Lowest Price Guarantee Policies on Travel Websites:
A Comprehensive Study on Policy Variety, Policy Costs, and Customer Perceived Value of Key Policy Features

by

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Abstract

According to eMarketer (2015), approximately 60% of travel product purchases are made online, a figure that will continue to increase due to the widespread use of smart phones and the booming of mobile device booking. To motivate customers to book in advance using their own domains, all major hotel chains, airline companies, car rental firms, cruise lines, and third-party online travel agencies (OTAs) have launched various lowest price guarantee policy (LPGP) programs (Garrido, 2012). These policies promise to match the lower rate (some offer additional incentives) within a certain period of time since purchase. To have a successful LPGP, travel companies not only need to find a desirable combination of policy features (e.g., policy duration, refund depth) palatable to the shoppers in the targeted market but also to handle them carefully to fit their overall financial capabilities and risk appetite.

This dissertation consists of three studies on LPGPs from different perspectives, the results of which complement each other, thus providing a strong managerial and theoretical guidance to the travel industry. The basic methodologies proposed are general and can be readily applied to different sectors of the travel industry. The Monte Carlo real option pricing method can be used to estimate companies' financial costs of offering an LPGP, while choice-based conjoint analysis (CBCA) can help in assessing the policy value perceived by customers. As a result, management can leverage both tools to design a competitive LPGP without losing cost-effectiveness.

The first study documents the existing LPGPs in the current travel market and summarizes them in five key features using data (policies) published by travel websites of a majority of service sectors in the US. In addition, it infers the motives, policy effects, and financial risks from these features for companies that adopt them. It also examines the restrictions and hassle costs for customers who use LPGPs to obtain refunds. It also provides insight on policies' similarities and differences between two major distribution channels (brand official websites and online travel agencies) as well as within and across diverse service sectors (hotels, airlines, car rental firms, and cruise lines). The results suggest that a majority of LPGPs are inconsistent with their use as a facilitating device because travel companies add numerous restrictions to mitigate the financial risks involved in LPGPs and customers' refunds are associated with relatively high hassle costs. It also shows that price-beating LPGPs (PB LPGPs) and price-matching LPGPs (PM LPGPs) differ significantly in their features, with PB LPGPs being linked with higher hassle costs and being more likely to have restricted features than customer favored features. Furthermore, it is observed that LPGPs vary across distribution channels and service sectors while having more homogeneity in terms of features within the service sector. The evidence reveals that a great number of brand official websites offer PB LPGPs while a majority of online travel agencies employ PM LPGPs.

The second study focuses on LPGPs from a risk management perspective. It examines the cost of promoting LPGPs from the standpoint of real option pricing, simulating the price paths of underlying assets (travel products or services) using the Monte Carlo method, and the necessity of provisions as tools for managing policy risk exposure. The study presents numerical examples using data from Orbitz.com and applies the parameters derived from real-world data to simulate the price paths of airfares. The simulation results show that the probability of a lower price

occurring throughout the booking period up until departure is 92% and that the average affordability of offering Orbitz Price Assurance is 19%, which means for every US$100 worth of air ticket sales, a maximum US$19 provision should be made to satisfy potential customer refund claims.

The third study is an extension of the other two studies and analyzes LPGPs from the perspective of customers. It provides significant insight into customers' perceptions and preferences regarding the LPGP features and calibrates the importance of each feature and the customer utility of different feature levels by using a fractional orthogonal design and CBCA in questionnaire development and preference modeling. The findings show that customers perceive duration as the most important feature, followed by refund, scope, and required customer action as the least important; the threshold feature is not significant in the model. The results show that "any time before departure" carries the highest utility score among the 17 tested feature categories, indicating customers assign very high importance to it in their decision-making process. Furthermore, the survey finds only 6.2% of customers who are experienced online travel product shoppers have used an LPGP to claim a refund. To leverage the results of the second study, the author can estimate that the overall cost of LPGPs (featuring duration throughout the booking period until departure) is approximately 1.26% of total sales. Last, this study and its conclusion provide a strong managerial and theoretical implication for the travel industry and offer a fundamental framework to design an LPGP in a presumably wide range of target markets.

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Chapter I: Introduction

Background

The recent growth in Internet-based distribution technologies has stimulated the widespread use of the dynamic pricing strategy in the travel industry (Levin, McGill, & Nediak, 2010). As the most flexible marketing mix component with characteristics that facilitate relatively rapid implementation, price is a critical and powerful tool in business (Garda, 1991). Dynamic pricing refers to the modification of prices for the same service over time and across customers to generate more revenues and increase profits for sellers (McAfee & Te Velde, 2006). In the meantime, the rise of Internet booking channels has increased price transparency and has decreased search costs for consumers (Hinz, Hann, & Spann, 2011), thereby enabling travelers to compare multiple travel websites across time while constantly pursuing lower prices (Jain & Cox, 2011). Caroll (2004) revealed that in 2003, 69% of online travel buyers visited two or more websites to book hotel rooms. Consumers are aware of dynamic rates and strategically time their purchases (Levin et al., 2010). This strategy in turn challenges travel companies' advance selling and perishable inventory control. To motivate customers to book in advance and book through their own domains, all major hotel chains, airline companies, car rental firms, cruise lines, and third-party online travel agencies (OTAs) have launched various LPGP programs (Garrido, 2012). As stated by Starkov and Price (2003), an LPGP has become one of the main factors that influence people to book online. It is also ranked as one of the most desirable website features according to the Portrait of American Travelers survey conducted by MMGY Global[1] (Yesawich, 2013).

[1] A global marketing communications firm founded in 1981 and that has grown to be the largest advertising and

Travel companies are aware of the lowest price guarantee as a powerful marketing tool and the necessity of competing in the market by offering policies with advanced features favored by customers (e.g., long coverage). For instance, Priceline.com offers its Best Price Guarantee, which is applicable within 24 hours of booking, but Hotwire.com goes further with its Low Price Guarantee, which has a duration of 48 hours (Starkov & Price, 2003). Orbitz.com surpasses these offers with its Price Assurance, which is applicable up until departure. A successful LPGP relies on having better knowledge of customer needs and wants in order to design more desirable policy features for the target market within the affordable financial cost and risk exposure; that is, management must effectively use their limited financial resources to maximize the perceived value of their LPGP offerings to target customers.

Problem statement and significance

While numerous travel websites extensively advertise their LPGPs, little assessment has been conducted regarding the following aspects: 1, existing LPGPs' terms and restrictions and their inferences regarding how LPGPs are facilitating; 2, the financial risk exposure for travel companies offering LPGPs; and 3, customer perceived value of LPGPs and of each of the key LPGP features. This appears to be a significant weakness in the literature, and it is this lack that is addressed in this dissertation.

The dissertation consists of three studies and each study explores LPGPs from different perspectives. The first study presented in Chapter II documents LPGPs' terms and conditions, summarizes them into five key feature categories and analyses the policy motives, policy effects, and financial risks for companies that adopt them. It mainly focuses on the online published policy itself in a qualitative fashion and summarizes the key policy features, but nevertheless

communications company that specializes in hospitality, travel, and entertainment in the US.

lacked a systematic way of pricing these policy offers. In order to fill the gap, the second study is carried out in Chapter III to answer a critical question of how to price LPGPs in a quantitative way to achieve both revenue and risk management goal for industry practitioners. The risk management concept and Monte Carlo approach employed in the second study is a widely-recognized method to handle the problems of analyzing risks exposure and pricing financial risks. However, a simplified treatment on customers' refund claiming behavior and the hassle free refund policy assumptions overestimate the cost of offering LPGPs by conservatively assuming that all customers will automatically receive refund as long as their purchase prices are not the lowest and the LPGPs protect their purchases anytime up to the service is provided. To account for the behavioral differences among customers (e.g., different degrees of hassle tolerance and price sensitivity) and different restrictions involved in the identified key features of LPGPs, the third study is introduced in Chapter IV to measure a vast range of characteristics of customers, their shopping and refund claim behaviors and their preferences of different LPGP offers to complement the result from the previous study.

In terms of methodology, the Monte Carlo real option pricing method and the choice-based conjoint analysis (CBCA) applied in the dissertation are the contribution to the literature from research methodology and managerial implication perspectives. The Monte Carlo real options pricing concept is used in Chapter III to simulate the price of travel products and thus estimate companies' financial cost of offering LPGPs. CBCA is employed in Chapter IV to assess the policy utility from customers' perspective. These two methods complement each other and together provide a comprehensive provision plan for travel companies for future refund claim events. In addition, managers in the travel company can leverage both tools to design a

specific LPGP by balancing feature competitiveness and risk affordability. These basic methodologies proposed are general and readily applicable to different sample or service sectors.

Research Questions

The dissertation provides comprehensive analyses of LPGPs through the lens of both travel companies and online travel product shoppers. Each of its three major studies has one set of research questions on LPGPs from different perspectives. The first study assesses LPGPs from the perspective of policy terms and conditions and its corresponding research questions are:

Research question set 1: What is the presence percentage of the LPGPs on current travel websites? What are the key features of these policies? Do the key features facilitate refunds? Do PB LPGPs have more restrictions and create more hassle costs for customers than PM LPGPs? Do the official brand websites create more restrictions and more hassle costs for customers than OTAs? What are the LPGPs' similarities and differences within and across major service sectors (hotels, airlines, car rental firms, and cruise lines) in the travel industry?

Although the first study thoroughly surveys policy terms and conditions of LPGPs existing in travel websites, the pricing factors and the costs of companies to run price guarantee programs are not considered. Therefore, the second study conducts both theoretical and empirical assessment of how price guarantee policies are valued from the perspective of travel companies and its corresponding research questions are:

Research question set 2: What is the "probability of lower price[2]"? How much does an LPGP cost from the Monte Carlo real option pricing perspective?

The second study analyses the risk exposure and LPGP costs without considerations of different customer refund claim behaviors and the parameters used in the Monte Carlo

[2] The probability that the price paid on purchase day is not the lowest price during the period at which the lowest price policy is in effect.

simulation assume hassle free automatic refund. Thus, the third study fills the gap by providing insights into customer characteristics of refund claims and policy preferences and its corresponding research questions are:

Research question set 3: What are customers' LPGP preferences and their perceived value of key policy features? Based on CBCA, what is the importance score for each key feature? What are about the utility score for each of the key feature levels?

Research Methods

Different research methods are developed to explain LPGPs and explore answers to above mentioned three sets research questions. Coding strategy, descriptive statistical analysis, and a t-test are used in Chapter II to document the policy terms and conditions and to facilitate the summarizing of policies into key features. The Monte Carlo real option pricing method is applied in Chapter III to estimate the companies' financial cost of offering LPGPs, and CBCA is adopted to assess the customer-perceived policy value. As a result, management can leverage both tools to design a specific LPGP by balancing both cost affordability and policy competitiveness. The basic methodologies proposed are general and can be readily applied to different sectors of the travel industry.

Coding Strategy

Chapter II uses the coding strategy to summarize LPGPs based on key feature components. The definition of coding by Creswell (2009) is "the process of organizing the material into chunks or segments of text in order to develop a general meaning of each segment" (p. 227). The idea is to condense the data of LPGP terms and conditions to the basic informational unit(s) to express the gist of the policy. In the study, the data unit is placed into one code, and the coded unit could be a short phrase, a sentence, or an entire paragraph of data.

Monte Carlo Real Option Pricing Method

LPGPs match a lower rate within a certain period. The conceptual model for valuing such policies is similar to the method used to estimate the price of real options. Travelers who make advance non-cancellable purchases at the current observed price for future trips are exposed to price risks because prices may fall at a later time. This means that they will end up paying a relatively higher price. Lowest price policies provide travelers with the right (not the obligation) to sell a service back to a travel company at the purchase price. Companies that offer such policies are not interested in re-acquiring a service and re-issuing a new one but instead prefer to settle by paying the price difference, as is common in the financial market (Jain & Cox, 2011). This strategy is the non-plain vanilla put option application in the service business and ensures that purchasers (policy holders) are offered the minimum price. Meanwhile, travel companies (policy issuers) are obligated to refund the price difference if the price decreases after the time of purchase. In contrast to the financial options on securities, these options are called “real options” because they and their underlying assets (service) are typically not traded as securities (Jain, Palaniswami, & Kang, 2006). The Monte Carlo method is highly effective for simulating real option prices (Godinho, 2006). In contrast to conventional options, LPGPs fall in the category of exotic options because they represent a class of special options priced under a special set of circumstances described in policy terms and conditions (Carvell & Quan, 2008), such as policy duration (contract time to expiration), refund amount (payoff at maturity depends on minimum price), and refund type (manner of settlement). As an option pricing method, the Monte Carlo approach is especially flexible in valuing options with complicated features and multiple uncertainty sources. In view of various LPGPs in the travel industry and the rapid changes in

existing policies, the method can be extended to value different lowest price guarantee schemes by customizing the model parameters that reflect policy features.

The conceptual model presented here is implemented in two stages. The first involves estimating the "probability of lower price," whereby the author employed a Monte Carlo simulation to quantify the probability that the price paid on purchase day is not the lowest price during the period at which the lowest price policy is in effect. The second stage involves estimating the payout to consumers. From a travel company's perspective, this payout is the "cost of lower price," which is the refund of the price difference between the price paid and the lowest price. The author uses publicly available prices from a public travel website to estimate price volatility, simulates price movement paths based on the parameters derived from the samples, and then calculates the price difference occurring in the period in which the lowest price is guaranteed. The detailed calculation procedures will be presented in Chapter III of this dissertation.

Choice-based Conjoint Analysis

Conjoint measurement as a methodology was introduced in the field of mathematical psychology by Green and Rao (1971) and became popular in the marketing research community (Struhl, 1994; Desarbo et al., 1995) in relation to new product development and market responses. A famous story about conjoint analysis in the hospitality industry is that Marriott applied a conjoint analysis-based approach involving all major hotel features and services influencing choice in designing a new hotel chain, Courtyard by Marriott (DecisionPro, Inc., 2014). The brand new hotel concept was successfully test marketed and was subsequently introduced nationally. This spawned an entirely new product category in the hotel industry (DecisionPro, Inc., 2014). The method then became popular in hospitality research dealing with

broad aspects of the hotel business (Rhee & Yang, 2014), such as how hotel attributes contribute to customer satisfaction (Danaher, 1997), managers' perceptions of the importance of hotel attributes (Kim & Okamoto, 2006), and the impact of the presentation of hotel-related attributes in travel agent brochures on travelers' purchase decisions (Huertas-Garcia, García, & Consolación, 2014). Chapter IV applies CBCA to assess customers' preferences regarding LPGPs and to calculate policy feature importance and the feature level utility score. It contributes to the literature on conjoint analysis application in the area of hospitality policy, specifically LPGPs offered by travel websites.

Statistically, conjoint analysis is based on a main effects analysis of variance model that assesses the variables based on full design or a fractional orthogonal design (used later in the study). The model generates utilities that need to be input into a simulator to model choice. Choice models as an alternative to conjoint analysis are gaining popularity because they can be used to study choice directly. The data collection becomes a more realistic and relatively simple task; rather than rating or ranking the profiles, respondents are asked to choose one preferred profile from amongst several choice sets. Therefore, it is also referred to as CBCA (Desarbo et al., 1995; Louviere et al., 2001; Kuhfeld, 2011). The multinomial logit model is a choice model (Manski & McFadden, 1981) used in carrying out the analysis in the study. The multinomial logit model is applied to model the relationships between a polytomous response variable and a set of regressor variables. In our study in particular, the model is a conditional logit model with unordered response. Only choice of LPGP profiles need to make, and no ranking is required in the questionnaire. The detailed calculation procedures in the multinomial logit model will be Chapter IV of the dissertation.

The CBCA method used in the Chapter IV and the Monte Carlo option pricing used in Chapter III are complementary to each other, just as a service quality controller and a financial controller work together to achieve the optimal goal of a company. The Monte Carlo real option pricing concept is used to simulate the price of travel products and thus to estimate companies' financial cost of offering LPGPs. CBCA is employed to assess the policy utility from a customer perspective. Therefore, travel company managers can leverage both tools to design a specific LPGP by balancing feature competitiveness and risk affordability.

Definition of Terms

The following definitions are furnished to provide, as nearly as possible, clear and concise meanings of the terms used in this study.

Dynamic pricing—The practice of varying prices for the same goods over time and across customers aimed at generating more revenue and increasing profits for the sellers (Levin et al., 2010).

Lowest price guarantee policy—The policy guarantees to match or beat the lower rate within a certain period of time and offers cash or credit or a combination refund. It is a tool aimed at boosting direct online distribution and is applicable to every hospitality business model, playing an important psychological and promotional role in online distribution (Starkov & Price, 2003).

Brand.com—In this study, it refers to official brand sites, such as Hilton.com or United.com.

Hassle cost—The non-monetary effort and inconvenience a customer incurs in setting up, maintaining, or disposing of a product or service (Lambrecht & Tucker, 2012).

Signaling theory—The theory describes the actions characterized by information asymmetry of an unobservable attribute between firms and consumers (Srivastava & Lurie, 2004; Nelson, 1970).

Coding—The process of organizing material into chunks or segments of text to develop a general meaning for each segment (Creswell, 2009). The purpose of this idea is to condense the data to its basic informational unit(s) that express the gist of the policy.

Monte Carlo simulation—A method in the valuation of options with multiple sources of uncertainty or with complicated features (Cortazar, Gravet, & Urzua, 2008).

Real option—The right but not the obligation to undertake certain business initiatives, generally distinguished from conventional financial options in that they are not typically traded as securities and do not usually involve decisions on an underlying asset that is traded as a financial security (Amram & Howe, 2003).

Monte Carlo real option model—An option pricing model uses Monte Carlo simulation to calculate the value of an option with multiple sources of uncertainty or with complicated features; the technique is widely used in real options analysis (Cortazar et al., 2008).

Customer refund claim behavior—In this study, it refers to customers' possible actions when the service purchase price is not the lowest price vis-à-vis the lowest price guarantee.

Fractional orthogonal design—An experimental design consisting of a carefully chosen subset (fraction) of the experimental runs of a full factorial design. In this study, it refers to creating a reduced set of LPGP profiles that is small enough to include in a survey but large enough to assess the relative importance of each feature.

Choice-based conjoint analysis—Conjoint analysis is based on a main effects analysis of variance model, which assesses the variables based on a full design or a fractional orthogonal

design. The model generates utilities that need to be input into a simulator to model choice. A choice model, as an alternative to conjoint analysis, can be used to study choice directly. Rather than rating or ranking the profiles, respondents are asked to choose one preferred profile among several choice sets; therefore, it is also referred to as CBCA (Desarbo et al., 1995; Louviere, Hensher, & Swait, 2001; Kuhfeld, 2011). The multinomial logit model is a choice model (Manski & McFadden, 1981) employed in the analysis in this paper.

Limitations

This paper has several limitations that must be discussed. First, it focuses on LPGPs existing in the travel industry and concentrates on the post-sale scenario. LPGP terms and conditions are changing constantly, but this study does not cover the evolution and trends of LPGPs over time in the travel industry. Second, the respondents in the study are recruited from an online platform, Amazon Mechanical Turk (Mturk), and the sample is biased due to potentially more exposure to Internet technology and higher hassle tolerance. Therefore, care should be taken in generalizing the findings to the overall population. This could lead to overestimating the overall cost of an LPGP program (approximately 1.26% of total sales). Third, features other than those included in the present study might emerge in LPGPs. The 5-feature and 17-feature categories used in the study more than likely do not cover all the details of an LPGP. Other features may impact the customer-perceived value of an LPGP, such as the geographical area where the LPGP is applicable, the requirement on identical products, and the constraints on services that are on sale or offered at discount. Last, the effect of the brand name of travel websites on customers' perceived value is not considered in the study. However, the basic methodology proposed in the study is general and can be readily applied to other samples or service sectors.

Summary

In conclusion, this chapter has provided both an overview and the foundation for the subsequent work examining LPGPs in the travel industry. The purpose and significance of the study and the specific research questions and corresponding research methods have been identified and introduced. The terms used and the potential limitations of the study have been described. The next chapter will present the first of the three studies in the dissertation.

Chapter II: Lowest Price Guarantees on Travel Websites, Policy Variety, and Key Features

Abstract

This study focuses on LPGPs as a powerful marketing tool applied to online travel purchases. It provides evidence of the variety of LPGPs found on travel websites using the data (policies) published by travel websites covering a majority of service sectors in the US. First, it documents LPGP terms and conditions; summarizes them based on five key feature components; and infers the motives, policy effects, and financial risks from these features for companies that adopt them. Second, it examines the restrictions and hassle costs for customers who use LPGPs for refund purposes. Last, it compares LPGPs' similarities and differences between different distribution channels and across different service sectors in the travel industry.

The results suggest that a majority of LPGPs are inconsistent with their use as facilitating devices based on the following observations: companies add restrictions to mitigate their financial risks from LPGPs, and customers face a high hassle cost during the refund process. The study also finds that the two primary types of LPGPs, PB LPGPs and PM LPGPs, differ significantly in their features, which makes PB LPGPs more prone to being associated with higher hassle costs and more restrictions. In addition, the adoption of a specific LPGP varies substantially across distribution channels and service sectors. In the service sector, LPGPs are more homogeneous and the features are more similar. The evidence reveals that a majority of Brand.com sites offer PB LPGPs, while a majority of OTAs employ PM LPGPs.

Keywords: lowest price guarantee policies, travel websites, key features, facilitating, hassle costs

Introduction

LPGPs promise at least a 100% price difference refund if a lower price is available on a similar travel product for a given period of time (Kukar-Kinney & Walters, 2003). As stated by Starkov and Price (2003), LPGPs are powerful marketing tools for boosting online distribution and are applicable to every hospitality and tourism business model. Having an LPGP becomes one of the main factors that influences people to book online (Starkov & Price, 2003) and is ranked as one of the most desirable website features by MMGY Global (Yesawich, 2013). Yesawich's 2013 Portrait of American Travelers™ survey indicates that the websites regarded by 83% of travelers as the most useful are those that enable them to "check the lowest available fares/rates", followed by sites that provide "a lowest price/rate guarantee" (80%) and sites that enable them to "compare the fares/rates of multiple suppliers" (73%). From hotel chains, airline companies, car rental firms, and cruise lines to third-party OTAs, all major travel websites have instituted various price guarantee programs to compete for market share. For example, Hilton introduced a Best Rate Guarantee, United Airlines initiated a Low Fare Guarantee, Budget Car Rental launched a Lowest Rate Promise, Carnival Cruise Line offers a Lowest Price Guarantee, and Orbitz has a Price Assurance policy.

Although price guarantees are widely offered by travel websites to gain customer preference, they do not bear much resemblance to each other in terms of policy features that define the benefits to consumers and the astounding risks to travel companies. From the perspective of travel companies, the downside risks of LPGPs need to be carefully evaluated because the more advanced features are usually associated with greater policy risk exposure, higher financial cost, and greater cash flow distress. Companies mitigate risks by adding restrictions to LPGPs, which, however, may alienate some customers. From the customer

perspective, requesting a refund involves a laborious, if not annoying, cost-benefit calculation. The expected benefit is a product worth the promised amount of the refund when all restrictions are met and the likelihood of obtaining it; which is to decrease the number of restrictions.

As is evidenced by the fact that almost all the major players in the travel industry guarantee to match or beat a lower rate, policy terms and conditions vary across distribution channels and service sectors. Although some policies generously accept comparison rates publicly available on any website (no constraints), it is more common to require a comparison rate published only on their competitors' websites. In terms of time for customers to be eligible for a refund, travel websites promise to honor their LPGPs ranging from within 24 hours of booking to any time before service is delivered. For example, Hilton.com and United.com only allow refunds on the same day of booking. Carnival.com and Hotwire.com have a 48-hour window. Budget.com has a time limit of seven business days, Hotels.com has a time limit of the cancellation deadline, and Orbitz.com has a time limit of the date on which a service is physically delivered.

LPGPs also differ significantly in terms of refund amount and refund type. Some provide a refund that only equals the difference between booking price and the competitor's lower price, while others offer a refund exceeding the price difference. Some guarantee a cash refund and others only cash-equivalent credit or a combination of credit and cash. For instance, Hotels.com, Hotwire.com, and Orbitz.com give cash refunds equivalent to 100% of the price difference, Carnival.com extends a 110% refund equivalent to the price difference in onboard credit format; Hilton.com gives a 100% cash refund that corresponds to the price difference plus a $50 American Express gift check; United Airlines grants a 100% cash refund of the price difference plus a US$100 travel certificate; and Budget.com offers a 100% cash refund of the price

difference plus a free day rental certificate. Before the refund amount is considered, some travel websites set minimum and/or maximum refund amounts. For example, American Airlines only processes price differences greater than US$ 5 for refunds; Starwood Hotels & Resorts Worldwide only processes claims greater than or equal to 1% of the total cost; and Orbitz's refund threshold is at US$ 5, with the maximum amount not to exceed the total booking cost. In addition to all the refund amount policies, there is a definition on the trigger that initiates refund process prescribed by various travel service providers. Some LPGPs require travelers to call customer service and speak with a particular service associate to request refunds; some allow customers to submit a claim form online; and some remove all the hassle by automatically processing refunds and not forcing customers to initiate the conversation.

The widespread use of LPGPs has stimulated a growing body of research in terms of economics (Arbatskaya, Hviid, & Shaffer, 2004), marketing, and consumer behavior (e.g., Belton, 1987; Biswas, Pullig, Yagci, & Dean, 2002; Dutta & Biswas, 2005; Hviid & Shaffer, 1999; Kukar-Kinney & Grewal, 2006; McWilliams & Gerstner, 2006; Srivastava & Lurie, 2001; Srivastava & Lurie, 2004). However, most of the research involves traditional retail business models rather than online travel websites that use dynamic pricing strategies to sell perishable products or services. This study fills the void by surveying all major travel websites and documenting their existing LPGPs. Moreover, while numerous travel websites extensively advertise their LPGPs, there has been little empirical assessment of the policy key features, their inferences on how LPGPs are facilitating, and their similarities and differences in relation to different types of travel websites. Therefore, the following research questions have been developed for the study.

What is the presence percentage of the LPGPs on current travel websites? What are the key features of these policies? Do the key features facilitate refunds? Do PB LPGPs have more restrictions and create more hassle costs for customers than PM LPGPs? Do the official brand websites have more restrictions and create more hassle costs for customers than OTAs? What are the LPGPs' similarities and differences within and across the major service sectors (hotels, airlines, car rental firms, and cruise lines) in the travel industry?

Theory and Literature Review

Signaling theory.

Signaling theory, which is based on information economics and is extensively applied to situations characterized by information asymmetry of an unobservable attribute between firms and consumers (Srivastava & Lurie, 2004; Biswas et al., 2002; Nelson, 1970), helps us to understand LPGPs. Previous studies show that an LPGP, as a valid market signal, helps customers differentiate between companies that offer low prices (companies that have LPGPs) and those that do not (companies without such policies), and customers may rely upon this information as a true indication of the lowest market price (Biswas et al., 2002; Mañez, 2006; Jain & Srivastava, 2000; Mago & Pate, 2009). In terms of a "value signal," Biswas et al. (2002) suggest that customers consider an LPGP to be a signal of low store prices. Mañez (2006) provides evidence that a PB guarantee can be a signal of low prices. Internet-based distribution technology has stimulated the widespread use of the dynamic pricing strategy in the travel industry (Levin et al., 2010). Dizzying prices can result in consumer inertia, a tendency to delay purchases (Su, 2009). Consumers are aware that price is dynamic and tend to experience uncertainty about having paid the lowest price possible after purchasing a travel service in advance (Jain & Cox, 2011). Because prices frequently change, consumers continue to observe

prices, compare prices, and delay buying even when immediate purchase is the optimal strategy (Su, 2009). According to the marketing literature, customers regard LPGPs as a heuristic for low prices (Mago & Pate, 2009) and consumers assume that companies either take a cost advantage or want to increase their market share by using such guarantees to signal low prices (Jain & Srivastava, 2000; Mago & Pate, 2009). LPGPs allow post sale price match, which induces consumers to buy now rather than wait. As stated by Starkov and Price (2003), the LPGP is a powerful tool to boost online distribution and is applicable to every hospitality business model. Much like a warranty serving as a signal of quality (Boulding & Kirmani, 1993), an LPGP serves as a signal of the nature or integrity of the advertised price and results in higher value perceptions and shopping intentions of the customers (Biswas et al., 2002).

