Journal of Air Transport Management 59 (2017) 134–142

Contents lists available at ScienceDirect

Journal of Air Transport Management

journal homepage: www.elsevier.com/locate/jairtraman

Willingness to pay for airlines' premium economy class: The perspective of passengers

Chung-Wei Kuo [a], Rong-Chang Jou [b, *]

[a] Department of Tourism Information, Aletheia University, No. 32, Zhenli St., Danshui Dist., New Taipei City 25103, Taiwan
[b] Department of Civil Engineering, National Chi Nan University, 1, University Road, Puli 545, Taiwan

ARTICLE INFO

Article history:
Received 19 September 2016
Received in revised form
3 December 2016
Accepted 4 December 2016

Keywords:
Premium economy class
Willingness to pay
Spike model

ABSTRACT

This study investigates how much extra air travellers are willing to pay to upgrade to premium economy class by using a suitable econometric model. Since a large portion of travellers' willingness to pay for premium economy class is zero, the spike model is applied to overcome the issues that may occur when traditional statistical models are used. Three flight distances, short, medium, and long hauls were separately estimated to investigate the effects of flight distance on willingness to pay. Travellers' willingness to pay to upgrade from economy class to premium economy class round-trip was US$138 ,[1] US$309, and US$545 for short-, medium-, and long-haul, respectively. The research results should be a helpful reference for the civil aviation industry in strategic pricing planning.

1. Introduction

Although in recent years, the economic downturn has lingered and the growth of international travel has slowed, the World Tourism Organization (2012) reports a growth of 3–4% in the number of travellers worldwide. With both higher knowledge levels and an increase in consumer awareness, people not only value leisure activities more but also ask for more in terms of service. People not only request sophisticated services but also hope for greater selection. However, in light of high fuel prices and a period of low-profit operation, competition in the airline industry has become increasingly fierce. To offer travellers a better flight environment and attract more travellers of all types, airline services are becoming more sophisticated and diversified.

Some airlines strive to bring elements of business-class service to economy class by offering not only service upgrades and innovations but also diversified premium economy class services as additional choices to meet travellers' needs. By providing more comprehensive and diversified services, airlines hope that travellers not only will perceive a high level of added value but will also establish loyalty. In the current economic-downturn environment, the concept of premium economy class service also offers travellers who once travelled in business class an alternative to economy-class travel while still cutting costs. Conversely, this design offers a new option to economy-class travellers who are willing to pay extra to enjoy higher-level services. Lee and Luengo-Prado (2004) found that United's Premium Economy program helped it boost its average fare, while it was also effective in attracting passengers willing to pay higher fares for greater seat pitch. Doganis (2010) indicates that the premium economy class will be a successful and profitability cabin. Cindy and O'Connell (2015) even think that premium economy class cabins could very well become an embedded and sustainable product long haul travel in the near future. Accordingly, offering premium economy class not only provides airlines with self-competitiveness but can also sustainably enhance airlines' load factors and profitability.

In 1992, EVA Air was one of the world's first carriers to introduce a premium economy class. Premium economy class is a civil aviation service class that is higher than economy class but lower than business class. Different airlines have different names for premium economy class. For example, Eva Air calls its premium economy class Elite Class or Evergreen Deluxe Class. China Airlines calls its premium economy class Economy Extra. In terms of costs, business class fares are much higher than economy class fares. However, in Taiwan, premium economy class fares can be found on various travel websites and are usually approximately 10%–30% higher than economy class, proportional to travel distance. In addition, long-haul flight travellers hate cramped seats the most because such seats always cause discomfort during the travel. However,

* Corresponding author.
E-mail address: rcjou@ncnu.edu.tw (R.-C. Jou).

[1] 1 US$ = 31.77 NT$ at the time of study.

http://dx.doi.org/10.1016/j.jairtraman.2016.12.005
0969-6997/

premium economy class offers relatively new equipment and more satisfying services, such as greatly expanded personal space (including seat width and seat pitch), premium personal necessities, and higher service levels than in economy class.

