigate any potential differences in respondents' demographic and travel specific variables. While the preference estimation results do not evidently favour one solution, the insignificance of most covariate differences in the 4-class scenario advocates the existence of three classes. Moreover, an examination of the 3- and 4-segment solutions shows that the fourth segment demerges from a smaller segment of the 3-class solution, resulting in small segments sizes for two segments. In light of these indications, we conclude that adding a fourth segment will not yield improved results to justify additional complexity and chose a 3-segment solution.

Table IV-5. Goodness of Fit Results for the Latent Segmentation and Airline Choice Model

Number of latent segments	LL at convergence	BIC(LL)	AIC(LL)	AIC3(LL)	No. of parameters	Pseudo R^2
1	-17851.2	35917.39	35772.42	35807.42	35	0.1362
2	-16119.5	32675.1	32381.01	32452.01	71	0.2345
3	**-14974.1**	**30605.4**	**30162.2**	**30269.2**	**107**	**0.2967**
4	-14526.2	29930.74	29338.42	29481.42	143	0.3291
5	-14277.1394	29653.7	28912.28	29091.28	179	0.3434
6	-14042.9348	29406.41	28515.87	28730.87	215	0.356

4.2.1 Segment characteristics and comparison of preference coefficients

The characteristics of members in the three segments are summarized in Table IV-6, as relative frequencies in the segments compared to those of the entire sample. Chi-square tests were conducted to test for independency of individuals' travel-specific characteristics and their allocation to information conditions in the experiment. Travel variables include whether a respondent belongs to any frequent traveller program(s), the joined programs, the membership level (basic – premium), previous travel experience to Bangkok, as well as annual business and leisure travel both internationally and domestically. Information conditions are trip scenario (business – leisure), for business

scenario whether the employer pays for travel cost upfront or reimburses the employee, the justification of price discrimination as season specials, and the presentation of price as a percentage discount or surcharge relative to a standard rate. The results showed that the assignment of respondents to the three segments is dependent on some of these demographic variables, but except for trip purpose and payment method, the experimental conditions showed no difference (see Table IV-6).

Table IV-6. Characteristics of Airline Segments – Deviations of Segment Frequencies from Overall Sample

Characteristics	**Segment 1: Premium All-Purpose Travellers**	**Segment 2: Loyal Leisure Travellers**	**Segment 3: Business Travellers**
Segment Size	47.43%	35.99%	16.58%
Frequent flyer membership - Program(s) and levels			
None [1]	+2.64%	-2.16%	-3.12%
1 program [1]	-0.22%	+3.26%	-6.28%
2 or more programs [1]	-2.42%	-1.10%	+9.40%
Basic level [1]	-3.23%	+2.46%	+4.22%
Premium level [1]	+1.09%	+0.73%	-4.72%
Trip scenario			
Business/Leisure	+/-4.23%	-/+17.19%	+/-24.03%
Payment method business travel			
Reimbursed/Upfront [1]	+/-1.84%	-/+8.76%	+/-5.95%
Price as percentage			
Yes in leisure scenario	+12.43%	-9.19%	-7.79%

[1] significant at $p<0.1$, all other differences significant at $p<0.05$

Segment 1 is labelled Premium All-Purpose Travellers because it contains respondents who have been allocated equally to the leisure and business travel scenario, and who have achieved premium-level frequent flyer status if they belong to a program at all. For Segment 2, respondents tend to belong to only one frequent flyer program and are most likely to be allocated to the leisure travel scenario. They were therefore classified as Loyal Leisure Travellers. Finally Segment 3 was labelled Business Travellers, as they are mainly found in the experimental business scenario, and are not loyal because they generally belong to two or more frequent traveller programs at entry level.

The utility function parameters β_{nks} for the three-segment model are displayed in Table IV-7. Please recall that the utility of alternative i for customer n is modelled as a combination of utility directly obtained from product attributes, and fairness adjustments to utility relative to a reference point. We will first discuss the effects of product attributes shaped by loyalty program features and revenue management,

followed by the results for fairness adjustments. Due to the effects coding of all attributes other than price, preference parameters are interpreted relative to the base value. Note that we follow the notion of Hensher, Rose et al. (2005, p.351) and interpret individual effects codes even if not all effects codes relating to the same attribute show significant preference coefficients.

The preferences for airline alliances, and associated frequent traveller programs, vary across segments. Frequent flyer program membership is one of the main sources of switching cost which influence customers' airline choice (Carlsson and Löfgren 2006). Segment 2, which consists mainly of loyal frequent flyer members who belong to only one program, shows a strong preference for Oneworld over Skyteam (base), and somewhat dislikes Velocity. The premium all-purpose travellers in Segment 1 are either not a member of any frequent traveller programs, or premium members. They show a weak preference for Star Alliance and a weak negative effect for Oneworld relative to Skyteam. Segment 3 shows a clear preference for Star Alliance and obtains negative utility from Velocity flights although it consists mainly of travellers who belong to two or more programs, including Velocity and Oneworld. These results indicate that airline alliance preference is not as clearly aligned with frequent flyer memberships as expected, and that other factors are more decisive.

Price parameters are consistent with economic theory and exhibit negative signs for every segment. Please note that the seemingly small size of price coefficients compared to other attributes results from using different scales. Segment 1 is comparatively unconcerned about price (-0.0004), while the loyal leisure travellers in Segment 2 are clearly the most price conscious segment. It is worth noting that respondents in Segment 2 were most likely in the leisure travel scenario, or being reimbursed for business travel expenses. Respondents in Segment 3 have been mainly allocated to the business travel scenario where the employer pays all expenses upfront. Their price coefficient is substantially smaller than that of Segment 2. The different price sensitivity of business travellers depending on payment method suggests that a later reimbursement induces similar behaviour to having to pay for a leisure trip out of one's own pocket. Using Thaler's (1985) segregation-integration reasoning, where losses are accumulated and considered jointly while gains are perceived separately, the payment of business travel expenses is initially a loss, which is integrated with a slightly smaller gain of the reimbursement discounted to present value to result in an overall loss.

Different routing is also often used to justify fare differences. Airlines generally use more stopovers and a longer travel time as rate fences for cheaper rates, and the parameters for routing consistently reflect the negative effect of increased travel time. The all-purpose travellers in Segment 3 are most opposed to stopovers, indicated by large negative parameters for stopover flights compared to direct flights to Bangkok. Given that Segment 3 represents the business travel scenario, travel-time savings are more important than cost. Segments 1 and 2 also prefer direct flights, but are more willing to accept stop-overs. A 2h-increase in travel time going via Singapore has even a small positive coefficient compared to a direct flight, possibly because a stop in Singapore is desired.

The loyal leisure traveller Segment 2 emerges as a finicky customer group. Non-refundable flights compared to a 10% fee for changes or cancellation decrease utility, and 60 rather than 14 days advance payment is also penalised. This is a particularly interesting result in light of the high price sensitivity of Segment 2. Customers are expected to understand that RM attaches higher booking restrictions as a trade-off to lower rates. Tying lower rates to restrictions as artificial rate fences is a basic RM tool to justify different prices for physically identical inventory units (Kimes and Wirtz 2003). The business scenario travellers in Segment 3 are even more concerned about the inflexibility of non-refundable tickets, but do not mind advance payment.

With regards to flight attributes influenced by CCM, a most surprising finding is that the conditions under which free award flights can be claimed do not significantly influence customer choices. Data from our focus group research however shows that most frequent flyer members experienced problems with booking free award flights, and existing research further confirms the regular occurrence of obstacles with award bookings (Whyte 2004). A possible explanation is that customers have become accustomed to the lack of capacities for free flights to a degree that it does not influence their purchasing choice. It should be monitored whether the practices of more recent programs such as Velocity, which promises even the last seat on a plane to award bookings, will change this effect over time. Preference estimates for membership fees are negative as anticipated, except for Segment 3 which is unconcerned with fees. The price-conscious loyal leisure travel segment is opposed to membership fees. Segment 1 individuals, who are all-purpose travellers and either non-members or premium members, somewhat dislike being charged for membership. Given that respondents in

this group travel extensively and would benefit from a frequent flyer membership, we presume that fees have discouraged this profitable segment from joining any programs. An interesting pattern emerges from Segment 1's parameters for validity of frequent flyer points. Relative to no expiry for points, a 3-year limitation attracts a larger penalty than tying validity to a minimum of one purchase a year because Segment 1 tends to easily meet this threshold. Segment 2 on the other hand only worries about the strictest validity limitation to 2 years, but is ambivalent to the less dramatic limitations. The averseness to limited point validity is consistent with the conception of loyalty programs as a promise of future benefits in return for customers' current purchases (Shugan 2005). Customers perceive points as a purchased entitlement for redemption and are not prepared to make concessions.

Finally, Segments 1 and 2, who represent frequent flyers with an above standard status level or loyalty to one particular program, show negative preference for spending frequent flyer points on upgrades relative to receiving free upgrades for platinum (highest) status members. A preference for ad-hoc decisions at check-in for upgrades prevails across all three segments and is strongest for Segment 3. Please recall that Segment 3 comprises mainly of basic level frequent travellers who would otherwise not be able to receive upgrades.

Overall, Hypothesis 2a is well supported, with all attributes but free flights significantly influencing choices. Rate fences (routing, cancellation, ticketing) as expected have negative utility effects. There are clear differences in terms of price sensitivity between the different segments, which are linked to the frequency of travel and the trip scenario. Especially amongst more price sensitive customers, the trade-off for restrictions does not seem to be as well understood as assumed by airlines. Frequent flyer members have expectations regarding program benefits, and restrictions decrease utility. Extensive travellers who are non-members fail to see the benefits of frequent flyer programs and are alienated by fees.

Table IV-7. Model Estimation Results – Preference Parameter Estimates for Airline Study

	Expected sign	Segment 1	Segment 2	Segment 3
Segment size		47.43%	35.99%	16.58%
Attributes				
Price	(-)	**-0.0004** [1]	**-0.0059** [1]	**-0.0016** [1]
Routing_HK(15h)	(-)	**-0.1206** [1]	**-0.4538** [1]	**-1.9908** [1]
Routing_KL(13h)	(-)	**-0.1638** [1]	**-0.1783** [1]	**-0.9202** [1]
Routing_SIN(11h)	(-)	**0.0934** [1]	**0.0749** [1]	-0.0432
Cancellation&Changes	(-)	**-0.081** [1]	**-0.1008** [1]	-0.0536
Ticketing_24h	(-)	0.0041	0.0056	0.058
Ticketing_60d	(-)	-0.0023	**-0.079** [1]	**-0.2462** [1]
Ticketing_30d	(+/-)	0.0233	-0.0023	-0.0203
Program Oneworld	(+/-)	**-0.0407** [2]	**0.1547** [1]	0.0806
Program Star Alliance	(+/-)	**0.037** [2]	0.0573	**0.1693** [1]
Program Velocity	(+/-)	0.0106	**-0.0732** [2]	**-0.2139** [1]
Free flights (FT seats)	(+)	-0.0239	0.0092	0.0099
Membership fees (50$ fee)	(-)	**-0.0589** [1]	**-0.1457** [1]	0.006
Point Validity_2y	(-)	-0.0137	**-0.1488** [1]	-0.0023
Point Validity_3y	(-)	**-0.1177** [1]	0.0103	-0.0714
Point Validity_purchase	(+/-)	**-0.0485** [1]	0.0135	0.1067
Upgrades_points	(-)	**-0.1026** [1]	**-0.0857** [1]	0.1082
Upgrades_ad hoc	(+/-)	**0.0988** [1]	**0.0726** [1]	**0.241** [1]
Upgrades_gold	(+/-)	-0.0258	-0.0333	-0.0881
Fairness adjustments				
Price_gain	(-)	**-0.0004** [1]	**-0.005** [1]	**-0.001** [1]
Price_loss	(-)	**-0.0005** [1]	**-0.0063** [1]	**-0.001** [1]
Routing_gain	(+)	-0.0549	-0.0354	**-0.7671** [1]
Routing_loss	(+)	**0.133** [1]	**0.1833** [1]	**0.4133** [1]
Ticketing_gain	(+)	-0.0357	0.0427	0.0926
Ticketing_loss	(+)	-0.0145	**-0.0955** [2]	-0.1245
Cancellation_gain	(+)	**-0.0764** [2]	0.059	0.136
Cancellation_loss	(+)	**0.0712** [2]	0.0904	**-0.1977** [2]
Flights_gain	(+)	0.0166	-0.0741	0.0285
Flights_loss	(+)	0.0059	-0.0074	0.0455
Fees_gain	(+)	-0.0792	0.0563	0.2804
Fees_loss	(+)	**0.2117** [2]	0.0275	**0.8138** [1]
Validity_gain	(+)	-0.0087	-0.039	**0.2011** [1]
Validity_loss	(+)	0.0015	-0.0528	-0.0027
Upgrades_gain	(+)	-0.0092	0.0233	0.1272
Upgrades_loss	(+)	-0.0464	0.0551	0.0935

[1] significant at p=0.05
[2] significant at p=0.1

As to the effects of fairness adjustments for the eight service attributes directly related to CCM and RM (Hypothesis 2b), price behaves exactly as predicted. The gain and loss terms show negative coefficients across all three segments, and the loss coefficients are larger or the same as the gain coefficients. The results confirm reference price research, and hypotheses 3 and 4 are supported for the price attribute. Price-related fairness

adjustments are also a reflection of a segment's price sensitivity, where Segment 2 reacts most strongly to price gains and losses, followed by Segment 3.

Also, across all segments the loss term for routing is significant and has the correct sign, meaning that customers who expect a direct flight and are sent via another city discount their utility. Interestingly, in Segment 3 we observe a rather large negative coefficient for routing gains, meaning those who were prepared for a stop-over but are offered a reduced travel time and/or direct flight, also discount their utility of an alternative. This can be explained by deliberate itinerary planning of the more experienced travellers contained in this segment, where a stop-over is seen as beneficial. In view of the strong preference for direct flights, this is a particularly interesting result and shows that fairness adjustments are not simply a reflection of direct attribute-generated utility but capture utility effect relative to a reference point.

Segment 1 is most concerned with reference point deviations of rules for cancellation and changes of the ticket. However, only the loss term shows the expected positive sign. A negative gain term, and likewise the negative loss term for Segment 3, denotes that stricter rules than expected would lead to an increase in utility. Similarly, the loss term for ticketing and payment conditions in Segment 2 has a negative coefficient. These seemingly peculiar results may be a reflection of customers' preference for definite travel plans locked in through pre-payment and tickets that do not allow changes. The apparent utility gain from a negative deviation can also be a consequence of our necessary assumption that categorical answer options for previous experiences can be arranged in ascending order. In the case of cancellations and changes, some respondents might perceive rules which allow cancellations and changes in return for a fee, or a fee and fare differences, as less desirable than a non-refundable ticket.

Significant estimates for gain and loss terms related to frequent flyer program features are mainly limited to Segment 3. Individuals in this class are the fussiest frequent flyers, perhaps because most can compare their experiences from more than one program. They are very strongly opposed to any fees charged beyond what they would expect to pay. Membership in more than one program indicates opportunistic behaviour, and fees would be an unwelcome entry barrier. Segment 1 also has a significant albeit smaller loss term for fees. This means that customers who are not prepared to pay membership fees (or only a small fee) heavily discount an alternative

that charges (higher) fees. It is also important to note that customers who are prepared to pay a fee cannot be delighted by no membership fees. Segment 3 also rewards less stringent rules for point validity, meaning if points are valid for longer than expected utility of an alternative increases.

In summary, Hypotheses 3 and 5 are partly supported for fairness adjustments related to non-price attributes. Although no significant effects were found for free flights, upgrades, gains regarding ticketing and fees, and losses related to validity of frequent flyer points, all other fairness components verify Hypothesis 5 by showing significant coefficients in at least one segment. With the exception of ticketing loss, cancellation gain, and cancellation loss, the coefficients are positive as expected, and the negative sign of routing gains is attributed to itinerary planning. This endorses the notion of Hypothesis 3 that positive deviations from a reference point increase utility, while negative deviations reduce utility. Confirmation for Hypothesis 4 is somewhat difficult, as in most cases only the negative fairness adjustments (losses) are significant which renders a comparison of coefficients for corresponding gain and loss terms within a segment unfeasible. This phenomenon could however be regarded as an extreme case of losses weighing more than gains, because with the exception of validity gains, only loss terms have a significant effect on utility judgements.

We also hypothesised that frequent flyer program members react more strongly to fairness issues, as the contradicting nature of CCM and RM is particularly noticeable to frequent flyers. They are assumed to have firmer reference points because they are regular travellers and have expectations regarding membership benefits promised by their program(s). The potential for fairness adjustments also increases with the frequent flyer membership status. As a result, for frequent flyers compared to non-members we would expect to see a larger number of significant fairness terms as well as larger coefficients for the significant terms. As the latent segments identified earlier are confounded regarding respondents' frequent flyer status (e.g. non-members and premium members in Segment 1), we estimated separate conditional logit models for members and non-members to compare the stability of reference points and the impact of fairness adjustments. The dispersion of reference points for RM induced flight attributes (price, routing, ticketing, cancellation) operationalised as the range between the best and the worst attribute level experienced by the respondent does not differ for frequent flyers and non-frequent flyers. There is however a significant distinction with

regards to the reference point dispersion for three of the frequent flyer program attributes, where dispersion is consistently lower for frequent flyer members (see Table IV-8, where 0 denotes no dispersion and 1 maximum dispersion). For the frequent flyer sample, 10 of the 16 fairness adjustments coefficients are significant at p=0.1 or below and show the correct sign, while only 5 of 16 coefficients are significant in the non-member group. The gain and loss terms for price and routing are significant across both groups, and consistently larger for members ($p<0.01$). As only non-members are concerned about negative deviations for validity of frequent flyer points, no comparison is possible. Members further demonstrate their susceptibility for fairness issues with significant terms for losses regarding ticketing, cancellations and fees, and significant gain and loss coefficients for upgrades, unlike non-members. Hypothesis 8 is therefore well supported.