Hassle cost.

LPGPs are usually associated with hassle costs. Travel companies typically manipulate the policy features, which generally results in some hassle costs in relation to customer refunds (Baake & Schwalbe, 2013). Lambrecht and Tucker (2012) define hassle costs as the non-monetary effort and inconvenience a customer incurs in setting up, maintaining, or disposing of a product or service. Arbatskaya et al. (2004) examine 515 LPGPs in retail stores in the US and state that PB and PM guarantees differ significantly in their features, with the former being associated with higher hassle costs. Hviid and Shaffer (1999) offer an analogy and explain hassle costs as the Achilles heel of PM guarantees. They state that the restrictions in LPGPs increase customers' hassles costs and make them more reluctant to request refunds. For example, having to call customer service to speak to a representative to initiate a refund or being forced to fill out and submit a qualified online claim form imposes certain costs on consumers. The process of searching for lower prices also inevitably incurs hassle costs (Baake & Schwalbe, 2013) because

customers have very limited information about the prices charged in the market compared to the service providers, and any additional price information collected is relatively costly in terms of both effort and opportunity cost. In addition, customers need to ensure that the lower prices found qualify for the conditions of the LPGPs offered by the travel websites where they book the travel products. Disqualification can occur under various circumstances; for example, some LPGPs limit the qualified lower prices only to rivals' websites, while some only accept a lower price on their own websites within a certain period of time.

Cost-benefit analysis.

Despite the benefits derived from LPGPs, honoring such guarantees is associated with cost (Boulding & Kirmani, 1993; Biswas et al., 2002). Important considerations are the risks incurred due to LPGPs. For example, companies that provide PB LPGPs (refunds that exceed the price difference) incur more cost than those offering PM LPGPs (refunds that equal the price difference), while all other policy terms and conditions remain the same. Arbatskaya et al. (2004) state that having customer-favoring features exposes companies to greater risks, and adding in restrictions increases customers' hassle costs but mitigates travel companies financial risks. They also state that using an LPGP to claim a refund is a cost-benefit calculation for a customer and the customer will invoke PM or PB guarantees if the expected benefit exceeds the cost. The expected benefit is equivalent to 1) the promised refund when all restrictions are met and 2) the likelihood of obtaining the refund, which decreases with the number of restrictions, such as the minimum starting refund, the comparable lower rate requirement, and the time constraint of the lower rate found. All these things decrease the likelihood that a refund claim will be approved and thus lower a consumer's expected benefit. Zeithaml (1988) and Biswas et al. (2002) suggest that consumers should view the LPGPs as saving overall costs and boosting value.

Methods

This study focuses on LPGPs published on travel websites in the US and applied to the purchase of online travel products (or services). The mixed method approach is applied to fully explore the research questions posed above. Mixed methods enable the use of multiple methods, both qualitative and quantitative, to achieve convergence of the data from multiple viewing points (Murray, 2011). As Miles and Huberman, (1994, p. 40) state, "at bottom we have to face the fact that numbers and words are both needed if we are to understand the world". The study posits that using mixed methods—such as simple sampling, data collection, documentation, coding, key feature summarization, frequency analysis, and T-test—will help provide a comprehensive look at LPGPs through the lens of both travel companies and online travel product shoppers.

Sample and data collection.

In total, the author surveyed 52 major travel websites publically accessible in the US in August 2014. These travel websites cover two major categories of distribution channels of travel products and services (Brand.com and OTAs) in four service sectors (hotels, airlines, car rental firms, and cruise lines). Using the Smith Travel Research [3](STR) 2013 list of top 10 hotel parent companies in the US by number of rooms as a resource, the author visited each of the websites and collected nine LPGPs (G6Hospitality.com, official website of Motel 6, Studio 6, and Hotel 6 budget brands does not offer an LPGP). For airline companies, the author visited top seven US airline companies based on the number of enplaned passengers as of the 2013 year end (Airtravel.about.com, 2014). Five LPGPs were collected and two companies' websites (Southwest.com and Spirit.com) do not offer LPGPs. For car rentals, the author surveyed the

[3] STR is the leading global provider of competitive benchmarking, information services, and research to the hotel industry.

websites of the best 10 customer-reviewed US car rental companies. Five LPGPs were identified and the other five websites do not offer LPGPs. In terms of cruise lines, the author visited each of the official websites of the top 10 (by number of ships) cruise line brands operating in the US (USNews, 2014). Four LPGPs were found and the other six websites do not offer LPGPs. Regarding OTAs, the author investigated the top15 of the most popular (by number of desktop visits) US Online Booking Sites in Travel as of 2014 (Skift.com, 2014) and gathered nine LPGPs (the other six websites do not offer LPGPs). Appendix A shows the domain names of each of the 52 websites visited. Of these, 20 grey background websites are the ones do not offer LPGPs and the rest 32 offer LPGPs, and therefore the study's sample is limited to this number 32 LPGPs. Table 1 summarizes the information—the number of travel websites surveyed, the number of LPGPs offered, and corresponding percentages. The survey results provide an understanding of the existence of LPGPs on current travel websites; 62% of the major travel websites offer LPGPs.

Table 1

Data details

Number of travel websites	Brand.com				Online travel agency	Total
	Airlines	Hotels	Car Rental Firms	Cruise lines		
Travel websites surveyed	7	10	10	10	15	52
Travel websites offering LPGPs	5	9	5	4	9	32
% of total surveyed	71%	90%	50%	40%	60%	62%

For each of the LPGPs, the study collected the actual wording on the websites, including the general information (company name, LPGP program name); how to use the policy for refund; and detailed policy terms and conditions. For example, how long will the LPGP protect customers' purchase? Does it match its own future price or only rivals? Does the program have additional incentives besides price matching? What type of monetary refund is included—cash, credit, or a combination? Is there any threshold for refund, such as minimum starting refund or a maximum ceiling for each refund? Of most importance, does the LPGP include a most favored customer clause, such as an automatic refund issued by the website without the need for customers to initiate the refund process? An example of the details collected for each LPGP appears in Appendix B (based on United.com).

Coding for Key Features.

This section aims to shed light on key features of LPGPs using the coding strategy. According to Creswell (2009), coding is "the process of organizing the material into chunks or segments of text in order to develop a general meaning of each segment" (p. 227). The purpose is to condense the data of LPGP terms and conditions into basic informational unit(s) to express the gist of the policy. In this study, the data unit is placed into one code. The coded unit, which is also named as a key policy feature, could be a short phrase, a sentence, or an entire paragraph of data. In total, five key policy features were generated. Table 2 shows the key features (codes) identified and their corresponding wording (data units).

Table 2

Key features and feature content

#	Features	Content
1	Refund	Does the LPGP refund 100% of the price difference? Is there any additional incentive besides price matching? What is (are) the type(s) of monetary refund, cash, credit, or combination thereof?
2	Duration	How long does the LPGP protect customers' purchase?
3	Scope	Does the LPGP apply to its own future price, only rivals', or both?
4	Refund threshold	Is there any threshold for refunds, such as minimum starting refund or a maximum ceiling for each refund?
5	Required customer action	Is customer action required to initiate the refund process?

Below are examples of policy statements coded as *refund*: "We'll refund the difference" (Hotels.com); "We will not only match the lower the rate but we will give you US $50" (Hilton.com); and "We'll refund the difference and give you a $100 USD Electronic Travel Certificate toward a future United flight" (United.com). Examples of policy statements coded as *duration* are: "Within 24 hours of booking" (Hyatt.com) and "Price match right up until the day before check in" (Hotels.com). Examples of the data unit coded as *scope* are: "Anywhere other than at Hertz.com" (Hertz.com) and "A lower rate on Expedia.com or on another U.S.-based website" (Expedia.com). Examples of the data unit coded as *refund threshold* are: "US$5 or greater" (Aa.com), and "Starwood may deny claims where the difference between the Competing Rate and the rate on the Starwood Website is less than 1%" (Starwoodhotels.com).

Examples of the data unit coded as *required customer action* are: "Complete the 'Best Price. Guaranteed' claim form and submit it online" (Ncl.com); "Call JetBlue Customer Support at 1-800-JETBLUE (538-2583), option 3" (Jetblue.com); and "Find a lower fare on

alaskaair.com any time…use our automated process to claim a Guaranteed Airfare credit" (Alaskaair.com).

Key Features Analysis

This section discusses LPGP key features in depth, including financial risks that arise from some extraordinarily generous refund features, whether other policy features facilitate refunds, travel companies' motives, and the impact of these features on travel companies. It pursues to trace the inferences regarding how travel companies are able to afford LPGPs and whether the key features facilitate the refund process.

Refunds.

From official brand sites to OTAs, travel companies have recognized the huge potential of LPGPs as marketing tools and have instituted various types of price guarantee programs that substantially differ in policy features to compete successfully in the market, especially with regard to refunds. To satisfy customers' needs, all these companies differentiate refunds based on the refund amount and refund format (cash/credit/points or a combination of all three; if credit or points is/are offered, it can only be used on the websites that provided them); examples of such refunds include a cash refund equivalent to 100% of the price difference (e.g., Hotel.com, Hotwire.com, Orbitz.com), a 110% refund equivalent to the price difference of onboard credit (e.g., Carnival.com), a 100% cash refund that corresponds to the price difference plus US$50 (e.g., Hilton.com), a 100% cash refund of the price difference plus a US$100 travel certificate (e.g., United.com), a 100% cash refund of the price difference plus 2000 points per room per stay (e.g., Starwoodhotels.com), and a 100% cash refund of the price difference plus a free day rental certificate (e.g., Budget.com).

The same coding strategy is used to identify the sub-unit of the feature. However, the sub-unit of data is placed into one or more sub-codes because some LPGPs provide more than one refund option. For instance, the official Norwegian Cruise Line site gives two refund options: “We will either: re-price your cruise at the lower price or you'll receive 110% of the difference in the form of an Onboard Credit”; this was coded into two sub-codes/categories/options, 100% of the price difference in cash and 110% of the price difference in credit.

Table 3 shows all categories of refund features and their incidence identified in our data. There are 10 categories of refund, and almost one-third (n=11, 31%) of travel websites offer a 100% price difference refund in cash, and 3% offer a 100% price difference in credit. These two LPGPs are classified as PM LPGPs. The rest offer additional incentives besides price matching to gain advantage over any other products with a lower price or, in some cases, to attract business even without any price advantage; these are classified as PB LPGPs. This study does not further differentiate PM or PB by refund format. However, the author observed that some websites provide refund format options and are more generous with credit refunds than with cash refunds. A typical example is that if a customer chooses a cash refund, the policy offers a 100% price difference cash refund, while if a customer chooses a credit refund, they are given more than a 100% price difference in credit. Table 4 shows the incidence of the two types of LPGPs in the study, and both the total number and percentage of firms offering a given type of LPGP are listed. As stated in Table 4, PB LPGP is a more common type of LPGP and is adopted by more than two-thirds (N=23, 71%) of the travel websites that offer LPGPs. The top ranked refund categories of PB LPGP, as summarized in Table 4, are “match lower price cash and additional 10% discount of the competing rate” (n=6, 17%) and “100% price difference cash and $50

credit". Less than one third (n=9, 29%) of the websites provide PM LPGPs. Some websites offer more than one refund category and therefore the total is greater than 32, which is the actual number of sites with LPGPs from Table 1. For example, Alaska Airlines' LPGP falls under PM with two refund categories (1 and 7), and Starwood's LPGP falls under PB with two refund categories (3 and 9). The websites Ncl.com (Norwegian Cruise Line official site) and Celebritycruises.com offer refund options of 100% price difference in cash (category 1) or 110% of the price difference in credit (category 2). In this study, their LPGPs are classified as PB.

Table 3

Categories of refunds*

Categories of refunds	Travel websites (%)
1 - 100% price difference cash	11 (31)
2 - Match lower price cash and additional 10% discount of the competing rate	6 (17)
3 - 100% price difference cash and $50 credit	5 (14)
4 - 110% of the price difference credit	4 (11)
5 - 100% price difference cash and $100 credit	3 (8)
6 - Match lower price, one night/day free	3 (8)
7 - 100% price difference credit	1 (3)
8 - Match lower price cash and additional 20% discount of the competing rate	1 (3)
9 - Match lower price cash and 2000 points per room per stay	1 (3)
10 - Match lower price, one night/day free credit	1 (3)
Total	36 (100)

*Some websites (Alaskaair.com, Starwoodhotels.com, Ncl.com and Celebritycruises.com) offer more than one refund category and therefore the total is greater than 32, which is the actual number of sites with LPGPs from Table 1.

Table 4

Type of lowest price guarantees by refund feature

	1 - PM LPGP	2 - PB LPGP	Total
Refund categories (%)	2 (20%)	8 (80%)	10
Travel websites (%)	9 (29%)	23 (71%)	32

It is necessary to carefully consider the financial risks that arise with some extraordinarily generous refund policies. More generous refunds are commonly associated with greater risk exposure, higher financial costs, and greater cash flow distress for companies. It appears that travel websites use aggressive refund strategies in LPGPs and provide tempting refund benefits to customers. However, is this actually true? Following, the discussion focuses on the other four LPGP key features and their function of facilitating refunds, travel companies' motives, and the impacts of these features.

Duration.

Travel websites guarantee to honor LPGPs within a certain period of time, such as 24 hours (e.g., Hilton.com, United.com), 48 hours (e.g., Carnival.com, Hotwire.com), seven business days (e.g., Budget.com), and until the day before check-in (e.g., Hotels.com). Therefore, the longer the duration an LPGP covers, the greater the chance that a lower price will be found, the larger the possibility that the customer qualifies for a refund, and the more risk the LPGP brings to the service provider. Using the same coding strategy, the author classified the duration feature of LPGPs into six categories. Table 5 lists the details of categories and the number of firms offering a given type of duration. The typical duration is 24 hours (n=17, 50%), followed by 48 hours (n=6, 18%). Five (15%) websites state the duration is until the time the service is delivered, and only four (12%) restrict the duration to the same day. One (3%) website offers seven business days and one (3%) limits LPGPs to one business day. Most websites have only one category of duration. Others provide two duration options, depending on where the lower price is found, such as the LPGP offered on Alaska Airlines' site. Some are excluded in the summary table when the wording of a travel website's LPGP on duration is ambiguous or blank, such as Agoda.com. Furthermore, based on the requirements of the study, when a duration

feature permits refund after more than 24 hours (categories 2, 3, and 5 in Table 5), it is classified as a ***customer-favored feature***; when the duration is limited to within 24 hours (categories 1, 4, and 6 in Table 5), it is classified as a ***restriction***.

Table 5

Categories of duration*

Categories of duration	Travel websites (%)
1 - 24 hour	17 (50)
2 - 48 hours	6 (18)
3 - Any time before your departure/check in/pick up	5 (15)
4 - Same day (<=24 hour) of booking	4 (12)
5 - 7 business day	1 (3)
6 - one business day	1 (3)
Total	34 (100)

*Some websites (Alaskaair.com) offer more than one duration category and some (Oceaniacruises.com and Agoda.com) do not explicitly state the scope in their policies; therefore, the total is not necessarily equal to32, which is the actual number of sites with LPGPs from Table 1.

Scope.

There are three scenarios when LPGPs come to eligible lower price. Some travel websites only accept the lower prices on their rivals' websites (e.g., AA.com, Hyatt.com), some choose to match their own future price (e.g., Alaskaair.com), and others have no constraints (e.g., Marriott.com, Cheapoair.com). The more relaxed the scope constraint is the greater the chance that the lower price will be accepted, the greater the possibility that the customer qualifies for a refund, and the riskier the LPGP. The author classified scope feature into three categories. Table 6 lists the details of the categories and the number of firms accepting a given scope category. The most common scope used was "comparison rate publicly available on another website" (n=20, 61%), followed by "comparison rate publicly available online, no website constraint" (n=12, 36%), and "comparison rate publicly available on its own website" (n=1, 3%). Most websites

have only one scope category. The exception is Alaska Airlines, which has two scope categories (1 and 3). Furthermore, if a scope has no website constraint (category 2), the author classify it as a ***customer-favored feature***; if a scope limits a refund within either its own website or only another website (categories 1 and 3), it is classified as a ***restriction***.

Table 6

Categories of scope*

Scope categories	Travel websites (%)
1 - Comparison rate publicly available on another website	20 (61)
2 - Comparison rate publicly available online, no website constraint	12 (36)
3 - Comparison rate publicly available on its own website	1 (3)
Total	33 (100)

*Some websites (Alaskaair.com) offer more than one scope category; therefore, the total is greater than 32, which is the actual number of sites with LPGPs from Table 1.

Refund Threshold.

Some travel websites set refund ceilings and minimum starting amounts for claims; for example, United.com starts refunds at US$10 and IHG.com requires a minimum refund of at least 1% of the total cost or US$1, whichever is higher. The more unbridled the refund threshold (i.e., the lower the minimum requirement and/ or the higher the maximum ceiling), the greater the possibility that the customer qualifies for a refund and the riskier the LPGP is. The author classified the refund threshold feature into five categories. Table 7 lists the details of the categories and the number of firms accepting a given category of refund threshold. There are three (30%) websites that allow refunds starting US $10, three (30%) that allow refunds that are at least 1% of the total cost, one that promises refunds that are greater than US$ 0.25, and one that allows refunds starting US $5. Not all LPGPs have a refund threshold. Furthermore, if an LPGP limits refunds within a certain threshold, it is classified as a ***restriction***; otherwise, it is viewed as a ***customer-favored feature***.

Table 7

Categories of refund thresholds*

Categories of refund thresholds	Travel websites (%)
1 - Minimum starting refund $10	3 (30)
2 - Minimum starting refund at least 1% of total cost or $1 USD, whichever is higher	3 (30)
3 - Minimum starting refund at least 1% of total cost	2 (20)
4 - Starting refund greater than 25 cents	1 (10)
5 - Minimum starting refund $5	1 (10)
Total	10 (100)

*Only 10 websites explicitly state refund thresholds in their policies; and therefore the total is not necessarily equal to32, which is the actual number of sites with LPGPs from Table 1.

Required Customer Action.

Some travel websites require customer action to initiate the refund process. For example, Delta.com requires that customers submit their completed claim form online, Priceline.com asks customers to call its customer service center to request refunds, Hilton.com needs customers to either call customer service or submit an online claim form, and Alaskaair.com has an automated refund process if a lower fare is found on Alaskaair.com. *The less customer action needed, the greater the possibility that the customer gets a refund and the riskier the LPGP is.* Using the same coding strategy, the author classified the required customer action feature into four categories. Table 8 lists the details of the categories and the number of firms offering a given category of required customer action. A majority (n=24, 73%) of the travel websites require that customers “submit an online claim”. Four websites (12%) ask customers to “call the customer service center”, four (12%) websites request customers to “call the service center or submit an online claim form”, and only one website (3%) uses an “automated refund and customers are not required to initiate the refund process”. Most websites have only one category of required

customer action, while Alaska Airlines has two categories depending on where the lower price is found. If the wording of a travel website's LPG is ambiguous and has not clearly stated the required action but only says "contact us", it is excluded from the summary table. Furthermore, if a required customer action feature falls to categories 3 and 4 (automated refund and call or submit an online claim), it is classified as a ***customer-favored feature***; otherwise, it is a ***restriction*** (categories 1 and 2).

Table 8

Categories of required customer action

Categories of required customer actions	Travel websites (%)
1 - Submit online claim	24 (73)
2 - Call customer service center	4 (12)
3 - Call service center or submit online claim form	4 (12)
4 - Automated refund; customers are not required to initiate the refund process	1 (3)
Total	33 (100)

* Alaska Airlines has two categories depending on where the lower price is found; therefore, the total is greater than 32, which is the actual number of sites with LPGPs from Table 1.

To summarize, according to the ranking of the most popular category for each of the five key features, the author can draft a typical LPGP offered by travel website is that if you find a published retail price at another website (scope, 62%) lower than your original price for the same type of room within 24 hours (duration, 50%) of your original booking by at least $10 USD or more (threshold, 30%), you submit online claim (required customer action, 73%), and the website will refund 100% price difference (refund, 32%).

Restrictions and Hassle Costs Analysis

This section discusses the restrictions and hassle costs associated with LPGPs and investigates whether PB LPGPs have more restrictions and create more hassle costs for customers than PM LPGPs. In an earlier section, the author grouped LPGPs into two types, PB

LPGPs and PM LPGPs, based on their refund features and classified the LPGP features into two kinds, customer-favored features and restrictions, according to the particular category the feature is in. Therefore, the study has data on the number of restrictions contained in each LPGP, thus making it possible to test whether PB LPGPs are less likely than PM LPGPs to be facilitating.

From the customer perspective, the restrictions in LPGPs are considered hassle costs (Baake & Schwalbe, 2013). Adding more restrictions in LPGPs will create greater hassle costs in terms of customer refunds. Using an LPGP to claim a refund is a cost-benefit calculation for a customer. The expected benefits could be 1) the promised refund when all restrictions are met, times and 2) the likelihood of obtaining it, which decreases with the number of restrictions (Arbatskaya et al., 2004). For example, restrictions on the key features, such as the minimum starting refund threshold and the time constraint of the lower rate found, decrease the likelihood that a refund claim will be granted and therefore lower a consumer's expected benefit. Having to phone a customer service center to initiate a refund or being forced to fill out and submit a qualified online claim form imposes costs on consumers and increases their expected cost. All these show that restrictions increase customer hassle costs and make them reluctant to request refunds (Hviid & Shaffer, 1999).

However, having customer-favored features exposes companies to greater risk, while adding restrictions increases customers' hassle costs and mitigates travel companies' financial risk. Consider the following price quotes listed in Table 9. Background: Hilton.com is selling a room with two queen beds at the Hilton Garden Inn Auburn/Opelika for US$134 per night and is offering a PB LPGP that matches a lower rate and an additional US$50 American Express gift card. The duration limit is 24 hours, the scope is a lower price found on another website, there is no refund threshold, and the required customer action is to either submit a claim form or call 1-

800- HILTONS. Roomertravel.com, a relatively new travel service website founded in 2011 offers the same accommodation for US$133 per night.

Scenario 1 (threshold restriction): After a customer booked this room for a night with Hilton.com, he found a lower price for this hotel room within 24 hours on Roomer. Because the Hilton.com LPGP boasts a customer-favored feature instead of a threshold restriction for this booking, Hilton incurred an out-of-pocket cost of US$1 and a US$50 American Express gift card. Hilton could have mitigated its risk by adding restrictions to its LPG; for example, it could have required that the minimum refund threshold would be greater than US$1. If the same scenario was applied to Starwoodhotels.com or Hyatt.com, the customer will not be qualified for a refund because their LPGPs have a refund threshold restriction (price difference has to be at least 1% of the total booking cost). Thus, these hotel companies avoid the financial risk that Hilton exposes itself to.

Scenario 2 (duration restriction): If the lower price on the Roomer website is found 24 hours after the booking, the customer will be not qualified for the refund from Hilton because its LPGP has a duration restriction. However, if the room is booked through Hotels.com, Hotels.com needs to give a refund because Hotels.com has a customer-favored duration feature in its LPG that is valid until the time of check-in. Hotels.com could have mitigated its risk by adding restrictions to its LPG; for example, it could have limited its duration to within 24 hours.

Scenario 3 (scope restriction): If the room price dropped to US$133 on the Hilton website instead of on Roomertravel.com, the customer will not be able to claim a refund and Hilton will not have the financial risk associated with this kind of refund because it has a restriction on its scope feature whereby it accepts a lower price that is only available on another website. Adding the scope restriction that only a rival’s lower price will be accepted increases customers’ hassle

cost and at the same time eliminates travel companies' risk. Yet, if the room is booked with Hotels.com, Hotels.com still needs to give a refund because its LPGP does not have such a constraint. This puts financial pressure on the travel company.

Scenario 4 (required customer action restriction): Both Hilton.com and Hotels.com offer options for customers to claim refunds either by calling customer service or by submitting an online claim form. Therefore, it is relatively easy and fast and accommodates customers with different communication preferences. Their customer required action feature is considered a customer-favored feature. However, if the room is booked through Expedia.com, the customer has to submit the claim online, which is viewed as a restriction because it may be inconvenient for a traveler who does not have a computer on hand or no Internet available at that time or who prefers to make a phone call. Thus, the travel company may potentially save the refund cost for those who do not have the ability to claim a refund or those who are reluctant to use a computer to claim the refund. Having the required customer action restriction increases the hassle cost for customers, but it means that travel companies can mitigate their risk.

Scenario 5 (Refund feature: PB vs.PM): Had Hilton.com offered a PM LPG instead, its refund would have reduced to US$1, much less than the actual out-of-pocket cost of initially paying (US$1 and a US$50 American Express gift card).

Table 9

Example of hotel room price quotes offered by various travel websites

Therefore, it is necessary to systematically go through the LPGPs and summarize the restrictions at the feature level. If an LPGP has ambiguous wording describing a certain feature, the feature is assumed to be a restriction. If an LPGP has more categories for a certain feature, the feature is put in the customer-favored category when grouping.

Duration restriction: The customer must find a lower price within no more than 24 hours in 73% (24/32) of the LPGPs offered by the travel websites (for example, “within the same day of booking” or “within 24 hours of booking”).

Scope restriction: Restrictions on a lower future price of their own or only on a lower future price of rivals are mentioned in 63% (20/32) of the LPGPs offered by the travel websites (for example, “comparison rate publicly available on its own website” or “comparison rate publicly available on another website”).

Threshold restriction: Restrictions on any refund threshold a travel company applies are mentioned in 31% (10/32) of the LPGPs offered by the travel websites (for example, “The lower fare difference must be $10 or higher per ticket” or “the difference equal to or greater than 1% of the current rate”).

Required customer action restriction: Customers are instructed one way without any alternatives to initiate the claim process in 84% (27/32) of the LPGPs offered by travel websites (for example, “submit a qualified claim form” or “call 1-800-PRICELINE”).

Table 10 shows the percentage occurrence of each restriction based on the type of LPGP. For example, restriction 1, duration restriction, occurs in 78% of PB LPGPs and 56% of PM LPGPs, which is 72% of all LPGPs. The top three most popular applied restrictions in LPGPs are the required customer action to initiate the refund process (restriction 4), the limitation on duration that LPGPs cover (restriction 1), and the scope within which a lower price is accepted

(restriction 2), which occur in 84%, 72%, and 63% of all LPGPs, respectively. The percentages of PB LPGPs are higher than those of PM LPGPs in all restrictions. In the restriction for threshold, they are almost three times larger than those of PM LPGPs.

A travel company could mitigate its financial losses in the event of an unanticipated price drop by rivals by its choice of LPGP type and the restrictions it places on the policy. If PB LPGPs are linked to greater risk than PM LPGPs, then, all else remaining the same, the author would expect the former to have a greater number of restrictions. Furthermore, if the author measures hassle costs using the proxy of the number of restrictions in each LPGP, the author would expect PB LPGPs to be associated with higher hassle costs than PM LPGPs. The author would therefore also anticipate that PB LPGPs would have more restrictions.

To test this conjecture, the null hypothesis and one-sided alternative hypothesis are:

Ho: PM LPGPs have the same number of or more restrictions than PB LPGPs.

Ha: PM LPGPs have fewer restrictions than PB LPGPs.

To be more mathematical, a one-sided t-test is applied to test the hypothesis that compares the mean number of restrictions between PM LPGPs and PB LPGPs. The mean number of restrictions for all LPGPs in the sample is 2.50. The sample mean is lower for PM LPGPs (1.89) and higher for PB LPGPs (2.74), and the difference is significant at the 5% level according to the one-sided t-test (t statistics = 5.048, p-value = 0.007). Therefore, the author can reject the null hypothesis in favor of the alternative hypothesis that PM LPGPs have fewer restrictions than PB LPGPs.