Premium economy class even relaxes limits on checked baggage. Travellers therefore experience a fairly comfortable seating environment and sophisticated services even during a long-haul flight. In addition, the primary reason for airlines to introduce a premium economy class different from economy and business class is to attract travellers who enjoy services better than those in economy class but are not willing to pay business-class fares. The trend of offering a premium economy class indicates that some airlines have already sensed that offering this type of premium class service will enhance their business strategy of improving occupancy rates. Hugon-Duprat and O'Connell (2015)'s findings show that implementing a premium economy seat only 1.6 times more expensive than an economy seat to produce, but it generates revenues that are 2.3 times higher than its cost of production. The trend also indicates that there is room for further development of premium economy class services.

However, in the existing literature, most of the discussions are on environmental issues (Lu and Shon, 2012; Hagmann et al., 2015), service quality issues (Zhang, 2012), and WTP issues which are not relevant to the WTP of premium economy class (Chang and Sun, 2012; Balcombe et al., 2009). It is therefore important for the aviation industry to understand the factors that affect travellers' choice of premium economy class and how much travellers are willing to pay, which are crucial topics in promotions of premium economy class. In addition, since approximately 44.8% of short-haul travellers, 31.3% of medium-haul travellers, and 29.9% of long-haul travellers, respectively, were not willing to pay extra for premium economy class, this study used the spike model to avoid estimation bias and thus provide a more realistic result.

This study mainly hope to understand how much air travellers are willing to pay to upgrade from economy to premium economy class. Because travellers' choice of airline cabin class is a reflection of a choice behaviour based on their perceptions of cabin service, the economic value of that service cannot be measured in monetary terms. From an economic point of view, service content is in the nature of non-market goods. One widely used approach for assessing non-market goods is the Contingent Value Method (CVM), which has an advantage in assessing the value of nonmarket goods in the conversion of the value of goods, primarily through surveys or similar interview methods. CVM asks respondents to subjectively determine the dollar value of non-market goods, and determines what maximum sum the respondents would be willing to pay for a given good. The value of willingness to pay (WTP) for the individual is elicited from answers to hypothetical questions in the survey. As a result, this study is based on random utility theory, combined with CVM, to establish a virtual market for travellers were willing to pay extra to upgrade to premium economy class under different pricing scenarios.

In the survey conducted for this study, approximately 44.8% of short-haul travellers, 31.3% of medium-haul travellers, and 29.9% of long-haul travellers, respectively, were not willing to pay extra for premium economy class. As a result, this study also used the spike model to avoid estimation bias and thus provide a more realistic result. In addition, previous research indicates that there are significant differences in WTP among travellers with different travel distances (Jou et al., 2013b). Espino et al. (2008) also stated that travellers were willing to pay more than the basic fare for additional legroom for this short haul flight, they even prepared to pay significantly more on long-haul travel. Thus, this study also aims to understand whether travel distance has any impact on travellers' choice of premium economy class and their WTP. Therefore, the length of flight time was included in this study's analysis and investigation.

2. Literature review

Airlines offer a Premium Economy class to passengers willing to pay more for slightly better seats and, in some cases, better service. However, whether the public can accept premium economy class and the price the public is willing to pay for that class are important aviation topics that are worth discussion. Because participants' WTP can be zero, most research worldwide uses the spike model to overcome the problem of finding zero WTP. Based on research using the spike model, Jou et al. (2013c) investigate the public's future choice behaviour in the business cabin of high-speed rail and the price the public is willing to pay when services are added to those currently offered in the business cabin. This research uses the stated preference method (SP) to design a double-bounded dichotomous choice questionnaire for the survey. The spike model is used to resolve the problem of finding zero WTP in the binary choice estimation. The results indicate that fare is the primary factor that has an impact on high-speed rail travellers' choice to travel in the business cabin. Long-haul travellers are more concerned about the level of tranquillity and services in the business cabin, whereas short-haul travellers consider whether they can afford to pay the business cabin fare. In addition, Internet connection in the business cabin tends to attract potential customers who have a college education or higher.