Table IV-8. Dispersion (X_{range}) of Reference Points – Frequent Flyer Members vs. Non-Members

Dispersion Factor for	Non-members	Members	P
Free flights	0.792424	0.73424	0.0511
Point validity	0.716667	0.611565	0.0011
Upgrades	0.762121	0.542857	0.0000

Finally, Hypothesis 7 states that frequent flyer members have a lower willingness to pay (WTP) compared to non-members. We tested members and non-members both for the WTP for a particular airline alliance group, and their WTP for the product attributes induced by CCM and RM used in this study. WTP estimates were obtained from the ratio of an attribute preference estimate and the price coefficient, given that both coefficients are statistically significant (Hensher, Rose et al. 2005), rather than asking respondent how much money they are willing to forfeit to receive some attribute benefit (Poria and Oppewal 2002). Where comparable (i.e., both terms significant), members have a lower WTP for the same product feature than non-members, with the exception of cancellations and changes and ad-hoc upgrades. This implies that frequent flyer members would expect a non-refundable fee to be cheaper by only half as much as non-members, and they are prepared to pay an extra $118 for a flight if the program offers ad-hoc upgrades at check-in rather than free upgrades for platinum members.

Table IV-9. WTP for attributes depending on Frequent Flyer Status

Attribute	Non-members	Members
Routing_HK(15h)	-$429.65	-$962.77
Routing_KL(13h)	-$413.80	-$928.97
Routing_SIN(11h)	-$308.41	-$701.16
Cancellation & Changes	-$113.93	-$66.82
Ticketing_24h	n.s.	-$81.15
Ticketing_60d	n.s.	n.s.
Ticketing_30d	n.s.	n.s.
Point Validity_2y	-$77.38	n.s.
Point Validity_3y	-$81.62	-$161.03
Point Validity_purchase	n.s.	n.s.
Upgrades_points	-$41.98	-$103.21
Upgrades_ad hoc	$11.37	$118.24
Upgrades_gold	-$32.86	-$68.57
Free flights	n.s.	n.s.
Membership fees	-$89.17	-$92.15

Regarding the WTP of individuals to stay with "their" program however revealed that members of Oneworld and Star Alliance respectively, compared to non-members and members of other programs, are prepared to pay a price premium to book a flight within their program's airline alliance. This brand effect is however not present for Velocity members. A possible explanation is the fact that only 37% of Velocity members exclusively belong only to the Velocity Rewards program, as opposed to 64% exclusive members for Oneworld and 48% for Star Alliance.

Table IV-10. WTP for Airline Alliances

	Program members		Non-members & members of other programs		Total	
Alliance	**Preference Coefficient**	**WTP**	**Preference Coefficient**	**WTP**	**Preference Coefficient**	**WTP**
Oneworld	.12654 (p=.000)	$263.28	-.030639 (p=.105)	-$16.89	.0165513 (n.s.)	($32.30)
Star Alliance	.142383 (p=.001)	$214.67	.0140147 (n.s.)	$25.23	.0308731 (p=.051)	$41.90
Velocity	.0287407 (n.s.)	($97.27)	-.026065 (n.s.)	-$ 0.89	-.0157544 (n.s.)	($10.66)

4.3 STUDY 2: HOTELS

For the hotel data we estimated latent class models for 2-6 segment solutions, and again confirmed the existence of heterogeneous subgroups as the pseudo R^2 jumped from 0.1023 to 0.1806 for a 2-class solution (see Table IV-11). Similar to the airline data, three segments provide the best solution. Despite the further improvements in log-

likelihood, AIC, BIC, and pseudo R^2, the changes moving from a 3- to a 4- and 5-segment solution decrease noticeably. Plotting the goodness of fit statistics also visually supports the decision to choose three classes as the most suitable solution.

Table IV-11. Goodness of Fit Results for the Latent Segmentation and Hotel Choice Model

Number of latent Segments	Number of Parameters	Log-likelihood at convergence	BIC(LL)	AIC(LL)	AIC3(LL)	Pseudo R^2
1	35	-17739.8	35693.15	35549.63	35584.63	0.1023
2	71	-16304.5	33042.04	32750.91	32821.91	0.1806
3	**107**	**-15212.6**	**31077.91**	**30639.18**	**30746.18**	**0.2505**
4	143	-14844.2	30560.67	29974.33	30117.33	0.2786
5	179	-14653.6	30399.22	29665.26	29844.26	0.2898
6	215	-14496.5	30304.66	29423.09	29638.09	0.3013

4.3.2 Segment characteristics and comparison of preference coefficients

The segments emerging from the hotel data can be more easily differentiated in terms of their demographics compared to the airline sample. Table IV-12 presents the deviations of frequencies for selected demographic variables from the frequencies of the overall sample. Segment 1 represents the most extensive travellers and premium hotel loyalty members of Marriott Rewards and Hilton HHonors, and they have generally stayed in Sydney/Melbourne 11-20 times. Respondents are equally split between the leisure and business scenario, and overrepresented in the treatment conditions where justification of offerings and non-available contextual offerings are present. We therefore name Segment 1 All-purpose Travellers. Segment 2 is labelled Leisure Travellers. The respondents in this class travel the least frequently and mainly for leisure purposes, are most likely to have stayed in Sydney or Melbourne only once, and least likely to belong to any hotel loyalty program. Segment 2 is overrepresented in the experimental leisure travel scenario, and respondents that were allocated to the business travel scenario were in the treatment condition where travel expenses will be reimbursed. Respondents in Segment 3 are similar to Segment 1 in that they also travel for both business and leisure, but the emphasis is slightly more on work related travel. Those respondents who belong to a hotel loyalty program are most likely to be basic members of Hilton HHonors and/or Marriott, or Starwood Platinum Preferred Guests. The majority of respondents in Segment 3 received a business trip scenario, and no justification of rate and availability variations. They are hence labelled Business Travellers.

Table IV-12. Characteristics of Hotel Segments – Deviations of Segment Frequencies from Overall Sample

Characteristics	Segment 1 All-Purpose Travellers	Segment 2 Leisure Travellers	Segment 3 Business Travellers
Segment Size	**54.49%**	**25.45%**	**20.06%**
Loyalty program membership – Programs and levels			
Non-member [1]	-1.97%	+4.79%	-0.79%
1 or 2 programs [1]	-0.40%	-1.86%	+3.47%
3 or more programs [1]	+2.36%	-2.93%	-2.69%
Hilton premium level	+17.43%	-29.63%	-29.63%
Marriott premium level	+3.17%	-11.11%	-11.11%
Hilton basic level	-14.38%	-5.56%	+44.44%
Marriott basic level	-2.64%	-74.07%	+25.93%
Travel patterns			
Total travel	Extensive (43.2)	Regular (29.4)	Extensive (41.1)
Thereof work travel	Extensive (19.6)	Some (9.7)	Extensive (21.1)
Stayed in Sydney/Melbourne before			
Once [1]	-2.62%	+11.89%	-8.38%
6-10 times [1]	+0.67%	-5.98%	+6.03%
11-20 times [1]	+2.3%	-5.18%	+0.46%
>21 times [1]	-0.25%	-0.68%	+1.57%
Trip scenario			
Business/Leisure	+/-3.63%	-/+20.14%	+/-15.88%
Payment method business travel			
Upfront/Reimburse	+/-6.01%	-/+12.01%	-/+5.23%
Justification of RM			
Yes	+4.51%	+0.82%	-13.36%
Contextual offerings			
Present [1]	+4.62%	-7.49%	-3.04%

[1] significant at $p<0.1$, all other differences significant at $p<0.05$

The segment-specific preference parameters β_{nis} for the hotel study are presented in Table IV-13. The discussion of results again first covers the direct utility effects of hotel attributes moulded by CCM and RM, followed by a presentation of results for reference-dependent fairness adjustments.

The hotel study, identical to the airline study, shows consistently negative price coefficients albeit varying degrees of price sensitivity. The leisure travel segment is extremely susceptible to price, with a 15 times larger coefficient than the least price sensitive extensive all-purpose travellers in Segment 1. The very experienced travellers in Segment 1, who are also most likely to be premium members of the Hilton HHonors and/or Marriott Rewards program, are not too concerned about price. The findings endorse the results from the airline study that leisure travellers, as well as business

travellers who pay for work related travel expenses out of their own pocket prior to being reimbursed, show the highest price sensitivity.

Table IV-13. Model Estimation Results – Preference Parameter Estimates for Hotel Study

	Expected sign [14]	Segment 1	Segment 2	Segment 3
Segment size		**54.49%**	**25.45%**	**20.06%**
Attributes				
Price	(-)	**-0.0018** [1]	**-0.0278** [1]	**-0.0065** [1]
Location_next	(+)	**0.1796** [1]	**0.8576** [1]	**2.2001** [1]
Location_walk	(+)	**0.1587** [1]	**0.2917** [1]	**0.6140** [1]
Location_public	(-)	**-0.1619** [1]	**-0.4343** [1]	**-1.4664** [1]
Cancellation& Changes	(+)	**0.0496** [1]	**0.2257** [1]	**0.1157** [1]
Payment_arrival	(+)	0.0330	**0.2424** [1]	**0.1919** [1]
Payment_deposit	?	0.0206	0.0096	-0.0214
Payment_30d	(-)	**0.0404** [2]	**-0.1786** [1]	**-0.1657** [1]
Program IHG	(+/-)	**0.0656** [1]	**-0.2647** [1]	-0.0426
Program Hilton	(+/-)	0.0056	0.0678	0.0236
Program Marriott	(+/-)	-0.0054	**0.1315** [1]	**0.1811** [1]
Free stays (any room)	(+)	-0.0094	-0.0201	0.0011
Membership fees ($50)	(-)	**-0.1317** [1]	**-0.1066** [1]	**-0.0887** [2]
Point Validity_always	(+)	**0.1438** [1]	-0.0996	0.0312
Point Validity_purchase	(+/-)	-0.0049	0.0636	**0.2074** [1]
Point Validity_3yrs	(-)	**-0.1155** [1]	0.0610	-0.0935
Upgrades_ad hoc	(-)	-0.0342	-0.0138	-0.0012
Upgrades_platinum	(+/-)	-0.0180	-0.0870	**-0.0989** [2]
Upgrades_gold	(+/-)	**0.1240** [1]	**0.1269** [1]	0.1068
Fairness adjustments				
Price_gain	(-)	0.0008	-0.0005	0.0004
Price_loss	(-)	0.0005	**-0.0063** [1]	-0.0031
Location_gain	(+)	-0.0174	**-0.2336** [1]	-0.0071
Location_loss	(+)	0.0042	**0.3812** [1]	**0.5411** [1]
Cancellation_gain	(+)	-0.0371	0.0106	-0.0317
Cancellation_loss	(+)	0.0143	**-0.0066** [2]	-0.0427
Ticketing_gain	(+)	0.0328	-0.0870	-0.1168
Ticketing_loss	(+)	-0.0121	0.0794	-0.0112
Stays_gain	(+)	**0.1011** [1]	-0.0724	0.0667
Stays_loss	(+)	0.0403	0.0030	0.0330
Fees_gain	(-)	**-0.1395** [1]	0.0676	-0.1093
Fees_loss	(-)	**-0.1037** [1]	0.0662	**-0.1642** [1]
Validity_gain	(+)	-0.0374	0.0442	0.1173
Validity_loss	(+)	-0.0170	**0.1253** [2]	0.0462
Upgrades_gain	(+)	0.0314	0.0689	0.0276
Upgrades_loss	(+)	0.0238	0.0670	-0.0328

[1] significant at p=0.05
[2] significant at p=0.1

[14] The expected signs for some coefficients differ from those in the airline study due to reversed coding.

The hotel study also reconfirmed the airline study in that preferences for certain hotel groups are not immediately related to membership of the associated hotel loyalty program. Program membership and preference for the corresponding hotel brand yielded results only for the Marriott basic members in Segment 3.

Regarding the hotel location – which is considered an analogy to flight routing – the more convenient locations next to or within walking distance of places to be visited, are preferred over hotels that require public transport (negative coefficients for all segments) or car transport (base). Members of Segment 3, who travel extensively for business purposes, value a convenient hotel location the most, while the experienced all-purpose travellers in Segment 1 are most willing to trade off location.

Comparable to the airline study results, the least profitable customers in terms of their travel intensity, price sensitivity, and lack of loyalty program membership reveal themselves as the most finicky segment. Segment 2 values the flexibility of lenient rules regarding cancellation and changes, as well as favourable payment conditions the most, followed by Segment 3. The profitable Segment 1, on the other hand, is least opposed to non-refundable bookings, and accepts a 30 day pre-payment period. This result reconfirms the findings of the airline study that the most price sensitive customer segment does not acknowledge the association between stricter constraints and cheaper rates.

In comparison to the airline study, where the most price sensitive customers were also quite particular about frequent traveller program features, in the hotel study the extensive travellers and premium loyalty members in Segment 1 emerge as the most fastidious frequent traveller members. All three segments are opposed to charging a $50 fee as opposed to a free membership, but the effect is strongest in Segment 1, which contains customers with premium recognition levels, and weakest for the basic level members in Segment 3. Premium members should hence not be subjected to fees. Given that Segment 2, representing current-non-members with a comparatively low travel frequency, is extremely price sensitive and overall the least attractive segment, membership fees could be used as an entry barrier to join a loyalty program. The expiry of frequent traveller points matters only to Segments 1 and 3. Segment 1 has a positive preference estimate for unlimited validity, but a negative estimate for a limited validity of 3 years. Segment 3 prefers validity tied to one purchase per annum, probably

because their travel frequency means they are not at risk of any losses. Regarding upgrades, the basic members in Segment 3 have a negative parameter for free upgrades for platinum members, perhaps because they feel devalued as less attractive loyalty members. The premium members (Segment 1) naturally prefer free upgrades for gold status and above over receiving an upgrade in exchange for reward points, given that they are the main beneficiaries of this feature. It is however surprising that Segment 2, mainly non-members, shows the same preference. They might perceive themselves as equally valuable guests than basic loyalty program members, and any benefits should be reserved to individuals who have gained higher status levels.

Overall, the hotel study again provides ample support for Hypothesis 2a as most attributes have significant coefficients in one or more segments. Exceptions are once more the conditions to redeem points for free award stays. Hotel respondents also reconfirmed the finding that the most price sensitive customer group is also the least prepared to accept trade-offs regarding location and booking restrictions regarding changes and payment terms.

Pertaining to the impact of reference-dependent utility, we find slightly less support for Hypothesis 2b in the hotel study. Contrary to the airline study, the gain and loss adjustment terms for price are mostly not significant, except for the loss term of Segment 2. This could be a reflection of the small price parameters for Segments 1 and 3 which indicate low price sensitivity[15]. The seemingly small reference price effects might also result from the way in which data on past price experiences and price knowledge was collected. In an effort to avoid overestimating the effects of price-related fairness adjustments, the lowest price category in the survey section of the hotel study was specified as 'up to $175'. This means that reference prices of respondents with knowledge and experience below $175 are conservative estimates above their real unobserved reference prices. As a result, fairness adjustments are deflated. The extensive body of reference price research confirming the importance of reference price terms renders the non-significance of the fairness adjustments for price a surprising result. In support of Hypothesis 5, several fairness adjustment terms for attributes other than price are however significant in at least one segment. Regarding the location of the

[15] Although the magnitude of the hotel parameters seems comparable to those of the airline study, it has to be noted that the size of the price parameters is influenced by the actual price levels, which are substantially lower in the hotel study.

hotel, Segment 3, and to a lesser extent Segment 2, penalise a location that is further away from the places to be visited than expected. The difference can be attributed to the different trip purposes, where business travellers are less willing to compromise on a convenient location. Surprisingly, Segment 2 also shows a negative coefficient for the location gain term, representing cases where the distance of the hotel to places of interest is larger than expected. We have already observed this phenomenon in the airline data, and a plausible explanation is that some customers prefer a more quiet location further away from places to be visited. The unexpected, small negative, coefficient for the cancellation loss term in Segment 2 is also consistent with the findings of the airline study. It is difficult to account for an increase in utility resulting from cancellation terms that are more stringent than the individual's reference terms.