Table 10

Percentage of LPGPs by number of restrictions

#	Restriction	PB LPGP	PM LPGP	LPGP
1	Duration restriction	18(78)	5 (56)	23 (72)
2	Scope restriction	15 (65)	5 (56)	20 (63)
3	Threshold restriction	9 (39)	1 (11)	10 (31)
4	Required customer action restriction	21 (91)	6 (67)	27 (84)

The notion that PB LPGPs carry a greater risk than PM LPGPs and that travel companies could mitigate such risk by adding restrictions to LPGPs published on their websites is intuitive and is supported by the data. Given the differences in risk, the only reason for a travel company to employ a PB LPGP over a PM LPGP would be if it were more effective than a PM LPGP in achieving its intended marketing purpose. More than two-thirds of the travel websites offer PB LPGPs to attract customers. However, in taking a closer look at the policies, the policy features may not actually facilitate customer refunds but rather increase the hassle cost for customers. This is because there are more restrictions that result in more time and effort on the part of customers to claim a refund, and the possibility that the customers eventually get a refund is not necessarily higher.

Across distribution channel and service sector Analysis

The study compares the LPGPs between two major distribution channels of travel products (Brand.com and OTAs) as well as among four major service sectors (hotels, airlines, car rental firms, and cruise lines) in the travel industry.

This section illustrates the presence of LPGPs on Brand.com and OTA sites and the two distribution channels' policy types. From Table 11, it can be seen that among the travel websites the study surveyed, more than 62% of Brand.com official sites offer LPGPs and 60% of OTAs provide LPGPs. Table 12 shows the breakdown of each type of LPGP; it can be seen that 23 (72%) Brand.com websites provide LPGPs, and of these 87% (20/23) offer PB LPGPs. The percentage is much higher than that of OTAs, of which 33% (3/9) adopt PB LPGPs. However, only 13% (3/23) of Brand.com sites have PM LPGPs, whereas 67% (6/9) of OTAs have PM LPGPs.

Table 11

Percentage of travel websites providing LPGPs

Travel Websites	Brand.com	Online Travel Agency	Total
Number of travel websites surveyed	37	15	52
Number of travel websites offering LPGPs	23	9	32
% of travel websites offering LPGs among all websites surveyed	62.2%	60.0%	61.5%

Table 12

LPGP type by category of travel website

Travel Websites (%)	Brand.com	Online Travel Agency	Total
PB LPG	20 (87)	3 (33)	23 (72)
PM LPG	3 (13)	6 (67)	9 (28)
Total	23 (100)	9 (100)	32 (100)

A travel company could mitigate its financial losses in the event of an unanticipated price drop by rivals by its choice of LPGP type and the restrictions it places on the policy. If Brand.com travel websites adopt more PB LPGPs, the author would expect they would apply a

greater number of restrictions. Furthermore, if the author measures hassle cost by using the proxy of the number of restrictions in each LPGP, the author would expect Brand.com to be associated with higher hassle costs compared to OTAs. the author would therefore also anticipate that Brand.com would have more restrictions.

To test this conjecture, the null hypothesis and the one-sided alternative hypothesis are:

Ho: Brand.com travel websites have the same number of or more restrictions than OTAs.

Ha: OTAs have fewer restrictions than Brand.com websites.

Table 13 presents the percentage occurrence of each restriction for Brand.com and OTAs, as well as for all travel websites in the sample. For example, restriction 1, duration restriction, occurs in 74% of Brand.com and 67% of OTAs, which is 72% of all travel websites. The ranking from the most to least popular applied restrictions on Brand.com are the required customer action to initiate the refund process (restriction 4), the limitation on duration that LPGPs cover (restriction 1), the constraint on the scope within which a lower price would be accepted (restriction 2), and the refund threshold limitation, which occur on 87%, 74%, 70%, and 43% of Brand.com websites, respectively. The ranking of the most to least applied restrictions in OTAs are the same; however, in terms of percentage all of them are lower, occurring on 78%, 67%, 44%, and 0% of Brand.com websites, respectively. The Brand.com websites have a higher number of restrictions than do the OTAs. Regarding the restriction for refund threshold, none of the OTAs apply this restriction, while 43% of Brand.com websites use it.

The null hypothesis is tested statistically with the one-sided t-test to compare the mean number of restrictions between Brand.com and OTAs. The mean number of restrictions for all websites in the sample is 2.50. The sample mean is smaller for OTAs (1.89) and larger for Brand.com (2.74), and the difference is significant at the 5% level based on the one-sided t-test

(t-statistic = 2.527, p-value = 0.004). Therefore, the author can reject the null hypothesis in favor of the alternative hypothesis that OTAs have fewer restrictions than Brand.com websites.

Table 13

Percentage occurrence of each restriction for Brand.com and OTAs

#	Restriction	Brand.com	Online Travel Agency	Total
1	Duration restriction	17 (74)	6 (67)	23 (72)
2	Scope restriction	16 (70)	4 (44)	20 (63)
3	Threshold restriction	10 (43)	0 (0)	10 (31)
4	Required customer action restriction	20 (87)	7 (78)	27 (84)

More Brand.com websites than OTAs have PB LPGPs to attract customers. In taking a closer look at their policies, the policy features may not actually facilitate customer refunds but rather increase the hassle cost for customers. This is because there are more restrictions that result in more time and effort on the part of customers to claim a refund, and the possibility that the customers eventually get a refund is not necessarily higher. This finding suggests that Brand.com websites are less likely to facilitate their LPGPs than OTAs. In addition, a large portion of Brand.com PB LPGPs have features that are inconsistent with their use as a facilitating device; therefore, it is likely that they are adopted for reasons other than providing favors to customers in their LPGP programs.

The study also investigated LPGPs offered by different service sectors of Brand.com official websites. Table 14 shows a breakdown of the service sector by LPGP type. It can be seen

that no matter which service field, the majority offer PB LPGPs, especially car rental firms (100%) and the hotel industry (89%). Constraints on required customer action is the most popular restriction employed by most service sectors (87%), followed by duration (74%). Compared to other travel businesses, cruise lines on Brand.com have fewer restrictions on all features except required customer action. Table 15 shows the percentage occurrence of each restriction for each service sector. Restriction 1, the duration restriction, occurs for 100% of hotels listed on Brand.com and 80% of airlines and car rental firms. However, none of the cruise lines have duration restrictions. Restriction 2, the scope restriction, occurs for 67% of hotels listed on Brand.com, 80% of airlines, 100% of car rental firms, and 25% of cruise lines. Regarding restriction 3, the threshold restriction, car rental and cruise line travel websites have no restrictions on refund threshold, while 67% of hotels listed on Brand.com and 80% of airlines do. Regarding restriction 4, the required customer action restriction, all car rental firms and cruise lines have this restriction, as do approximately 80% of hotels listed on Brand.com and airlines. The author went through LPGPs by service sector and category level of each feature and summarized the top-ranked category of each feature. The results in Table 16 suggest that LPGPs are homogenous in each feature category level within each service sector, which is probably due to the homogeneous product and the similar pricing method used within the service sector. For example, how a typical LPGP works for customers who book hotel rooms via official hotel websites is as follows. If you find a published retail price on another website that is lower by at least 1% of the total cost or US$1 (whichever is higher) than your original price for the same type of room within 24 hours of your original booking, you submit an online claim. The website will refund 100% of the price difference in cash plus the first night free. Following is an example of how a typical LPGP works for customers who rent cars from a rental car company’s official

website. If you find a published retail price on another website that is lower than your original price for the same type of car within 24 hours of your original booking, you submit an online claim. The website will refund 100% of the price difference in cash and an additional 10% discount on the competing rate.

Table 14

LPGP type by service sector on Brand.com

Travel Websites (%)	Brand.com				Weighted Average
	Hotels	Airlines	Car Rentals	Cruise Lines	
PB LPG	8 (89)	3 (60)	5 (100)	4 (100)	20 (87)
PM LPG	1 (11)	2 (40)	0 (0)	0 (0)	3 (13)
Total	9 (100)	5 (100)	5 (100)	4 (100)	23 (100)

Table 15

Percentage occurrence of each restriction by service sector on Brand.com

Restrictions \ Travel Websites		Brand.com				Total
		Hotels	Airlines	Car Rentals	Cruise Lines	
1	Duration restriction	9 (100)	4 (80)	4 (80)	0 (00)	17 (74)
2	Scope restriction	6 (67)	4(80)	5 (100)	1 (25)	16 (70)
3	Threshold restriction	6 (67)	4 (80)	0 (0)	0 (0)	10 (43)
4	Required customer action restriction	7 (78)	4 (80)	5 (100)	4 (100)	20 (87)

Table 16

Frequency of most popular category under each feature by service sector

Hotels	%	Airlines	%	Car Rentals	%	Cruiselines	%
Refund		**Refund**		**Refund**		**Refund**	
6 - Match lower price, one night/day free	30	5 - 100% price difference cash and $100 credit	33	2 - Match lower price cash and additional 10% discount of the competing rate	80	4 - 110% of the price difference credit	67
		1 - 100% price difference cash	33				
Duration		**Duration**		**Duration**		**Duration**	
1 - 24 hour	89	4 - Same day (<=24 hour) of booking	50	1 - 24 hour	80	2 - 48 hours	100
Scope		**Scope**		**Scope**		**Scope**	
1 - Comparison rate public available on Another website	67	1 - Comparison rate public available on Another website	67	1 - Comparison rate public available on Another website	100	2 - Comparison rate public available online, no website constraint	75
Refund Threshold		**Refund Threshold**		**Refund Threshold**		**Refund Threshold**	
2 - Minimum starting refund at least 1% of total cost or $1 USD,whichever is higher	75	1 - Minimum starting refund $10	75	No statement in this feature	0	No statement in this feature	0
Required Cutomer Actions		**Required Cutomer Actions**		**Required Cutomer Actions**		**Required Cutomer Actions**	
1 - Submit online claim	78	1 - Submit online claim	50	1 - Submit online claim	100	1 - Submit online claim	100

Conclusion and Limitations

The study investigated LPGPs offered by the travel industry, documented policy terms and conditions, recorded the incidence and variety of LPGPs and their features, and conducted descriptive statistical analysis of each of the five key features using data (policies) published by travel websites covering the majority of service sectors in the US travel industry. A total 52 major travel websites were surveyed, 62% of which provide LPGPs. Based on the collected dataset, it is evident that the use of LPGPs is widespread in the travel industry, including both Brand.com (62.2% of Brand.com listings have LPGPs) and OTA distribution channels (60.0% of OTAs have LPGPs) and every service sector from hotels to airlines, car rental firms, and cruise lines. Of the travel websites that have LPGPs, 72% choose PB LPGPs whereby refunds exceed price differences, and 28% have PM LPGPs whereby refunds are equal to the price difference. Among PB LPGPs, the most popular refund category is to match the lower price in cash and provide an additional 10% discount off the competing rate. More generous refund features are

associated with greater risk and higher financial costs for travel companies. However, in analyzing the key features in policy restrictions, it was found that PB LPGPs have more restrictions and are associated with higher hassle costs than PM LPGPs, which are less likely to be used as facilitating devices for refunds. Using an LPGP to claim a refund is a cost-benefit calculation for customers. To mitigate policy risks, travel companies add more restrictions and create greater hassle costs for customers in terms of refunds, such as limiting the duration threshold to within 24 hours, adding a scope restriction whereby they accept only a rival's lower price, having a minimum starting refund of at least US$10, and requiring customers to initiate the refund process by calling customer service.

In addition, the author leveraged the dataset and compared LPGPs between two different distribution channels (Brand.com and OTAs) and among four different service sectors (hotels, airlines, car rental firms, and cruise lines) in the travel industry. It was found that LPGPs vary across distribution channels and service sectors. In general, more than half the Brand.com listings (65%) and OTAs (60%) have LPGPs, and the majority of Brand.com listings (87%) have PB LPGPs with a higher number of restrictions, especially in terms of duration, scope, and required customer action. A majority of OTAs (67%) offer PM LPGPs with fewer restrictions, such as no refund threshold restrictions. Within service sector, LPGPs present homogeneity in each feature, for example, most (89%) hotel websites have a duration restriction of 24 hours, and all cruise line websites have a duration restriction of 48 hours. This is probably due to the homogeneous nature of the business, the unique nature and pricing methods of the service sector, and its particular customer purchase behavior and preferences. Therefore, it would be valuable to conduct future research on customer online search behavior, online shopping preferences, and

customers' familiarity with and usage of different LPGPs to enhance the understanding of LPGPs among different service sectors.

The limitations of the study are that it is mainly documented existing LPGPs in the travel industry and that it focuses on the application of LPGPs in post-sale scenarios. LPGP terms and conditions evolve all the time. Some are terminated because of financial burden, as was the case when United.com eliminated its Low Fare Guarantee Program, and some are becoming ever more complicated due to legal pressure, such as Orbitz's Best Price Guarantee Program. In addition, as is typical in a post-recession economy, we are now on the cusp of a new merges and acquisitions (M&A) market upswing (Doerksen, 2013). For example, American Airlines completed an acquisition with US Airways on October 17, 2015 and the US Airway brand was absorbed by American Airlines and its LPGP vanished (Jean, 2015). Another example is that Marriott International closed a deal to acquire Starwood Hotels & Resorts in April, 2016, and the companies announced that their loyalty programs will run in parallel at first but will eventually be combined by 2018 (Ting, 2016). Therefore, we can conjecture that the two LPGPs will be merged to new one program. We can safely say that one reason LPGPs are changing is because of M&A events among travel companies. However, this study does not cover the evolution and trends of LPGPs over time in the travel industry. Moreover, due to the data limitation, the pricing factor is not considered in the study, that is, the pricing strategy of a travel company before and after offering an LPGP and the LPGPs' impact on the pricing dynamic among travel companies. Last, the study summarized LPGPs into five key feature categories and limited the discussion around the five features. Other detailed terms and conditions possibly involved in LPGPs have not been discussed in the study, such as the geographical area in which LPGPs are applicable, the

requirements associated with identical products, and the constraints on services that are on sale or offered at discount.

Chapter III: Measuring Risk Exposure using Monte Carlo Simulation and Option Pricing: A Policy Risk Study for Lowest Price Guarantees

Abstract

This study investigates lowest price guarantee policies (LPGPs) from a risk management perspective, examines the cost of promoting LPGPs from the standpoint of real option pricing, simulates the price paths of underlying assets (services) using the Monte Carlo method, and discusses provisions as tools for managing policy risk exposure. First, the article introduces the evolution of dynamic pricing, the conceptual framework of price dynamics, option payoff features, and price simulations. Next, it presents numerical examples using data from Orbitz.com and applies the parameters derived from real-world data to simulate the price paths of airfares. The simulation results show that the probability of a lower price occurring throughout the booking period up to departure is 92% and that the average affordability of offering Orbitz Price Assurance is 19%. These results indicate that there is a 92 out of 100 chance that a customer will be eligible for a refund if the purchase price is not the lowest price. Therefore, for every US$100 sales of air tickets, there should be a maximum US$19 provision for satisfying potential customer refund claims (assuming the LPGP has no restrictions that discussed in Chapter II). This has strong managerial implications for the travel industry. Orbitz examples are presented primarily to demonstrate the purpose of this. The results using the data of other companies or other samples may differ markedly from those found in this study; however, the framework and basic methodology are general and can be readily applied to other company settings and other service sectors.

Keywords: dynamic pricing, lowest price guarantee, risk management, Monte Carlo simulation

Introduction

The recent growth in Internet-based distribution technologies has stimulated the widespread use of the dynamic pricing strategy in the travel industry (Levin et al., 2010). As the most flexible marketing mix component with characteristics that facilitate relatively rapid implementation, price is a critical and powerful tool in business (Garda, 1991; Shipley & Jobber, 1981). Dynamic pricing refers to the modification of prices for the same service over time and across customers to generate more revenue and increase profits for sellers (McAfee & Te Velde 2006). In the meantime, the rise of Internet booking channels has increased price transparency and has decreased search costs for consumers (Hinz et al., 2011), thereby enabling travelers to compare multiple travel websites across time while constantly pursuing lower prices (Jain & Cox 2011). Caroll (2004) found that in 2003, 69% of online travel buyers visited two or more websites to book hotel rooms. Consumers are aware of dynamic rates and strategically time their purchases (Levin et al., 2010). This strategy in turn challenges travel companies' advance selling and perishable inventory control. To motivate consumers to book early and book through their own domains, all major hotel chains, airline companies, cruise lines, and third-party OTAs have launched various LPGP programs (Garrido, 2012), such as Best Rate Guarantee (Hilton.com), Low Fare Guarantee (United.com), Lowest Price Guarantee (Carnival.com), and Price Assurance (Orbitz.com). A price guarantee policy is one of the main factors that influences people to book online (Starkov & Price, 2003) and is ranked one of the most desirable website features by MMGY Global[4] (Yesawich, 2013). Yesawich's 2013 Portrait of American Travelers™ survey indicated that the websites regarded by 83% of travelers as the most useful are those that enable

[4] A global marketing communications firm founded in 1981 that has grown to be the largest advertising and communications company specializing in hospitality, travel, and entertainment in the US.

them to “check the lowest available fares/rates”, followed by sites that provide “a lowest price/rate guarantee” (80%) and enable them to “compare the fares/rates of multiple suppliers” (73%).

Dynamic Pricing

The evolution of dynamic pricing is presented in Figure 1. Dynamic pricing was first introduced by the airline industry in the 1980s (Cross, Higbie, & Cross, 2009) given that the deregulation of airline pricing in 1978 permitted much more extensive use of computerized reservation systems for economic activities, especially pricing (McAfee & Te Velde, 2006). Its initial development is often credited to American Airlines, which established the strategy as a response to the rise in market fluctuations (McAfee & Te Velde, 2006). This practice, as Borenstein and Rose (1994) reported, so deviated from traditional static pricing and the “law of one price” that the substantial price dispersion between any two flight tickets reached 36% on average. Given this backdrop, McAfee and Te Velde (2006) unsurprisingly concluded that American Airlines changes half a million prices per day. Dynamic pricing was applied to the hotel industry in the early 2000s (Mannix, 2008) as a replacement for the traditional static rack rate whereby the best available rate fluctuates with supply and demand. Hotel groups, such as Marriott, Hilton Hotels Corporation, and InterContinental Hotels Group (IHG), introduced the pricing strategy primarily in the US and some European countries; its use has since grown among chains in other regions (Koushik, Higbie, & Eister, 2012). Technically, real-time booking and inventory control have already been achieved, but unlike airline companies, hotel chains prefer to change prices less frequently. For example, each day, IHG uses its shopping data to optimize room rates for the next 350 days (Koushik et al., 2012). Dynamic pricing is applicable to many service businesses and has lately been directly integrated into the operations of cruise

lines and car rental firms (Marcus & Anderson, 2006). As indicated in the Carlson Wagonlit Travel (CWT) Vision report (Mannix, 2008), dynamic pricing will be a key trend for managing the perishability of travel products over the next few years.

The value of dynamic pricing continues to be revealed. An estimate by Davis (1994) suggests that American Airlines earns an extra US$500 million per year from pricing strategies. IHG also performed a live market test to quantify the effect of price optimization derived from dynamic pricing. The test shows that price optimization resulted in a 3.2% mean improvement in revenue per available room, with 99% confidence that the improvement was greater than zero (Koushik et al., 2012). In 2009, IHG earned US$145 million in incremental revenue by using price optimization via dynamic pricing (Koushik et al., 2012).

Customer Response to Dynamic Pricing

The implementation of the dynamic pricing strategy and the growth of Internet distribution channels also educated consumers as to purchase strategies. However, dizzying prices can result in consumer inertia, a tendency to delay purchases (Su, 2009). Last-minute offers of lower prices drive them to book services at the last minute. Consumers are aware that price is dynamic, and they tend to experience uncertainty about having paid the lowest price possible after purchasing a travel service in advance (Jain & Cox, 2011). Because prices frequently change, consumers continue to observe prices, compare prices, and delay buying even when immediate purchase is the optimal strategy (Su, 2009). For instance, when encountering a low chance of price drops, consumers may take an “irrational gamble” and wait until the last minute to take action without considering service availability (Su, 2009).

Many well-established behavior theories can explain customer behaviors when they encounter and react to dynamic pricing. Kahneman and Tversky (1979) introduced loss aversion

theory and suggested that impending losses are larger than gains of the same magnitude. When consumers are loss averse, the possibility of ex post losses generates purchase inertia. This potential loss generates an increased tendency to wait. Probability weighting decision models (in the sense of cumulative prospect theory) (Kahneman & Tversky, 1992) demonstrate that consumers may overweigh low probabilities and underweigh high probabilities. For example, when customers notice that an observed online price is the lowest price posted online in the past three weeks and that vacation is approaching, they continue to wait for a lower price even if the last-minute price is unlikely to be the lowest one. Confronted with a small probability of obtaining low valuations, customers may become "paranoid" and wait irrationally (Su, 2009). Frederick et al. (2002) proposed the hyperbolic time preferences and decision model, which explains the tendency of customers to excessively focus on immediate payoffs rather than on future payoffs, even when both are equally relevant. Customers cannot see immediate payoffs when purchasing in advance; even if the purchase price is the lowest price, they are unable to foresee future payoffs. Financial put options have values to customers that guarantee customers the right but not obligation to gain price difference refund if their purchase price is not lowest.

Nature of Service Products

Consumers would not patronize a firm without some form of price assurance that they will find the products or services that they desire (Su & Zhang, 2009), and they implement shopping strategies for handling dynamic pricing by online retailers. Customer inertia challenges travel companies' advance selling and perishable inventory control, thereby considerably affecting their cash flow and financial planning. Perishability means that products (services), such as hotel rooms, airline flights, generated electricity, or time-dated ("sell before") products, expire at a certain time (McAfee & Te Velde, 2006). The perishability nature of service at

production and consumption gives rise to the need to sell services in advance (Ng, 2009). Customer inertia may create high opportunity costs for companies as they maintain inventory. In the hotel industry, for example, a lower occupancy rate is considered to induce lower prices; customers tend to wait until a particular period at which the price will continue to decrease if occupancy remains low (Raya, 2011). This phenomenon is attributed to the perishable nature of a service or product (Raya, 2011).

Purpose and Significance of the Study

The importance of LPGPs cannot be over-emphasized. As stated by Starkov and Price (2003), LPGPs are powerful tools to boost online distribution and are applicable to every hospitality business model. From airlines and hotels to OTAs, travel companies have recognized the huge potential of these guarantee policies as marketing tools and have instituted various types of price guarantee programs that differ substantially in policy features, especially with regard to stipulated time and refund amounts, to compete for success in the market. All these programs are guaranteed to match a lower rate but within a different period of time, such as 24 hours (e.g., Hilton.com, United.com), 48 hours (e.g., Carnival.com, Hotwire.com), seven business days (e.g., Budget.com), the period up until the cancellation deadline (e.g., Hotel.com), and the period up until the date at which a service is physically delivered (e.g., Orbitz.com). To satisfy customers, all these companies also compete in terms of refund amounts; examples of such refunds include a cash refund equivalent to 100% of the price difference (e.g., Hotel.com, Hotwire.com, Orbitz.com), a 110% refund equivalent to the price difference of onboard credit (e.g., Carnival.com), a 100% cash refund that corresponds to the price difference plus US$50 or a gift card (e.g., Hilton.com), a 100% cash refund of the price difference plus a US$100 travel certificate (e.g., United.com), and a 100% cash refund of the price difference plus a free one day

rental certificate (e.g., Budget.com). Table 17 shows examples of the LPGPs implemented within service businesses. Despite the benefits derived from such offers, however, important considerations include the risks incurred due to LPGPs, the more advanced features associated with greater policy risk exposure, higher financial cost, and greater cash flow distress.

Although numerous hospitality companies offer LPGPs, there has been little empirical or theoretical assessment of how price guarantee policy risks are valued from the perspective of travel companies. To investigate the risk exposure that comes with promoting LPGPs, the author uses the Monte Carlo option pricing technique to value such policies and determine the provision that companies need to make for potential refund claims. The primary goal of the study is to provide insight into applying Monte Carlo simulations and option pricing theory to LPGPs. The study has value in that the methodology for the policy valuation and policy risk management is generalizable. In addition, the author present numerical examples from Orbitz.com to demonstrate the procedure involved in implementing the method in a real company setting. In accordance with the purpose and significance of this study, the article first outlines the conceptual framework of price dynamics, option payoff features, and price simulation. It then discusses numerical examples using real-world data from Orbitz.com and simulates the price paths of the sampled price data. It concludes with results, applications, and limitations.

This study contributes to the existing literature on LPGPs in several ways: First, in contrast to previous research carried out from the standpoint of marketing strategy or revenue management, this work views LPGPs from a risk management perspective and proposes the need for provisions for potential refund claims. Second, it leverages financial derivative pricing methods to quantify such policy risk exposure, which can be extended to assess different LPGPs and estimate the potential financial cost associated with the relative policy risk exposure. Last,

unlike previous studies that suggest the use of an LPGP as a pure conceptual model, the present study converts the conceptual model into an empirical model and demonstrates the procedures involved in implementing the method in a real company setting using data collection, parameter calculations, price path simulation, option payoff calculations, and refund and provision estimations.

The Monte Carlo simulation utilized in the present study is another feature that contributes to the literature from the methodology perspective. In previous policy research, Su and Zhang (2009) analyzed the relationship between consumers and sellers on the basis of game theory and proposed the news vendor model in operations management to value commitment and availability guarantees. Levin et al. (2010) presented a dynamic game model to investigate different scenarios of pricing policies and confirmed the existence of a unique pricing policy for subgame perfect equilibrium between a monopolist and strategic consumers. Quan (2002) was the first to introduce the European option method for establishing a hotel reservation system. This work was later improved by Carvell and Quan (2008) by providing alternative reserve policies and proposing a conceptual model of "exotic" reservation that offers an LPGP. This model is extensively employed in today's hotel industry. Jain, Palaniswami, and Kang (2006) recognized airfare price insurance as a real option and employed the Black–Scholes–Merton model to calculate an insurance premium. Unlike financial options on stocks, the underlying assets (services) of LPGPs are non-tradable and have multiple sources of uncertainty, hence the term "real options" (Jain et al., 2006). The Monte Carlo method is particularly useful in real options analysis (Godinho, 2006), whereas the Black–Scholes–Merton model is more frequently used in theoretically estimating the price of conventional options. The main advantages of a Monte Carlo simulation are as follows: First, by running numerous trials, it can leverage the law

of large numbers to generate a large quantity of random samples that may be impossible to observe in real life. Second, it is widely used in modeling systems characterized by many uncertainties, such as business risks. If no explicit mathematical formula can describe the relationship among variables of interest, a Monte Carlo simulation can be used to generate samples and analyze empirical distributions, thereby facilitating a good understanding of the relationship among variables. Third, in practice, the method can be applied to value different LPGP schemes by changing the model parameters that reflect policy features. Additionally, the parameters drawn from samples for simulation can be tailored to the individual pricing characteristics of a travel company using the company's historical data.

Conceptual Framework

LPGPs match a lower rate within a certain period. The conceptual model for valuing such policies is similar to the method used to estimate the price of real options. Travelers who make advanced non-cancellable purchases at the current observed price for future trips are exposed to price risks because prices may fall at a later time. This means that they will end up paying a relatively higher price. Lowest price policies provide travelers with the right (not the obligation) to sell a service back to a travel company at the purchase price. Companies that offer such policies are not interested in re-acquiring a service and re-issuing a new one but instead prefer to settle by paying the price difference, as is common in the financial market (Jain & Cox, 2011). This strategy is the non-plain vanilla put option application in the service business and ensures that purchasers (policy holders) are offered the minimum price. Meanwhile, travel companies (policy issuers) are obligated to refund the price difference if the price decreases from the time of purchase. In contrast to the financial options on securities, these options are called "real options" because they and their underlying assets (service) are typically not traded as securities (Jain et

al., 2006). The Monte Carlo method is highly effective for simulating real option prices (Godinho, 2006). In contrast to conventional options, LPGPs fall in the category of exotic options because they represent a class of special options priced under a special set of circumstances described in policy terms and conditions (Carvell & Quan, 2008), such as stipulated time (contract time to expiration), refund amount (payoff at maturity depends on minimum price), and refund type (manner of settlement). As an option pricing method, the Monte Carlo approach is especially flexible in valuing options with complicated features and multiple uncertainty sources. In view of various LPGPs in the travel industry and the rapid changes in existing policies, the method can be extended to value different LPGP schemes by customizing the model parameters that reflect policy features.