Jou and Wang, (2013a) study focuses on Taiwanese drivers' WTP for moving violations such as speeding, running a red light, making a right turn on a red light, and driving under the influence. In their model estimation, they use the logit binary probabilistic model, along with the spike model that can handle zero WTP while minimising bias resulting from too many zero WTP responses. Model estimation results indicate that drivers' WTP is US$23 for speeding, US$4 for running a red light, US$12 for making a right turn on a red light, and US$584 for driving under the influence. Research results also indicate that the current minimum penalty for speeding is lower than the price drivers are willing to pay. In other words, the speeding penalty is not high enough to have any deterrent effect. According to Jou et al. (2013b), because Taiwan's electronic toll-collection pricing system and on-board unit (OBU) price are not determined by market supply and demand, the actual price that users are willing to pay cannot be determined. In addition, considering the possibilities of calibration bias due to high zero WTP, the spike model is used to estimate the price that freeway users are willing to pay for OBU and distance-based tolls for different travel distances. The results indicate that drivers are willing to pay US$23, US$26 and US$41/OBU for short-, medium-, and long-haul travel on freeways, respectively, based on freeway distance segmentations. For short- and medium-haul drivers, because there remains a gap in the current fares, Jou et al. (2012) suggest offering a discount program. In addition, drivers' distance-based WTP is 0.81, 0.943, and 0.97/km for short-, medium-, and long-haul drivers, respectively, indicating that short-haul users' WTP is relatively lower. The results the study suggest implementing a distance-based, toll-differential pricing strategy. To alleviate the strong opposition to distance-based tolls from short-haul freeway drivers, the government can establish a distance threshold under which drivers need not pay any toll.

Focusing on related research in other countries, Kriström's (1997) two studies are the earliest to use spike models. The first study investigates the possible ferry-traffic damage caused by a Finland ferry carrying large number of passengers to and from the Stockholm archipelago. The study asked how much participants would be willing to donate per year to change the ferry's navigation

routes. The second study investigates reducing activity at the Bromma Airport to alleviate environmental problems such as pollution, risks and noise. That study explores residents' WTP to reduce flight activities. Its results indicate that 77% of the respondents are not willing to pay. The approximate value is 0.78 (proportion to zero WTP). WTP is −2540 Swedish krona (SEK)[2] using logit model estimates, versus 1500 SEK using the spike model. The variance between the two models indicates that when a sample contains many respondents with zero WTP, the price calibrated by the spike model is more reasonable.

Hu (2006) has studied WTP for non-GMO vegetable oil. The Contingent Value Method (CVM) is used in price collection, and both traditional models and the spike model are used in model calibration. Because many participants have zero WTP, using the spike model can eliminate bias in estimation. When estimating the model results under normal distribution, WTP is 35.83 Yuan in the traditional model. The single variable using the spike model is 34.86 Yuan. The WTP is 35.83 Yuan using multiple variables in the spike model. Conversely, the estimated results using a Gumbel distribution show a WTP 36.18 Yuan in the traditional model. The single variable using spike is 34.50 Yuan. The WTP is 35.13 Yuan using multiple variables in the spike model. The results indicate that the calibrated WTP price using a single variable in the spike model yields the lowest result compared to the other two models. Moreover, a lower variance in WTP is also produced, which indicates that a single variable is more accurate in calibrating WTP.

Yoo et al. (2006) uses the Contingent Value Method to find the public's WTP to control or eliminate the annoyance of receiving junk emails. In evaluating a price for non-market goods, the virtual market hypothesis in CVM can effectively help participants to create and present a monetary price for eliminating junk-email-related annoyance. Double-bounded dichotomous choice is primarily used in the questionnaire design. The spike model, as recommended by Kriström (1997), is also used in estimating WTP to accommodate zero WTP. The results of the study indicate that under a single variable (without any other variables), participants' WTP to eliminate the annoyance of junk emails is 1836 South Korean won (KRW). Estimation results using multiple variables show that factors such as total emails received, participants' number of email accounts and number of junk emails have a positive impact on WTP to eliminate the annoyance of junk emails. However, the final results indicate that the public still leans more towards using anti-spam filters to stop the spread of junk emails.

In addition to the Spike model, it shall be noted that there are a few alternatives to this approach. Anastasopoulos et al. (2008) had identified the tobit regression as an appropriate approach to the censoring problem. Recently, there is a growing body of research that has dealt with possible heterogeneity across observations by allowing some or all parameters to vary randomly across observations (Gkritza and Mannering, 2008; Anastasopoulos and Mannering, 2011). In addition, a notable amount of research investigates consumers' WTP from another direction, conjoint analysis (Chiambaretto et al., 2013; Orme, 2010; Miller et al., 2011). All the methods mentioned above are well-established and widely applied in the past. However, the spike model, as recommended by Kriström (1997) and others (Morancho et al., 2005; Hu, 2006; Jou and Wang, 2013a; Jou et al., 2013b,c), is quite suitable in this study mainly because it can accommodate zero WTP to avoid estimation bias and provide a more realistic result.