Customers in Segment 1 are most likely to make fairness adjustments if the hotel loyalty program features deviate from the respective reference points. In particular, the mainly premium level loyalty program members in this segment adjust utility upwards if the terms to make an award booking are less strict than expected, and if membership fees are below the reference point. The result for Segment 1 differs from the airline studies, where a fairness gain could not be achieved for award bookings and fees. This is one of the rare cases emerging from this study where exceeding customers' reference points can in fact increase utility for a profitable customer segment, meaning that fees and terms for award bookings for premium members should exploit this effect. Kim, Shi et al. (2004) however encourage the use of loyalty programs as a means to successfully fill excess capacities during times of low demand, which means that award bookings are not available during shoulder or peak times. While this might be an appropriate approach for casual customers (Segment 2 and 3 can not be delighted with absent or lower fees and easier access to award bookings), it has negative effects on demand from premium loyalty members. In accordance with the airline findings, the coefficients for fee-related unfairness show that Segments 1 and 3 are strongly opposed to fees. However, the fairness loss in Segment 1 is smaller than a potential gain, which contradicts the proposal of Hypothesis 3. Finally, Segment 2 adjusts utility downwards if the validity of loyalty points is shorter than the reference value, reconfirming the results of the airline study and the claim that loyalty programs are in fact future benefits that customers acquire through their purchases (Shugan 2005).

In summary, the hotel study partly supports Hypothesis 3, in that all but two of the significant fairness adjustments had the correct sign. The negative sign for location gains can be easily explained, whereas the negative sign for cancellation gains is difficult to account for. With regards to Hypothesis 4, we identified only one pair of matching gain and loss terms, for membership fees in Segment 1, where the size of the parameter estimates for gains and losses contradict the hypothesis. For the remaining fairness adjustments the same argument presented in the airline study applies: mainly unfairness terms are significant while fairness gain terms, with a few exceptions, do not have a significant effect.

Table IV-14. Dispersion Ranges for Hotel Segments

Mean dispersion for	Segment 1	Segment 2	Segment 3	p
Price	0.70439	0.767544	0.754682	0.091
Routing	0.655007	0.73538	0.691011	0.0546
Cancellation & Changes	0.792867	0.881579	0.82397	0.0297
Free flights	0.681253	0.825292	0.81367	0.0001
Fees	0.683128	0.783626	0.745318	0.0268
Validity	0.623434	0.71808	0.710986	0.0223

The discussion of the hotel study will again conclude with results related to the choice behaviour of hotel loyalty program members versus non-members. Several results examining whether hotel loyalty program members are more concerned with fairness issues fail to support Hypothesis 8. To demonstrate that loyalty program members have more stable reference points, we compared the average ranges of dispersion of reference experiences and reference knowledge across the three segments. Table IV-14 presents the mean dispersion ranges for attributes that showed significant between-segment differences, where 0 denotes no dispersion and 1 maximum dispersion. Segment 1 consistently has the most constant reference points, followed by Segment 3 and finally Segment 2, which is an immediate reflection of the level of each segment's travel experience. While the reference points of more experienced travellers in Segments 1 and 3 are significantly firmer ($p<0.1$ or better), this effect is not as obvious in the preference parameters for the fairness adjustment components across the segments. We consequently split respondents into members and non-members of loyalty programs and reanalysed the data to examine differences in the number and size of significant fairness adjustment terms. The results reaffirm the earlier presumption that hotel loyalty members are not unlike non-members in their reaction to fairness deviations. In the member sub-sample, 6 out of 16 fairness adjustments showed significant coefficients,

compared to 5 out of 16 for non-members. The magnitude of the effects is slightly larger for non-members ($p<0.01$) where significant coefficients for both groups allow comparison, but hotel loyalty program members make positive and negative fairness adjustments for membership fees whereas non-members do not. For the most part Hypothesis 8 could not be supported, because the more stringent reference points of loyalty members do not directly translate into stronger fairness adjustments.

There is however substantial support for Hypothesis 7 because the WTP of hotel loyalty program members is either the same or lower compared to non-members. Considering WTP for the hotel product attributes capturing CCM and RM, the results in Table IV-15 demonstrate that loyalty program members are clearly not prepared to pay a higher price than non-members for any attributes. The WTP estimates to stay within a certain hotel group and the associated loyalty program compared to staying at Starwood hotel (baseline) paint a similar picture, with only one of the terms being significant. Hilton members have a negative WTP of $-39.24 to stay within the Hilton group relative to the base Starwood. The lack of significant WTP effects can be explained with the high fragmentation of the hotel industry and the abundance of independent and group hotels available. 44% of hotel loyalty program members belong to a program other than the four largest programs in Australia chosen for this study.

Table IV-15. WTP for Hotel attributes

	Hotel loyalty program membership	
	Non-members	**Members**
No. of observations	27648	29440
Location_next	$132.15	$134.32
Location_walk	$59.83	$59.66
Location_public	$2.45	-$4.87
Cancellation & Changes	$32.19	$17.48
Payment_arrival	$34.00	$25.65
Payment_deposit	n.s.	n.s.
Payment_30days	n.s.	n.s.
Free stays_any room	-$9.70	n.s.
Membership fees ($50)	-$23.57	-$28.50
Point validity_always	$14.71	n.s.
Point validity_purchase	n.s.	n.s.
Point validity_3yrs	-$7.61	-$12.26
Upgrades_ad hoc	n.s.	n.s.
Upgrades_platinum	$1.65	n.s.
Upgrades_gold	$27.02	$22.53

5 IMPLICATIONS FOR DECISIONS MAKING THEORY AND CUSTOMER-CENTRIC MARKETING UNDER CAPACITY CONSTRAINTS

The results discussed in the previous section provide support for most of the eight hypotheses put forward in this paper in two different industry contexts, as summarised in Table IV-16. This section presents both implications for decision making theory and insights that service firms managing fixed capacities can gain from the empirical findings to improver their CCM strategy (i.e., the structure of their frequent traveller programs).

First of all, the results of both studies substantiate that customers' choices are more completely captured by a choice model accounting for the coding of alternatives relative to a reference point. This is a core argument of prospect theory (Kahneman and Tversky 1979), and especially the more general reference-dependent preference theory (Tversky and Kahneman 1991; Sugden 2003). In the latter, it is shown how choices depend on both reference points and a preference component not related to reference points. In addition to the utility obtained directly from product attributes, customers make utility adjustments as a result of a coding phase in which outcomes are coded relative to a reference point as either gains (above the reference point) or losses (below the reference point). In confirmation of Hypothesis 1, we found empirical support for both of these utility components, which Thaler (1985) identified as acquisition and transaction utility. Reference-dependent fairness effects for all attributes partly coincide with the direct effect of the attributes, but also add a new dimension. For example, although the availability of rooms for award bookings does not have a direct impact on utility, one segment of hotel guests gains additional utility if the rules are less stringent than expected.

Reference-dependent preferences have mainly been applied to price, giving rise to an extensive body of research on the effects of reference prices on customer choices (cf. Winer 1989; Putler 1992; Kalyanaram and Winer 1995; cf. Briesch, Krishnamurthi et al. 1997; Niedrich, Sharma et al. 2001). Reference price effects are clearly visible in the airline data, but to a lesser extent in the hotel study because of the way data about past price experiences was collected. The two studies extend the concept of reference dependency beyond price and test the utility effects of reference-dependent gain and

loss terms for an additional seven non-price attributes. While only four of the reference-dependent components for non-price attributes were significant across both studies (price losses, routing gains and losses, and fee losses), we recognise the importance of reference points for all attributes except upgrades in one or more segments of the data. The relevance of reference points for non-price attributes as outlined in Hypothesis 3 is attested, but further research may further investigate different approaches of how to compute reference points for non-monetary values.

A closer examination of the significant reference-dependent components in both studies further confirms prospect theory. Loss terms are more likely to be significant, and where they can be compared to a matching gain term, they are consistently larger. In both the airline and hotel study hypotheses 4 and 5 are well supported and provide empirical indication for the effects of gains and losses outlined in prospect theory. This is an important finding to consider for those in charge of RM and CCM strategies. Achieving positive deviations from an individual's reference point presumably entail additional cost, but fail to delight customers in a way that influences their choices favourably. The hotel study revealed that premium level frequent traveller program members are the exception to this pattern, and hotels can manipulate their offerings to achieve utility increases for their most profitable customers. Negative deviations however are penalised by a utility deduction and decrease the likelihood of a particular alternative to be chosen. Service firms need to decide whether the cost savings of performing below customers' reference points outweigh the potential loss of sales.

We further contribute to decision making theory by pooling together aspects of the fairness and justice literature with reference-dependent preference theory to explain how customers react to simultaneous RM and CCM. Fairness judgements are the subjective comparison of an outcome and/or process to arrive at this outcome relative to a standard or reference point to assess whether it is acceptable or just (Kahneman, Knetsch et al. 1986; Maxwell 2002; Bolton, Warlop et al. 2003). In our model, positive and negative deviations from a reference point are therefore regarded as fairness adjustments and incorporated into an expected utility framework, rather than relying on self-stated fairness perceptions. While reference-dependent preference theory assumes that the reference point is known, we employ principles of justice theory to establish the factors determining individuals' attribute-specific reference points, although the individual significance of these factors are not tested empirically. The four determinants used to

calculate reference points are derived from reference price research, but also mirror fairness and justice theory. The role of past purchase experiences and indirect knowledge about offerings previously not chosen is anchored in equity theory, distributive justice, and adaptation-level theory (Helson 1948; Konow 2003). The potential impact of deliberately presenting prices as a surcharge or discount relative to a standard rate seeks to reconfirm reference-dependency. Finally, reference point effects of non-available contextual offerings derive from adaptation-level theory, transactional justice, and the insights of contextual reference price research (Tversky and Simonson 1993).

Table IV-16. Summary of Hypotheses and Results

Hypothesis	Support	Airline Study	Hotel Study
H 1	Fairness models Ia, Ib, IIa and IIb significantly outperform base model; significant LLR	Supported	Supported
H 2a)	Significant preference coefficients for all but one attributes reflecting CCM and RM	Supported	Supported
H 2b)	Significant preference coefficients for 9 of 16 (airlines) and 8 of 16 (hotels) fairness adjustment components	Partly supported	Partly supported
H 3	Significant preference coefficients for fairness adjustments of non-price attributes	Partly supported	Partly supported
H 4	Coefficients for loss terms are bigger than those for matching gain term, or gain terms not significant	Partly supported	Partly supported
H 5	Significant preference coefficients with the correct sign for gain and loss fairness terms	Partly supported	Partly supported
H 6	Goodness of fit statistics for fairness models Ib and IIb are inferior to those of fairness models Ia and IIa	Not supported	Not supported
H 7	Willingness to pay of frequent traveller program members is lower or the same than that of non-members	Mainly supported	Supported
H 8	More fairness adjustment coefficients are significant for members, and the significant coefficients are larger compared to non-members.	Partly supported	Not supported

For managers of service firms with fixed capacities, which face the challenge of maximising revenues in the short and long term, it is important to understand how to manipulate their offerings and CCM to maximise attribute utility and fairness utility for their more profitable customer segments. The two basic tactics are to shape price and service product features to meet customers' reference points, and to alter the reference points as such. Both approaches require service firms to have knowledge about their customers' reference points. Gathering and interpreting customer knowledge is a key feature of customer centricity of a service firm (Shah, Rust et al. 2006), and data on customers' past experiences at least with one service provider as well as data on the firm's own and competitors' past and present offers is readily available. Research on

the fairness effects of RM (Kimes 1994; Kimes and Wirtz 2003; Choi and Mattila 2004) recommends several ways to employ price discrimination without risking perceived unfairness. Providing additional perceived value in return for higher prices, or obscuring the reference point with obfuscated service bundles, takes advantage of customers' reference points. Raising the reference price or lowering reference points for other attributes aims at altering reference points to the advantage of the firm. Service firms cannot leverage all four reference point determinants with equal success. Hotels and airlines have little influence over the competition's past and present offers and the past purchase experiences of their customers, particularly with competitors. They can however control the range of offers they advertise at the time of purchase, as well as manipulate the semantic presentation of an offering as a discount or surcharge.

A number of recommendations for the management of frequent traveller programs and RM can be deduced from the findings of the airline and hotel studies. On the subject of RM, both studies revealed that the link between cheaper prices and higher restrictions may be understood but is not reflected in customers' choices. As RM draws on more rigorous booking restrictions to justify rate differences, this is a disconcerting result. To bypass potential unfairness, hotels and airlines need to a) articulate better that cheaper rates are offered as a trade-off for less favourable booking conditions; and b) avoid additional utility decreases from booking restrictions below customers' reference points.

A customer-centric culture has been postulated to be the link between establishing and maintaining customer relationships and the marketing concept (Shah, Rust et al. 2006). Frequent traveller programs are a tangible implementation of CCM and equally pursue the aims of customer acquisition and retention. The appropriateness of frequent traveller programs to acquire customers with a high lifetime value has been challenged especially in the airline study. Some customers with high travel frequency have decided not to join any frequent flyer programs, but show a similar choice behaviour than premium level frequent flyers. The preference estimates for this customer segment demonstrate that membership fees and restricted access to membership benefits have deterred them from becoming a member. This is a particularly alarming result because frequent flyer members show an above average WTP to book with their airline alliance. Airlines run the risk of revenue loss due to repelling a profitable customer segment with conditions that have been established as an entry barrier for less profitable infrequent travellers who do not have an attractive lifetime value. Frequent flyer programs need to

seek a better approach to distinguish desirable from less desirable aspiring members, such as a grace period for new members during which they are not subjected to fees given that they will accumulate a certain amount of points during this time.

Proceeding to the challenge of customer retention, a segment of the most finicky frequent traveller segment emerged in both industry contexts. For airlines, basic members who belong to only one program are the hardest to please, whereas hotels need to turn their attention to premium members. The task is exacerbated by the particular susceptibility of frequent traveller members to fairness judgements. Airlines and hotels benefit from not offering product features that fall short of members' reference points and can exploit any positive fairness deviations to capitalise on their customer database, which delivers insights into customers' reference points. Provided that a service firm is confident that their frequent traveller program recognition levels successfully identify customers with higher lifetime values, hotel loyalty programs should privilege premium members. Airlines on the other hand need to assess the potential lifetime value of every basic frequent flyer members to decide on a profit maximising strategy. Depending on their lifetime value, this segment should receive privileges equivalent to the highest recognition level (high LTV), or be discouraged from being member (low LTV) because the raised expectations due to belonging to the program and subsequent negative fairness adjustments might outweigh the benefits through higher brand preference of members.

Lastly, airlines and hotels can derive important insights from the WTP results of frequent traveller members, allegedly a firm's more frequent and profitable customers, compared to their occasional customers (i.e., non-members). Contrary to the common belief that loyal customers show a higher WTP, we found that neither hotel nor airline customers who belong to a frequent traveller program have a higher WTP than non-members for product attributes related to RM and CCM. In the hotel study, there is virtually no difference in WTP, and in the airline study non-members even show a higher WTP. Moreover, only airline passengers are prepared to pay a price premium to book a flight within their preferred airline alliance. Hotel loyalty program members however do not differ from their occasional purchasing counterparts in their WTP for a particular hotel group. These results are in accordance with earlier research by Cox (2001) and Xia, Monroe et al. (2004) and advise that price discrimination should not disadvantage frequent traveller members.

6 CONCLUSION

Airlines and hotels face the challenge of simultaneously maximising revenues from profitable customer segments and fixed capacities, and generally apply CCM and RM to achieve this goal. The concurrent employment of CCM and RM poses the risk of perceived unfairness which influences customers' purchase choices.

Our analyses of airline and hotel customers documents how CCM and RM attributes affect customer choices, and the impact is fairly strong. Customers' reactions to price variations are in line with economic theory, but price sensitivity varies across customer segments. Direct flights and hotel locations in close proximity of places to visit are preferred over less favourable routings or locations, and the magnitude of this effect differs depending on the trip purpose. In both studies the most price-sensitive customer segments are also those who are most opposed to any rate restrictions imposed by RM as a trade-off for better prices. Regarding CCM attributes, we found that charging membership fees for frequent traveller programs negatively affects choices of most customers in both industries and across segments. The redemption of 'loyalty' points for free award booking unexpectedly does not have a significant effect, whereas rules concerning validity of points and upgrades only matter to selected customer segments in both studies.

Regarding the second and third objective of this study, we were also able to show how perceived unfairness caused by simultaneous CCM and RM influences choice. Customers make fairness adjustments to utility for deviations from their individual reference points regarding price and a range of other CCM and RM induced hotel or flight attributes. In accordance with prospect theory, losses (i.e., negative deviations) are generally more profound than gains. The results thus document the appropriateness of reference-dependent preference theory to explain fairness adjustments due to CCM and RM, and show that reference-dependency extends beyond the price variable. The two studies are an important step towards including perceived fairness in a utility framework of customer choice models and we introduced a comprehensive choice model to capture fairness effects.

To further demonstrate the conflicting nature of CCM and RM, we established that frequent traveller program members are particularly susceptible to fairness adjustments

compared to non-members. Moreover, frequent traveller members in the airline study show a lower WTP for a range of CCM and RM induced attributes than non-members, and hotel loyalty program member do not differ from non-members in their WTP. Frequent flyer members have however a higher WTP to fly with their preferred airline, while this effect is not present in the hotel study.

Regarding the limitations of our research, the interpretability of the study results is complicated by the fact that the measured demographic and travel-related covariates do not satisfactorily explain segment differences, particularly in the airline study. This means that most of the difference in choice behaviour across the identified segments is caused by yet unidentified factors. As a result, the distinction between customers who simultaneously experience CCM and RM and those who are subjected mainly to RM alone, with regards to their fairness judgements and choice behaviour, is not as clearly defined as we expected. The capacity of service firms to act upon the findings of this research however depends on the ability to better describe customer characteristics of the different segments. The issue of preference heterogeneity existent in the data could also be approached with hierarchical Bayesian procedures, which might yield better results (Huber and Train 2001; Teichert 2001). With regards to model estimation, the analyses did not include the attribute capturing future availability as a main effect to ensure comparability of estimation results for the different weighted and unweighted fairness choice models. As future availability no longer enters the analysis as a determinant of the importance weight in Fairness Model Ia, it could be taken into account in future research.