The conceptual model presented here is implemented in two stages. The first involves estimating the "probability of lower price," whereby the author employed a Monte Carlo simulation to quantify the probability that the price paid on the purchase day is not the lowest price during the period at which the lowest price policy is in effect. The second stage involves estimating the payout to consumers. From a travel company's perspective, this payout is the "cost of lower price," which is the refund of the price difference between the price paid and the lowest price.

The author uses publicly available prices from a public travel website to estimate price volatility and simulates price movement paths on the basis of the parameters derived from the samples and then calculates the price difference occurring in the period at which the lowest price is guaranteed. The probability that a lower price event (P) will occur indicates the chances that a refund (R) will be issued, $R \neq 0$ .This study assumes that consumers purchase a service D days in advance at price S_0 within a duration of price assurance d day(s) ($d \leq D$), and afterwards price

($S_t, t = 1,2,3 \ldots T$) is observed every day. *D* day(s) is the duration that price assurance covers, while *T* is the number of days that the policy is valid. The probability of a lower price occurring is calculated as the sum of the number of Monte Carlo realizations for which the price becomes lower than purchase price S_0 (defined as $n_{lower<purchase}$) divided by the total number of Monte Carlo iterations (defined as *n* iterations):

$$\text{P}= n_{lower<purchase} / n_{realizations}. \qquad (1)$$

The dynamic pricing strategy causes companies to change prices frequently. A refund, as the cost of a lower price, is guaranteed by lowest price policies. This study applies Mun's (2006) logarithmic price change approach to calculate relative price change, x_t:

$$x_t = ln\, S_t - ln\, S_{t-1} = ln\left(\frac{S_t}{S_{t-1}}\right). \qquad (2)$$

The average of relative price change μ is then calculated by

$$\mu = \frac{1}{T}\sum_{t=1}^{T} x_t. \quad (3)$$

The volatility of relative price change is derived thus:

$$\sigma_{daily} = \sqrt{\frac{1}{T-1}\sum_{t=1}^{T}(x_t - \mu)^2}, \qquad (4)$$

which is a daily volatility that is then transformed into annualized volatility (σ) by

$$\sigma = \sigma_{daily} \times \sqrt{365}\,. \qquad (5)$$

Price S_t is assumed to follow a stochastic process defined by a geometric Brownian motion (GBM) process with drift given by

$$dS = \mu S dt + \sigma S dZ_S(t), \qquad (6)$$

where $dZ_S(t)$ is a Wiener process following *N(0, t)*. Building upon Equation (6), the author derives the price movement path as follows:

$$S_t = S_{t-1} exp\left\{\left(\mu - {\sigma^2}/{2}\right) t + \sigma Z_s(t)\right\}, \qquad (7)$$

where σ^2 is the annualized variation of relative price change. Equation (7) provides the estimate of lowest price S_{min} as follows:

$$S_{min} = mi\, n(S_t), \qquad (8)$$

and the refund of the price difference R is expressed as

$$R = max[0, (S_0 - S_{min})]. \qquad (9)$$

Assuming that simulations are conducted *i (i=1,2,3…n)* times, the lowest price option price, the cost, or the provision of the lowest price guarantee policy, *V*, is

$$V = \frac{1}{n}\sum_{i=1}^{n} R_i \times e^{-WACC \times T}, \qquad (10)$$

where WACC is the weighted average cost of capital, commonly referred to as a company's cost of capital; in other words, it is the interest that the company is expected to pay for every dollar it can finance based on its risk level. Therefore, WACC is the appropriate discount rate to use for the company cash flow calculation (Berk, DeMarzo, & Harford, 2012).

A question that usually arises with the application of Montel Carlo simulations is how many iterations of a particular Monte Carlo simulation are needed. To answer the question, it is necessary to start by considering certain performance measures expected of the simulation and the iterations needed to obtain a specified accuracy in the result. Driels and Shin (2004) suggested the method that uses a maximum acceptable percentage error for the mean to determine the required number of iterations. Because the limits for the confidence interval are constructed by subtracting and adding the maximum error of the estimate (E_{max}) from and to the sample mean, the maximum error of the estimate can be given by the formula

$$E_{max} = \boldsymbol{Z\alpha}_{/\mathbf{2}} \frac{\boldsymbol{\sigma}}{\sqrt{\boldsymbol{n}}} \qquad (11)$$

where α is the significance level and $\boldsymbol{Z\alpha_{/2}}$ is the z-score obtained from the normal distribution table and is a factor of the level of confidence. For instance, given the confidence level 95%, the significance level is 5%, and the corresponding $\boldsymbol{Z\alpha_{/2}}$ is 0.196. The percentage error of the mean (E) can then can be expressed by:

$$E = 100 Z_{\alpha/2} \frac{\sigma}{\mu\sqrt{n}}. \qquad (12)$$

Equation (12) can be transformed to the number of the required iterations,

$$n = \left[100\ \boldsymbol{Z\alpha_{/2}} \frac{\sigma}{E\mu}\right]^2, \qquad (13)$$

where μ and σ are given by formulas (3) and (5). So, for the example used above where the confidence level is 95%, $\boldsymbol{Z\alpha_{/2}}$ is 0.196, and E= 5, the required number of iterations, n, becomes a certain number and can be interpreted as, by running simulations for n trials, we are 95% confident that a sample mean will not differ by more than 5% from the true mean.

Numerical Example

Considering various LPGPs offered by the hospitality and tourism industry and the quick evolution and frequent modifications of existing policies in their detailed terms, conditions, and restrictions, this study analyzed an LPGP that is analogous to an exotic put option on extremes to resolve the issue of policy migration. In this type of LPGP, a seller offers an *automatic cash refund* equivalent to *100% of the price difference* against the minimum price that occurred *on its own website any time until departure*. Determining the value of this policy also reveals the provision needed to fund such a policy program. The study mainly serves to provide insight into applying the Monte Carlo method and option pricing theory to LPGPs and the numerical examples presented for the purpose of demonstrating the procedures involved in implementing the method in a real company setting. This study collected the prices of 12 non-stop, one-way

flights departing from Chicago en route to Atlanta on August 21, 2012. For each observation, flight prices for economy-class flights were collected from Oribiz.com on a daily basis from July 18 to August 21, 2012. The features of the Price Assurance policy (as of July 30, 2012) offered by Orbitz.com are close to those of the above-mentioned exotic option, with few exceptions. These options are therefore assumed to be equivalent. In this case, the first observed price, S_0, is the purchase price; afterwards, price S_t $(t = 1,2,3 \ldots T)$ is observed every day; the duration of price assurance, *T*, is 34 days; the refund of the price difference $R = max[0, (S_0 - min(S_t))]$, and the provision necessary for the LPGP is $V = \frac{1}{n}\sum_{i=1}^{n} R_i \times e^{-\mathrm{WACC}\times T}$. Figure 2 shows the maximum, minimum, and purchase prices of the 12 flights. Figure 3 plots out the series of observed prices of each of the 12 flights, for which no seasonality on a weekly basis could be observed. Furthermore, the author uses the forecast package installed in R studio[5] to test their seasonality and auto-correlation; the results confirm that there is no significant seasonality on a weekly basis or auto-correlation existing in each of the series. Therefore, price S_t following a GBM is assumed, and a Monte Carlo method is an appropriate model for the analysis.

Table 18 shows the computations of price range and volatility, along with the average relative price change and the daily and annual volatilities of relative price change. The price range of a flight is substantial, with United 3732 having a US$606.00 range between its lowest and highest ticket prices. This result demonstrates a spread between the minimum (US$118.80) and maximum (US$724.80) prices by a factor of 6.1 times. The average relative price change ranges from –0.004 to 0.023; the negative sign indicates the general pattern of price decreases and the positive sign indicates an increase. In terms of annualized volatility of relative price

[5] A free and open-source integrated development environment (IDE) for R, a programming language for statistical computing and graphics.

change, it ranges from 0.406 (US Airway 7267) to 2.284 (AA 3732); the higher volatility indicates the flight is subject to higher price fluctuation, which is consistent with what has already been found, that AA 3732 has the largest price spread.

The Monte Carlo method was used to simulate the price paths of each of the 12 flights, and the parameters used in the simulation are listed in Table 19.The parameters for purchase price (S_0), average relative price change (μ), and annualized volatility of relative price change (σ) were observed or derived from the samples, and their values are presented in Table 18. The number of required iterations (n) for each flight was calculated based on Equation 13 (for details, see the section titled Conceptual Framework) at a 95% confidence level, and the results are displayed in Table 20. The maximum number of required iterations, 1,250,468, is for AA 3720, which can be interpreted as, by running simulations for 1,250,468 trials, it is 95% confident that the simulated mean for AA 3720 will not differ by more than 5% from its true mean. As more iterations take place, the simulation more approaches the population (Driels & Shin, 2004). This study proposed 1,500,000 interactions for all 12 flights. The parameter of stipulated time (T) was determined by the needs of the policy feature: how long the LPGP lasts from the time the service was purchased, in this case $T = 34$ (any time before departure), which are also corresponding numbers for the time points in the simulation (m). According to the WRatings report (2009), the WACC of Orbitz Worldwide Inc. (NYSE: OWW) is 6.2%.

Figure 4 shows the simulated price paths of the US Airways flight (100 simulations used for graphing purposes; 1,500,000 were used in modeling). The generation of the price paths was a random process based on GBM. Starting from the purchase price, the paths exhibit different directions and degrees of velocity and volatility. Figure 5 shows the overall simulated average price paths of the 12 observed flights (1,500,000 iterations), from which we can see that the price

on the last day (departure day) is not necessarily the maximum price. It could be the lowest price (e.g., US 7115, US 6369); the lowest price could occur seven days after ticket purchase (e.g., AA3720) or three days before departure (e.g., US 7267).

Results

The results for the probability of a lower price (*P*) occurring, the cost of price assurance (*V*), the average ticket price ($\overline{S_t}$), and the affordability of the policy ($^{V}/_{\overline{S_t}}$) are shown in Table 21. The probability of a lower price occurring is the sum of the number of Monte Carlo realizations for which the price became lower than the purchase price divided by the total number of Monte Carlo realizations (i.e., *n* realizations). Based on 1,500,000 Monte Carlo simulation runs, the probability of obtaining a lower price is very high, with an average of 92%. This result indicates that there is a 92 out of 100 chance that a customer will be eligible for a price difference refund because the purchase price is not the lowest price. The cost of the price assurance policy with a 34-day coverage ranges from approximately US$26 to US$50.82, with an average of US$37.41, and the simulated average ticket price is US$198.97. From the perspective of a company that offers a price assurance policy, the maximum provision needed to withstand policy risks is approximately US$37 for every ticket sold. Affordability is the indicator that measures the sales percentage allocated to provisions for future refund events. This percentage can be expressed as the cost of an assurance policy divided by the average ticket price. The affordability of launching such a policy ranges from 8.57% for US Airways flight 7267 to 33.32% for United flight 3727. The weighted average affordability across 12 flights is 18.80%, indicating that for every US$100 sales, approximately a maximum US$19 provision should be made for refunds.

Conclusion and Discussion

This study investigated LPGPs from a risk management perspective, examined the cost of promoting LPGPs from the standpoint of real option pricing, and simulated the price paths of underlying assets (service) using the Monte Carlo method. Unlike previous studies, the current work converted the conceptual model into an empirical model, applied parameters derived from real-world data to the model, quantified policy risk exposure, and suggested the provision that companies need to set aside to withstand risks. Given the various LPGPs in the travel industry and the rapid changes in existing policies, the study assessed the cost of an LPGP that is analogous to an exotic put option on extremes to resolve policy migration. The Orbitz Price Assurance scheme possesses features that are similar to those in the aforementioned exotic put option policy, in which a seller offers a guarantee until the period at which a service is used and provides a cash refund equivalent to100% of the price difference. Based on the daily airfares for a flight from Chicago en route to Atlanta (derived from Orbitz.com), the results show that for every US$100 in sales, US$19 (approximately 19% of total sales) should be earmarked for customer refunds. The findings also indicate that there is a 92 out of 100 chance that a customer will receive a refund because the purchase price is not the lowest price.

The policy risk management concept and the Monte Carlo option pricing method introduced in this study present value for practical purposes. Travel companies are aware of the LPGP as a powerful marketing tool and the necessity of competing in the market by offering policies with advanced features favored by customers (e.g., long policy duration). For instance, Priceline.com offers its Best Price Guarantee, which is applicable within 24 hours of booking, but Hotwire.com goes further with its Low Price Guarantee, which has a duration of 48 hours (Starkov & Price, 2003). Orbitz.com surpasses these offers with its Price Assurance, which is

applicable up until departure. Despite the benefits derived from such offers, however, there are some important considerations, such as the risks incurred due to LPGPs, the more advanced features associated with higher financial costs, and greater cash flow distress. The Monte Carlo option pricing model proposed here can be used to assess different LPGPs by changing the parameters that reflect policy features. In addition, the parameters drawn from samples for simulation can be tailored to the individual pricing characteristics of a travel company using the company's historical data. As a result, a marketing analyst in the service field can use their own Monte Carlo outcomes to design specific LPGPs by balancing feature competitiveness and risk affordability. Meanwhile, a financial controller can project cash flow and develop annual budget plans to cope with exposure to the risk of cash flow distress.

Several limitations of this study need to be discussed. First, although the Monte Carlo method presents considerable advantages, as with any mathematical model, it also suffers from a few limitations. Its use heavily depends on a variety of assumptions about inputs and the distribution of samples; false assumptions may cause misleading results. Second, the empirical results derived in this study are based on samples from Orbitz.com and on the features of its Price Assurance scheme, which cannot be generalized to other travel companies or other LPGPs. Moreover, the estimation of provision allowances does not account for the variability of customer refund claim behaviors; this variability comes with the assumption that as long as a lower price occurs, customers will automatically be eligible for and eventually will receive the full price difference. In reality, most travel companies require particular customer actions to trigger refund issuance. These companies also have certain minimum and maximum refund thresholds. For instance, United.com directs its customers to their 1-800 customer service provider to initiate a refund claim, for which a price difference greater than US$10 (United.com,

2013) is necessary. In contrast, Travelocity.com asks customers to submit a request online for refund amounts of no greater than US$500 (Travelocity.com, 2013). Furthermore, not all customers are aware of a company's LPGP or claim a refund unless refund benefits are greater than the corresponding "call-to-action" costs. These limitations can result in estimated policy costs and program affordability indices that are significantly larger than the actual values. Future studies are therefore needed to examine customers' perceptions of and attitudes toward the costs associated with using LPGPs. However, the framework and basic methodology proposed in the study is general and is readily applicable to other samples or service sectors.

*Postscript

According to a news release published on October 17, 2013, Orbitz.com discontinued its Price Assurance program. Bookings made on and after October 17, 2013 will no longer be eligible for the benefits of the scheme. The company website does not disclose any financial or risk-related information on this matter. One cannot help but wonder whether the withdrawal of the program was prompted by the potentially excessive costs associated with offering the guarantee.

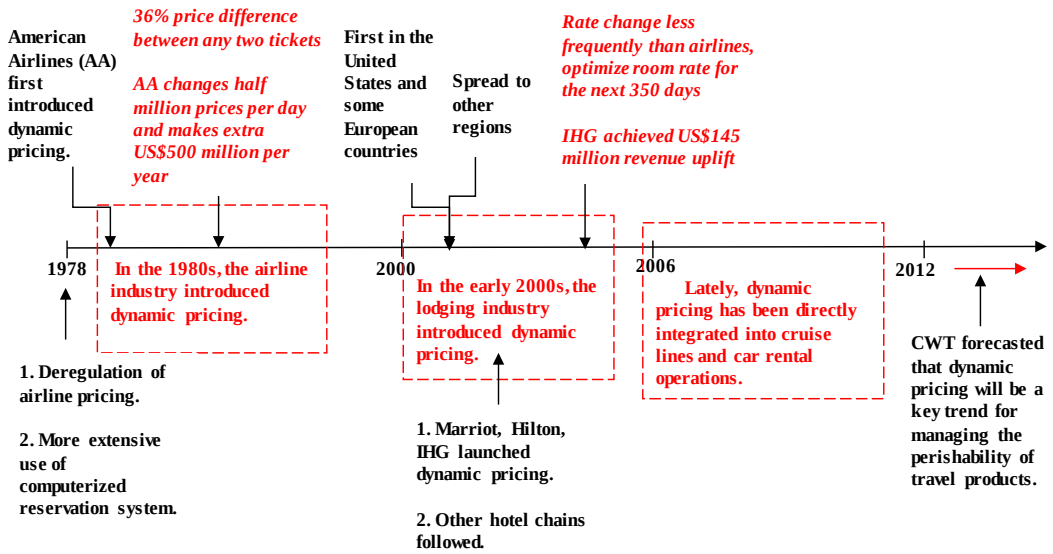


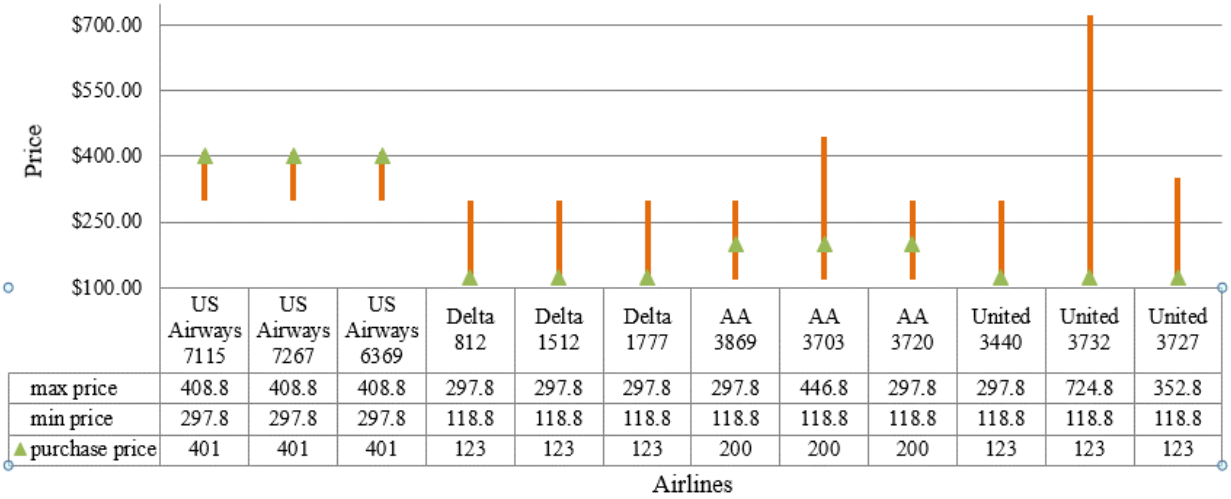
Figure 1. The evolution of dynamic pricing

Table 17

Examples of Lowest Price Guarantee Policies

Company Website	Policy	Time	Benefit
Budget.com	Lowest Rate Promise	Within 7 business days	Refund price difference + a free day rental certificate
Carnival.com	Lowest Price Guarantee	Within 48 hours	Refund 110% price difference onboard credit
Hilton.com	Best Rate Guarantee	Within 24 hours	Refund price difference + $50 USD/gift card
Hotel.com	Price Match Guarantee	Before the cancellation deadline	Refund price difference
Hotwire.com	Low Price Guarantee	Within 48 hours	Refund price difference
Orbitz.com	Price Assurance[1]	Until the date at which a service is pr	Refund price difference
United.com	Low Fare Gurantee	Within 24 hours	Refund price difference + $100 travel certificate

[1]Note: Orbitz reserves the right to modify or cancel Orbitz Price Assurance. The above-mentioned benefit issued by Orbitz.com is valid through July 30, 2012.



	US Airways 7115	US Airways 7267	US Airways 6369	Delta 812	Delta 1512	Delta 1777	AA 3869	AA 3703	AA 3720	United 3440	United 3732	United 3727
max price	408.8	408.8	408.8	297.8	297.8	297.8	297.8	446.8	297.8	297.8	724.8	352.8
min price	297.8	297.8	297.8	118.8	118.8	118.8	118.8	118.8	118.8	118.8	118.8	118.8
purchase price	401	401	401	123	123	123	200	200	200	123	123	123

Figure 2. Descriptive analysis of flight prices

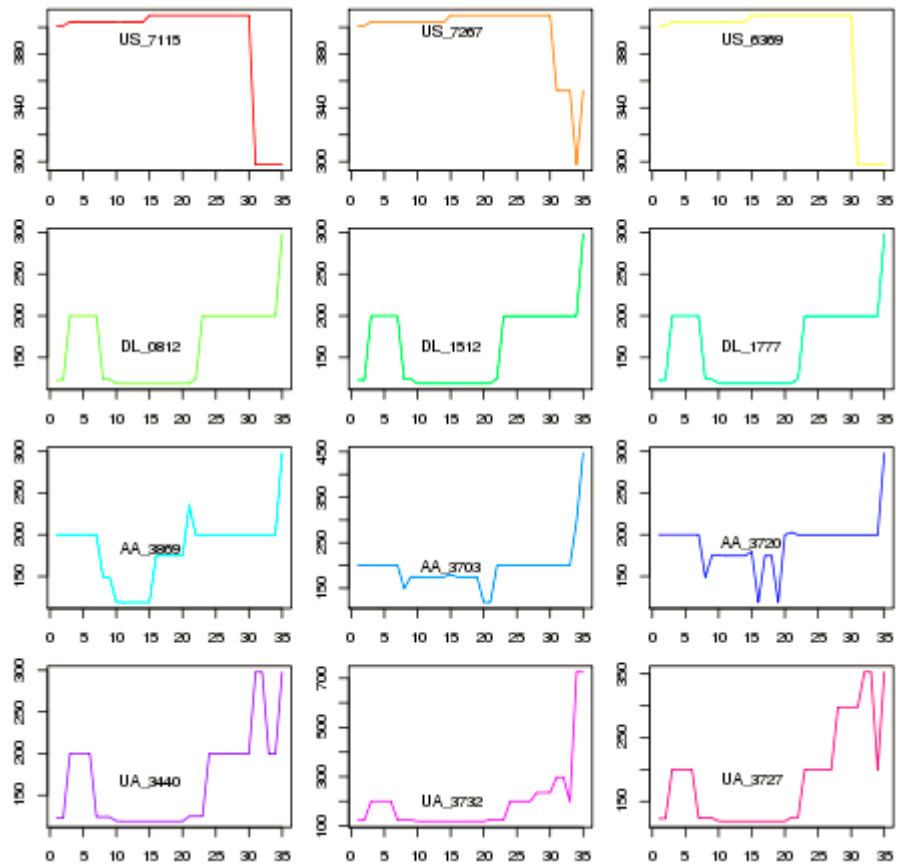


Figure 3. Observed flight prices

Table 18

Variability of ticket prices

Flight	Price range (US$)	Volatility	Average of relative price change	Daily volatility of relative price change	Annualized volatility of relative price change
US Airways 7115	111.00	38.62	-0.004	0.024	0.452
US Airways 7267	111.00	24.55	-0.002	0.021	0.406
US Airways 6369	111.00	38.62	-0.004	0.024	0.452
Delta 812	179.00	46.13	0.011	0.069	1.313
Delta 1512	179.00	46.13	0.011	0.069	1.313
Delta 1777	179.00	46.13	0.011	0.069	1.313
AA 3869	179.00	37.93	0.005	0.056	1.075
AA 3703	328.00	52.14	0.010	0.069	1.323
AA 3720	179.00	28.48	0.005	0.076	1.451
United 3440	179.00	55.72	0.011	0.081	1.546
United 3732	606.00	142.62	0.023	0.120	2.284
United 3727	234.00	78.92	0.013	0.092	1.764

Table 19

Parameters

Parameter	Meaning	Value
S_0	Purchase price	From sample
μ	Average of relative price change	From sample, see equation 3
σ	Annualized volatility of relative price change	From sample, see equation 5
T	Stipulated time	Based on policy feature
n	Number of required iterations	Based on sample, see equation 13
m	Number of time points in the simulation	Based on price observation frequency

Table 20

Number of required iterations

Flight	Average of relative price change (μ)	Annualized volatility of relative price change (σ)	Number of the required iterations (n)[1]
US Airways 7115	-0.004	0.452	217,423
US Airways 7267	-0.002	0.406	944,986
US Airways 6369	-0.004	0.452	217,423
Delta 812	0.011	1.313	207,746
Delta 1512	0.011	1.313	207,746
Delta 1777	0.011	1.313	207,746
AA 3869	0.005	1.075	686,929
AA 3703	0.010	1.323	254,960
AA 3720	0.005	1.451	1,250,468
United 3440	0.011	1.546	287,798
United 3732	0.023	2.284	156,140
United 3727	0.013	1.764	264,080
Maximum required iterations			1,250,468

[1]Note: $n = \left[100\, Z\alpha_{/2}\, \frac{\sigma}{E\mu}\right]^2$, at 95% confidence level, Z(α/2) = 0.196, and E= 5.