[2] 1 SEK is approximately NT$ 4.33; 1 Yuan is approximately NT$ 4.75; 1 KRW is approximately NT$ 0.029; and 1 Euro (EUR) is approximately NT$ 34.3.

3. Model theory

The main drawback of these models used in estimating WTP is that these models were prone to estimation errors when a large number of survey respondents reported as the WTP price is zero. Kriström (1997) develops a model based on a specific likelihood function which allows for zero responses in the WTP. The model (Spike model) overcomes the drawback in contingent valuation since all distributions are commonly assumed to be in dichotomous formats (such log-logistic, log-normal and Weibull, and the logit and probit models). The mostly assume respondents to be in the market and to have a positive WTP. In addition, Strazzera et al. (2003) highlighted that zero values can be viewed as the true, protest or the indifference behaviour of individuals to the changes in the non-market good under evaluation. It is therefore possible to find respondents with a zero WTP and, consequently, a discontinuity can occur in the WTP distribution. Halvorsen and Saelensminde (1998) also proves the model is heteroscedastic and the estimators are biased if this fact is not considered. The model developed by Kriström (1997) allows for a zero WTP. The WTP distribution function will have a "spike" (this is, a discontinuity or a break) at the zero value. This approach is appropriate when the WTP distribution is asymmetric and the proportion of zero responses is high. Many studies also have generally used the Spike model as an alternative to avoid creating bias (Morancho et al., 2005; Hu, 2006; Jou and Wang, 2013a; Jou et al., 2013b,c). These studies all showed the Spike model can effectively deal with a large number of zeros in the WTP survey data, and can accommodate other WTP factors. Even when zero WTP is proportionally high, the spike model can still generate more stable results (Del Saz-Salazar and Garcia-Mendez, 2001).

In the spike model, let the utility function of a personal decision's certainty (observable) be. The utility equation is made up of personal gain, Y, economic variable in society, X, and asset value of the evaluated item, Q (such as airline cabin services). Therefore, the random personal utility function $U(Y,X,Q)$ shows the following:

$$U(Y,X,Q) = V(Y,X,Q) + \varepsilon_0 \tag{1}$$

However, when participants agree to the designed amount (A_1) in the virtual market, the derivative utility (case 1) becomes higher than the original utility (case 0), as shown below:

$$V_1(Y - A_1, X, Q_1) + \varepsilon_1 \geq V_0(Y,X,Q_0) + \varepsilon_0 \tag{2}$$

Whereas ε_0 and ε_1 agree to an independent and identical distribution among the random variables, with the mean being 0.

Subtracting items after rearranging the above equation derives participants' utility error terms. F_ε is the cumulative distribution function, cdf of error term ε in $\varepsilon = \varepsilon_0 - \varepsilon_1$, as shown below:

$$V_1(Y - A_1, X, Q_1) - V_0(Y,X,Q_0) \geq \varepsilon_0 - \varepsilon_1\ ,\ \Pr(Yes) = \Pr(\Delta V(\bullet) \geq \varepsilon) = F(\Delta V(\bullet))$$

Because *WTP* is the maximum amount that participants will accept, when participants are given a scenario price (A_1) and if participants' $WTP \geq A_1$, participants are considered willing to accept that price. We present the probability function of participants' accepted price (A_1) as follows:

$$\Pr(Yes) = \Pr(WTP \geq A_1) = 1 - F_{WTP}(A_1) = F_\varepsilon(\Delta V(\bullet)) \tag{3}$$

However, the price range of participants' WTP is divided into two parts. The first part shows that when participants' *WTP* is higher than the hypothesised amount (A_1), the distribution of *WTP is*. The second part shows that when participants' *WTP* is lower than

0, the distribution of *WTP is*. Two indicators, described as follows, can be used for this puorpose. *M* represents whether air travellers' WTP exists (*WTP* > *0*); *W* represents air travellers' *WTP* greater than the designated amount (A_1), as defined below:

$$M = \begin{cases} 1 & WTP > 0 \\ 0 & otherwise \end{cases}; \quad W = \begin{cases} 1 & WTP > A_1 \\ 0 & otherwise \end{cases}$$