Furthermore, in order to fully avail of the insights gained from the stated-preference choice experiments, additional research needs to simulate how a more integrated system of CCM and RM could change customers' choices in favour of the service provider. The simulation of an integrated solution can apply the stated choice models presented in this paper to predict the impact of any changes to CCM and RM attribute combinations, or use a more complex approach to simulate customer choices if competitors also change their RM strategy. Future research may also want to explore the robustness of our findings. Firstly, the generalisability can be improved by extending the research to additional capacity constrained service industries, and by testing customer choices for airlines and hotels for a variety of travel scenarios rather than just one. Our findings are based on one particular travel scenario for each study, whereas the established effects

may change for different trip scenarios. Secondly, reference points can be re-calculated using different reference point determinants and estimation methods, and the assumption of equally spaced qualitative attribute levels may also affect results. Potential problems associated with the necessary yet limiting assumptions have for instance become apparent in the results for reference dependent effect of cancellations and changes. A related issue is the use of data collected with a survey tool rather than revealed preference data to calculate reference points. Although reference points are a subjective measure and do not rely upon objectively correct memory of past experiences, drawing on purchase histories and past and present purchase options might improve reference point calculations. Finally, we only collected data on expectations and experiences with the particular trip scenario covered in the experiments. Further research may explore the cross-effects of experiences with similar travel on reference point formation.

V PREDICTING THE DEMAND EFFECTS OF AN INTEGRATED APPROACH TO CUSTOMER-CENTRIC MARKETING AND REVENUE MANAGEMENT

1 INTRODUCTION

Capacity constrained service firms, in particular airlines and hotels, apply revenue (yield) management (RM) and customer-centric marketing (CCM) to simultaneously maximise revenues per capacity unit and per customer respectively. CCM is relationship-oriented and focuses on creating value for customers, who in return create value for the firm over their customer lifetimes (Shah, Rust et al. 2006). RM approaches revenue maximisation from a transaction-based viewpoint with the aim of selling each capacity unit to the highest paying customer (Kimes 1989; Weatherford and Bodily 1992), but is not concerned with customer lifetime values. The incompatible nature of these two targets for revenue maximisation means that concurrent yet unintegrated CCM and RM can negatively influence customer demand, and therefore decrease revenues. The risk of jeopardising demand ensues from a range of conflicts which customers may perceive as a result from the current practice of unintegrated use, especially perceived unfairness, inconsistent transactions, and perceived lack of customer appreciation (McMahon-Beattie, Yeoman et al. 2002; Wirtz, Kimes et al. 2003). Table V-1 provides a summary of the distinguishing features of CCM and RM which cause the potentially demand-dampening conflicts.

Perceived conflicts resulting from RM practices affect all customers, although more profitable repeat customers are considered particularly susceptible for a number of reasons. They are more likely to perceive RM practices as unfair because they have stronger reference points from their past travel experiences, a higher risk for inconsistent transactions over time, and higher expectations to be treated favourably. For the purpose of this research, the beneficiaries of CCM activities of hotels and airlines are equated with members of their frequent traveller programs. Frequent traveller programs are a frequently used marketing tool of service firms pursuing a customer-centric strategy (Lacey and Sneath 2006).

Most research on RM focuses on further improvements to forecasting and allocation algorithms to achieve marginal additional revenue increases (Weatherford and Bodily 1992). We propose that an integration of RM with CCM bears much greater potential to advance revenues, because the probability that customers choose an alternative produced by RM rules tailored to their CCM status is greater than if uniform RM rules were applied to all customers. Ambitious consulting studies promise airlines average revenue gains of 8% following the adoption of an integrated CCM-RM solution (Jonas 2001). While research and industry identified the risk of damaging demand and acknowledge the need for integration (Noone, Kimes et al. 2003; Talluri and van Ryzin 2004), the magnitude of potential revenue losses has not been determined, and neither have the potential revenue benefits of an integration.

In this paper we address this gap, and intend to contribute to the debate about the feasibility and usefulness of integrating RM and CCM by investigating three research objectives. Firstly, the discussion of three alternative avenues to an integrated CCM-RM system assesses the feasibility of a synchronised solution. The three alternatives approach the problem from different angles, depending on the strategic focus of the service firm on customer-centricity, yield management, or both equally. Secondly, we select the most basic alternative of integration, namely customising RM allocation heuristics to give credit to the customer lifetime value of specific customer segments, and demonstrate the demand effects of a segment-specific RM system. The prediction of customer demand utilises the results of two stated choice experiment studies in the airline and hotel industries which investigated customers' choices in light of concurrent yet unintegrated RM and CCM. Thirdly, we present simple financial measures to demonstrate how changed choice probabilities due to an integrated CCM-RM solution can increase aggregate demand for the firm's service products and resulting revenues from the same capacities and market demand.

2 A RATIONALE FOR INTEGRATING CCM AND RM

Traditionally, RM is not directly concerned with customers' purchase choices, and its effect on customers' perception of the firm and its offerings and the willingness to engage in ongoing buyer-seller transactions (McGill and van Ryzin 1999; Talluri and van Ryzin 2004). However, service firms that adopt a customer-centric orientation

"need to consider how their activities impact their relationship with different customers" (Reinartz and Kumar 2003, p.77). Treated as competing strategic marketing tools, RM and CCM are contradictive and hinder each others revenue maximisation potentials (see Table V-1).

Table V-1. Revenue Management versus Customer-Centric Marketing in a Nutshell

Criteria	Revenue Management	Customer-Centric Marketing
Definition	Managing the trade-off between capacity utilisation and price, by charging different prices/rates for the same product to different customers in an attempt to balance demand and revenues per capacity unit	Managing the portfolio of customer assets, that is a firm's current and future customer lifetime values, by optimising the mix of customer acquisition and retention, and cross-selling
Aim	Short term Maximise revenue, contribution, profits per inventory unit	Long term Maximise customer assets/equity per customer and the portfolio
Principle	Apply microeconomics principles and decision heuristics to manage the availability of rate classes	Compute customers' lifetime value by measuring revenues and cost (contributions)
Main Elements	Overbooking policies Demand patterns and forecasting Price discrimination Inventory Control = Allocation rules	Determine customer lifetime values Estimation of contribution per customer per time period Develop marketing tools to positively influence lifetimes and contributions
Forecasted variables	Overall demand and demand for rate-products and associated probabilities Expected marginal revenue or contribution	Customers' future resource investment and associated probabilities Cost associated with acquiring, retaining and cross-selling a customer Customer Lifetimes
Segmentation	Based on customer's willingness to pay/ price elasticities	Based on customer's lifetime profitability

Research on the usefulness and feasibility of CCM activities under capacity constraints is still in its infancy, and the existing body of literature is limited to conceptual work and individual case studies on some early-adopting firms (cf. Libert and Cline 1996; Cox 2001; Jonas 2001). Authors who acknowledge the necessity of integration first of all cite the expected positive impact on customer loyalty as the key benefit of a synchronized solution, as incautious use of RM techniques can dampen repurchase behaviour (Noone, Kimes et al. 2003; Shoemaker 2003). The harmful side-effects are based on the legitimate assumption that unfavourable fairness judgements of a firm using RM impair customers' commitment to the firm and its products, and hence their likelihood to repurchase. Secondly, repeat customers seek interaction consistency between current and previous transactions (Zablah, Bellenger et al. 2004). RM practices however inherently lead to inconsistencies because they cause variations in prices, associated restrictions and availabilities of certain price options. Thirdly, one of the underlying assumptions of RM is that capacity allocation rules are independent of

the demand for auxiliary products and services (Kimes 1989), and the demand for the firm's services in the future. While CCM has long recognised the profitability of cross-selling, Noone and Griffin (1999) are the first to account for the revenue effect of auxiliary spending in RM by suggesting a comprehensive integration of RM with CCM activities aimed at increasing cross-sales.

2.1 Three possible approaches to integrate RM and CCM

In order to tackle the challenge of quantifying the potential of a synchronised implementation of CCM and RM to enhance customer demand and subsequently the firm's profitability, we first present possible avenues to achieve such an integrated solution. Depending on the strategic focus of a service firm, there are three generic options. A firm's revenue maximisation strategy can assign the dominant role to revenue management, customer-centric marketing, or treat them both as equally strong tools for maximising revenues.

2.1.1 Option A: Strategic focus on RM

A firm selecting Option A considers RM to be the main source of potential revenue increases, but gives CCM activities credit for additional revenue contributions. RM forecasting and allocation heuristics remain essentially unaffected. The aim is to maximise revenues per available capacity unit (RevPAR), which is usually achieved by using capacity allocation heuristics to different fare classes based on expected marginal returns EMSR. EMSR is a heuristic to calculate how many units of a perishable product should be sold to different groups of customers, which is usually determined by the optimal protection level (Weatherford and Bodily 1992). The role of CCM in this scenario is limited. Kim, Shi, and Srinivasan (2004) for example promote loyalty rewards program, a common CCM tool in service industries, as a means to fill excess capacities with free award bookings and thereby reduce price competition in times of low demand. CCM activities thus do not interfere with the aim of short-term revenue maximisation per inventory unit. Non-paying award bookings are treated similar to a separate booking class, the size of which is determined by the optimal sizes of more profitable booking classes.

2.1.2 Option B: Strategic focus on CCM

Firms can also view customer-centricity as the guiding principle to maximise revenues, with RM only acting as a contributing factor. This implies that customer segmentation is based on customers' value to the firm (i.e., their lifetime value, LTV). For each segment price-service bundles and capacity allocation rules are tailored to customers' needs and simply support the respective CCM strategy (Parvatiyar and Sheth 2001; Noone, Kimes et al. 2003). Bowen and Shoemaker (1998) take one additional step and argue, in the context of hotels, that RM should only be applied to customers who fail to meet the criteria of a loyal, continuingly profitable customer. In this scenario, CCM is a tool to decide which customer segments should be exposed to RM, and to what extent. Revenue per available customer RevPAC (=average revenue per customer x market share) replaces the common RevPAR as the metric to measure success of RM activities (Shoemaker 2003). A firm can increase RevPAC by either offering services which generate higher revenue and are more likely to be chosen. Note that the accumulated RevPACs of a customer equals her expected LTV for the given time period, not considering cost.

2.1.3 Option C: Equal strategic importance of RM and CCM

The equal eligibility of both systems in a firm's revenue maximisation efforts has received little attention in the literature, but is generally built on the notion of customer utility. Shoemaker (2003) is one of the few who insinuates the necessity to base yield pricing on the value generated by and for every individual customer. Weatherford (2004) more explicitly promotes the use of expected marginal seat utility EMSU instead of the current EMSR to account for a firm's risk aversion towards probable higher priced demand compared to certain lower priced demand, which translates into the customers' choice probability to accept an offer resulting from RM activities. The final, most advanced progress in service pricing would therefore be to incorporate knowledge about customer behaviour into pricing/bundling, and to base RM decisions on VALUEPAC, that is the value delivered to each available customer (Shoemaker 2003). Talluri and van Ryzin (2004) use a similar approach and apply a general choice model of customers' behaviour to decide which sets of alternatives are made available at any given time. They recommend the integration of pricing and product attribute design to advance RM to consider customer relationships. VALUEPAC can be captured as a

function of the value=utility generated with an alternative for each individual customer, and the probability that that alternative will be chosen. This approach of choice-based RM requires firms to embed both RM and CCM into an expected utility framework, where customer choices and management decisions are equally dependent on utility maximisation.

3 METHOD

This section outlines the techniques applied to predict the potential outcomes of applying a simple version of integration option B, where different RM rules apply to different customer profitability segments. Option B is the most basic approach to integrate RM and CCM and can easily be adopted by service firms without substantial resource implications. As the segment-specific RM strategies are developed based on customer choice behaviour, this approach is a simple yet valuable implementation of more harmonised RM and CCM activities. The predictions employ the results of two series of stated choice experiment in the hotel and airline industry, where a total of 911 respondents recorded their most preferred option from 32 choice profiles of four unlabelled alternatives each. In the airline study, the task involved selecting a flight to Bangkok for either a business or leisure trip. In the hotel study, respondents chose a hotel for a stay in Sydney or Melbourne for a business or leisure trip. Each alternative is described by ten attributes resulting from concurrent RM and CCM application.[16] For both the hotel and airline study, the utility coefficients for each attribute and its effect-coded levels were estimated using conditional logit regression (McFadden 1974). The choice study also investigated the impact of reference-based fairness adjustments on customers' choices and found that gains and losses relative to attribute specific reference points form a significant part of customers' utility judgements. The model coefficients for the attributes and fairness adjustments are presented in Table V-2 (airline study) and Table V-3 (hotel study). In addition to analysing the two samples as a whole, latent class analysis was conducted to identify subgroups of respondents with similar choice behaviour. Assuming the existence of S segments, and that customer n belongs to segment $s \in [1;S]$, the probability that customer n chooses alternative $i \in J$ can be specified as:

[16] Please refer to Appendix V-1 for a more detailed description of the experimental design, attributes, and attribute levels for both the airline and hotel study.

$$P_{ni/s} = \frac{e^{x'_n \beta_{1is} + FAGAIN'_n \beta_{2is} + FALOSS'_n \beta_{3is}}}{\sum_{j \in J} e^{x'_n \beta_{1js} + FAGAIN'_n \beta_{2js} + FALOSS'_n \beta_{3js}}} \quad \text{(V-1)}$$

where $x'_n \beta_{1is}$ is the utility directly derived from product attributes, and β_2FAGAIN and β_3FALOSS are the positive and negative fairness adjustments to utility. Each of the k FAGAIN terms is the difference between the actual attribute of that alternative (x_{nik}) and customer n's reference attribute ($\bar{x}_{nk}$), given that $x_{nik} < \bar{x}_{nk}$ for price and $x_{nik} > \bar{x}_{nk}$ for all other attributes. FALOSS terms are the difference given that $x_{nik} < \bar{x}_{nk}$ for price and $x_{nik} > \bar{x}_{nk}$ otherwise. The segment characteristics and segment-specific utility coefficients for each segment are also summarised in Table V-2 (airline study) and Table V-3 (hotel study).

We use the utility coefficients obtained in the airline and hotel studies to develop what-if scenarios to simulate the effects of integration option B on customer choices (Hensher, Rose et al. 2005). We predict choice probabilities and changes in utility resulting from the different scenarios and illustrate how a firm's revenues could change.

The what-if prediction scenarios encompass two basic approaches to adapt RM to CCM segments. Firstly, we generically vary whether or not a customer segment is subjected to RM techniques. The three different options of abolishing RM are outlined in the results section. Secondly, we explore the effects of changes to specific CCM and RM attributes which proved to be significant. The choice model results presented in Table V-2 and Table V-3 can inform how for example a higher price changes the attractiveness of an alternative compared to other individual attributes. We can also evaluate the effect of particular RM and CCM attribute combinations at different price levels, which provides particularly valuable information to develop an integrated CCM-RM program for different customer segments. It is possible to assess how far higher prices and/or membership fees for frequent flyer programs can be charged to finance other CCM and RM activities which aim at increasing customers' choice probability beyond the losses induced by higher purchase cost. Changes in attractiveness due to changes of one attribute, all else remaining equal, are calculated as linear predictions of the systematic utility component $v = \beta_1 x' + \beta_2$FAGAIN' + β_3FALOSS' for the initial attribute level and any level that the attribute can be changed to (Schroeder and Louviere 1999; Hensher, Rose et al. 2005).