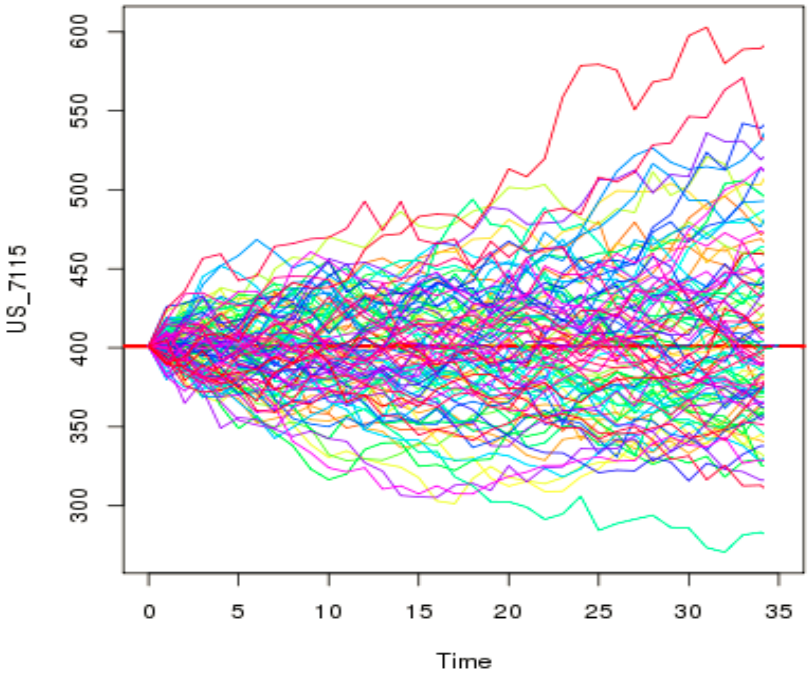


Figure 4. Simulated price paths of US Airways Flight 7115

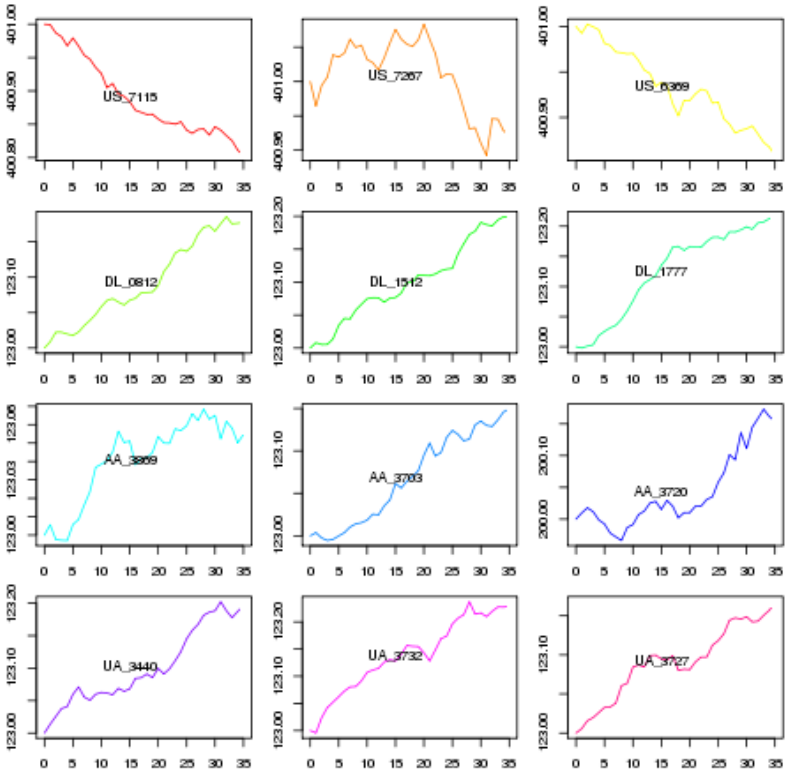


Figure 5. Simulated average price paths of the 12 observed flights based on 1,500,000 iterations

Table 21

Results

Flight	Probability of lower price	Cost of price assurance policy (US$)	Average ticket price (US$)	Affordability
US Airways 7115	91.29%	38.28	400.89	9.55%
US Airways 7267	91.19%	34.38	401.00	8.57%
US Airways 6369	91.30%	38.23	400.93	9.54%
Delta 812	92.54%	31.65	123.09	25.71%
Delta 1512	92.54%	31.66	123.10	25.71%
Delta 1777	92.53%	31.64	123.13	25.70%
AA 3869	92.20%	26.45	123.04	21.50%
AA 3703	92.58%	31.88	123.07	25.91%
AA 3720	92.78%	56.30	200.04	28.14%
United 3440	92.84%	36.56	123.10	29.70%
United 3732	93.90%	50.82	123.14	41.27%
United 3727	93.22%	41.01	123.09	33.32%
Average	**92.41%**	**37.41**	**198.97**	**18.80%**

Chapter IV: Choice-based Conjoint Analysis of Lowest Price Guarantee Policies Offered by Travel Websites: A Customer Preference and Policy Feature Importance Study

Abstract

Customer perceptions and satisfaction are historically major research topics in the hospitality and travel industries. However, research on LPGPs are still relatively limited in the marketing literature, and a thorough understanding of customers' LPGP preferences and the policy features embedded in various LPGPs is much needed in both academia and industry. To have a successful LPGP, travel companies not only need to find a desirable combination of policy features (e.g., policy duration, refund depth) palatable to the shoppers in the targeted market, but also need to handle them carefully to fit their overall financial capabilities and risk appetite. To fill the void, this study is carried out to identify customers' perceptions and preferences in terms of the features of LPGPs, map out the importance of each feature, and quantify the customer utility associated with the various levels of each feature. The statistical technique of choice-based conjoint analysis (CBCA) is used in the investigation from survey design to preference modeling. The findings show that duration is perceived as the most important feature by customers, followed by refund, scope, and required customer action. The threshold feature is not significant statistically, indicating that threshold is not a decision criterion when customers choose LPGPs. The results also indicate that the feature that allows customers to take advantage of lower prices any time before service is delivered carries the highest utility score among the 17 tested feature categories, indicating that customers value long duration more than any other features in their decision-making process. This study is also an extension of Chapter III, eliminating its limitations on customer refund claim behaviors. The survey finds only 6.2% of customers who have or potentially have online travel product purchase

experience have actually claimed refunds using LPGPs. To summarize the results of both studies, it is estimated that the tested LPGPs' overall cost is approximately 1.26% of total sales. This whole study and its conclusion provide strong managerial and theoretical guidance to the travel industry and offer a fundamental framework for designing an LPGP in a presumably wide range of target markets.

Keywords: lowest price guarantee policies, travel websites, customer perceptions and satisfactions, choice-based conjoint analysis

Introduction

The travel industry has gone through a tremendous evolution, from the use of computerized reservation systems in the early 1980s (Rhee & Yang, 2014) to the extensive application of dynamic pricing in the early 2000s (Mannix, 2008). In the meantime, the rise of Internet-based booking channels has increased price transparency and decreased search costs for consumers (Hinz et al., 2011), thereby enabling travelers to compare multiple travel websites across time while constantly pursuing lower prices (Jain & Cox, 2011). Carroll (2004) revealed that in 2003, 69% of online travel buyers visited two or more websites to book hotel rooms. To motivate customers to book in advance and to book through their own domains, all major hotel chains, airline companies, car rental firms, cruise lines, and third-party OTAs have launched various LPGPs (Garrido, 2012). As stated by Starkov and Price (2003), an LPGP is a powerful marketing tool to boost online distribution and has become one of the main factors that influence people to book online. It is also ranked as one of the most desirable website features according to the results of the Portrait of American Travelers survey conducted by MMGY Global (Yesawich, 2013).

Travel companies have been aware of the necessity of competing in the market by offering LPGPs with advanced features favored by customers (e.g., long duration). The ability of travel companies to survive and boost their market share in today's exceptionally competitive market depends on their having a thorough understanding of customers' needs and preferences and on delivering true customer value. That is, management must effectively use their resources to maximize the perceived value of their LPGP offerings to target customers, which consequently results in higher purchase intention and customer satisfaction. Initially, LPGPs were designed by brick and mortar stores to send the low price signal (e.g., Walmart's slogan: Everyday Low Prices), and now they are employed by numerous online retailers in the travel industry (e.g., Hilton.com offers a Best Rate Guarantee). Today, marketing, finance, and risk management play increasingly important roles when designing LPGPs for various online travel product shoppers. The widespread use of LPGPs has stimulated a growing body of research on these policies in the areas of economics (Arbatskaya et al., 2004), marketing, and consumer behavior (e.g., Belton, 1987; Biswas et al., 2002; Dutta & Biswas, 2005; Hviid & Shaffer, 1999; Kukar-Kinney & Grewal, 2006; McWilliams & Gerstner, 2006; Srivastava & Lurie, 2001; Srivastava & Lurie, 2004). However, most focus on traditional retail business models rather than on online travel websites that use dynamic pricing strategies to sell perishable products (services). Moreover, very few LPGP studies provide implications for consumer policy advocates by interpreting the results of sophisticated mathematical models. This study supplements prior research by demonstrating how CBCA can be applied by travel companies to design LPGPs that maximize value for customers.

Background and Purpose of the Study

During the past several decades, rapid technological developments, especially Internet technology, have resulted in enormous changes in the travel industry.

First, the travel industry is the world's second-fastest growing sector (Ali, 2015), providing 284 million jobs and generating 9.8% of the world's GDP (World Travel & Tourism Council, 2016). According to the Oxford Economics global industry model projects, travel and tourism will direct industry GDP to grow 3.9% per annum (compound annual growth) over the next decade.

Second, the revolution in booking arrangements led to the change of sales and transactions from direct on-the-spot purchasing with suppliers to Internet-based distribution channels. With the success of the commercial Internet in the early 1990s, many leading travel brands began developing websites, some with online reservation capabilities (Joyce, 2013). As of 2015, 60% of travel product purchases are made online, which will continue growing due to the widespread use of smart phones and the booming of mobile device booking (eMarketer estimates, 2015).

Third, with the rise of Internet booking channels, new opportunities emerge to foster price transparency and provide travelers more price and product information, including access to reviews and recommendations (Joyce, 2013), which results in sharply increased competitive pressures for travel companies. Meanwhile, travelers have become more informed and educated buyers of travel products (Del Chiappa, 2013) and their expectations have grown as their knowledge on travel products and prices has expanded. Customers would not patronize a firm without some form of assurance (e.g., LPGP) that they will find the products or services they desire (Su & Zhang, 2009). Eighty percent of American travelers view "a lowest price/rate

guarantee" as one of the most desirable travel website features (Yesawich, 2013). Therefore, for travel companies to take a proactive stance in today's dynamic environment, managers must have knowledge about their competitors' LPGP offers and about consumers' reactions to alternative policy choices (Zeithaml & Zeithaml, 1984; Gates, McDaniel, & Braunsberger, 2000). Furthermore, under the pressure of potential legal consequences and cost control, LPGP terms and conditions are evolving rapidly. In addition, according to the nature of a post-recession economy, the author projects LPGPs will change due to a new merges and acquisitions (M&A) market upswing among travel companies. For example, American Airlines completed an acquisition with US Airways on October 17, 2015, and then the US Airway brand was absorbed by American Airlines and its LPGP eliminated (Jean, 2015). Another example is that Marriott International closed a deal to acquire Starwood Hotels & Resorts in April, 2016; the companies announced that their loyalty programs will run in parallel at first but will eventually be combined by 2018 (Ting, 2016). It is anticipated that the same thing will happen to their LPGPs. Therefore, managers of travel companies must continue to evaluate their LPGPs and monitor customer perceptions and satisfaction over time as the environment transforms.

Customer perceptions and satisfaction are historically major research topics in the hospitality and travel industries. However, research on LPGPs is still relatively limited in the marketing literature, and a thorough understanding of customers' LPGP preferences and of the policy features embedded in various LPGPs is greatly needed in both academia and industry. Customers vote with their fingers in online shopping, and the presence of an LPGP with customer-favored characteristics results in higher value perceptions and shopping intentions (Kukar-Kinney, 2006). To have successful LPGPs, travel companies not only need to find a desirable combination of policy features (e.g., policy duration, refund depth) palatable to the

shoppers in the targeted market but also need to handle them carefully to fit their overall financial capabilities and risk appetite. With these goals, the current study is carried out to identify customers' perceptions of and preferences regarding the features of LPGPs, map out the importance of each feature, and quantify the customer utility associated with the various levels of each feature. The statistical technique CBCA is used in the investigation, from survey design to preference modeling. The CBCA method is chosen because of the simple premise that customers evaluate the value or utility of an LPGP by combining the utilities they associate with each level of each feature. The survey asks respondents to perform a very realistic task—to choose among a set of LPGPs. For the model input, respondents do not need to answer questions, such as how important a specific LPGP feature is or their evaluation of the LPGP on a number of feature ratings. The study constructs the sets of LPGPs in the questionnaire in a specific manner (explained in more detail in a later section), and the importance of each feature and each level of the features can be gauged based on the overall rating collected in the survey.

Selection of Policy Features and Feature Categories

To investigate the contribution of each feature to the customers' overall rating, the study first needs to determine the set of LPGP features and their categories or levels that are reasonably connected to the goal of the study. Subsequently, an appropriate number of feature combinations will make up the set of LPGPs that respondents need to assess. Chapter II (Lowest Price Guarantee on Travel Websites, Policy Variety and Key Features) has summarized LPGPs into five key features, as well as their related categories/levels, using data (policies) published by travel websites covering a majority of service sectors in the US travel industry. This study utilizes the results and combines them into policy profiles to be selected by respondents in a CBCA-based questionnaire.

Refund.

The refund feature includes questions such as “Does the LPGP refund 100% of the price difference?”, “Is there any additional incentive besides price matching?” and “What type(s) of monetary refund, cash, credit, or combination thereof is offered?” Refund is the main feature considered in the study. To satisfy customers, the travel websites compete by offering advanced refund features; examples of such refunds include a cash refund equivalent to 100% of the price difference (e.g., Hotel.com, Orbitz.com), a 110% refund equivalent to the price difference of onboard credit (e.g., Carnival.com), a 100% cash refund that corresponds to the price difference plus US$50 or a gift card (e.g., Hilton.com), and a 100% cash refund of the price difference plus a US$100 travel certificate (e.g., United.com). Saini and Sahay (2014) state that the depth of the refund can positively affect customer perceptions of LPGPs, and an LPGP with a higher refund amount may lead to stronger customer intention to purchase.

Based on the results generated in the previous study (Chapter II, Table 3) and the requirements in the current one, the number of refund categories is limited to five (the top five by frequency refund categories were selected which represent 86% of the LPGPs that have an explicit refund in Study 1). The five refund categories selected for the present study are:

R1 - 100% price difference refund in cash
R2 - Match lower price in cash and additional 10% discount off the competing rate
R3 - 100% price difference in cash and $50 in credit
R4 - 110% of the price difference in credit
R5 - 100% price difference in cash and additional $100 in credit

Duration.

The duration feature in LPGPs provides information on how long the LPGP will protect customers’ purchases. Examples of duration are: “within 24 hours of booking” (Hyatt.com) and “Price match right up until the day before check in” (Hotels.com). The duration feature is

commonly the focus of attention when customers compare LPGPs. The longer the duration an LPGP covers, the more likely a customer will be eligible for a refund eventually and the more positive perception of the LPGP a customer will have.

Based on the results from the previous study (Chapter II, Table 5) and the requirements of the current one, the number of duration categories are reduced to three (the top three duration categories by frequency are selected, which represent 85% of all the LPGPs that have an explicit duration in Study 1). The three duration categories selected for the study are:

D1 - 24 hours
D2 - 48 hours
D3 - Any time before your departure/check-in/pick-up

Scope.

The scope feature in LPGPs answers the following question: Does the LPGP apply to the provider's own future price, only rivals', or both? There are three scenarios about legible lower prices in LPGPs. Some travel websites accept lower prices that are only available on their rivals' websites (e.g., AA.com, Hyatt.com), some only match their own future prices (e.g., Alaskaair.com), and others set no constraint in terms of the websites that offer lower prices (e.g., Marriott.com, Cheapoair.com). The fewer constraints the scope feature has, the more likely the lower price will be acknowledged, the more customers will be qualified for a refund, and the higher the perceived value from customers. Based on the results in the previous study (Chapter II, Table 6), the three scope categories are as below:

S1 - Comparison rate publicly available on another website
S2 - Comparison rate publicly available online, no website constraint
S3 - Comparison rate publicly available on its own website

Threshold.

The threshold feature describes the minimum amount of refund defined by an LPGP. For example, United.com starts to refund at US$10 and IHG.com provides minimum refunds of at least 1% of total cost or US$1, whichever is higher. The threshold is considered a restriction in the LPGP terms and conditions because it blocks customers under a certain price range from claiming a refund. The lower the refund threshold is, the more customers will be qualified for refunds, and the more favorable the LPGP is to customers. Based on the results in the previous study (Chapter II, Table 7) and the requirements in the current study, the number of threshold categories is reduced to two. The two threshold categories used for the present study are:

T1 - Minimum starting refund at US$10
T2 - Minimum starting refund at US$1

Required Customer Action.

Last, the feature of required customer actions is used to define whether the trigger for a refund process consists of actions taken by customers. Examples of the required customer actions include: “complete the ‘Best Price Guaranteed’ claim form and submit it online” (Ncl.com), “call JetBlue Customer Support at 1-800-JETBLUE (538-2583), option 3” (Jetblue.com), and “find a lower fare on Alaskaair.com any time…use our automated process to claim a Guaranteed Airfare credit” (Alaskaair.com). It is widely acknowledged that claiming a price guarantee refund incurs some hassle cost (Baake & Schwalbe, 2013). It imposes high costs on customers in terms of either contacting a customer service center to initiate a refund conversation or submitting a qualified claim form online, making customers reluctant to request refunds (Hviid & Shaffer, 1999). The fewer customer actions are needed, the more positive perceptions customers will have of LPGPs. Therefore, it is crucial for management to understand the customers’ perceptions of and preferences for different actions required to start to a refund claim when LPGPs are being

designed and developed. Based on the results in the previous study (Chapter II, Table 8), four required customer action categories are selected, as below:

A1 - Submit online claim
A2 - Call customer service center
A3 - Call service center or submit online claim form
A4 - Automated refund, customers are not required to initiate the refund process

Method

Questionnaire Development.

The data collected for the policy features and feature categories provide the input for the CBCA-based questionnaire design. The five key features and their associated categories provide the basis to create 360 possible LPGPs (5×2×3×3×4=360). It is too costly and time-consuming to ask respondents to evaluate the full set of 360 LPGPs. To make the task more feasible and manageable, a fractional orthogonal design is adopted to evaluate only a small subset of all possible policies without losing the power to evaluate the utility of all features. In this study, the Generate Orthogonal Design procedure in IBM SPSS Statistics 22.0 is employed to create a reduced set of LPGP profiles that are small enough to include in a survey but large enough to assess the relative importance of each feature (IBM SPSS Conjoint 22 Manual). The results are further validated by statistics experts at Auburn University's Statistical Consulting Center. The experts are satisfied that the orthogonal design SPSS generated has the following strong characteristics:

1. It is replicable: the experts ran it twice in SPSS, with the same seed of 10,000 and then got SAS to confirm that the resulting datasets are identical[6].

[6] A different seed is used each time generating a set of random numbers, producing different results; to duplicate the same random numbers, set the same seed value for each run (IBM SPSS Conjoint 22).

2. The results show fair representation of each level for each factor with a subset of 25 (plus four holdouts) from the full set of 360 possible combinations of factor levels[7].

3. The correlation matrix (see Table 22) shows that the design is orthogonal: all factors are completely uncorrelated, a desirable characteristic of experimental designs. This means no confounding of main effects, which leads to a more straightforward interpretation of results.

Table 22

Correlation matrix

Pearson Correlation Coefficients, N = 25					
Prob > |r| under H0: Rho=0					
	Scope	Duration	Refund	Threshold	Required Customer Action
Scope	1	0.000 1	0.000 1	0.000 1	0.000 1
Duration	0.000 1	1	0.000 1	0.000 1	0.000 1
Refund	0.000 1	0.000 1	1	0.000 1	0.000 1
Threshold	0.000 1	0.000 1	0.000 1	1	0.000 1
Required Customer Action	0.000 1	0.000 1	0.000 1	0.000 1	1

In addition, the 25 LPGPs (plus four holdouts) that were validated and confirmed by Auburn University's Statistical Consulting Center are further reviewed by the author and her

[7] According to IBM SPSS Conjoint 22, holdout cases are rated by the subjects but are not used when the conjoint procedure estimates utilities. They are generated from another random plan and not the main-effects experimental plan. The holdout cases do not duplicate the experimental profiles or each other. In the present study, two holdout cares are left and used in the questionnaire for a choice set; however, they are not used in the later CBCA model.

main advisor. By leveraging the knowledge gained in Chapter II, which surveys and documents the LPGPs existing on various travel websites, five LPGPs (plus two holdouts) are removed from the set because their combination of policy features is too favorable to customers and no companies would use them. For example, no such policy exists in the travel market that has all the best features categories for the five key features: those features include no website scope constraint for lower prices, a duration of any time before departure, a 100% price difference refund in cash plus US$100 with only a US$1 threshold, and fully automated refunds with no customer action required to initiate the refund process.

The next step in the questionnaire design using the CBCA approach is to decide: 1) the number of choice sets or cards and 2) the number of LPGPs on each card. Twenty LPGPs (plus two holdouts) are used on five cards with four, four, four, five, and five full policy profiles on each card. Each of the 20 LPGP profiles (plus two holdouts) on the five cards is described in terms of specific categories or levels of the five features identified earlier. The summary of the features and feature categories based on their presentation order in the policy profile is shown in Table 23. Table 24 shows one of the five cards.

Table 23

Summary of features and feature categories in the study

Features/Categories
Scope
S1 - Comparison rate publicly available on another website
S2 - Comparison rate publicly available online, no website constraints
S3 - Comparison rate publicly available on its own website
Duration
D1 - 24 hours
D2 - 48 hours
D3 - Any time before your departure/check-in/pick-up

Threshold

T1 - Minimum starting refund of US$10

T2 - Minimum starting refund of US$1

Required customer action

A1 - Submit online claim

A2 - Call customer service center

A3 - Call service center or submit online claim form

A4 - Automated refund; customers are not required to initiate the refund process

Refund

R1 - 100% price difference refund in cash

R2 - Match lower price in cash and additional 10% discount off the competing rate

R3 - 100% price difference in cash and $50 in credit

R4 - 110% of the price difference in credit

R5 - 100% price difference in cash and an additional $100 in credit

Table 24

Sample card

	LPG1	LPG2	LPG3	LPG4
Scope	You find a published retail price at **another** website lower than your original price for the same travel product(s)	You find a published retail price at **another** website lower than your original price for the same travel product(s)	You find a published retail price at **another** website lower than your original price for the same travel product(s)	You find a published retail price at **another** website lower than your original price for the same travel product(s)
Duration	within **24 hours** of your original purchase	within **24 hours** of your original purchase	**any time** until travel service delivered	within **48 hours** of your original purchase
Threshold	by **$10** or more	by **$10** or more	by **$10** or more	by **$10** or more
Required Action	**no action required**, the website will **automatically** refund	you **call** customer service center, the website will refund	you **call** customer service center **or submit** online claim, the website will refund	you **submit** online claim, the website will refund
Refund	**100% price difference** cash and give you a **$100** certificate for your next time purchase once lower price verified	**100% price difference** cash and give you **additional 10%** discount of the competing rate once lower price verified	**110% price difference** certificate once lower price veilfied	**100% price difference** cash and give you **additional 10%** discount of the competing rate once lower price verified

Besides completing the five cards in the questionnaire, respondents are also requested to answer questions designed to provide a complete individual personal profile. The target population of this study is mainly customers who have experience with or will potentially have

experience with shopping online for travel products. The personal profile questionnaire covers the following topics:

1. demographic data (gender, age, occupation, income, education)
2. information on online travel product shopping
   - previous experience and future potential
   - frequency and expenditure
   - Brand.com or OTAs
3. information on LPGPs
   - familiarity with LPGPs
   - use of LPGPs

Statistical Methodology

Background.

Conjoint measurement was introduced in the field of mathematical psychology (Green & Rao, 1971) as a methodology and then became popular in the marketing research community (Struhl, 1994; Desarbo et al., 1995) in relation to new product development and market response. A famous story of conjoint analysis in the hospitality industry is that Marriott applied a conjoint analysis-based approach involving all major hotel features and services influencing choice to design a new hotel chain, resulting in Courtyard by Marriott (DecisionPro, Inc, 2014). The brand new hotel concept was successfully test-marketed and was subsequently introduced nationally. It eventually spawned an entire new product category in the hotel industry (DecisionPro, Inc, 2014). The method has since became popular in hospitality research dealing with broad aspects of the hotel business (Rhee & Yang, 2014), such as hotel attributes' contribution to customer satisfaction (Danaher, 1997), managers' perceptions of the importance of hotel attributes (Kim & Okamoto, 2006), and the impact of the presentation of hotel-related attributes in travel agent brochures on travelers' purchasing decisions (Huertas-Garcia et al., 2014). This study contributes

to the literature on the application of conjoint analysis in the area of hospitality policies, specifically LPGPs offered by travel websites.

Calculation.

Conjoint analysis is based on a main effects analysis of variance model, which assesses the variables based on a full design or a fractional orthogonal design (used later in the study). The model generates utilities that need to be input into a simulator to model choice. The choice model, as an alternative to conjoint analysis, is gaining popularity because it can be used to study choice directly. The data collection becomes a more realistic and relatively simple task; rather than rating or ranking the profiles, respondents are asked to choose one preferred profile from several choice sets. Therefore, it is also referred to as CBCA (Desarbo et al., 1995; Louviere et al., 2001; Kuhfeld, 2011). The multinomial logit model is a choice model (Manski & McFadden, 1981) employed in carrying out the analysis in this paper.

The multinomial logit model is adopted to model the relationships between a polytomous response variable and a set of regressor variables. In our study in particular, the model is a conditional logit model with unordered responses; only profile features are being chosen from, and no ranking is required in the questionnaire.

In the multinomial logit model, we assume that the log-odds of each response follow a linear model,

$$\gamma_{ij} = log\frac{p_{ij}}{p_{iJ}} = \alpha_j + X_i'\beta_j \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots [eq1],$$

where α_j is a constant and β_j is a vector of regression coefficients for $j = 1,2, \dots, J-1$, where J equals 20 because there are five cards with four, four, four, five, and five profiles, with the last two profiles on the five cards being hold-outs from the model. p_j follows a multinomial distribution. In eq1, the X is a generalized independent variable matrix $[n \times q]$ with $n = 3580$

records (179 individual respondents × 20 LPGP profiles) and $q = 12$ (where there are five variables—scope, duration, refund, refund threshold, and required customer action—and each has three, three, five, two, and four levels. In total, there are 17 levels, five of which are baselines for the five variables; 17-5=12).

The multinomial logit model can also be written in terms of the original probabilities γ_{ij} rather than the log-odds, and it will be equivalent to

$$p_{ij} = \frac{exp\{\gamma_{ij}\}}{\sum_{k=1}^{J} exp\{\gamma_{ik}\}} = \frac{exp\{\alpha_j + X_i'\beta_j\}}{\sum_{k=1}^{J} exp\{\alpha_k + X_i'\beta_k\}} \dots\dots\dots\dots\dots\dots\dots\dots\dots [eq2].$$

In this paper, the models are focused on investigating the utilities based on LPGP features in order to optimize the LPGP. Therefore, the individual respondent characteristics, such as gender, occupation, and age, are intentionally excluded to minimize the noise in order to observe the overall influences from a product design perspective. Consider an individual respondent choosing among m alternatives or profiles in a choice set. Let L_{ik} denote the probability that individual respondent i chooses alternative m as

$$L_{im} = \frac{exp\{\gamma_{im}\}}{\sum_{k=1}^{J} exp\{\gamma_{ik}\}} = \frac{exp\{\alpha_m + Z_i'\beta_m\}}{\sum_{k=1}^{J} exp\{\alpha_k + Z_i'\beta_k\}} \dots\dots\dots\dots\dots\dots\dots\dots\dots [eq3],$$

where α_k is the constant of one combination of features, Z is the survey data matrix with n $=$ 3580 records and 12 levels in the model, and β_k is the coefficient (or utility as commonly used in the conjoint analysis) for the *k-th* profile of 20. A stratification based on the individual respondent ID is included in the models in order to take account of the fact that each individual respondent is requested to answer five questions (five cards, each card is a choice question), each of which requires an individual to choose the best LPGP profile they perceived among those listed.

The null hypothesis H_0 states that all the alternatives or profiles based on the combination of different feature levels are same from each other, which can be expressed statistically as

$$H_0: \beta_1 = \beta_2 = \beta_3 = \cdots = \beta_{20}.$$

A chi-square test is employed to test the overall model significance. The chi-square statistic with degrees of freedom m is

$$\chi^2 = \sum_{j=1}^{m} \frac{(O_j - E_j)^2}{E_j} \dots\dots\dots\dots\dots\dots [eq4].$$

The importance of each feature is defined based on the spread of coefficients within specific features, and it can be formulated as

$$Importance\ of\ F_i = \frac{\max\{\beta_{j\in F_i}\} - \min\{\beta_{j\in F_i}\}}{\sum_{i=1}^{5} \max\{\beta_{j\in F_i}\} - \min\{\beta_{j\in F_i}\}} \dots\dots\dots\dots\dots\dots [eq5],$$

where F_i is the i-th feature among five features in the model, and β_j is the *j-th* coefficient that belongs to F_i.

Results

This section presents the results of the questionnaires. It is divided into three subsections. Subsection one provides a short description of the data collection. Subsection two presents a detailed breakdown of the respondent demographic information and self-identification results. Subsection three summarizes the CBCA findings on the importance of LPGs' features and the utility of each feature level.

Data Collection Results.

The target population of this study was customers who have experience with shopping for travel products online or potential customers who have an interest in shopping for travel products online. The participants had to be at least 19 years old and proficient in English to fully

understand the consent process. Amazon Mechanical Turk (Mturk)[8], a crowd-sourcing online platform, was used to approach the target population and to accomplish the survey task. Because this research was conducted under the auspices of Auburn University, IRB approval was sought and obtained. The researcher posted a survey cover letter on Mturk that invited potential participants to take the survey. Participants were then directed to the survey hosted by Qualtrics through Auburn University, a secure online survey administration and data collection tool. Participation in this study was voluntary though an information letter approved by the IRB, and each participant received US$1.00 as compensation for taking the survey via the Mturk platform. During the period between January 2016 and March 2016, a total of 420 surveys were collected, 290 of which were completed for a completion rate of 69%.

Personal Profile Results.