Therefore, we can use the integration approach to find expected WTP, *E(WTP)*, as shown below:

$$\begin{aligned} E(WTP) &= \int_0^{\infty} (1 - F_{WTP}(A_1))dA_1 - \int_{-\infty}^{0} (F_{WTP}(A_1))dA_1 \\ &= \int_0^{\infty} (F_{\varepsilon}(\Delta V(\bullet)))dA_1 - \int_{-\infty}^{0} (1 - F_{\varepsilon}(\Delta V(\bullet)))dA_1 \end{aligned} \tag{4}$$

In that case, $F_{WTP}(A_1)$ is the cumulative probability function of offer price A_1 that participants are reluctant to accept, with the value range shown below:

$$F_{WTP}(A_1) = \begin{cases} F_{WTP}(A_1), & if \quad A_1 > 0 \\ P, & if \quad A_1 = 0 \\ 0, & if \quad A_1 < 0 \end{cases} \tag{5}$$

In the equation above, the value of *P* is (0,1).

The maximum likelihood function can then be presented as the following equation.

$$\begin{aligned} \ln L = \sum_i^N M_i W_i \ln(1 - F_{WTP}(A_1)) + \sum_i^N M_i(1 - W_i)\ln(F_{WTP}(A_1) \\ - F_{WTP}(0)) + \sum_{\iota}^N (1 - M_i)\ln(F_{WTP}(0)) \end{aligned} \tag{6}$$

Assuming that the utility function is a linear function, the utility function $V(Y, X, Q)$ can be rewritten as follows:

$$V(Y, X, Q) = \alpha_j + \beta A_i, j = 0, 1 \tag{7}$$

Therefore, when, change in the utility function becomes equation (8):

$$\Delta V(\bullet) = \alpha_1 - \alpha_0 + \beta A_1 = \alpha - \beta A_1 \tag{8}$$

To calculate the expected value for WTP, assume $F_{WTP}(A_1)$ is a logistic probability model, and function $F_{\varepsilon}(\Delta V(\bullet))$ can be expressed as:

$$F_{\varepsilon}(\Delta V(\bullet)) = \frac{1}{1 + e^{-(\alpha - \beta A_1)}} \tag{9}$$

Integrating the equation above with equation (5) obtains the following distribution range:

$$F_{WTP}(A_1) = \begin{cases} 1 \Big/ \left(1 + e^{(\alpha - \beta A_1)}\right), & if \quad A_1 > 0 \\ 1/(1 + e^{\alpha}), & if \quad A_1 = 0 \\ 0, & if \quad A_1 < 0 \end{cases} \tag{10}$$

In the above equation, we define α as a constant and β as the marginal utility of the accepted bid. When participants' *WTP* > A_1, substitute $F_{WTP}(A_1 > 0) = (1 + e^{(\alpha - \beta A_1)})^{-1}$ into equation (4) to perform an integration that generates the expected price of WTP as follows:

$$\begin{aligned} E(WTP) &= \int_0^{\infty} (1 - F_{WTP}(A_1))dA_1 - \int_{-\infty}^{0} (F_{WTP}(A_1))dA_1 \\ &= \int_0^{\infty} \frac{e^{(\alpha - \beta A_1)}}{1 + e^{(\alpha - \beta A_1)}} dA_1 \\ &= \frac{1}{\beta}\left\{ \lim_{A_1 \to \infty} \left(- \ln\left(1 + e^{\alpha - \beta A_1}\right)\right) + \ln(1 + e^{\alpha}) \right\} \end{aligned} \tag{11}$$

Then the expected value of WTP is as shown below:

$$E(WTP) = \frac{1}{\beta}\ln(1 + e^{\alpha}) \tag{12}$$

The definition of spike value is as follows: the probability value of zero WTP, that is, when the spike value equals the value in equation (10) when $sss = 0$, we know the following:

$$Spike = \frac{1}{1 + e^{\alpha}} \tag{13}$$

4. Questionnaire design and survey analysis

4.1. Questionnaire design

The survey was divided into four parts. The first part primarily inquired about participants' personal socioeconomic characteristics and the nature of their travel. The second part related to perception investigation. We attempted to understand whether the participants had travelled in, heard of, or understood premium economy class. Participants then received an explanation of premium economy class. By providing that explanation, not only were we able to learn whether participants would consider premium economy class but we could also enable participants to complete subsequent survey questions.