Table V-2. Segment Characteristics, Attributes and Utility Coefficients in the Airline Study

	Segment 1	Segment 2	Segment 3	Entire Sample
Segment size	**47.43%**	**35.99%**	**16.58%**	**100%**
Segment Characteristics	**Premium All-Purpose Travellers**	**Loyal Leisure Travellers**	**Business Travellers**	
Frequent flyer membership - Program(s) and levels				
None [2]		-2.16%	-3.12%	
1 program [2]	-0.22%	+3.26%	-6.28%	
2 or more programs [2]	-2.42%	-1.10%	+9.40%	
Basic level [2]	-3.23%	+2.46%	+4.22%	
Premium level [2]	+1.09%	+0.73%	-4.72%	
Trip scenario				
Business/Leisure [1]	+/-4.23%	-/+17.19%	+/-24.03%	
Attributes				
Price	**-0.0004** [1]	**-0.0059** [1]	**-0.0016** [1]	**-.0015** [1]
Routing_Hong Kong (15h)	**-0.1206** [1]	**-0.4538** [1]	**-1.9908** [1]	**-.2950** [1]
Routing_Kuala Lumpur(13h)	**-0.1638** [1]	**-0.1783** [1]	**-0.9202** [1]	**-.2605** [1]
Routing_Singapore (11h)	**0.0934** [1]	**0.0749** [1]	-0.0432	**-.0432** [1]
Cancellation&Changes (no vs. fee)	**-0.081** [1]	**-0.1008** [1]	-0.0536	**-.0758** [1]
Ticketing_within 24h	0.0041	0.0056	0.058	-.0262
Ticketing_60d before departure	-0.0023	**-0.079** [1]	**-0.2462** [1]	-.0130
Ticketing_30d before departure	0.0233	-0.0023	-0.0203	.0123
Program Oneworld	**-0.0407** [2]	**0.1547** [1]	0.0806	.0165
Program Star Alliance	**0.037** [2]	0.0573	**0.1693** [1]	**.0309** [1]
Program Velocity	0.0106	**-0.0732** [2]	**-0.2139** [1]	-.0157
Free flights (quota vs. any seat)	-0.0239	0.0092	0.0099	-.0091
Membership fees (50$ fee vs. free)	**-0.0589** [1]	**-0.1457** [1]	0.006	**-.0685** [1]
Point Validity_2years	-0.0137	**-0.1488** [1]	-0.0023	**-.0457** [1]
Point Validity_3years	**-0.1177** [1]	0.0103	-0.0714	**-.0510** [1]
Point Validity_one purchase p.a.	**-0.0485** [1]	0.0135	0.1067	-.0134
Upgrades_use points	**-0.1026** [1]	**-0.0857** [1]	0.1082	**-.0703** [1]
Upgrades_ad hoc at check in	**0.0988** [1]	**0.0726** [1]	**0.241** [1]	**.0923** [1]
Upgrades_free for gold and above	-0.0258	-0.0333	-0.0881	**-.0447** [1]
Fairness adjustments				
Price_gain	**-0.0004** [1]	**-0.005** [1]	**-0.001** [1]	**-.0018** [1]
Price_loss	**-0.0005** [1]	**-0.0063** [1]	**-0.001** [1]	**-.0007** [1]
Routing_gain	-0.0549	-0.0354	**-0.7671** [1]	**-.1562** [1]
Routing_loss	**0.133** [1]	**0.1833** [1]	**0.4133** [1]	**.1858** [1]
Ticketing_gain	-0.0357	0.0427	0.0926	-.0008
Ticketing_loss	-0.0145	**-0.0955** [2]	-0.1245	-.0297
Cancellation_gain	**-0.0764** [2]	0.059	0.136	-.0198
Cancellation_loss	**0.0712** [2]	0.0904	**-0.1977** [2]	**.0459** [2]
Flights_gain	0.0166	-0.0741	0.0285	-.0116
Flights_loss	0.0059	-0.0074	0.0455	.0011
Fees_gain	-0.0792	0.0563	0.2804	-.0327
Fees_loss	**0.2117** [2]	0.0275	**0.8138** [1]	**.1502** [1]
Validity_gain	-0.0087	-0.039	**0.2011** [1]	-.0101
Validity_loss	0.0015	-0.0528	-0.0027	-.0141
Upgrades_gain	-0.0092	0.0233	0.1272	.0032
Upgrades_loss	-0.0464	0.0551	0.0935	-.0232

[1] significant at $p<0.05$
[2] significant at $p<0.1$

Table V-3. Segment Characteristics, Attributes and Utility Coefficients in the Hotel Study

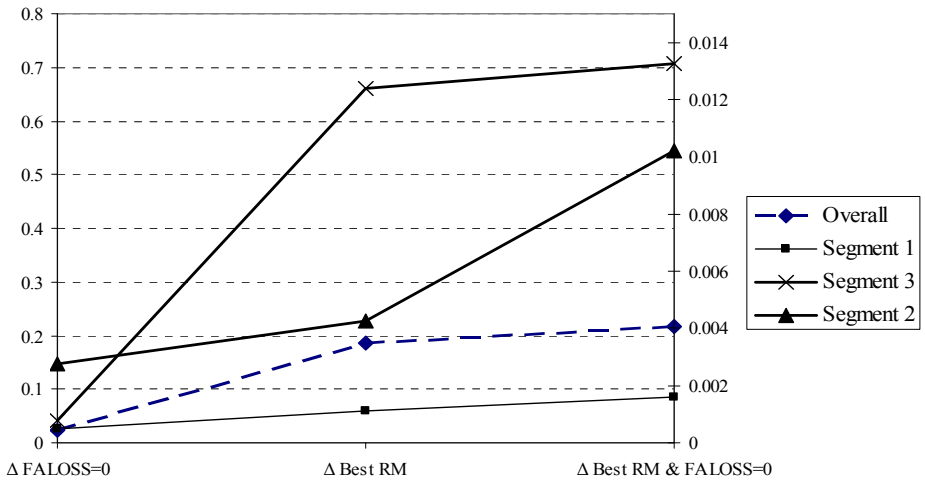
	Segment 1	Segment 2	Segment 3	Entire Sample
Segment size	**54.49%**	**25.45%**	**20.06%**	**100%**
Segment Characteristics	**All-Purpose Travellers**	**Leisure Travellers**	**Business Travellers**	
Loyalty program membership – Programs and levels				
Non-member [2]	-1.97%	+4.79%	-0.79%	
1 or 2 programs [2]	-0.40%	-1.86%	3.47%	
3 or more programs [2]	+2.36%	-2.93%	-2.69%	
Hilton premium level [1]	+17.43%	-29.63%	-29.63%	
Marriott premium level [1]	+3.17%	-11.11%	-11.11%	
Hilton basic level [1]	-14.38%	-5.56%	+44.44%	
Marriott basic level [1]	-2.64%	-74.07%	+25.93%	
Travel patterns				
Total travel [1]	Extensive (43.2)	Regular (29.4)	Extensive (41.1)	
Thereof work travel [1]	Extensive (19.6)	Some (9.7)	Extensive (21.1)	
Stayed in Sydney/Melbourne before				
Once [2]	-2.62%	+11.89%	-8.38%	
6-10 times [2]	+0.67%	-5.98%	+6.03%	
11-20 times [2]	+2.3%	-5.18%	+0.46%	
>21 times [2]	-0.25%	-0.68%	+1.57%	
Trip scenario				
Business/Leisure [1]	+/-3.63%	-/+20.14%	+/-15.88%	
Attributes				
Price	**-0.0018** [1]	**-0.0278** [1]	**-0.0065** [1]	**-0.00687** [1]
Location_next to places	**0.1796** [1]	**0.8576** [1]	**2.2001** [1]	**0.582942** [1]
Location_walk to places	**0.1587** [1]	**0.2917** [1]	**0.6140** [1]	**0.07976** [1]
Location_public transport	**-0.1619** [1]	**-0.4343** [1]	**-1.4664** [1]	**-0.3363** [1]
Cancellation& Changes (fee vs. no)	**0.0496** [1]	**0.2257** [1]	**0.1157** [1]	0.086049
Payment_upon arrival	0.0330	**0.2424** [1]	**0.1919** [1]	**0.097564** [1]
Payment_1 night deposit	0.0206	0.0096	-0.0214	0.017913
Payment_30d before arrival	**0.0404** [2]	**-0.1786** [1]	**-0.1657** [1]	-0.01012
Program IHG	**0.0656** [1]	**-0.2647** [1]	-0.0426	-0.00891
Program Hilton	0.0056	0.0678	0.0236	0.018884
Program Marriott	-0.0054	**0.1315** [1]	**0.1811** [1]	0.01505
Free stays (any room vs. quota)	-0.0094	-0.0201	0.0011	**-0.02654** [1]
Membership fees ($50 vs. free)	**-0.1317** [1]	**-0.1066** [1]	**-0.0887** [2]	**-0.09026** [1]
Point Validity_always	**0.1438** [1]	-0.0996	0.0312	**0.06667** [1]
Point Validity_purchase	-0.0049	0.0636	**0.2074** [1]	-0.00477
Point Validity_3yrs	**-0.1155** [1]	0.0610	-0.0935	**-0.06436** [1]
Upgrades_ad hoc at check in	-0.0342	-0.0138	-0.0012	-0.01392
Upgrades_free platinum and above	-0.0180	-0.0870	**-0.0989** [2]	**-0.03572** [1]
Upgrades_free gold and above	**0.1240** [1]	**0.1269** [1]	0.1068	**0.108749** [1]
Fairness adjustments				
Price_gain	0.0008	-0.0005	0.0004	**0.001646** [1]
Price_loss	0.0005	**-0.0063** [1]	-0.0031	0.000151
Location_gain	-0.0174	**-0.2336** [1]	-0.0071	**-0.09687** [1]
Location_loss	0.0042	**0.3812** [1]	**0.5411** [1]	**0.153312** [1]
Cancellation_gain	-0.0371	0.0106	-0.0317	**-0.04778** [2]
Cancellation_loss	0.0143	**-0.0066** [2]	-0.0427	0.000668
Ticketing_gain	0.0328	-0.0870	-0.1168	-0.02234
Ticketing_loss	-0.0121	0.0794	-0.0112	-0.00642
Stays_gain	**0.1011** [1]	-0.0724	0.0667	**0.059773** [2]
Stays_loss	0.0403	0.0030	0.0330	0.030013
Fees_gain	**-0.1395** [1]	0.0676	-0.1093	**-0.07422** [1]
Fees_loss	**-0.1037** [1]	0.0662	**-0.1642** [1]	**-0.05504** [1]
Validity_gain	-0.0374	0.0442	0.1173	-0.00506
Validity_loss	-0.0170	**0.1253** [2]	0.0462	0.013115
Upgrades_gain	0.0314	0.0689	0.0276	0.026749
Upgrades_loss	0.0238	0.0670	-0.0328	0.01846

[1] significant at p=0.05
[2] significant at p=0.1

4 RESULTS

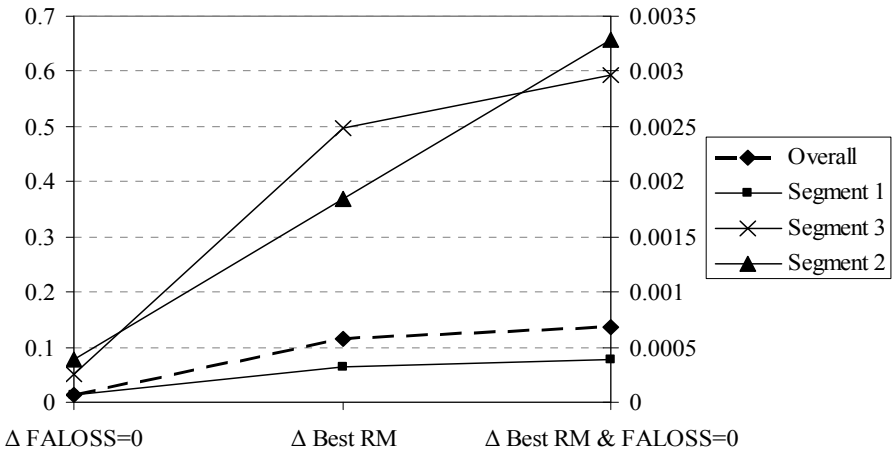
We first assume that all attributes levels are at their mean value, and then apply the airline and hotel choice models to predict how choice probabilities and utilities would change across the entire sample, and for the three segments identified. As stated earlier, predictions are based on a) global changes to RM rules and/or fairness losses, and b) customised changes to specific RM attributes. Initially, changes in choice probabilities are investigated for three different cases that reflect a comprehensive adaptation of RM rules to customer segments, given all other attributes remain unchanged. Firstly, all fairness losses are set to zero to simulate an alternative that does not fall short of customers' reference points. Secondly, all attribute levels which represent RM practices[17], except price, are set to their most favourable levels. Thirdly, we combine option one and two, that is we simultaneously apply the most lenient RM rules and avoid any negative fairness deviations. For all three cases, the effects on choice probabilities (i.e., the absolute changes in choice probabilities for the three generic options compared to the status quo) are shown in Figure V-1 for the airline study and Figure V-2 for the hotel study, with the entire sample and each segment plotted separately. As expected, all three scenarios noticeably improve the choice probability for a flight to Bangkok and a hotel stay in Sydney or Melbourne, with choice probabilities showing a steady increase over the range of improvement scenarios. More detailed results are discussed separately for the airline and hotel study.

Figure V-1. Changes in Choice Probabilities for Entire Sample and Segments – Airline Study



[17] These attributes are routing, restrictions for cancellations and changes, and ticket issuing and payment terms.

Figure V-2. Changes in Choice Probabilities for Entire Sample and Segments – Hotel Study



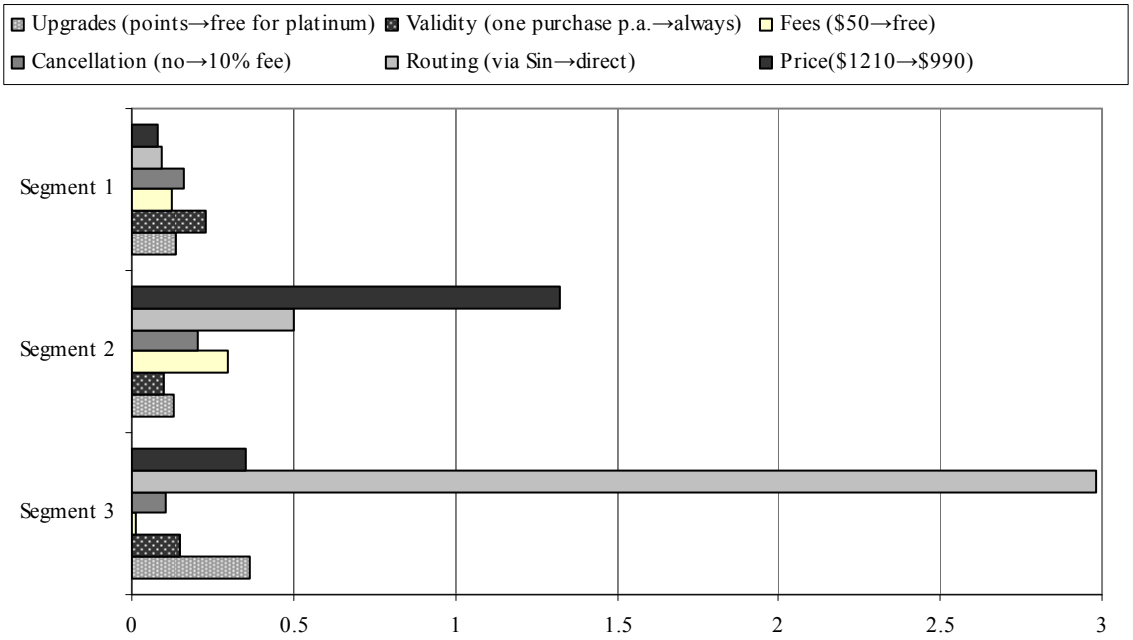
4.1 Study 1: Airlines

In the airline study, the avoidance of any fairness-induced utility losses increases the original choice probability for the entire sample (0.196) by 0.022, which is a relatively small increase compared to a 0.18 improvement at the best RM attribute levels (i.e., direct flight, changes and cancellations allowed at a 10% fee, and ticketing and full payment 14 days before departure), and 0.217 if both approaches are combined.

The matter becomes more complex when we evaluate the impact of more favourable RM attributes for the three customer segments separately. The flight choices of Segment 1 are only moderately affected by the proposed changes to RM, with changes ranging from 0.027 to 0.086. Segment 2 shows an interesting pattern in that avoidance of negative fairness adjustments to utility affects choice probability comparatively stronger than in other segments ($\Delta p=0.0027$), and is similar to the effect of the more drastic method of changing all RM attributes ($\Delta p=0.0043$). Note that these seemingly small changes are a substantial improvement of the minuscule original choice probabilities reflecting the high price sensitivity of Segment 2. A combination of both approaches has the potential to increase choice probabilities by 0.0102 to 0.0138. In Segment 3 the consequences are inverted, as averting unfairness has a negligible impact on choice ($\Delta p=0.040$) compared to avoiding unfavourable RM attribute levels ($\Delta p=0.660$).

The findings demonstrate that different customer segments react to comprehensive changes in RM practices to a greater (Segment 2 and 3) or lesser (Segment 1) extent relative to their original choice probabilities. The other option to adapt RM to customer LTV segments involves segment-specific bundling of individual CCM and RM attributes to maximise the attractiveness=utility of an alternative for each segment. In Figure V-3 the impact of a price reduction from $1210 to $990 is compared to changes in five other attributes that had statistically significant effects on choices in the airline study (three CCM attributes and two RM attributes). While all attribute level changes were explored, Figure V-3 exemplifies the effects with one randomly selected change per attribute.

Figure V-3. Changes in Flight Alternative Attractiveness



While Segment 1 is not overly receptive to comprehensive changes in RM, virtually any improvement of an individual attribute level easily compensates for a fare increase from $990 to $1210 for a flight to Bangkok. As long as a higher price is paired with frequent flyer benefits, such as unlimited point validity or free upgrades for platinum members, or with a more flexible ticket, the attractiveness of the alternative does not decrease. However, if Segment 1 were charged frequent flyer membership fees, program benefits need to be improved in return. Customers in Segment 2 do not accept higher fares and cannot be enticed to purchase higher fares in return for a direct flight, or a changeable ticket. Their rejection of higher monetary cost extends to frequent flyer membership

fees, as a $50 fee cannot be compensated with improved program benefits. The appeal of an alternative for Segment 3 can be enhanced tremendously by offering direct flights, and to a much lesser but still substantial extent, by offering free upgrades for platinum members. As membership fees appear not to interfere with the attractiveness of a hotel option, Segment 3 can be subjected to membership fees to finance improvements to frequent flyer program benefits which promise to increase attractiveness substantially.