Table 25 gives a snapshot of the population in this survey. Gender is fairly distributed, with approximately 54% of all respondents classifying themselves as male. In addition, approximately 54% of the respondents self-reported as full-time employees. In terms of age, the range indicates a prime of life orientation among the respondents, with approximately 42% falling in the 30–39 age group. Regarding education, approximately 47% of the respondents have earned a Bachelor's degree or a higher graduate degree. Financially, approximately 34% of respondents have an annual household income ranging between $40,000 and $69,000, and 27% (approximately) self-report an annual household income of over $70,000.

Table 26 shows the characteristics of online shoppers for travel products. It is worth highlighting a few findings from the survey: over 96% of the sample had previous experience with shopping for travel products online. In terms of frequency and expense, approximately 55%

[8] https://www.mturk.com/mturk/help?helpPage=overview

of the respondents purchased travel products online one to two times, and 31% purchased travel products online three or more times in the past 12 months; nearly 69% of respondents spent more than US$200 and 32% spent more than US$600 on the purchase. Regarding the future tendency for online purchasing, 64% of the respondents self-report that they will either likely or very likely purchase travel products online in the coming 12 months. Interestingly, when asked to name the type of websites they like to visit to purchase travel products, more than 70% of the respondents choose OTAs, while only 21% choose to go to Brand.com (official brand websites).

Information on LPGPs is summed up in Table 27. More than 61% of the respondents self-report as being familiar with LPGPs offered by travel websites before taking this survey. However, only 18 of those individuals (6.2%) have used an LPGP to claim a refund on a travel product purchased online, and 67% of those claimed a refund from OTAs and 19% claimed refunds from Brand.com. The low percentage of usage leads to a strong inference that there is a low likelihood that LPGPs are being used by customers or that refunds are actually granted. This finding is consistent with the conclusion from Chapter II that travel companies add restrictions to LPGPs to increase customers' hassle costs in claiming refunds in order to mitigate the financial risk associated with LPGP offers. Furthermore, it is also an extension of Chapter III, the results of which indicate there is roughly a 92 out of 100 chance that lower prices will occur and that for every US$100 in sales, a maximum US$19 provision should be made to satisfy potential customer refund claims. Admittedly, these results are purely based on a Monte Carol simulation, and the estimation of 19% of provisions does not account for the variability in customers' refund claim behaviors. Chapter III is based on a strong assumption that as long as a lower price occurs, customers will automatically be eligible for and will eventually receive the full price difference. In reality, the majority of customers are unaware of LPGPs; even if they notice the policy, they

will hardly claim a refund unless the refund benefits are substantially greater than the corresponding “call-to-action” costs. These limitations in Chapter III resulted in overstating the estimated policy costs and program affordability indices compared to the actual costs of the LPGPs. Chapter IV takes account of the customers’ familiarity and pattern of usage of LPGPs. To combine the results of both studies, it is estimated that LPGPs’ overall cost is approximately 1.26% of total sales (18.80%×6.2%÷92.41%=1.26%).

Table 25

Demographic Information

Frequency of Gender	**N**	**%**	**Frequency of Ages**	**N**	**%**
Male	156	53.8	19–29	71	24.5
Female	134	46.2	30–39	123	42.4
Total	290	100.0	40–49	53	18.3
			50–59	38	13.1
			60+	5	1.7
			Total	290	100.0
Present Occupation (choose all that apply)	**N**	**%**	**Annual Household Income**	**N**	**%**
Student (part time)	10	3.2	Under $15,000	23	7.9
Student (full time)	13	4.1	$15,000–$39,999	92	31.7
Full-time employee	171	53.9	$40,000–$69,999	98	33.8
Part-time employee	49	15.5	$70,000–$99,999	47	16.2
Self-employed	53	16.7	$100,000–$149,999	21	7.2
Unemployed	19	6.0	$150,000 and over	9	3.1
Retired	2	0.6	**Total**	290	100.0
Total	317	100.0			
Education Level	**N**	**%**			
Less than high school	3	1.0			
High school / GED	36	12.4			
Some college	77	26.6			
Associate’s degree	38	13.1			
Bachelor’s Degree	106	36.6			
Graduate Degree	30	10.3			
Total	290	100.0			

Table 26

Information on online travel product shopping – experience and future potential

Had previous experience	**N**	**%**	**How likely to purchase travel products online in next 12 months**	**N**	**%**
Yes	279	96.2	Very likely	108	37.2
No	11	3.8	Likely	77	26.6
Total	290	100.0	Somewhat likely	65	22.4
			Undecided	23	7.9
			Somewhat unlikely	9	3.1
			Unlikely	5	1.7
			Very unlikely	3	1.0
			Total	290	100.0

– Frequency and expenditure

How many times purchased online in past 12 months	**N**	**%**	**How much spent on online travel products in past 12 months**	**N**	**%**
None	41	14.1	Less than $100	54	18.6
1 to 2 times	16	55.2	$101–$200	37	12.8
3 to 4 times	57	19.7	$201–$300	40	13.8
5 to 6 times	15	5.2	$301–$400	28	9.7
7 to 8 times	3	1.0	$401–$500	19	6.6
More than 9 times	14	4.8	$501–$600	19	6.6
Total	290	100.0	More than $600	93	32.1
			Total	290	100.0

– Brand.com or OTA

Which website likely to visit to purchase travel product	**N**	**%**
Brand.com	61	21.0
OTA	204	70.3
Others	25	8.6
Total	290	100.0

Table 27

Information on lowest price guarantee policy

Familiarity with LPGP	**N**	**%**
Yes	179	61.7
No	111	38.3
Total	290	100.0

Use of LPGP					
Have used LPGP for refund	**N**	**%**	**If yes, which website(s)** (choose all that apply)		
Yes	18	6.2	Brand.com	4	19.0
No	272	93.8	OTA	14	66.7
Total	290	100.0	Others	3	14.3
			Total	21	100.0

Choice-based Conjoint Analysis Results.

CBCA is used to estimate the importance of LPGP features as perceived by customers. The utility of each feature level and the chance of each profile being selected are *based on the data for 179 respondents who are self-reportedly familiar with LPGPs offered by travel websites.* Proportional hazard regression (PHREG) procedures in SAS 9.2 are used, and SAS outputs are presented in Appendix C. The results of the model show that the model as a whole is statistically significant ($p<0.01$). Table 28 shows that all the features except threshold are statistically significant ($p<0.01$) in customers' decision-making process. Clearly, the finding shows that threshold is irrelevant when customers choose an LPGP. It indicates that a travel company can add or increase threshold (limited to US$ 10) to mitigate its own financial risk while retaining the same or a similar level of customer preference regarding its LPGP.

Table 28

Results of discrete choice model_type 3 tests

Effect	DF	Wald Chi-Square	Pr > Chi-Square
Scope	2	54.58	<.0001**
Duration	2	80.46	<.0001**
Threshold	1	1.70	0.1922
Required customer action	3	21.42	<.0001**
Refund	4	53.96	<.0001**

** *p<0.001.*

Figure 6 shows that the most important feature is duration, followed by refund, scope, and required customer action. From Table 29, the preeminent role of duration is manifested by the very high utility that customers assign to "any time before departure" in their decision-making process. This feature category carries the highest utility score among all 17 tested. As expected, 48 hours duration is the second most favored among the three categories of duration; the least favored is 24 hours duration. This significance of duration can be justified by the actions taken by major industry players in the market. Priceline.com offers its Best Price Guarantee, which is applicable within 24 hours of booking, but Hotwire.com, a Priceline competitor, goes further with its Low Price Guarantee that has a duration of 48 hours (Starkov & Price, 2003). Orbitz.com surpasses these offers with its Price Assurance, which is applicable up to departure. Nevertheless, the cost of offering more customer-favored features can be overwhelmingly high, especially from the perspective of risk exposure control. It is well explained in previous studies that the more advanced features are associated with higher financial costs and greater cash flow volatility. The results of Chapter II show that 73% of travel websites add restrictions in duration to cope with the risk exposure due to LPGPs. Meanwhile, the results of utility in this study imply that this strategy might also significantly reduce customers' perceived value of the policies. In order to design an optimal strategy in LPGPs,

industry practitioners need to balance between the policy attractiveness and its financial cost to be successful in the market.

Refund is second in importance. Customers express a strong preference for 1) “100% price difference in cash and additional $100 credit” and 2) “100% price difference in cash and $50 in credit”; “110% of the price difference in credit” is ranked third in terms of the utility among refund categories, followed by “match lower price in cash and additional 10% discount off the competing rate”. All the above are PB refunds, and as expected, the purely PM refund of “100% price difference refund in cash” is least favored by customers. By comparing the utilities, it can be seen that “110% price difference refund in credit” is more effective than “match lower price in cash and additional 10% discount off the competing rate” and less effective than “100% price difference in cash and $50 in credit”. This provides grounds for the industry to choose an optimal refund plan that offers higher customer valued policy feature with a similar or lower cost. The results also show that an additional $50 credit refund is perceived as having a higher value than an additional 10% discount off competing rates. This coincides with the fact that the average amount of bookings through travel websites is less than US$500. This finding is also equally valuable to travel business managers offering luxury products or services with a higher value than $500 per booking, as they can consider only using $50 in credit as an additional refund instead of a 10% additional discount to achieve the goals of simultaneously gaining higher customer preference and lowering the policy cost.

Scope is the third important feature with “no website constraints” as the most preferred category, followed by “with constraints from another website”. Restriction to its own website is the category least favored by customers. “No website constraint” has the third highest utility

score among all 17 tested feature categories, implying that customers prioritize it in their decision-making process.

Interestingly, although required customer action in claiming refunds is being discussed extensively in literature—including its association with hassle costs, customer communication channels, and time constraints—this feature in the model is only ranked fourth in importance among the five features. This may be because the respondents recruited from Mturk have higher tolerance of hassle costs than general population. Threshold is not statistically significant in the model. As expected, automated refund is the most preferred category, followed by submitting an online claim and calling a customer service center. Of all the categories tested, calling service center or submitting online claim forms has the lowest score. Further looking at the model result among the four categories of this feature, only automated refund is statistically significant, showing that customers are indifferent to the other three required actions.

Threshold is reported as insignificant based on the model.

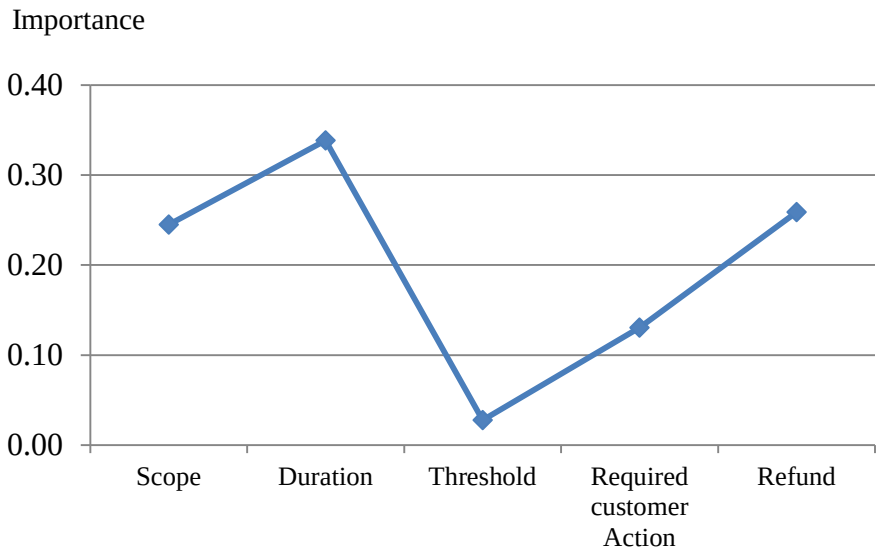


Figure 6. Feature importance

Table 29

Choice-based conjoint analysis results on feature importance, each level utility and significance

Features/Categories	Importance	Utility	Pr > ChiSq
Scope	0.24		
S1 - Comparison rate public available on Another website		0.29	0.04*
S2 - Comparison rate public available online, no website constraint		1.16	<.0001**
S3 - Comparison rate public available on its own website		0.00	
Duration	0.34		
D1 - 24 hour		0.00	
D2 - 48 hours		0.56	<.0001**
D3 - Any time before your departure/check in/pick up		1.61	<.0001**
Threshold	0.03		
T1 - Minimum starting refund at $10 US dollars		0.00	
T2 - Minimum starting refund at $1 US dollar		0.13	0.19
Required customer Action	0.13		
A1 - Submit online claim		0.14	0.44
A2 - Call customer service center		0.01	0.98
A3 - Call service center or submit online claim form		0.00	
A4 - Automated refund, customers do not require to initiate refund process		0.62	<.0001**
Refund	0.26		
R1 - 100% price difference refund in cash		0.00	
R2 - Match lower price in cash and additional 10% discount of the competing rate		0.21	0.28
R3 - 100% price difference in cash and $50 in credit		0.52	0.00**
R4 - 110% of the price difference in credit		0.34	0.04*
R5 - 100% price difference in cash and additional $100 credit		1.23	<.0001**

* *p<0.05.* ** *p<0.01.*

Discussion

Managerial Implications.

The travel industry is characterized by intense competition. The factors considered in evaluating travel products are increasingly linked to marketing messages due to the homogeneity of the products within the service sector. The presentation of an LPGP sends a low price signal to the market, and an LPGP with advanced policy features could be advantageous for travel websites. Different from traditional differentiation strategy focusing on the product itself, it is the differentiation engaging in the price policy of the product.

In addition, the ability of a travel company to survive the competition and further grow its market share in today's market requires the company to understand the needs and preferences of its customers thoroughly and then to deliver true customer value. A successful LPGP reflects comprehensive knowledge of customer needs and wants in order to carry more desirable policy features for the target market without making the financial cost and risk exposure unaffordable. This paper informs industrial practitioners how to leverage customer preference information to design LPGPs with higher customer perceived value. It also demonstrates how service providers can alter the features of LPGPs and estimate the impact on customer utility. For example, the study results show that an additional US$50 credit refund is perceived as having a higher value by customers than an additional 10% discount off a competing rate. Managers of travel businesses providing luxury products or services with higher than $500 per booking could consider using US$50 in credit as an additional refund instead of a 10% additional discount to gain higher customer preference without increasing the policy cost.

Another significant insight from this study relates to the advertisement potential of customers' top rated features. For example, this study identifies the leading role of duration among the five key LPGP features, and the "any time before departure duration" category carries the highest utility score of any feature category among the 17 tested. Travel websites that offer this duration category can take full advantage of this feature in advertising their LPGPs to differentiate their service through pricing policy and thus maximize sales by paying attention to increased customer perceived value and purchase intentions.

In addition, the present study is also a complement to the previous two studies and completes the LPGP research in the dissertation. The findings in the personal profile questionnaire show that only 6.2% of customers that have purchased travel products have used

an LPGP to claim a refund. The low percentage of usage strongly supports the argument that LPGPs are seldom used and that refunds are seldom granted even though widely offered in the industry. This finding echoes the fact highlighted in Study 1 that travel companies add restrictions to LPGPs to increase customers hassle cost in claiming refunds in order to minimize the financial risk associated with LPGP offers.

Moreover, this study is an extension of Chapter III by considering customer policy perceptions and refund claim behaviors. The results of Chapter III indicate that there is a 92 out of 100 chance that a lower price will occur and that for every US$100 in sales, a maximum US$19 provision should be made to satisfy potential customer refund claims. Admittedly, these results are purely based on a Monte Carol simulation, and the estimated provision of 19% of sales does not account for the variability in refund claim behaviors; this variability only depends on the assumption that customers will automatically be eligible for and eventually will receive the full price difference as long as a lower price occurs. The simplification overstates estimated policy costs and program affordability indices compared to the actual values. This study relaxes the assumption by taking account of the fact that not all customers are aware of LPGPs or use LPGPs to claim a refund. It was ultimately found that the LPGP (featuring duration up to departure) overall cost is approximately 1.26% of total sales.

Along with the Monte Carlo option pricing model proposed in Chapter III, managers are able to not only evaluate companies' financial cost by altering an LPGP feature but also to quantify the corresponding impact on customers' perceived policy value. Management can potentially use this knowledge to design the most desirable LPGP within their limited financial budgets to optimize LPGP programs. Moreover, by studying customers' reaction to different features and companies' financial benefits by adding restrictions to certain features, managers

can achieve the goal of mitigating financial risk and maintaining customer satisfaction at the same time. For example, a travel company could add the threshold feature or increase the minimum threshold requirement to reduce the cost of an LPGP while retaining a similar level of customer preference towards its LPGP.

The CBCA utilized in the current study is another aspect that contributes to the literature in terms of methodology. The fractional orthogonal design applied to the questionnaire design reduces the number of LPGP profiles to a level that is small enough to include in a survey but large enough to assess the relative importance of each feature. The survey requests the respondents to perform a realistic task by choosing their favorite policy among a set of LPGPs. The employment of this design makes the task of data collection more feasible and manageable. The use of the multinomial discrete choice model helps take the guesswork out of LPGP design. This model directly yields the importance of each feature and the utility of each level of the features from the overall rating collected in the survey. The results shed light on customer perceived value for various policy features, based on which managers can design better LPGPs to increase customer satisfaction.

The CBCA method presented in this study and the Monte Carlo option pricing used in Chapter III are complementary, just as a service quality controller and a financial controller work together to achieve the optimal goal for their company. The Monte Carlo real option pricing concept is used to simulate the price of travel products and thus estimate companies' financial cost of offering LPGs. CBCA helps in assessing the policy utility from customers' perspective. Therefore, travel company managers can leverage both tools to design a specific LPGP by balancing feature competitiveness and risk affordability.

Limitations

There are several limitations of this study that need to be discussed. First, the respondents were recruited from the MTurk online platform, and the sample is biased due to more exposure to Internet technology, more actual experience of online shopping for travel products, and greater familiarity with LPGPs offered by travel websites compared to the general population. Therefore, care should be taken in generalizing the results to general population. This also leads to overestimating the overall cost of an LPGP program. Second, features other than those included in the present study might emerge with the development of LPGPs in future. As LPGPs are evolving constantly and are becoming ever more complicated, the five features and 17 feature categories used in the study will more than likely not cover all the details of an LPGP. Other features may impact customer perceived value of an LPGP, such as the geographical area in which LPGPs are applicable, the requirement on identical products, and the constraints on services that are on sale or offered at discount. Finally, the effect of the brand name of travel websites on customers' perceived value is not considered in the study. Even though limitations exist, the basic methodology proposed in the study is general and can be readily applied to other samples or target markets without major modifications.

Chapter V: Conclusion

This dissertation has presented a comprehensive analysis of lowest price guarantee policies (LPGPs) on travel websites from the documentation of existing policies to the evaluation of the policy cost to the investigation of customer perceived value of key policy features. It consists of three studies on LPGPs from different perspectives, and their results complement each other, thus providing strong managerial and theoretical guidance to the travel industry. The basic methodologies proposed are general and can be readily applied to different sectors of the travel industry.

Using data (policies) published by travel websites representing the majority of service sectors in the US, the first study in Chapter II documented LPGPs' terms and conditions, summarized them into five key feature categories, and inferred the associated motives, policy effects, and financial risks for companies that adopt them. It also compared LPGPs' similarities and differences between different distribution channels and across different service sectors in the travel industry. The results suggest that a majority of LPGPs are inconsistent with their use as facilitating devices based on the following observations: companies add restrictions to mitigate their financial risks associated with LPGPs, and customers incur a high hassle cost during the refund process. The study also found that the two primary types of LPGPs, price-beating lowest price guarantee policies (PB LPGPs) and price-matching lowest price guarantee policies (PM LPGPs), differ significantly in their features and that PB LPGPs are more prone to being affiliated with higher hassle costs and more restrictions. Furthermore, it was found that the adoption of specific types of LPGPs varies substantially across distribution channels and service

sectors. In the service sectors, LPGPs are more homogeneous and the features are more similar.

Chapter II thoroughly discussed the LPGPs' terms and conditions in a qualitative fashion and comprehensively summarized the key features of LPGPs, but nevertheless lacked a systematic way of pricing this policy offer. In order to fill the gap, the second study in Chapter III was carried out to answer a critical question of how to price LPGPs in a quantitative way to achieve both revenue and risk management goal for practitioners.

Chapter III examined the cost of promoting LPGPs from the standpoint of real option pricing, simulated the price paths of underlying assets (travel products) using the Monte Carlo method, and demonstrated the necessity of provisions as tools for managing policy risk exposure. It presented numerical examples using price data from Orbitz.com and applied the parameters derived from real-world data to simulate the price paths of airfares. The simulation results illustrated that the probability of a lower price occurring throughout the booking period up to departure is 92% and that the average affordability of offering Orbitz Price Assurance is approximately19%, which means for every US$100 in air ticket sales, a maximum US$19 (approximate) provision should be made to satisfy potential customer refund claims.

The Monte Carlo approach employed in Chapter III is a widely-recognized robust method to handle the problem of pricing LPGPs. However, a simplified treatment on customers' refund claiming behavior did overestimate the cost of the product by conservatively assuming that all customers will automatically receive claim refund as long as lower prices exist before the service is provided. To account for the differences among customers in refund claim behaviors and policy preferences, the third study in Chapter IV was introduced to measure a vast range of characteristics of customers and their shopping behaviors and preferences, including their refund claim tendency to complement the result from Chapter III.

Chapter IV provided significant insight into customers' perceptions of and preferences for LPGP policy features and quantified the importance of each feature and feature level using fractional orthogonal design and choice-based conjoin analysis in questionnaire development and preference modeling. The findings showed that customers perceive the most important feature to be duration, followed by refund, scope, and required customer action; the threshold feature is not significant in the model, indicating that it is not considered when customers choose LPGPs. The results show that any time before departure carries the highest utility score of any feature category among the 17 tested categories, indicating customers assign very high importance to it in their decision-making process. Furthermore, the survey results found only 6.2% of customers who have or potentially have online travel product purchase experience have actually used an LPGP to claim a refund. To leverage the results of Chapter III, we can estimate that the overall cost of LPGPs (featuring duration up to departure) is 1.26% of total sales.

The three studies together provide strong managerial and theoretical implications for and guidance to the travel industry, .including a comprehensive framework to analyze LPGPs, different perspectives to study LPGPs from policy terms, policy pricing and customers policy preferences, and an estimate on overall policy provision for refund. The Monte Carlo real option pricing method proposed in the Chapter III can be used to estimate companies' financial cost of offering LPGPs, while CBCA employed in the Chapter IV can be deployed to assess the customer perceived policy value. Different data sources used for the three studies complement each other and three studies as a whole can assist management to apply the framework and methods included to evaluate the cost affordability and policy competitiveness of their LPGPs. Further, leveraging this knowledge, travel companies are able to design the most customer desired LPGP within their limited financial budgets for running these programs.

This dissertation is not free of limitations. First, key features other than those included in the present study might emerge in LPGPs. As we know, LPGPs are changing and evolving all the time; therefore, the five features and their corresponding categories used in the study may not be enough to cover all the details of an LPGP. Second, although the Monte Carlo method presented considerable advantages in policy cost calculation, as with any mathematical model it suffers from a few limitations, such as heavily depending on a variety of assumptions about inputs and the distribution of samples. False assumptions may cause misleading results. Third, the respondents in the study were recruited from the MTurk online platform, which means that the sample is biased due to potentially more exposure to Internet technology and higher hassles costs compared to the general population. Therefore, care should be taken in generalizing the results to the overall population. The sample used also led to overestimating the overall cost of LPGP programs. Finally, the effect of the brand name of travel websites on customers' perceived value is not considered in the study. Even though limitations exist, the basic framework and methodologies proposed in the study are general and can be readily applied to other samples or target markets without major modifications.

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Appendix A: Travel websites surveyed[9]

Brand.com				Online Travel Agencies[10]
Airlines[11]	Hotels[12]	Car Rentals[13]	Cruise Lines[14]	
Aa.com[15]	Hilton.com	Enterprise.com	Carnival.com	Booking.com
Delta.com	Marriott.com[16]	Hertz.com	Royalcaribbean.com	TripAdvisor.com
Southwest.com	Wyndham.com	Thrifty.com	Princess.com	Expedia.com
United.com	Choicehotels.com	Alamo.com	Costacruise.com	Hotels.com
Jetblue.com	Ihg.com	Budget.com	Ncl.com	Agoda.com
Alaskaair.com	Bestwestern.com	Nationalcar.com	Hollandamerica.com	Priceline.com
Spirit.com	Starwoodhotels.com	Dollar.com	Msccruisesusa.com	Kayak.com
	G6hospitality.com	Avis.com	Celebritycruises.com	Cheapoair.com
	Hyatt.com	Paylesscar.com	Oceaniacruises.com	Orbitz.com
	Lq.com	Acerentacar.com	Silversea.com	Airbnb.com
				Hotwire.com
				Travelocity.com
				Travelzoo.com
				Travel.yahoo.com
				Bookingbuddy.com

[9] Grey highlighted websites do not offer LPGPs.
[10] Top 15: The most popular US online booking sites in travel (by number of visits). Source: http://skift.com/2014/06/17/the-most-popular-online-booking-sites-in-travel-2014-edition/
[11] Top 7 US airlines (by number of enplaned passengers). Source: https://en.wikipedia.org/wiki/List_of_largest_airlines_in_North_America
[12] Top 10 parent lodging companies in US (by number of rooms). Source: STR CHIA certification course material
[13] Best 10 customer-reviewed US car rental companies. Source: http://car-rental-services-review.toptenreviews.com/
[14] Top 10 cruise lines operating in US by brand (by number of ships). Source: http://travel.usnews.com/cruises/
[15] The merger of American Airlines and US Airways fully completed in 2015. Numbers are the combined figures.
[16] Marriott International closed the deal to acquire Starwood Hotels & Resorts in April, 2016.

Appendix B: Example of collected LPGP document

Company United Airlines
Program Name Low Fare Guarantee
Access date 8/11/2014
http://www.united.com/CMS/en-US/products/travelproducts/Pages/Lowfareguarantee.aspx

if you find a fare for the same flight, itinerary and cabin at a price that is lower than the fare offered on united.com by $10 or more, we'll make up the difference and give you a $100 USD Electronic Travel Certificate. And not only will you find the lowest fare at united.com, but you'll never pay a service fee for booking online.

Here's how this offer works:
• Purchase your ticket at united.com (with a qualifying billing address).
• If you find a published retail price online, for the same United flight, itinerary and cabin, that is lower than the fare purchased on the same day of your original United purchase by $10 or more, call your local United Customer Contact Center office and a representative will connect you with one of our specialists to file your claim.
• We'll refund the difference and give you a $100 USD Electronic Travel Certificate toward a future United flight if we can verify the lower online fare.
We've made united.com one of the most user-friendly travel sites anywhere. You can manage all your flight, hotel and car rental reservations, save up to 75% when booking hotel stays, and save time by checking in online for your flight.

Terms and Conditions

1. Your claim must be made by midnight local time in the country of this country-specific website on the same day on which the ticket is purchased, or within four hours if the ticket is purchased after 8 p.m. local time. Claims must be made by calling your local United Customer Contact Center office. Claims for this offer may not be made through any other United Airlines phone number.

2. The point of sale of the ticket must match the country of the qualifying billing address. Valid only for tickets purchased on united.com.

3. This offer applies only to tickets purchased with cash or a credit card with a qualifying billing address. A qualifying billing address is either a U.S. billing address or a billing address located in the country of this country-specific website.

4. Applies only on itineraries wholly operated and marketed by United Airlines and United Express®.

5. Tickets must be the least expensive available on united.com for the chosen itinerary at the time of purchase. "Lower online fare" means air-only fares which are displayed and sold on a publicly-accessible Internet site for the exact same flights on the same travel dates for the same travel itinerary. Corporate, military, vacation package, opaque agencies and other status discount fares are not eligible. Fares must be for the same cabin (United Global First℠, United BusinessFirst®, United First®, United Business® or United Economy®), and for the exact same flights that carry the same fare restrictions.

6. United Airlines must be able to verify the lower online fare online at the time of claim. Other methods of verification (e.g., faxes, screen prints, etc.) are not eligible.