4.2 Study 2: Hotels

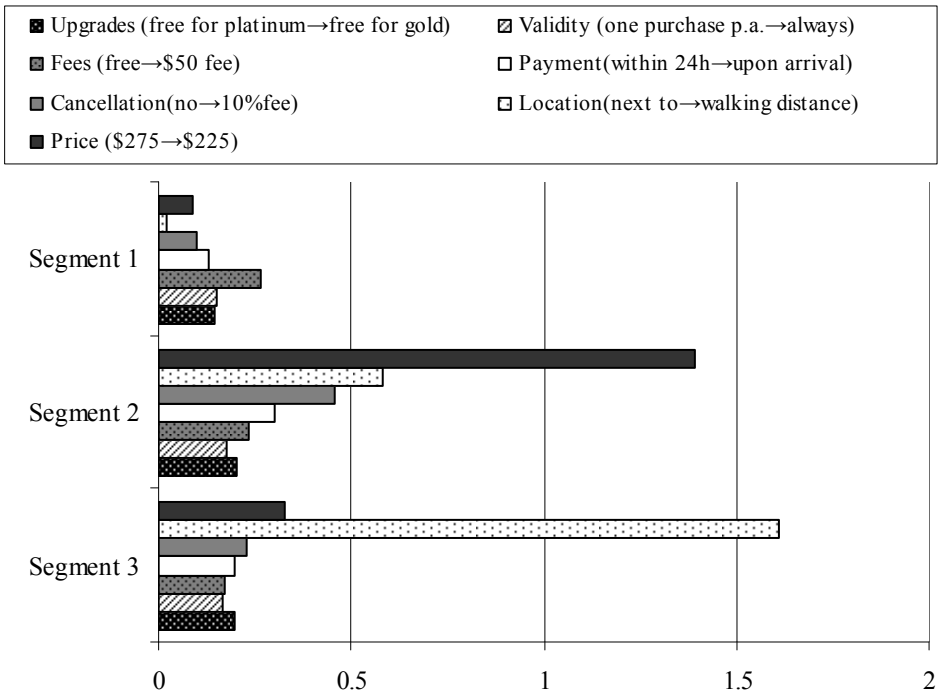
In the hotel study, the reaction of the overall sample to the generic approach of comprehensive RM changes (see Figure V-2) shows a very similar pattern to the one observed in the airline study. The elimination of perceived unfairness causes a relatively small improvement in the choice probability for a hotel stay ($\Delta p=0.014$), whereas the most moderate RM outcomes effectuate an increase of 0.114, and the combination of both approaches approximately doubles the choice probability from the original 0.131 to 0.267.

The three different segments correspond to this overall pattern, but the extent of the potential increases varies. Segment 1 is again relatively unaffected by any comprehensive RM changes, with increases in choice probability ranging from 0.013 for the elimination of unfairness to a maximum of 0.077 for the combined option. Segments 2 and 3 on the other hand react strongly to modified RM rules, and effects on choice probability exceed those experienced in the airline study. Segment 3 reacts with comparatively vast improvements ($\Delta p=0.498$) to the strategy of only applying the most favourable RM attribute levels (not including price), but unfairness avoidance appears to be only effective in combination with RM changes. In Segment 2, the originally very low choice probabilities due to high price sensitivity present virtually linear increases from $\Delta p=0.0004$ for averting unfairness, to 0.0018 for the most lenient RM, to 0.0032 for the combination of both approaches.

Analogous to the airline study, the second generic option to adapt RM to customer LTV segments encompasses segment-specific combinations of a range of CCM and RM attribute levels to create the highest possible utility for profitable customer groups. Figure V-4 exemplifies how a rate decrease from $275 to $225 affects the attractiveness of an alternative compared to changes in the six other RM and CCM attributes which

significantly influenced customer choices. While a rate change from $275 to $225 was selected to illustrate the price effect, any $50 rate change has virtually the same effect.

Figure V-4. Changes in Hotel Alternative Attractiveness



The results indicate that, for Segment 1, the attractiveness of a hotel option does not increase if the hotel is located directly next to places to be visited. A decrease in attractiveness resulting from a $50 rate rise can easily be offset against more flexible booking restrictions in terms of cancellations, changes and payment conditions. Imposing a $50 membership fee however can not be compensated for with improved point validity or rules to obtain upgrades alone, but only if both hotel loyalty program features are improved. Segment 2 is extremely susceptible to rate increases. The model predicts that advancing the room rate from $225 to $275 can only be compensated for by offering a convenient location and the most flexible booking restrictions. The aversion of Segment 2 to monetary cost is also reflected in the reaction to membership fees, which need to be balanced with unlimited validity of reward points and free room upgrades for gold members if decreased attractiveness is to be avoided. Customers in Segment 3 have a particularly strong preference for a convenient hotel location, and are prepared to pay a substantial price premium in return. They are more sensitive to a rate increase than they are to the elimination of advance payment or the possibility to cancel their booking for a 10% fee. Finally, the negative effects of membership fees on

attractiveness are almost identical in magnitude to the increases that can be obtained from offering unlimited point validity or free upgrades for gold members.

5 SEGMENT-SPECIFIC RECOMMENDATIONS AND REVENUE IMPLICATIONS

In this section, we incorporate the findings obtained from simulating the utility effects of changed RM practices in general and for particular attributes to develop suggestions for a meaningful integrated CCM-RM strategy for each customer segment. In order to make detailed recommendations for the airline and hotel context, the first step is to assess the profitability of each segment to distinguish the most attractive customer groups.

For the airline study, the available segment characteristics allow only limited conclusions about segment profitability, as no significant between-segment differences were found for travel frequency. Assuming that frequent flyer programs successfully distinguish customers based on their LTV, customer profitability can be approximated with frequent flyer membership patterns and the allocation to the experimental business or leisure travel scenario. Segment 3 promises high LTV, as it contains mainly respondents allocated to the business travel scenario who belong to at least two frequent flyer programs. They appear as savvy, opportunistic customers who probably travel regularly to make multiple program memberships worthwhile. As the segment is also not as price sensitive as Segment 1, an airline would aim to increase the share of wallet from customers in this attractive class. Segment 2 represents the leisure travel scenario, and contains frequent flyer members who are devoted to one particular program. Customers in this class are however very price-sensitive and finicky, which is reflected in their utility coefficients and extremely low choice probability. Segment 1 is the most difficult to describe in terms of its profitability because it comprises leisure and business travel scenarios, as well as a mix of premium members and non-members of frequent flyer programs. Its very low price sensitivity however makes this segment desirable, because regardless of their travel frequency they appear willing to pay premium prices per transaction.

The segments in the hotel study are much better defined in terms of their LTV potential. Segment 1 and 3 emerge as the most profitable customers, who travel extensively both

overall and for work-related purposes, have frequently stayed in Sydney/Melbourne previously, and show comparatively low price sensitivity. Moreover, Segment 1 contains premium members of the Hilton HHonors and Marriott Rewards hotel loyalty schemes, and individuals who are most likely to belong to three or more hotel loyalty programs. Segment 3 in contrast comprises mainly basic members, but represents primarily the experimental business travel scenario. Segment 2 reveals itself as the least attractive LTV segment. Customers in this group exhibit a much lower travel frequency and a small proportion of business travel, have stayed in Sydney/Melbourne only once, and generally do not belong to any hotel loyalty programs. Allocation to the leisure travel scenario further confirms the low profitability of Segment 2.

5.1 Recommendations for an integrated CCM-RM strategy for the three airline segments

Assuming that Segment 1 is relatively profitable, we decide that RM practices and some frequent flyer program features should be modified to increase the probability that a particular offer is chosen, especially because it is also the largest segment and comprises almost half of the market. While this segment does not greatly respond to overall comprehensive RM changes, well directed manipulation of individual RM and CCM features proves successful. Higher fare classes can target Segment 1, as long as booking restrictions are relaxed in return, particularly non-refundable tickets would not be acceptable at higher prices because the ability to change bookings at a 10% fee increases attractiveness almost twice as much as a fare decrease. With regards to the composition of frequent flyer program features, a $50 membership fee should be paired with unlimited validity of reward points. Improved point validity more than compensates customers for fee charges, and the earnings can fund the airline's increased liability for future free award bookings.

Customers in Segment 2 are typical bargain hunters – evidenced by extremely high price sensitivity and low choice probability – and should only be pursued in times of low demand to fill excess capacities. They make up for over one third of customers. A positive aspect is, however, that averting unfairness has a substantial effect on choice probability in this leisure traveller segment. The focus should thus be on detecting reference points for the various RM and CCM attributes and eliminate unfairness by matching offers or by altering reference points. Given that this segment refers to

exclusive frequent flyer members of only one program, data on past purchases and booking enquiries to determine reference points are readily available, and they are likely to respond to advertising related to 'their' frequent flyer program aimed at changing their reference points. If possible, direct flights should be made available to Segment 2 as they lead to a large increase in attractiveness. Finally, the strong negative preference for membership fees indicates that fees could be charged as a means to discourage unprofitable members from joining or remaining in the frequent flyer program.

Segment 3 is again a quite profitable albeit small target market, and reacts strongly to favourable RM practices. As the attractiveness of a flight offer is almost solely determined by a preference for direct flights, non-stop connections should be offered at a premium price. Although flexible rules for cancellation and changes slightly improve choice probability, there is no need to offer such additional benefits. Frequent flyer members in Segment 3 should be charged membership fees, and proceeds should be reinvested to offer free upgrades for premium members and unlimited point validity. Free upgrades for platinum members, for example, increase the attractiveness of an alternative by as much as lowering the fare by $220.

The segment-specific recommendations are summarized in Table V-4. These concrete measures are subsequently used to predict choice probabilities of airline passengers at four different fare levels ($770, $990, $1210, $1430), given that all other attributes remain unchanged from the original experimental design.

Table V-4. Integrated CCM- RM Rules for Airline Segments

Attribute / Segment	Routing	Cancellations & Changes	Membership Fees	Validity	Upgrades	Perceived Unfairness
Segment 1	- *	10% fee	$50	always	-	eliminate
Segment 2	direct	-	-	-	-	eliminate
Segment 3	direct	-	$50	-	Free for platinum	-

* '– ' indicates that the attribute level remains unchanged.

5.2 Recommendations for an integrated CCM-RM strategy for the three hotel segments

Recommendations for the hotel context are very similar to those identified for the airline study. Segment 1 represents more than half of the respondents in the hotel study

and promises to be highly profitable, but unfortunately cannot be overly enticed by more lenient RM rules and averting perceived unfairness. Customers in this segment do not place much value on a convenient hotel location right next to places of interest, and could be allured with special rate offers for less favourable locations. It is also important to maintain systemic trade-offs between cheaper rates and higher booking restrictions and vice versa, because the preferences for price, cancellation, and ticketing are comparable in size.

Segment 2 comprises very price conscious leisure travellers who travel infrequently. Although they account for about 25% of the market and react positively to the most lenient RM rules, we conclude that RM techniques should be categorically applied because their willingness to pay for less stringent booking restrictions is too low. The strategy for Segment 2 follows the notion of Bowen and Shoemaker (1998) that RM should only be applied to customers who are not profitable beyond the short-term. The attractiveness of an alternative can however also be improved by eliminating unfairness. If the strategic decision was to be made that it is worthwhile pursuing this segment with (costly) RM improvements, then it should only be done in combination with abolishment of unfairness to fully exploit the benefits. Given that the majority of respondents in Segment 2 do not belong to any hotel loyalty programs, membership fees should be introduced to discriminate profitable repeat customers from their less profitable counterparts. Ideally, the fees are matched with better program features regarding upgrades and point validity.

For the desirable customers in Segment 3 who travel mainly for business, an integrated CCM-RM system should charge premium prices for CBD locations. While this is a viable suggestion for hotel chains with multiple establishments in one city, independent hotels or smaller chains fail to capitalise on this effect. Although further increases in choice probability can be achieved by offering the most favourable booking restrictions, most of the RM effects are attributable to a strong preference for an excellent location. As the positive effects of lenient RM rules can be multiplied by simultaneously avoiding unfairness, hotels should attempt to match or alter the reference points of customers in Segment 3. Charging a $50 membership joining fee for a hotel loyalty program requires simultaneous improvement of membership benefits. Given that most individuals in this segment belong to at least two different loyalty programs, this might be a promising opportunity to increase repeat purchases.

Table V-5 demonstrates how the proposed changes are exemplified by choosing attractive attribute levels for the relevant RM and CCM attributes. This operationalisation again forms the input for the following predictions of segment-specific choice probabilities and revenue gains if the recommended changes were implemented.

Table V-5. Integrated CCM- RM Rules for Hotel Segments

Attribute / Segment	Location	Cancellations & Changes	Payment	Membership Fees	Validity	Upgrades	Perceived Unfairness
Segment 1	15min walk	10% fee ($275 & $325) non-refundable ($175 & $225)	- *	free	-	-	-
Segment 2	-	-	-	$50	-	-	eliminate
Segment 3	Next to places	-	-	free	-	-	eliminate

* '– ' indicates that the attribute level remains unchanged.

5.3 Predicted choice probabilities and revenue implications

Our discussion proceeds with an illustration of how revenues change if the proposed simple recommendations were introduced. The example uses a simplified scenario, where the airline or hotel has 1000 capacity units (seats on a flight to Bangkok, or hotel rooms in Sydney/Melbourne respectively) available at a specific date. Demand exceeds supply, and the firm has 1500 potential customers making booking inquiries. The number of booking inquiries per segment is directly proportional to segment size. We assume four different rate classes with allocated quotas of ≤100 units for the lowest class, 200, 300, and 400 for subsequent classes. The price levels are $770, $990, $1210, and $1430 in the airline context, and $175, $225, $275, and $325 in the hotel context.

We firstly predict the choice probability p at each price level as a linear function of the attribute levels and corresponding utility coefficients outlined in Table V-2 and Table V-3. Predictions are obtained for an unintegrated approach to CCM and RM (i.e., no changes), as well as for an integrated approach following option B and the segment-specific recommendations outlined in Table V-4 (Airline Study) and Table V-5 (Hotel Study). We then continue with estimating the number of units each segment demands at each price level, based on the number of booking requests in a particular segment and the predicted choice probabilities. Note that the number of potential booking requests

exceeds 1500, as each hypothetical customer can potentially be willing to purchase a capacity unit at any price level, depending on her choice probabilities. Thirdly, the potential revenue from each segment at each price level, if all demand could be accommodated, is computed. In the next step, we estimate the converted revenues given the capacity limitation of 1000 units, where higher priced demand is accommodated first. Note that based on the allocation of capacity units to demand at the highest price level of $1439 ($325 in the hotel study), the number of units demanded at the next lower level of $1210 (hotel study $275) are adjusted to accommodate the fact that 220 (hotel study 284) customers in Segment 1 and 20 (hotel study 18) customers in Segment 3 have already been allocated a higher priced seat (room). Analogous adjustments have been made for the remaining two price levels ($990 and $770, and $225 and $175 respectively). **Error! Reference source not found.** and Table V-7 show only the adjusted units demanded by each segment at the lower price levels.

Table V-6. Revenue Changes for Airline Example

			No Changes				Recommended Changes			
Segment	**Size**	**Measure**	**$770**	**$990**	**$1210**	**$1430**	**$ 770**	**$ 990**	**$1210**	**$1430**
Segment 1	47.43%	p	0.3910	0.3682	0.3403	0.3086	0.4661	0.4406	0.4150	0.3941
		Revenue	$61,600	$117,810	$202,070	$314,600	$255,640	$309,870	$356,950	$400,400
		Demand	80	119	167	220	66	111	179	280
Segment 2	35.99%	p	0.0113	0.0032	0.0004	0.0000	0.0331	0.0067	0.0013	0.0003
		Revenue	$4,620	$1,980	$0	$0	$13,860	$3,960	$1,210	$0
		Demand	6	2	0	0	18	4	1	0
Segment 3	16.58%	p	0.2615	0.1816	0.1157	0.0808	0.8354	0.7710	0.6797	0.5678
		Revenue	$33,110	$36,630	$31,460	$28,600	$160,160	$190,080	$204,490	$201,630
		Demand	43	37	26	20	7	27	73	141
Overall	100%	Revenue	$99,330	$156,420	$233,530	$343,200	$429,660	$503,910	$562,650	$602,030
		Demand	130	158	194	240	90	141	253	422
Protection levels			100	200	300	400	100	200	300	400
Revenue			$138,600	$305,910	$327,910	$343,200	$0	$0	$699,380	$595,020
Total revenues						**$833,690**				**$1,294,400**

The estimation results are summarized in **Error! Reference source not found.** for the airline study and in Table V-7 for the hotel study. Comparable to the prediction results for a generically lenient RM approach, choice probabilities for all segments and price levels substantially improve as a result of adapting CCM and RM procedures to the preferences of customers in the different segments. The effects are particularly strong for the third segment in both studies, which have been identified as particularly

profitable. Noticeable are also the exceedingly low choice probabilities in Segment 2, which reflect their high price sensitivity and reluctance to make a choice. From a revenue perspective, the proposed changes create more demand from the initial 1500 interested potential customers, and particularly shifts demand to higher priced fare or rate classes. The accumulated converted revenues demonstrate that in this particular example an airline can achieve a 33.15% revenue increase, assuming all other factors such as competitors' offers remain constant. The potential revenue gain for the hotel example is 15%.

While the figures for potential revenue improvements are promising, the implementation of an integrated CCM-RM solution similar to the suggestions above, involves considerable cost. As indicated earlier, providing more flexible booking restrictions and better frequent traveller program benefits generates cost. These costs might include, but are not limited to, the higher risk of revenue losses due to the difficulty of setting over-booking limits to compensate for changes and cancellations at short notice, and the increased future liability for award bookings and upgrades if reward points do not expire. The strategic recommendations however account for the necessity to counterbalance improved frequent flyer benefits with membership fees to at least partly fund these activities.

Table V-7. Revenue Changes for Hotel Example

			No Changes				**Recommended Changes**			
Segment	**Size**	**Measure**	**$175**	**$225**	**$275**	**$325**	**$175**	**$225**	**$275**	**$325**
Segment 1	54.49%	p	0.3861	0.3751	0.3627	0.3470	0.4693	0.4559	0.4441	0.4279
		Revenue	$14,350	$28,800	$53,350	$92,300	$11,550	$26,775	$57,200	$113,750
		Demand	82	128	194	284	66	119	208	350
Segment 2	25.45%	p	0.0059	0.0013	0.0003	0.0000	0.0069	0.0016	0.0004	0.0001
		Revenue	$350	$225	$0	$0	$525	$225	$0	$0
		Demand	2	1	0	0	3	1	0	0
Segment 3	20.06%	p	0.1892	0.1293	0.0883	0.0604	0.7636	0.7090	0.6442	0.5688
		Revenue	$7,525	$7,425	$6,875	$5,850	$1,750	$7,200	$23,100	$55,575
		Demand	43	33	25	18	10	32	84	171
Overall	100%	Demand	375	346	323	302	79	152	292	521
		Revenue	$22,225	$36,450	$60,225	$98,150	$13,825	$34,200	$80,300	$169,325
Protection levels			100	200	300	400	100	200	300	400
Revenue			$22,225	$36,450	$60,225	$98,150	$13,825	$34,200	$80,300	$169,325
Total revenues						**$217,050**				**$249,625**

In summary, the predictions of choice probabilities and utilities based on stated-preference choice models for the airline and hotel industry illustrate the superiority of an integrated CCM-RM approach compared to a discrete application of CCM and RM. A basic implementation of integration option B, that is the modification of RM practices to customer segments depending on their profitability, substantially increases the utility created for customers and their probability to choose an alternative, which subsequently improves revenues.

6 CONCLUSION

This paper contributes to the advancement of an integrated approach to CCM and RM in several ways. Firstly we act on the proposition to synchronise CCM and RM (Noone, Kimes et al. 2003; Talluri and van Ryzin 2004) by presenting three different avenues to achieve this goal. Depending on the strategic focus, firms can choose to pursue a stringent RM strategy and employ limited CCM in a supporting role, to develop segment-specific RM activities in acknowledgement of CCM efforts to nurture profitable customers, or to adopt a more sophisticated integrated system where CCM and RM are equally strong. The latter corresponds to what is referred to as choice-based revenue management. We take up the more basic alternative of implementing segment-specific RM activities to show that even this relatively basic integration approach substantially increases customers' choice probabilities and therefore a firm's revenues.

We found that there are several options of how RM can be adapted to the needs of a particular customer segment. A comprehensive adjustment means that all RM attribute are set to their most lenient levels, and/or that customers' attribute-specific reference points are either met or altered to eliminate any potential perceived unfairness. Alternatively, selected individual RM and CCM attributes can be modified to suit particular customer segments. We find that creating a tailored bundle of RM and CCM outcomes in combination with averting unfairness where practical best suits the aspiration towards integration. While any variation of developing segment-specific RM measures increases choice probabilities and revenues, the extent of the improvements and the best combination of measures depends on segment characteristics.

With regards to the third research objective, we applied the obtained choice probabilities to a hypothetical demand situation for fixed capacity units and calculated potential revenue increases between 11% (hotels) and 16% (airlines) from a simple integrated CCM-RM system. The generalisation of these potential revenue improvements however requires caution due to the limitations of our research.

Firstly, the limited information about customer characteristics and past purchase behaviour of respondents meant that the profitability of customer segments could not be definitely established for the sample. Airlines and hotels have more extensive and reliable customer data to forecast lifetime values of their customers, and can more clearly define customer segments based on profitability. A potential drawback however is the possibility that these segments, in contrast to the segments identified in the hotel and airline sample, may not necessarily display homogeneous choice behaviour. Secondly, the predicted utility effects of attribute level changes equally support a range of attribute change combinations for most segments. The revenue predictions are based on only one option per segment. Thirdly, the prediction scenario is rather simplistic and assumes that demand exceeds supply for a particular time. The ability of RM techniques to produce revenue increase in times of excess supply is generally lower than for times of excess demand (Yeoman, McMahon-Beattie et al. 2000).

Future research could embark upon overcoming some of these limitations by extending the sample scenario to different demand situations, and by using revealed preference data to segment customers. A more sophisticated approach to predicting demand from a basic integrated CCM-RM system could be to use agent-based modelling to simulate the behaviour of a complex market with many players (competitors and customers). Finally, further research should explore the feasibility of choice-based revenue management which takes into account the dynamic nature of choices as a sequence of current and future customer choices.

7 APPENDIX

Appendix V-1.

Congruent unlabelled discrete choice experiments for hotels and airlines were designed using the results of the focus group research, and included a tenth attribute to account for the association of an alternative with a specific frequent traveller program. A 32-profile fractional experimental within-subject design was obtained by selecting 32 profiles from the 4^7 x 2^3 complete factorial based on an orthogonal main effects design (Sloane 2006). The choice profiles were presented in randomised order to control for order effects. Attribute levels correspond to actual market situation and are summarised in **the table below**. In order to create four alternatives per choice set, we systematically varied the orthogonal main effects plan of the profiles in the first alternative by applying a set of generators modulo to the number of levels of each attribute in order to obtain, consistent with theoretical descriptions of D-optimal choice design (Street, Burgess et al. 2005), a 100% efficient main effects choice experiment. The respondents had to choose their most preferred, least preferred and second least preferred alternative for a flight to Bangkok, and a hotel stay in Sydney or Melbourne respectively, from each of the 32 choice sets, and were also asked whether they would a) book their most preferred option now, and b) join the associated frequent traveller program if they were not already a member. The within-subject design was nested within a $2^4 + 2^5$ full factorial between-subjects design, leading to 24 different conditions of the same choice experiment. Up to five factors were manipulated in both (airline and hotels) experiments: whether each choice set included two additional non-available alternatives[18] that could not be chosen (context); b) whether price was displayed as a dollar amount only, or as dollar amount and % discount or surcharge of a standard rate (semantic presentation); c) whether respondents received an explanation why prices and availability might vary (justification); d) whether the scenario was a holiday or business trip; and in the case of business trips (trip purpose); and e) whether the company paid for travel cost upfront or reimbursed the expenses later (payment method).

[18] The context alternatives were generated with the same approach as the experimental design.

Attributes and Their Levels for Airline and Hotel Studies

Airline Study		Hotel Study	
Attribute	**Levels [19]**	**Attribute**	**Levels [18]**
Price	AU$ 770 AU$ 990 AU$ 1210 AU$ 1430	Price	AU$ 175 AU$ 225 AU$ 275 AU$ 325
Routing	via Hong Kong (15hr) via Kuala Lumpur (13hr) via Singapore (11hr) Direct	Location	directly next to it 15 min walk 15 min by public transport 15 min drive
Cancellation	Non-refundable 10% fee	Cancellation	10% fee Non-refundable
Ticketing and Payment	within 24hr of booking 60 days prior to departure 30 days prior to departure 14 days prior to departure	Payment	upon arrival 1 night deposit 30 days prior to arrival within 24h
Future fare availability	10% 40% 70% 100%	Future rate availability	10% 40% 70% 100%
Frequent flyer program	Oneworld Star Alliance Velocity Skyteam	Hotel loyalty program	IHG Priority Club Hilton HHonors Marriott Starwood
Free award flights	If frequent flyer seats are still available If economy seats are still available	Free award stays	if standard room still available if frequent traveller room still available
Fees	AU$ 50 joining fee No fee	Fees	AU$ 50 joining fee No fee
Validity of miles/points	2 years 3 years as long as one flight per year is purchased points never expire	Validity of points	points never expire as long as one stay per year is purchased 3 years 2 years
Upgrades	in exchange for award points ad-hoc decisions at check-in free for gold and above free for platinum	Upgrades	ad-hoc decision at check-in free for platinum free for gold and above in exchange for reward points

[19] Non-price attributes are effects coded, with the last attribute level used as base level.

VI SUMMARY OF CONTRIBUTIONS

I conclude the report of my doctoral research with a brief summary of the key findings and contributions that are reported in the four research papers, as well as remaining limitations[20].

Firstly, I present a two-staged model of customer choice accounting for fairness judgements to explain how customers make decisions given perceived unfairness as a result of simultaneous yet unintegrated CCM and RM. The model is anchored in expected utility theory, reference-dependent preference theory, the fairness and justice literature, and draws on key findings of reference price research. In doing so, I contribute to decision making theory and the study of customer choices in several ways. First, the results from both focus group research and stated-preference choice experiments empirically confirm that individuals generate utility both from product attributes directly, and from comparisons to a reference point. The scope of application of reference-dependency is extended beyond the price variable to demonstrate that reference points are not limited to monetary aspects. I further contribute to decision making theory by bringing together aspects of the fairness and justice literature with reference-dependent preference theory. In particular, subjective fairness perceptions of an outcome compared to a reference point are incorporated into an expected utility framework. Also, while reference-dependent preference theory assumes the reference point is known, I employ principles of justice theory to establish the determinants of reference points. Finally, the comprehensive fairness model of customer choices is a valuable advancement for fairness research by offering a tool to quantify fairness effects that does not depend on self-stated fairness perceptions.

Secondly, I establish how customers of airlines and hotels make purchase choices when they are faced with the outcomes of simultaneously deployed CCM and RM. While existing research on customers' responses to unsynchronised CCM and RM and perceived conflicts is descriptive in nature, both focus group research and choice experiments empirically examine the existence and effects of these customer conflicts. The empirical findings also contribute to the debate about willingness to pay of 'loyal'

[20] To avoid unnecessary repetition, the conclusions and critical reflexion on limitations for each of the four research steps are discussed in the four essays.

repeat customers, and mostly disconfirm the often cited willingness of repeat customers to pay higher prices.

Thirdly, I examine how a service firm's revenues could change if customer-centric marketing and revenue management were integrated, and thereby contribute to the advancement of an integrated approach to CCM and RM. I present practicable approaches on how integration can be realised, and provide first empirical support for the superiority of an integrated solution which adopts RM rules to customer segments depending on their profitability. The empirical findings endorse the feasibility and benefits of segment-specific RM strategies and suggest revenue gains between 11% and 16%. This is an important progress for the debate on CCM-RM integration and paves the way to further research on how integration can be best implemented.

These findings should be interpreted in light of the limitations which emerged throughout the research agenda. Firstly, the interpretability of the stated choice study results is complicated by the fact that the measured demographic and travel-related covariates, such as previous travel experience and frequent traveller program membership, do not satisfactorily explain segment differences, particularly in the airline study. This means that most of the difference in choice behaviour across the identified segments is caused by yet unidentified factors. The capacity of service firms to act upon the findings of this research however depends on the ability to better describe customer characteristics of the different segments. Airlines and hotels have more extensive and reliable customer data to forecast lifetime values of their customers, and can more clearly define customer segments based on profitability. A potential drawback however is the possibility that these segments, in contrast to the segments identified in this doctoral research, may not necessarily display homogeneous choice behaviour.

Secondly, future research may also want to explore the robustness of our findings. First of all, the generalisability can be improved by extending the research to additional capacity constrained service industries, and by testing customer choices for airlines and hotels for a variety of travel scenarios rather than just one. Our findings are based on one particular travel scenario for each study, whereas the established effects may change for different trip scenarios. Moreover, additional research may explore different approaches to recalculate reference points using different reference point determinants

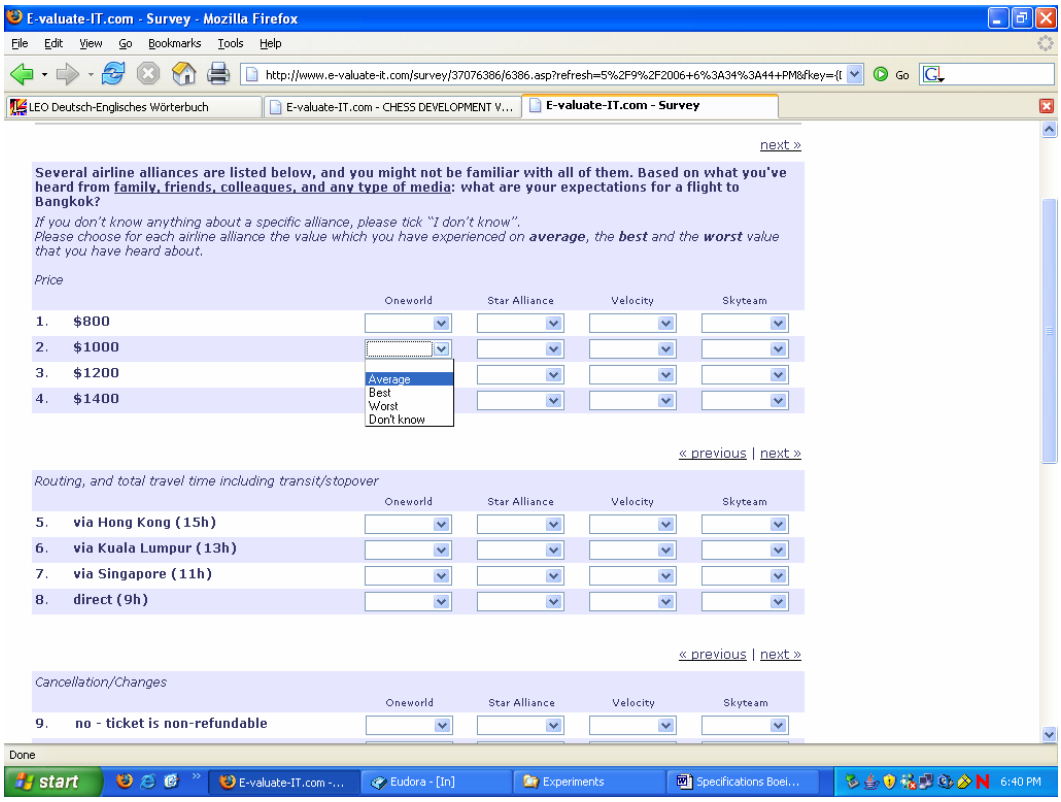
and estimation methods. The necessary yet limiting assumption of equally spaced qualitative attribute levels may also affect results. A related issue is the use of data collected with a survey tool rather than revealed preference data to calculate reference points. Although reference points are a subjective measure and do not rely upon objectively correct memory of past experiences, drawing on purchase histories and past and present purchase options might improve reference point calculations. Finally, we only collected data on expectations and experiences with the particular trip scenario covered in the experiments. Further research may explore the cross-effects of experiences with similar travel on reference point formation.

Thirdly, with regards to the simulation of demand resulting from segment-specific CCM-RM practices, the predicted utility effects of attribute level changes equally support a range of segment-specific adaptations of CCM and RM for each segment. The revenue predictions are however only based on one particular set of attribute changes per segment to represent the recommended adaptations for each customer group. Future research could address this issue by extending the sample scenario to different demand situations. A more sophisticated approach to predicting demand from a basic integrated CCM-RM system could be based on using agent-based modelling to simulate the behaviour of a complex market with many players (competitors and customers). Finally, further research could also explore the feasibility of choice-based revenue management which takes into account the dynamic nature of choices as a sequence of current and future customer choices. In choice based revenue management, the utility generated for each customer would replace expected revenues per capacity unit as the basis for allocation heuristics. Dynamic choice modelling has the potential to investigate a series of current and future customer choices and accounts for a decision maker's objective to maximise aggregate utilities over time.