7. This offer does not apply to base fare differences of less than $10 USD (or local currency equivalent). Differences of $10 USD or more will be refunded to the credit card used for the purchase. There is no limit to the amount of the refund. An Electronic Travel Certificate in the amount of $100 USD will be issued for each ticket eligible under this program. If required by the local law of the country of this country-specific website, a certificate in local currency equal to $100 USD will be granted, if reasonably practicable. The Electronic Travel Certificate is valid toward the future purchase of any United ticket, will only be issued in the name of the ticket holder, is non-transferable and is not combinable with any other Travel Certificate or promotion. The Electronic Travel Certificate will be valid for one (1) year from the date of issue. Electronic Travel Certificate is not valid for codeshare flights.

8. The Electronic Travel Certificate and the difference in fare are the sole and exclusive compensation that will be provided for United's failure to fulfill this offer.

9. United Airlines reserves the right to terminate this offer at any time without notice.

This offer is valid for customers who purchase travel through united.com. Offer valid only on flights operated by United Airlines and United Express. United Vacations® and united.com specials purchases do not qualify for this offer. This promotion is not available to customers who book reward travel via united.com site or other distribution channels.

This offer does not apply to unpublished fares. Unpublished fares are those not available to the general public and include but are not limited to wholesaler or consolidator fares, or corporate, military, government, contract or other discounted fares. This offer does not apply to package fares, including but not limited to airfares sold as part of a travel package, nor does it apply to airfares where the carrier or itinerary details are unknown until after purchase. This offer does not apply to airfares on another website that have been reduced as a result of promotional discounts, such as dollars off coupons, loyalty program discounts or fly "free" offers.

Appendix C: T-test procedure Use 1st t-test

Code:

```
PB<-c(.78, .65, .39, .91)
PM<-c(.56, .56, .11, .67)
sum(PB)
sum(PM)

var.test(PB,PM)
t.test(PB, PM, var.equal=T,paired=T, alternative="greater")
wilcox.test(PB,PM)
```

Result:

t = 5.0481, df = 3, p-value = 0.007497
alternative hypothesis: true difference in means is greater than 0
95% confidence interval

The t-test used percentage as input due to the unequal size of samples in PB and PM.
The mean calculation on number of restrictions in PB and PM is as follows:

Count of Restriction	PB LPGP	PM LPGP	LPGP
1	78%	56%	72%
1	65%	56%	63%
1	39%	11%	31%
1	91%	67%	84%
Total # of restrictions	2.74	1.89	2.50

e.g., 2.74=78%*1+65%*1+39%*1+91%*1

The second t-test for Brand.com and OTA comparison in the study applied the same R code and the same calculation procedure for the mean.

Appendix D: SAS outputs of discrete choice model

The PHREG Procedure

Model Information	
Data Set	WORK.M1
Dependent Variable	Choice2
Censoring Variable	Choice2
Censoring Value(s)	2
Ties Handling	BRESLOW

Number of Observations Read	3580
Number of Observations Used	3580

Class Level Information					
Class	Value	Design Variables			
Scope	1	1	0		
	2	0	0		
	3	0	1		
Duration	1	0	0		
	2	1	0		
	3	0	1		
Refund	1	1	0	0	0
	2	0	1	0	0
	3	0	0	0	0
	4	0	0	1	0
	5	0	0	0	1
RefThresh	1	0			
	2	1			
ReqCustAct	1	1	0	0	
	2	0	1	0	
	3	0	0	1	
	4	0	0	0	

Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Without Covariates	With Covariates
-2 LOG L	2236.442	2048.823
AIC	2236.442	2072.823
SBC	2236.442	2128.948

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	187.6193	12	<.0001
Score	180.8159	12	<.0001
Wald	161.3872	12	<.0001

Type 3 Tests			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Scope	2	54.5784	<.0001
Duration	2	80.4638	<.0001
Refund	4	53.9566	<.0001
RefThresh	1	1.7006	0.1922
ReqCustAct	3	21.4168	<.0001

The PHREG Procedure

Analysis of Maximum Likelihood Estimates								
Parameter		DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	Label
Scope	1	1	0.28742	0.13841	4.3124	0.0378	1.333	Scope 1
Scope	3	1	1.16482	0.15791	54.4157	<.0001	3.205	Scope 3
Duration	2	1	1.61087	0.17966	80.3947	<.0001	5.007	Duration 2
Duration	3	1	0.55969	0.10816	26.7769	<.0001	1.750	Duration 3
Refund	1	1	1.23113	0.21925	31.5300	<.0001	3.425	Refund 1
Refund	2	1	0.51960	0.14674	12.5387	0.0004	1.681	Refund 2
Refund	4	1	0.20835	0.19208	1.1765	0.2781	1.232	Refund 4
Refund	5	1	0.34310	0.17010	4.0686	0.0437	1.409	Refund 5
RefThresh	2	1	0.13132	0.10070	1.7006	0.1922	1.140	RefThresh 2
ReqCustAct	1	1	0.62004	0.14500	18.2853	<.0001	1.859	ReqCustAct 1
ReqCustAct	2	1	0.13656	0.17533	0.6066	0.4361	1.146	ReqCustAct 2
ReqCustAct	3	1	0.01061	0.36563	0.0008	0.9769	1.011	ReqCustAct 3

Appendix E: IRB related documents

The Auburn University Institutional Review Board has approved this Document for use from 01/07/16 to 01/06/19 Protocol # 15-536 EX 1601

COLLEGE OF HUMAN SCIENCE
DEPARTMENT OF NUTRITION, DIETETICS,
AND HOSPITALITY MANAGEMENT

(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS IRB APPROVAL INFORMATION WITH CURRENT DATES HAS BEEN ADDED TO THIS DOCUMENT.)

INFORMATION LETTER
for a Research Study entitled
"Lowest Price Guarantee Police in Travel Industry: A Study of Customers' Policy Preferences and Purchase Intention"

Dear participants:

You are invited to participate in a research study to exam customers' preferences of Lowest Price Guarantee (LPG) policies and their purchase intention from websites offering LPG polices for travel related products. The study is being conducted by Hui Xu, a graduate student, under the direction of Dr. Alecia Douglas, an associate professor in the Auburn University Department of Hotel and Restaurant Management. **You are invited to participate because you have online shopping experience or interests for travel products and are age 19 or older.**

What will be involved if you participate? Your participation is completely voluntary. If you decide to participate in this research study, you will be asked to fill out a questionnaire. Your total time commitment is estimated to be approximately fifteen minutes.

Are there any risks or discomforts? There are no foreseeable risks associated with participation in this study.

Are there any benefits to yourself or others? There are no identified benefits for you as a respondent. However, successful data collection could provide valuable insight for improving the service quality in the hospitality industry.

Will you receive compensation for participation? You will receive $1.00 for taking this survey through the Amazon Mechanical Turk (Mturk) Service.

Are there any costs? No, participation is totally free. Thank you for your time.

If you change your mind about participating, you can withdraw at any time by **closing your browser window**. If you choose to withdraw, your data can be withdrawn as long as it is identifiable. Once you've submitted anonymous data, it cannot be withdrawn since it will be unidentifiable. Your decision about whether or not to participate or to stop participating will not jeopardize your future relations with Auburn University or the Department of hotel and restaurant management.

You responses will be completely anonymous; no identifying information will be collected. All of the survey responses received will be sent immediately to the survey software web site. The survey software web site then stores the responses in a database accessible only by the researcher. All of the data will be deleted from the database at the conclusion of the study. Information collected through your participation may be used to fulfill an educational requirement and could be submitted for publication in an academic journal.

If you have questions about this study, *please* contact Hui Xu at hzx0003@auburn.edu or Dr. Alecia Douglas at acd0011@auburn.edu

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334) 844-5966 or e-mail at IRBadmin@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE IF YOU WANT TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, THE DATA YOU PROVIDE WILL SERVE AS YOUR AGREEMENT TO DO SO. THIS LETTER IS YOURS TO KEEP.

Hui Xu	12/15/2015
Investigator	Date
Alecia Douglas	12/15/2015
Faculty Investigator	Date

The Auburn University Institutional Review Board has approved this Document for use from 01/07/16 to 01/06/19
Protocol # 15-536 EX 1601

The Auburn University Institutional Review Board has approved this document for use from January 7, 2016 to January 6, 2019. Protocol #15-536 EX 1601.

Lowest Price Guarantee Police in Travel Industry: A Study of Customers' Policy Preferences and Purchase Intention

Your Anonymous Survey Link:
https://auburn.qualtrics.com/SE/?SID=SV_736eYho1NrW8N7L

The Auburn University Institutional Review Board has approved this Document for use from
01/07/16 to 01/06/19
Protocol # 15-536 EX 1601

AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD for RESEARCH INVOLVING HUMAN SUBJECTS

REQUEST FOR EXEMPT CATEGORY RESEARCH

For Information or help completing this form, contact: **THE OFFICE OF RESEARCH COMPLIANCE**, 115 Ramsay Hall
Phone: 334-844-5966 **e-mail:** IRBAdmin@auburn.edu **Web Address:** http://www.auburn.edu/research/vpr/ohs/index.htm

Revised 2/1/2014 **Submit completed form to IRBsubmit@auburn.edu or 115 Ramsay Hall, Auburn University 36849.**

Form must be populated using Adobe Acrobat / Pro 9 or greater standalone program (do not fill out in browser). Hand written forms will not be accepted.

Project activities may not begin until you have received approval from the Auburn University IRB.

1. PROJECT PERSONNEL & TRAINING

PRINCIPAL INVESTIGATOR (PI):

Name Hui Xu Title Doctoral Student Dept./School NDHM/HRMT

Address 322 Spidle Hall, Auburn University, 36849 AU Email hzx0003@auburn.edu

Phone 334-332-2990 Dept. Head Dr. Martin O'Neill

FACULTY ADVISOR (if applicable):

Name Alecia Douglas Title Associate Professor Dept./School NDHM/HRMT

Address 358 Spidle Hall, Auburn University, 36849

Phone 334-844-1434 AU Email acd0011@auburn.edu

KEY PERSONNEL: **List Key Personnel (other than PI and FA).** Additional personnel may be listed in an attachment.

Name	Title	Institution	Responsibilities

KEY PERSONNEL TRAINING: Have all Key Personnel completed CITI Human Research Training (including elective modules related to this research) within the last 3 years? ☑ YES ☐ NO

TRAINING CERTIFICATES: Please attach CITI completion certificates for all Key Personnel.

2. PROJECT INFORMATION

Title: Lowest Price Guarantee Polices in Travel Industry: A Study of Customers' Policy Preferences and Purchase Intention

Source of Funding: ☑ Investigator ☐ Internal ☐ External

List External Agency & Grant Number:

List any contractors, sub-contractors, or other entities associate with this project.

List any other IRBs associated with this project (including those involved with reviewing, deferring, or determinations).

FOR ORC OFFICE

DATE RECEIVED IN ORC: _____ by _____ APPRO

DATE OF IRB REVIEW: _____ by _____ APPRO

DATE OF ORC REVIEW: _____ by _____ INTERV

DATE OF APPROVAL: _____ by _____

COMMENTS:

The Auburn University Institutional Review Board has approved this Document for use from 01/07/16 to 01/06/19
Protocol # 15-536 EX 1601

3. PROJECT SUMMARY

a. Does the research involve any special populations?

- ☐ YES ☑ NO Minors (under age 19)
- ☐ YES ☑ NO Pregnant women, fetuses, or any products of conception
- ☐ YES ☑ NO Prisoners or Wards
- ☐ YES ☑ NO Individuals with compromised autonomy and/or decisional capacity

b. Does the research pose more than minimal risk to participants? ☐ YES ☑ NO

Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. 42 CFR 46.102(i)

c. Does the study involve any of the following?

- ☐ YES ☑ NO **Procedures subject to FDA Regulation** Ex. Drugs, biological products, medical devices, etc.
- ☐ YES ☑ NO Use of school records of identifiable students or information from instructors about specific students
- ☐ YES ☑ NO Protected health or medical information when there is a direct or indirect link that could identify the participant
- ☐ YES ☑ NO Collection of sensitive aspects of the participant's own behavior, such as illegal conduct, drug use, sexual behavior or use of alcohol
- ☐ YES ☑ NO Deception of participants

If you checked "YES" to any response in Question #3 STOP. It is likely that your study does not meet the "EXEMPT" requirements. Please complete a PROTOCOL FORM for Expedited or Full Board Review.
You may contact IRB Administration for more information. (Phone: 334-844-5966 or Email: IRBAdmin@auburn.edu)

4. PROJECT DESCRIPTION

a. **Subject Population** (Describe, include age, special population characteristics, etc.)

The target population of this study will consist of customers who have online travel product shopping experience and potential customers who have online travel products shopping interests. The ideal sample size is 400. The participants must be at least 19 years old and be proficient in English enough to fully understand the consent process.

b. Describe, step by step, all procedures and methods that will be used to consent participants.

☐ N/A (Existing data will be used)

Participation in this study is voluntary through an information letter. The participants will be informed clearly about: 1. The purpose of the research, the expected duration, and procedures, 2. Their rights of protection, confidentiality and withdrawal from the study anytime without any penalty, 3. The participants will be provided with a point of contact of the researcher and faculty advisor, in case they have questions about the research and the research participants' rights.

c. **Brief summary of project.** (Include the research question(s) and a brief description of the methodology, including recruitment and how data will be collected and protected.)

The research aims to provide significant insight into customers' preferences of Lowest Price Guarantee (LPG) policies and their purchase intention from websites offering LPG polices for travel products. The research questions are as follows:

(1) What is the relationship between individual customers' characteristics (e.g., price consciousness, fairness perception, gender, age, income, etc.) and their purchase intentions from travel websites offering LPG policies?

(2) What are the customers' overall preferences for LPG policies?

(3) What are the customers' preferences of each of the five LPG policy components (scope, duration, threshold, required action and refund)?

The methodology will be a quantitative survey approach using a random sampling available through Amazon Mechanical Turk (Mturk), a crowd-sourcing online platform that enables its users to obtain high-quality data inexpensively and rapidly. The researcher will post a survey covering letter on Amazon Mturk that invites the potential participants to take the survey. Then participants will be directed to the survey hosted by Qualtrics, through Auburn University, a secure online survey administration and data collection tool. At the completion of data collection, the data will be downloaded from Qualtrics and stored on a university controlled computer in the HRMT graduate office (332, Spidle Hall). Encoded data will be analyzed on the university computer with data restricted using auburn ID and password. Participants will be compensated $1.00 for completing the survey through Amazon Mturk since Amazon Mturk works as a platform of tasks, known as hits, that are allocated to a population of unidentified workers for completion in exchange for compensation.

d. **Waivers. Check any waivers that apply and describe how the project meets the criteria for the waiver.**

- ☐ **Waiver of Consent (Including existing de-identified data)**
- ☐ **Waiver of Documentation of Consent (Use of Information Letter)**
- ☐ **Waiver of Parental Permission (for college students)**

e. **Attachments.** **Please attach Informed Consents, Information Letters, data collection instrument(s), advertisements/recruiting materials, or permission letters/site authorizations as appropriate.**

Signature of Investigator Hui Xu Date 12/15/2015

Signature of Faculty Advisor Alecia Douglas Date 12/17/2015

Signature of Department Head [signature] Date 12/18/15

section1

IRB Approval document will be attached once available.

Have you ever purchased travel products (e.g., airline tickets, hotel rooms, cruise packages, car rentals, etc.) online?

- Yes
- No

In the past 12 months, how many times did you purchase travel products online?

- None
- 1 to 2 times
- 3 to 4 times
- 5 to 6 times
- 7 to 8 times
- More than 9 times

How much you spent on travel products purchased online in the past 12 months?

- Less than $100
- $101-$200
- $201-$300
- $301-$400
- $401-$500
- $501-$600
- More than $600

How likely are you to purchase travel products online in the next 12 months?

Very Unlikely	Unlikely	Somewhat Unlikely	Undecided	Somewhat Likely	Likely	Very Likely
○	○	○	○	○	○	○

When I purchase travel products online, price to me is:

Not at all Important	Very Unimportant	Somewhat Unimportant	Neither Important nor Unimportant	Somewhat Important	Very Important	Extremely Important
○	○	○	○	○	○	○

What one reason best describes your primary purpose for purchasing travel products online?

- Leisure
- Business
- Both

When you purchase travel products online, what website would you likely go to?

- ○ Brand.com (e.g., Hilton.com, United.com, Carnival.com, Enterprise.com)
- ○ Online Travel Agency (e.g., Hotels.com, CheapOair.com, Obitz.com, Expedia.com)
- ○ Destination Website (e.g., Visitflorida.com, Denver.org)
- ○ Flash Sale Website (e.g., Groupon.com, Livingsocial.com)
- ○ Social Media (e.g., Facebook, Twitter)
- ○ Others (please specify):

What travel products did you purchase from the following websites?

	Brand.com	Online Travel Agency	Others (e.g., Destination Website, Flash Sale Website, Social Media, etc.)
Airline tickets	○	○	○
Hotel rooms	○	○	○
Cruises	○	○	○
Car rentals	○	○	○
Vacation packages	○	○	○

section2

Do you know about Lowest Price Guarantee (LPG) Policies?
Many travel websites offer them!

Lowest Price Guarantee policies promise at least 100% price difference refund if a lower price is available on a same or similar travel product within a certain period of time.

What does LPG stand for in the survey?

- Lowest Price Guarantee
- Lowest Passing Grade
- Liquefied Petroleum Gas

Were you familiar with LPG policies offered by travel websites before taking this survey?

- ○ Yes
- ○ No

Have you ever used an LPG policy to claim a refund for price difference of a travel product you purchased online?

- ○ Yes
- ○ No

What travel products did you claim for refund? (choose all that apply)

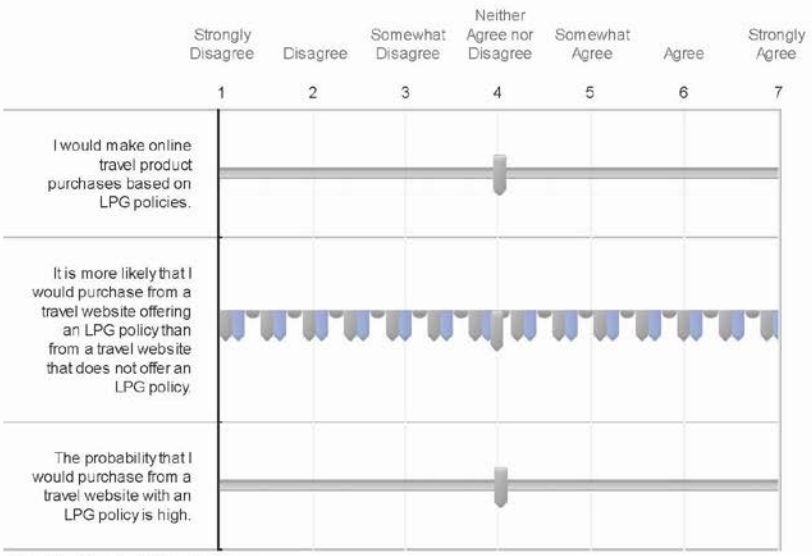
- ☐ Airline tickets
- ☐ Hotel rooms
- ☐ Cruises
- ☐ Car rentals
- ☐ Vacation packages

Which website(s) did you use LPG policies for refund? (choose all that apply)

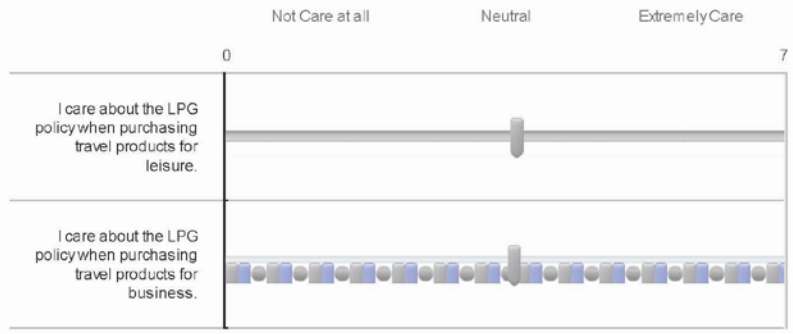
- ☐ Brand.com (e.g., Hilton.com, United.com, Carnival.com, Dollar.com)
- ☐ Online Travel Agency (e.g., Hotels.com, CheapOair.com, Obitz.com, Expedia.com)

- [ ] Destination Website (e.g., Visitflorida.com, Denver.org)
- [ ] Flash Sale Website (e.g., Groupon.com, Livingsocial.com)
- [ ] Social Media (e.g., Facebook, Twitter)
- [ ] Others (please specify):

Please tell us how you feel about the following statements?



Please rate your preference of LPG policies when making online purchases for different travel purpose.



Which travel website offering LPG policy do you believe creates most value for your money?

- ○ Brand.com (e.g., Hilton.com, United.com, Carnival.com, Dollar.com)
- ○ Online Travel Agency (e.g., Hotels.com, CheapOair.com, Obitz.com, Expedia.com)
- ○ Destination Website (e.g., Visitflorida.com, Denver.org)
- ○ Flash Sale Website (e.g., Groupon.com, Livingsocial.com)
- ○ Social Media (e.g., Facebook, Twitter)
- ○

Others (please specify):

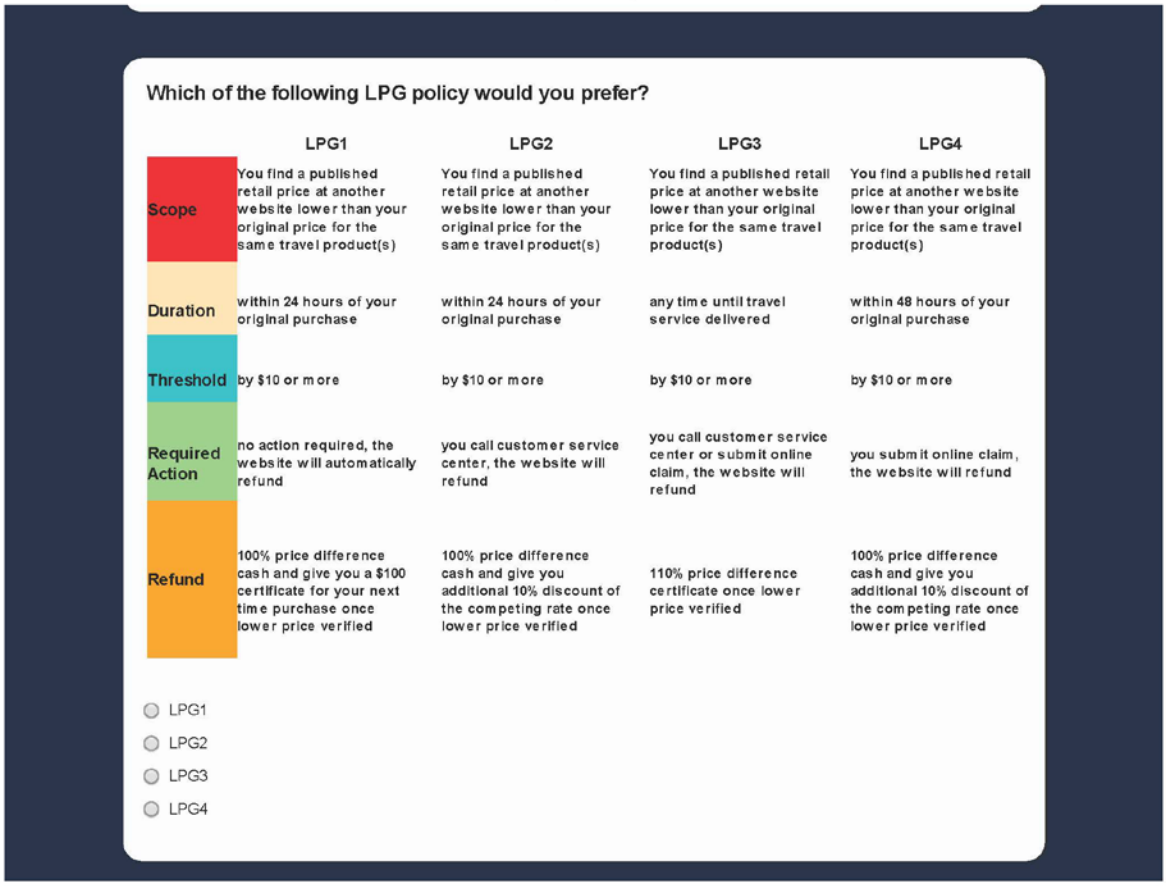
section3

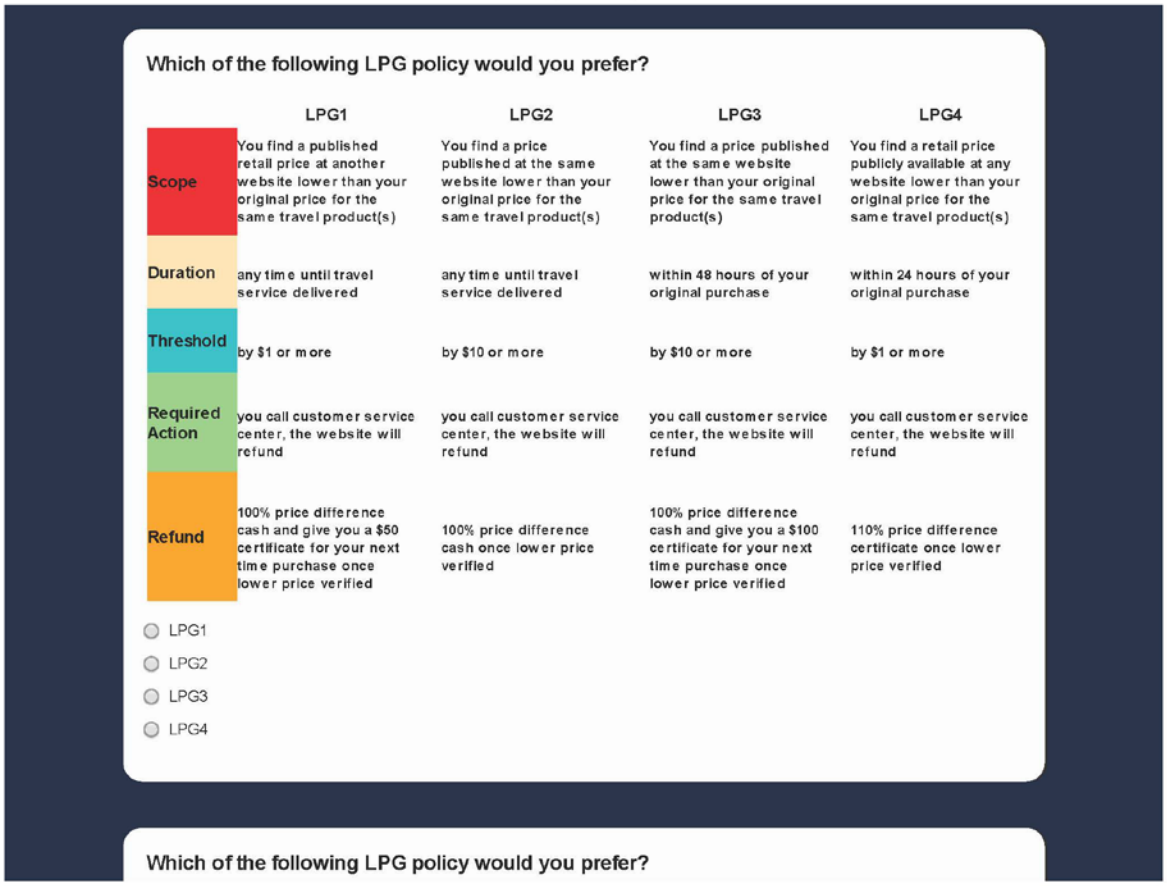
Let's get more details of LPG policies!

There are 5 components to an LPG policy. Here is an example of how United Airlines LPG policy works for American customers who purchased tickets at United.com:

1. You find a lower price at United.com or another travel website (scope) for the same United flight you originally purchased at United.com.
2. You find the lower price on the same day (duration) as your original purchase.
3. The price you found is lower by $10 or more (threshold) than your original purchase price.
4. You call local United Customer Contact Center office (required action) and a specialist will file your claim.
5. United will refund the difference and give you a $100 Electronic Travel Certificate (refund) toward a future United flight if they can verify the lower online fare.