VII APPENDIX

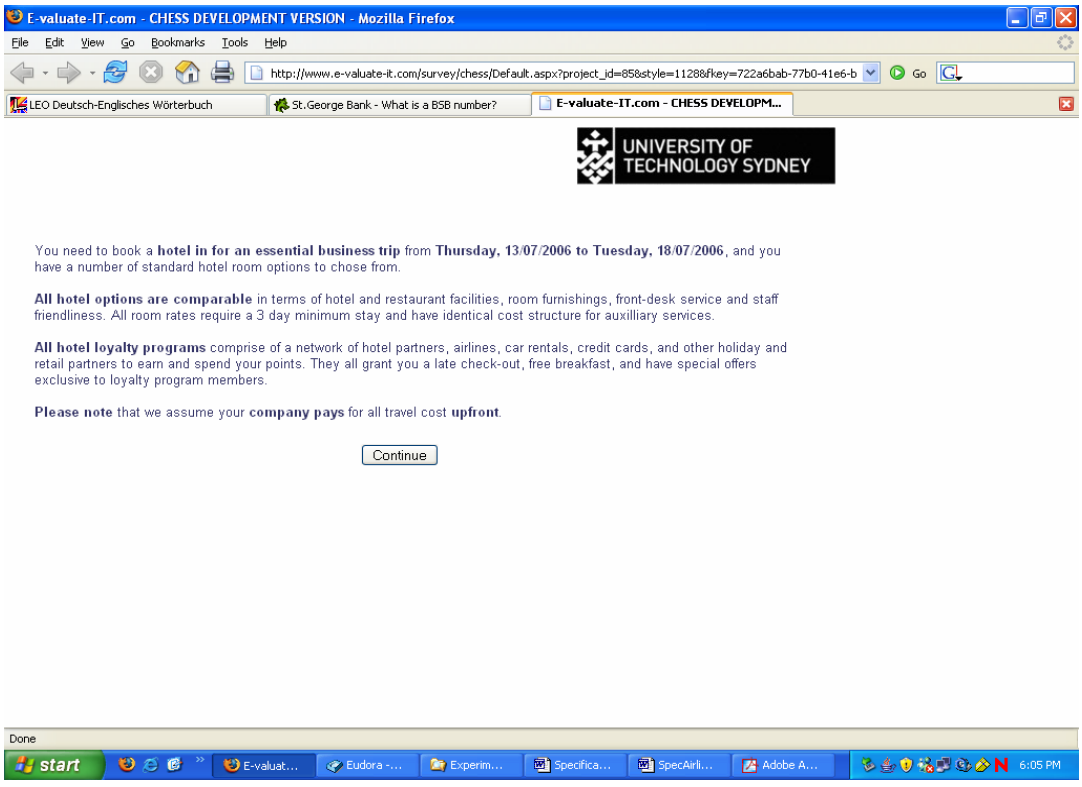
1 APPENDIX 1: SURVEY TOOL FOR PERSONAL EXPERIENCES AND KNOWLEDGE

The screenshot below shows the survey tool to measure respondents' knowledge about a flight to Bangkok. Respondents with previous travel experience to Bangkok also received an additional set of similar questions regarding their personal experiences.



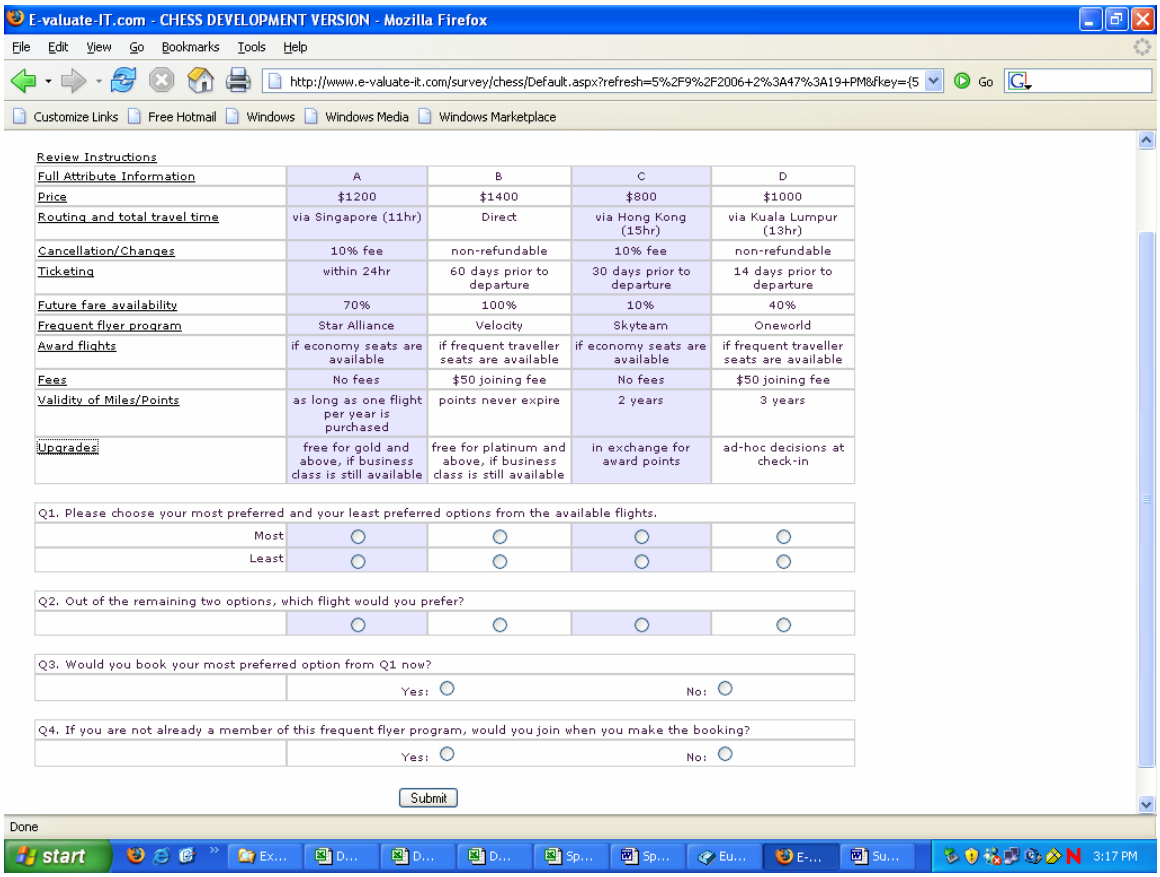
2 APPENDIX 2: INSTRUCTIONS FOR STATED CHOICE EXPERIMENTS

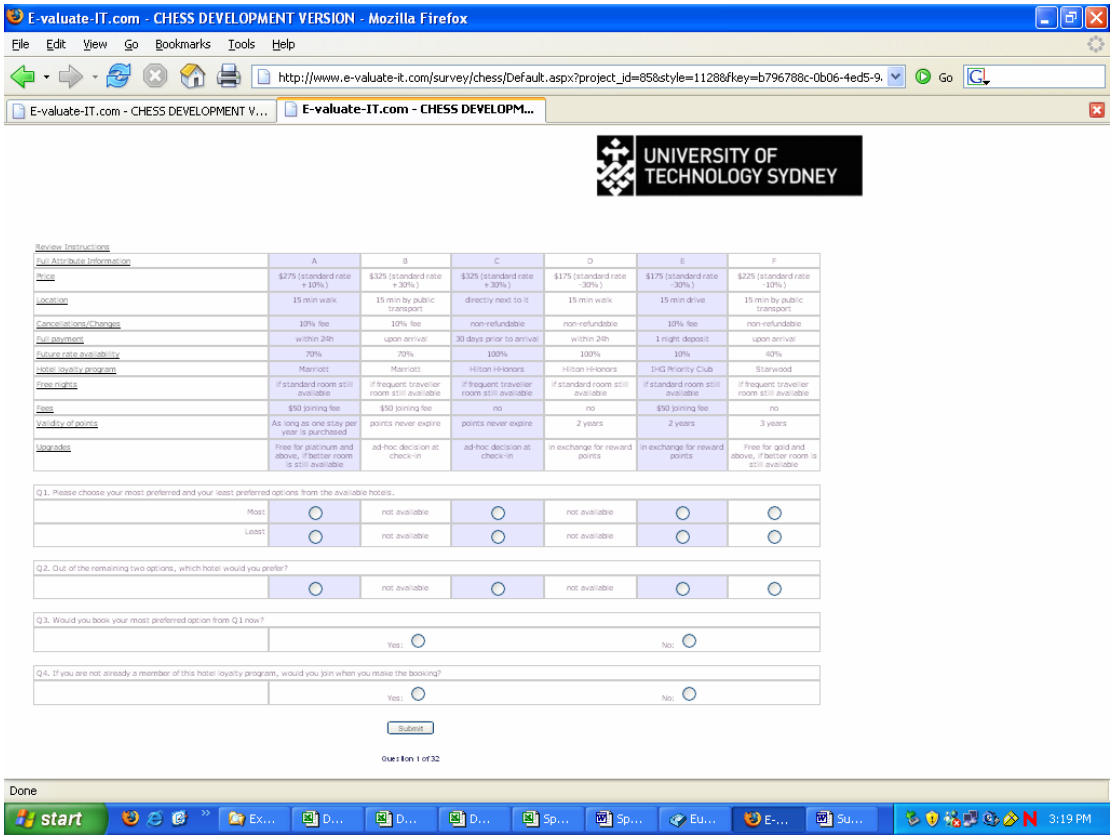
The figures below show the instruction screens for the airline and hotels studies…



3 APPENDIX 3: STATED CHOICE EXPERIMENT

The screenshot below shows one of 32 choice profiles in the airline choice task. In this information condition, the non-available contextual offerings are absent. The second screen shot illustrates the presence of non-available contextual offerings.




E-valuate-IT.com - CHESS DEVELOPMENT VERSION - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://www.e-valuate-it.com/survey/chess/Default.aspx?project_id=858&style=11288&key=b796788c-0b06-4ed5-9.
Go
E-valuate-IT.com - CHESS DEVELOPMENT V...
E-valuate-IT.com - CHESS DEVELOPM...
UNIVERSITY OF TECHNOLOGY SYDNEY
Review Instructions
Full Attribute Information
A
B
C
D
E
F
Price
$275 (standard rate +10%)
$325 (standard rate +30%)
$325 (standard rate +30%)
$175 (standard rate -30%)
$175 (standard rate -30%)
$225 (standard rate -10%)
Location
15 min walk
15 min by public transport
directly next to it
15 min walk
15 min drive
15 min by public transport
Cancellations/Changes
10% fee
10% fee
non-refundable
non-refundable
10% fee
non-refundable
Full payment
within 24h
upon arrival
30 days prior to arrival
within 24h
1 night deposit
upon arrival
Future rate availability
70%
70%
100%
100%
10%
40%
Hotel loyalty program
Marriott
Marriott
Hilton HHonors
Hilton HHonors
IHG Priority Club
Starwood
Free nights
if standard room still available
if frequent traveller room still available
if frequent traveller room still available
if standard room still available
if standard room still available
if frequent traveller room still available
Fees
$50 joining fee
$50 joining fee
no
no
$50 joining fee
no
Validity of points
As long as one stay per year is purchased
points never expire
points never expire
2 years
2 years
3 years
Upgrades
Free for platinum and above, if better room is still available
ad-hoc decision at check-in
ad-hoc decision at check-in
in exchange for reward points
in exchange for reward points
Free for gold and above, if better room is still available
Q1. Please choose your most preferred and your least preferred options from the available hotels.
Most
Least
not available
Q2. Out of the remaining two options, which hotel would you prefer?
Q3. Would you book your most preferred option from Q1 now?
Yes:
No:
Q4. If you are not already a member of this hotel loyalty program, would you join when you make the booking?
Submit
Question 1 of 32
Done
start
3:19 PM

4 APPENDIX 4: PLS ESTIMATION RESULTS FOR REFERENCE POINT CALCULATIONS

The conceptual and empirical paper outline that reference points for each of the eight selected CCM and RM attributes were modelled as latent variables formed by the four fairness constructs, namely experience, knowledge, contextual offerings, and – in the case of price – semantic presentation relative to a standard price:

$$\bar{x}_{nk} = \gamma_1 \overline{X}_{\exp\, nkt} + \gamma_2 \overline{X}_{know\, nkt} + \gamma_3 \overline{X}_{stand\, ni1t} + \gamma_4 \overline{X}_{cont\, nkt} + \xi \quad \text{for k=1 (price) and}$$

$$\bar{x}_{nk} = \gamma_1 \overline{X}_{\exp\, nkt} + \gamma_2 \overline{X}_{know\, nkt} + \gamma_3 \overline{X}_{cont\, nkt} + \xi \quad \text{for } k \neq 1$$

The measurement models for reference experiences, reference knowledge, and contextual offerings are specified as follows:

$$\bar{x}_{\exp nkt} = \omega_{11} \bar{x}_{\exp\, nkt1} + \omega_{12} \bar{x}_{\exp\, nkt2} + \ldots + \omega_{15} \bar{x}_{\exp\, nkt5}$$
$$\bar{x}_{know\, nkt} = \omega_{21} \bar{x}_{know\, nkt1} + \omega_{22} \bar{x}_{know\, nkt2} + \ldots + \omega_{25} \bar{x}_{know\, nk5}$$
$$\bar{x}_{cont\, nkt} = \omega_{31} \bar{x}_{cont\, nkt1} + \omega_{32} \bar{x}_{cont\, nkt2}$$

where ω_{1i} is the expected effect of personal past experiences with brand $i \in [1;5]$, ω_{2i} is the expected effect of indirect knowledge of brand $i \in [1;5]$, and ω_{3i} is the expected effect of two contextual offerings. Please note that $\overline{X}_{\exp\, nkt} = 0$ in cases where personal previous experience is absent.

Depending on the respondents previous travel experience and the allocated experimental condition, there are 4*(1+5+10+5)=84 different possible combinations to specify the model for and individual's attribute-specific reference point $\overline{X}_{nkt}$.

We therefore limit the presentation of PLS estimation results to an illustrative sample of bootstrapping results for both the airline and hotel study.

4.1 Sample PLS estimation results for the airline study

The first example provides the bootstrapping results of reference point calculations for the variable capturing conditions for obtaining upgrades (UP), with contextual offerings

(Context) being present. Respondents have flown to Bangkok previously with the following alliances: Oneworld (OW), Star Alliance (SA), and Velocity (V).

	Original Sample	Sample Mean	Standard Dev	T Statistics
Measurement Model				
CAUP->Reference	0.2652	-0.0149	0.2843	0.9329
CBUP->Reference	0.2652	0.0253	0.303	0.8753
CAUP->Context	0.7715	-0.0341	0.668	1.1549
CBUP->Context	0.7715	0.062	0.7101	1.0864
KUPA->Reference	0.5686	0.4891	0.0339	16.7621
KUPA->Knowledge	1	1	0	0
OWUPA->Reference	0.2825	0.2329	0.1289	2.1919
SAUPA->Reference	0.0945	0.0387	0.2082	0.4538
VUPA->Reference	0.478	0.3544	0.1056	4.526
OWUPA->Experience	0.5218	0.4804	0.2479	2.1044
SAUPA->Experience	0.1553	0.0744	0.3787	0.4102
VUPA->Experience	0.8505	0.7026	0.2068	4.1122
Structural Model				
Knowledge->Reference	0.5682	0.4853	0.0341	16.6463
Context->Reference	0.3438	0.4214	0.1001	3.4341
Experience->Reference	0.5583	0.5134	0.0423	13.1906

The second example refers to the reference point calculation bootstrapping results of 'Validity of points' (VA), where contextual offerings are absent, and respondents have flown to Bangkok previously with Star Alliance (SA) and Velocity (V)

	Original Sample	Sample Mean	Standard Dev	T Statistics
Measurement Model				
KVAA->Reference	0.612	0.6135	0.0346	17.6705
KVAA->Knowledge	1	1	0	0
SAVAA->Reference	0.4191	0.2901	0.3114	1.3458
VVAA->Reference	0.4879	0.4395	0.1687	2.8926
SAVAA->Experience	0.6134	0.4277	0.4919	1.247
VVAA->Experience	0.7274	0.6654	0.2657	2.7378
Structural Model				
Knowledge->Reference	0.6119	0.6126	0.0347	17.6267
Experience->Reference	0.676	0.6571	0.034	19.9048

4.2 Sample PLS estimation results for the hotel study

The following example shows the reference point calculation bootstrapping results for the price variable (pr), where the information conditions 'contextual offerings' (Context) and 'semantic presentation' (Semantic) are present, and the respondents have

prior travel experience. They stayed in a hotel in Sydney/Melbourne with the Starwood (sw), Hilton (hh), and Marriott (ma) groups.

	Original Sample	Sample Mean	Standard Dev	T Statistics
Measurement Model				
cbpr->Context	0.5738	0.1198	0.68	0.8437
cbpr->Reference	0.1921	0.0299	0.2148	0.8943
capr->Context	-0.7121	-0.0361	0.6866	1.0372
kpra->Knowledge	1	1	0	0
kpra->Reference	0.3559	0.3441	0.0404	8.8195
capr->Reference	-0.2289	-0.0414	0.2144	1.0676
gainl->Reference	0.2732	0.2443	0.0799	3.4192
gainl->Semantic	1	1	0	0
hhpr->Reference	0.2656	0.2394	0.0775	3.4264
hhpr->Experience	0.3627	0.3173	0.1791	2.0254
swpr->Reference	0.3211	0.3102	0.0508	6.3193
mapr->Reference	0.2721	0.2555	0.0606	4.4893
swpr->Experience	0.4885	0.5112	0.1524	3.2047
mapr->Experience	0.3777	0.3635	0.1452	2.6005
Structural Model				
Knowledge->Reference	0.3551	0.3403	0.0404	8.7852
Context->Reference	0.3269	0.2903	0.1358	2.4078
Experience->Reference	0.6967	0.6607	0.054	12.9036
Semantic->Reference	0.2731	0.2419	0.0789	3.4604

The second example illustrates the reference point calculation bootstrapping results for the location attribute (rt), with contextual offerings (Context) being present, and respondents have not stayed in a hotel in Sydney/Melbourne previously.

	Original Sample	Sample Mean	Standard Dev	T Statistics
Measurement Model				
cart->Context	0.7861	-0.0112	0.6608	1.1896
cbrt->Context	0.7861	0.0323	0.6666	1.1793
cart->Reference	0.4945	-0.0102	0.4712	1.0494
cbrt->Reference	0.4945	0.0239	0.4751	1.0408
krta->Reference	0.7774	0.6267	0.0367	21.2014
krta->Knowledge	1	1	0	0
Structural Model				
Knowledge->Reference	0.7774	0.6246	0.0368	21.1044
Context->Reference	0.629	0.719	0.0404	15.5772

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