The following section will ask your opinion and preference of LPG policies.


Which of the following LPG policy would you prefer?
LPG1
LPG2
LPG3
LPG4
Scope
You find a published retail price at another website lower than your original price for the same travel product(s)
You find a published retail price at another website lower than your original price for the same travel product(s)
You find a published retail price at another website lower than your original price for the same travel product(s)
You find a published retail price at another website lower than your original price for the same travel product(s)
Duration
within 24 hours of your original purchase
within 24 hours of your original purchase
any time until travel service delivered
within 48 hours of your original purchase
Threshold
by $10 or more
by $10 or more
by $10 or more
by $10 or more
Required Action
no action required, the website will automatically refund
you call customer service center, the website will refund
you call customer service center or submit online claim, the website will refund
you submit online claim, the website will refund
Refund
100% price difference cash and give you a $100 certificate for your next time purchase once lower price verified
100% price difference cash and give you additional 10% discount of the competing rate once lower price verified
110% price difference certificate once lower price verified
100% price difference cash and give you additional 10% discount of the competing rate once lower price verified
LPG1
LPG2
LPG3
LPG4

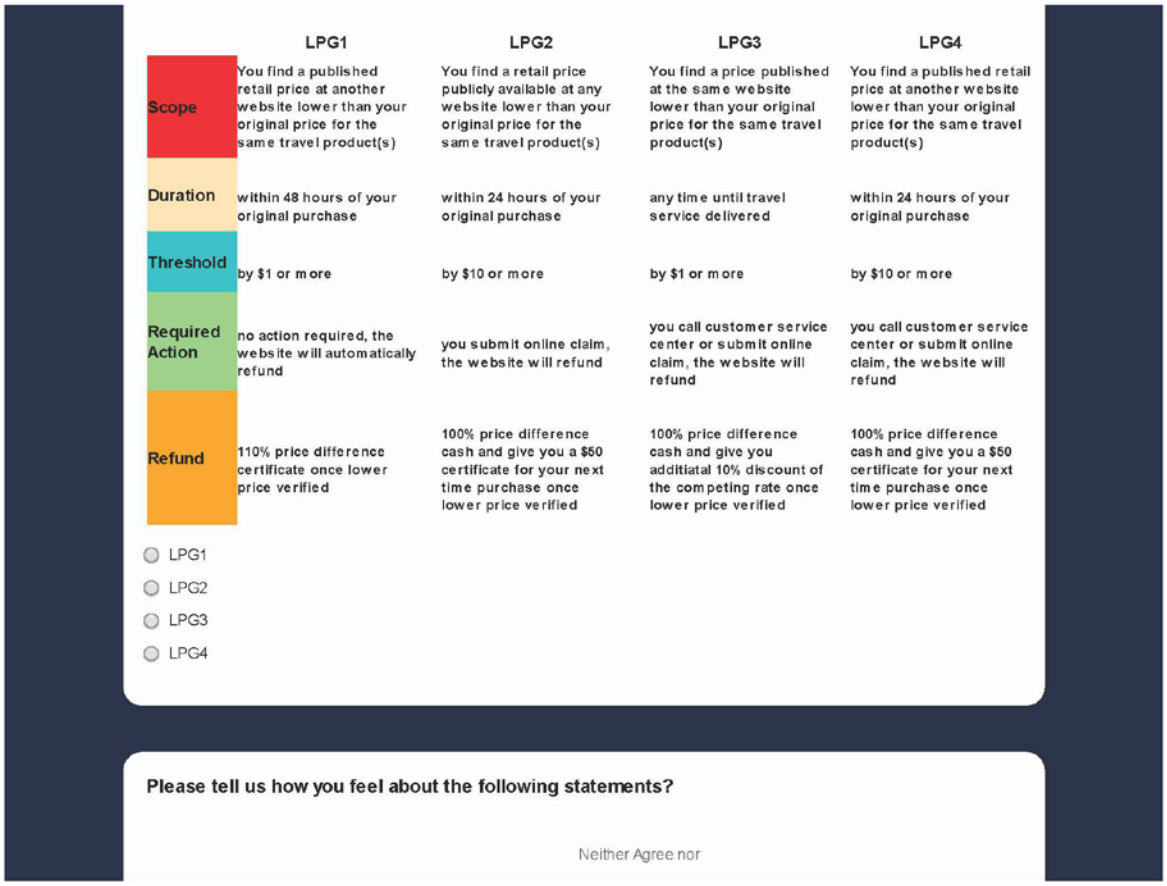


Which of the following LPG policy would you prefer?

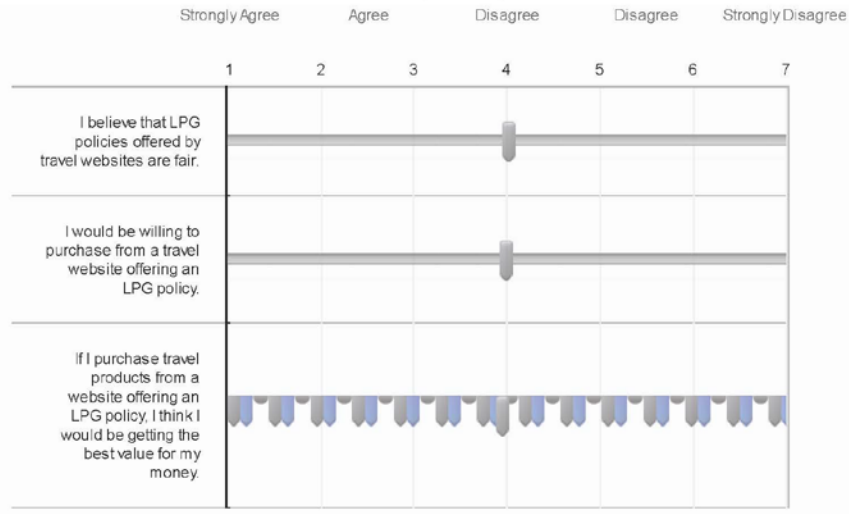
	LPG1	LPG2	LPG3	LPG4
Scope	You find a published retail price at another website lower than your original price for the same travel product(s)	You find a price published at the same website lower than your original price for the same travel product(s)	You find a price published at the same website lower than your original price for the same travel product(s)	You find a retail price publicly available at any website lower than your original price for the same travel product(s)
Duration	any time until travel service delivered	any time until travel service delivered	within 48 hours of your original purchase	within 24 hours of your original purchase
Threshold	by $1 or more	by $10 or more	by $10 or more	by $1 or more
Required Action	you call customer service center, the website will refund	you call customer service center, the website will refund	you call customer service center, the website will refund	you call customer service center, the website will refund
Refund	100% price difference cash and give you a $50 certificate for your next time purchase once lower price verified	100% price difference cash once lower price verified	100% price difference cash and give you a $100 certificate for your next time purchase once lower price verified	110% price difference certificate once lower price verified

- ○ LPG1
- ○ LPG2
- ○ LPG3
- ○ LPG4

Which of the following LPG policy would you prefer?



	LPG1	LPG2	LPG3	LPG4
Scope	You find a published retail price at another website lower than your original price for the same travel product(s)	You find a retail price publicly available at any website lower than your original price for the same travel product(s)	You find a price published at the same website lower than your original price for the same travel product(s)	You find a published retail price at another website lower than your original price for the same travel product(s)
Duration	within 48 hours of your original purchase	within 24 hours of your original purchase	any time until travel service delivered	within 24 hours of your original purchase
Threshold	by $1 or more	by $10 or more	by $1 or more	by $10 or more
Required Action	no action required, the website will automatically refund	you submit online claim, the website will refund	you call customer service center or submit online claim, the website will refund	you call customer service center or submit online claim, the website will refund
Refund	110% price difference certificate once lower price verified	100% price difference cash and give you a $50 certificate for your next time purchase once lower price verified	100% price difference cash and give you additiatal 10% discount of the competing rate once lower price verified	100% price difference cash and give you a $50 certificate for your next time purchase once lower price verified



Which of the following LPG policy would you prefer?

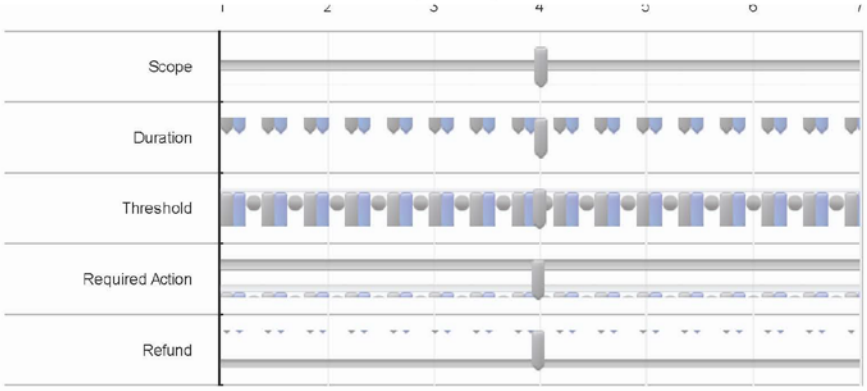
	LPG1	LPG2	LPG3	LPG4	LPG5
Scope	You find a price published at the same website lower than your original price for the same travel product(s)	You find a price published at the same website lower than your original price for the same travel product(s)	You find a price published at the same website lower than your original price for the same travel product(s)	You find a price published at the same website lower than your original price for the same travel product(s)	You find a retail price publicly available at any website lower than your original price for the same travel product(s)

Duration	within 24 hours of your original purchase	within 24 hours of your original purchase	within 24 hours of your original purchase	within 24 hours of your original purchase	within 48 hours of your original purchase
Threshold	by $10 or more	by $1 or more	by $1 or more	by $10 or more	by $10 or more
Required Action	no action required, the website will automatically refund	you call customer service center or submit online claim, the website will refund	you submit online claim, the website will refund	no action required, the website will automatically refund	you call customer service center or submit online claim, the website will refund
Refund	110% price difference certificate once lower price verified	100% price difference cash and give you a $100 certificate for your next time purchase once lower price verified	100% price difference cash once lower price verified	100% price difference cash and give you additiatal 10% discount of the competing rate once lower price verified	100% price difference cash once lower price verified

- ○ LPG1
- ○ LPG2
- ○ LPG3
- ○ LPG4
- ○ LPG5

How important each of the components to you?

	Extremely Important	Very Important	Somewhat Important	Neither Important nor Unimportant	Somewhat Unimportant	Very Unimportant	Not at all Important
	1	2	3	4	5	6	7



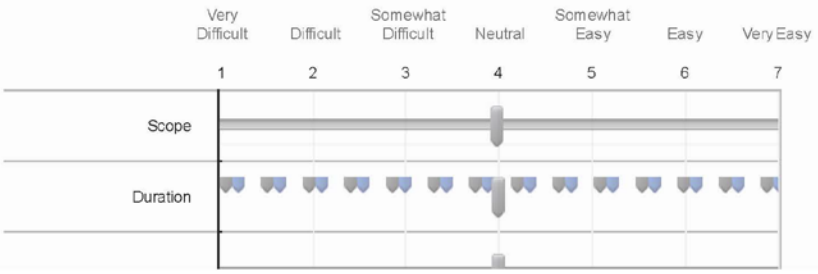
Which of the following LPG policy would you prefer?

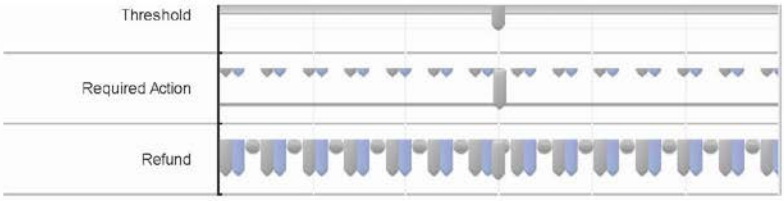
	LPG1	LPG2	LPG3	LPG4	LPG5
Scope	You find a published retail price at another website lower than your original price for the same travel product(s)	You find a published retail price at another website lower than your original price for the same travel product(s)	You find a price published at the same website lower than your original price for the same travel product(s)	You find a published retail price at another website lower than your original price for the same travel product(s)	You find a price published at the same website lower than your original price for the same travel product(s)
Duration	within 24 hours of your original purchase	any time until travel service delivered	within 48 hours of your original purchase	any time until travel service delivered	any time until travel service delivered
Threshold	by $1 or more	by $10 or more	by $1 or more	by $10 or more	by $10 or more

Required Action	no action required, the website will automatically refund	no action required, the website will automatically refund	no action required, the website will automatically refund	you call customer service center, the website will refund	no action required, the website will automatically refund
Refund	100% price difference cash once lower price verified	100% price difference cash once lower price verified	100% price difference cash and give you a $50 certificate for your next time purchase once lower price verified	100% price difference cash and give you a $100 certificate for your next time purchase once lower price verified	100% price difference cash and give you additiatal 10% discount of the competing rate once lower price verified

- ○ LPG1
- ○ LPG2
- ○ LPG3
- ○ LPG4
- ○ LPG5

How difficult do you perceived the components are when you claim a refund?





section4

It's all most done :)
Now tell me something about you.

This final set of questions will help us to understand your answers. This information is not in any way associated with your personal identity.
Your gender is?

- Male
- Female

Which age group do you belong to?

- 19-29

- 30-39
- 40-49
- 50-59
- 60+

Which best describes your present occupation? (choose all that apply)

- [ ] Student (part time)
- [ ] Student (full time)
- [ ] Full-time Employed
- [ ] Part-time Employed
- [ ] Self Employed
- [ ] Unemployed
- [ ] Retired

Please indicate your approximate yearly household income before taxes. (Include total income of all adults living in your household.)

- Under $15,000
- $15,000 - $39,999
- $40,000 - $69,999
- $70,000 - $99,999
- $100,000 -$149,999
- $150,000 and over

What is the highest level of education you have completed?

- Less than High School
- High School / GED
- Some College
- Associate's Degree
- Bachelor's Degree
- Graduate Degree

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

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- Name: [redacted] (ID: 2017747)
- Email: webmaster@auburn.edu
- Institution Affiliation: Auburn University (ID: 964)
- Institution Unit: COLLEGE OF HUMAN SCIENCE
- Phone: 3343322990

- Curriculum Group: IRB Additional Modules
- Course Learner Group: Internet Research - SBE
- Stage: Stage 1 - Basic Course

- Report ID: 14394532
- Completion Date: 12/26/2015
- Expiration Date: 12/25/2018
- Minimum Passing: 80
- Reported Score*: 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Internet-Based Research - SBE (ID: 510)	12/26/15	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

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- Curriculum Group: IRB Additional Modules
- Course Learner Group: Internet Research - SBE
- Stage: Stage 1 - Basic Course

- Report ID: 14394532
- Report Date: 12/28/2015
- Current Score**: 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Internet-Based Research - SBE (ID: 510)	12/26/15	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COURSEWORK REQUIREMENTS REPORT*

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- Institution Affiliation: Auburn University (ID: 964)
- Institution Unit: COLLEGE OF HUMAN SCIENCE
- Phone: 3343322990

- Curriculum Group: IRB Additional Modules
- Course Learner Group: IRB Member
- Stage: Stage 2 - Refresher Course
- Description: This Basic Course is appropriate for IRB or Ethics Committee members.

- Report ID: 14390923
- Completion Date: 12/28/2015
- Expiration Date: 12/27/2018
- Minimum Passing: 80
- Reported Score*: 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
SBE Refresher 1 – Defining Research with Human Subjects (ID: 15029)	12/26/15	2/2 (100%)
SBE Refresher 1 – Privacy and Confidentiality (ID: 15035)	12/26/15	2/2 (100%)
SBE Refresher 1 – Assessing Risk (ID: 15034)	12/26/15	2/2 (100%)
SBE Refresher 1 – Research with Children (ID: 15036)	12/26/15	2/2 (100%)
SBE Refresher 1 – International Research (ID: 15028)	12/26/15	2/2 (100%)
Biomed Refresher 2 - Instructions (ID: 764)	12/26/15	No Quiz
SBE Refresher 1 – History and Ethical Principles (ID: 936)	12/26/15	2/2 (100%)
SBE Refresher 1 – Federal Regulations for Protecting Research Subjects (ID: 937)	12/26/15	2/2 (100%)
SBE Refresher 1 – Informed Consent (ID: 938)	12/26/15	2/2 (100%)
SBE Refresher 1 – Research with Prisoners (ID: 939)	12/26/15	2/2 (100%)
SBE Refresher 1 – Research in Educational Settings (ID: 940)	12/26/15	2/2 (100%)
SBE Refresher 1 – Instructions (ID: 943)	12/26/15	No Quiz
Biomed Refresher 2 – History and Ethical Principles (ID: 511)	12/26/15	3/3 (100%)
Biomed Refresher 2 – Regulations and Process (ID: 512)	12/26/15	2/2 (100%)
Biomed Refresher 2 – Informed Consent (ID: 514)	12/26/15	3/3 (100%)
Biomed Refresher 2 – SBR Methodologies in Biomedical Research (ID: 515)	12/28/15	4/4 (100%)
Biomed Refresher 2 – Genetics Research (ID: 518)	12/26/15	2/2 (100%)
Biomed Refresher 2 – Records-Based Research (ID: 516)	12/28/15	3/3 (100%)
Biomed Refresher 2 - Populations in Research Requiring Additional Considerations and/or Protections (ID: 519)	12/28/15	1/1 (100%)
Biomed Refresher 2 – Vulnerable Subjects – Prisoners (ID: 520)	12/28/15	2/2 (100%)
Biomed Refresher 2 – Vulnerable Subjects – Children (ID: 521)	12/28/15	3/3 (100%)
Biomed Refresher 2 – Vulnerable Subjects – Pregnant Women, Human Fetuses, Neonates (ID: 522)	12/28/15	2/2 (100%)
Biomed Refresher 2 – FDA-Regulated Research (ID: 524)	12/28/15	3/3 (100%)
Biomed Refresher 2 – HIPAA and Human Subjects Research (ID: 525)	12/28/15	5/5 (100%)
Biomed Refresher 2 – Conflicts of Interest in Research Involving Human Subjects (ID: 681)	12/28/15	3/3 (100%)
Auburn University (ID: 12239)	12/28/15	No Quiz

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

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- Phone: 3343322990

- Curriculum Group: IRB Additional Modules
- Course Learner Group: IRB Member
- Stage: Stage 2 - Refresher Course
- Description: This Basic Course is appropriate for IRB or Ethics Committee members.

- Report ID: 14390923
- Report Date: 12/28/2015
- Current Score**: 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Biomed Refresher 2 - Instructions (ID: 764)	12/26/15	No Quiz
SBE Refresher 1 - History and Ethical Principles (ID: 936)	12/26/15	2/2 (100%)
Biomed Refresher 2 - History and Ethical Principles (ID: 511)	12/26/15	3/3 (100%)
SBE Refresher 1 - Federal Regulations for Protecting Research Subjects (ID: 937)	12/26/15	2/2 (100%)
Biomed Refresher 2 - Regulations and Process (ID: 512)	12/26/15	2/2 (100%)
SBE Refresher 1 - Informed Consent (ID: 938)	12/26/15	2/2 (100%)
Biomed Refresher 2 - Informed Consent (ID: 514)	12/26/15	3/3 (100%)
SBE Refresher 1 - Research with Prisoners (ID: 939)	12/26/15	2/2 (100%)
Biomed Refresher 2 - SBR Methodologies in Biomedical Research (ID: 515)	12/28/15	4/4 (100%)
SBE Refresher 1 - Research in Educational Settings (ID: 940)	12/26/15	2/2 (100%)
Biomed Refresher 2 - Records-Based Research (ID: 516)	12/28/15	3/3 (100%)
SBE Refresher 1 - Instructions (ID: 943)	12/26/15	No Quiz
Biomed Refresher 2 - Genetics Research (ID: 518)	12/26/15	2/2 (100%)
SBE Refresher 1 - International Research (ID: 15028)	12/26/15	2/2 (100%)
Biomed Refresher 2 - Populations in Research Requiring Additional Considerations and/or Protections (ID: 519)	12/28/15	1/1 (100%)
SBE Refresher 1 - Defining Research with Human Subjects (ID: 15029)	12/26/15	2/2 (100%)
Biomed Refresher 2 - Vulnerable Subjects - Prisoners (ID: 520)	12/28/15	2/2 (100%)
SBE Refresher 1 - Assessing Risk (ID: 15034)	12/26/15	2/2 (100%)
Biomed Refresher 2 - Vulnerable Subjects - Children (ID: 521)	12/28/15	3/3 (100%)
SBE Refresher 1 - Privacy and Confidentiality (ID: 15035)	12/26/15	2/2 (100%)
Biomed Refresher 2 - Vulnerable Subjects - Pregnant Women, Human Fetuses, Neonates (ID: 522)	12/28/15	2/2 (100%)
SBE Refresher 1 - Research with Children (ID: 15036)	12/26/15	2/2 (100%)
Biomed Refresher 2 - FDA-Regulated Research (ID: 524)	12/28/15	3/3 (100%)
Biomed Refresher 2 - HIPAA and Human Subjects Research (ID: 525)	12/28/15	5/5 (100%)
Biomed Refresher 2 - Conflicts of Interest in Research Involving Human Subjects (ID: 681)	12/28/15	3/3 (100%)
Auburn University (ID: 12239)	12/28/15	No Quiz

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

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- Institution Affiliation: Auburn University (ID: 964)
- Institution Unit: COLLEGE OF HUMAN SCIENCE
- Phone: 3343322990

- Curriculum Group: IRB Additional Modules
- Course Learner Group: Records-Based Research
- Stage: Stage 1 - Basic Course

- Report ID: 14392996
- Completion Date: 12/28/2015
- Expiration Date: 12/27/2018
- Minimum Passing: 80
- Reported Score*: 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Records-Based Research (ID: 5)	12/28/15	3/3 (100%)

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

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- Name: [redacted] (ID: 2017747)
- Email: webmaster@auburn.edu
- Institution Affiliation: Auburn University (ID: 964)
- Institution Unit: COLLEGE OF HUMAN SCIENCE
- Phone: 3343322990

- Curriculum Group: IRB Additional Modules
- Course Learner Group: Records-Based Research
- Stage: Stage 1 - Basic Course

- Report ID: 14392996
- Report Date: 12/28/2015
- Current Score**: 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Records-Based Research (ID: 5)	12/28/15	3/3 (100%)

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI)

COURSE IN THE PROTECTION HUMAN SUBJECTS CURRICULUM COMPLETION REPORT

Printed on 03/21/2014

LEARNER	Alecia Douglas (ID: 805276)
DEPARTMENT	Department of Nutrition, Dietetics and Hospitality Management
PHONE	334-844-1434
EMAIL	acdouglas@auburn.edu
INSTITUTION	Auburn University
EXPIRATION DATE	11/23/2015

SOCIAL/BEHAVIORAL RESEARCH COURSE : Choose this group to satisfy CITI training requirements for Investigators and staff involved primarily in biomedical research with human subjects.

COURSE/STAGE:	Basic Course/1
PASSED ON:	11/24/2010
REFERENCE ID:	4721410

REQUIRED MODULES	DATE COMPLETED	SCORE
Belmont Report and CITI Course Introduction	11/24/10	3/3 (100%)
Students in Research	11/24/10	8/10 (80%)
History and Ethical Principles - SBE	01/31/08	5/5 (100%)
Defining Research with Human Subjects - SBE	01/31/08	4/5 (80%)
Assessing Risk - SBE	02/02/08	5/5 (100%)
Informed Consent - SBE	02/02/08	5/5 (100%)
Privacy and Confidentiality - SBE	02/02/08	5/5 (100%)
Research with Children - SBE	02/02/08	5/5 (100%)
Internet Research - SBE	02/02/08	4/4 (100%)
Auburn University	11/24/10	No Quiz

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI Program participating institution or be a paid Independent Learner. Falsified information and unauthorized use of the CITI Progam course site is unethical, and may be considered research misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Program Course Coordinator

English Text size: A A Alecia Douglas ID: 805276 | Log Out | Help

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Main Menu › Completed Course

Social/Behavioral Research Course - Basic Course

Note: Your completed gradebook is provided for your general interest and suggested reading only!

You do not receive "extra credit" for completing them.
They do not show up on any completion reports.
They will be credited in a grade book if you subsequently enroll in a course that includes them.

Your Score
94%

Modules	Already Taken?	Score
Introduction (ID: 757)	03/21/14	--
Belmont Report and CITI Course Introduction (ID: 1127)	03/21/14	3/3 (100%)
Students in Research (ID: 1321)	03/21/14	10/10 (100%)
History and Ethical Principles - SBE (ID: 490)	03/21/14	5/5 (100%)
Defining Research with Human Subjects - SBE (ID: 491)	03/21/14	5/5 (100%)
The Regulations - SBE (ID: 502)	03/21/14	5/5 (100%)
Assessing Risk - SBE (ID: 503)	03/21/14	5/5 (100%)
Informed Consent - SBE (ID: 504)	03/21/14	5/5 (100%)
Informed Consent (ID: 3)	03/21/14	4/4 (100%)
Privacy and Confidentiality - SBE (ID: 505)	03/21/14	5/5 (100%)
Research with Prisoners - SBE (ID: 506)	03/21/14	4/4 (100%)
Research with Children - SBE (ID: 507)	03/21/14	4/4 (100%)
Research in Public Elementary and Secondary Schools - SBE (ID: 508)	03/21/14	4/4 (100%)
International Research - SBE (ID: 509)	03/21/14	3/3 (100%)
Internet Research - SBE (ID: 510)	03/21/14	5/5 (100%)
Research and HIPAA Privacy Protections (ID: 14)	03/21/14	5/5 (100%)
Vulnerable Subjects - Research Involving Workers/Employees (ID: 483)	03/21/14	4/4 (100%)
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	03/21/14	5/5 (100%)
Auburn University (ID: 12239)	03/21/14	--
History and Ethics of Human Subjects Research (ID: 498)	Optional	--
Basic Institutional Review Board (IRB) Regulations and Review Process (ID: 2)	Optional	--
Social and Behavioral Research (SBR) for Biomedical Researchers (ID: 4)	Optional	--
Records-Based Research (ID: 5)	Optional	--

Modules	Already Taken?	Score
Research With Protected Populations - Vulnerable Subjects: An Overview (ID: 7)	Optional	--
Vulnerable Subjects - Research Involving Prisoners (ID: 8)	Optional	--
Vulnerable Subjects - Research Involving Children (ID: 9)	Optional	--
Vulnerable Subjects - Research Involving Pregnant Women, Human Fetuses, and Neonates (ID: 10)	Optional	--
International Studies (ID: 971)	Optional	--
Group Harms: Research With Culturally or Medically Vulnerable Groups (ID: 11)	Optional	--
FDA-Regulated Research (ID: 12)	Optional	--
Human Subjects Research at the VA (ID: 13)	Optional	--
Hot Topics (ID: 487)	Optional	--
The IRB Member Module - 'What Every New IRB Member Needs to Know' (ID: 816)	Optional	--
VA Module (ID: 696)	Optional	--

Memo

To: Susan Anderson, IRB Administrator
From: Hui Xu
Date: 1/12/16
Subject: Memo for Protocol #15-536 EX 1601

Dear Ms. Anderson,

Thank you very much for IRB's review and comments on my study entitled " Lowest Price Guarantee Policies in Travel Industry: A Study of Customers Policy Preferences and Purchase Intention ". Below are the changes that made in the application documents:

1. Information Letter, 2nd page, 1st sentence, "Your responses will be completely anonymous and confidential;" is changed to "Your responses will be completely anonymous;"

2. Information Letter, 2nd page, last sentence is added "The Auburn University Institutional Review Board has approved this document for use from January 7, 2016 to January 6, 2019. Protocol #15-536 EX 1601."

All the changes are highlighted in the attached completed application package. Thank you very much for your review and please feel free to let me know if any additional information needed.

Best regards,

Hui Xu

Attachments: Protocol #15-536 EX 1601_revised