The third part of the survey investigated the importance of properties when choosing premium economy class. From an air traveller's perspective, there are many factors that affect choice of cabin class. To avoid exhausting the participants with too many case changes, we aligned our questionnaire with related, past literature (Quigley et al., 2001; Balcombe et al., 2009; Jou et al., 2007) and with real-world airlines (Eva Air, China Airlines, Cathy Pacific, etc.) in choosing the service items. Altogether, there were six service properties, which included the following: seat pitch & seat width, audio/video on demand (AVOD), a variety of meal and snack options, additional checked baggage allowance, a dedicated check-in counter, and supplies of travel necessities. Airfare was included in another evaluation of properties. Participants were asked about their perceptions of the degree of importance of those factors using five-point Likert scales. Participants were asked to pick a degree of importance for each item based on their feelings, ranging from very unimportant (one point) to very important (five points) to further explain the important factors that affect air travellers' selection of cabin class.

In the final part of the survey, we asked the extra price that participants were willing to pay. We priced the premium economy class fare based on the concept of price increases in round-trip economy class. A triple-bounded dichotomous choice was used in the scenario design. First, a starting price was set. Air travellers were asked whether they were willing to pay the starting price to upgrade to premium economy class. Subsequently, the participants were asked if they were willing to pay another set of prices. To examine the differences in the travellers' WTP to upgrade to

premium economy class with different trip length, three hypothetical situations of the travel distances are compared: short haul travel (Taipei-Bangkok), medium haul travel (Taipei-Sydney), and long haul travel (Taipei-Los Angeles)[3] to understand how travel distance leads to differences in WTP and has an impact on travellers' choice of premium economy class. This study used a short haul route between Taipei and Bangkok as a scenario design to explain travellers' WTP.

After inquiring with airlines and searching travel websites, we found that a round trip ticket between Taipei and Bangkok cost approximately US$441.[4] An average price of premium economy class approximately 30% higher than regular economy class was set at US$567. Therefore, this study used US$126 (567-441 = 126) as the starting price in the scenario to determine whether travellers were willing to pay extra to upgrade to premium economy class. At the first level of bid prices, US$126 was picked as the lowest starting incremental price, with US$16 as the price difference in the basic bid. Therefore, when travellers were willing to accept an extra expense of US$126, they were offered another price of US$142. If travellers rejected the extra expense of US$126, they were offered another bid price of US$110. When travellers entered the second level of bid prices, the extent of price increases and decreases were based on the first level. If travellers were willing to pay (Y) at the first level, then the increase at the second level remained at US$16. However, the decrease became half of US$16 -i.e., US$7.9-as the segmentation spread. However, if travellers were not willing to pay (N) at the first level, the increase was half of the incremental price of US$16 -i.e., US$7.9 -as the segmentation spread. If travellers at the second level remained unwilling to accept the bid price, the decrease remained at US$16 as the segmentation spread. The same approach continued for subsequent bid price scenarios. By the end, travellers' maximum and minimum WTP was determined from participants' answers. The starting extra price of WTP is shown in Fig. 1.

4.2. Data survey analyses

Economy class outbound travellers at an airport were the primary survey targets. Surveyors used convenience sampling to conduct the survey at Taoyuan International Airport and Kaohsiung International Airport. The survey period lasted from June 15, 2012 to September 15, 2012. There were 489 valid questionnaires after screening. The percentages of male (51.9%) and female (48.1%) visitors were similar, and most of the visitors were single (60.5%). Most of the respondents had a college-level education (junior college) (76.3%). The age range was primarily between 21 and 30 (45.6%). The service industry was the most common occupation (27.8%), then students (23.5%), followed by military personnel and police (14.9%). Monthly income was mostly in the range of NT$ 20,001–40,000 (44.2%) (see Table 1).

About travellers' travel characteristics after the statistics were collated. Most of the participants took an average of 1–2 trips per year (79.8%). The most common reason for travel was leisure (60.1%). Most of the participants were traveling to Asia (87.1%). Most of the participants were not members of a frequent-flyer program (94.7%). Most of the participants had one piece of carry-on baggage (60.1%). More than half of the participants had one piece of checked baggage (59.9%). Most of the respondents were traveling in groups of two (including the respondent) (30.7%). The investigation of perceptions of the premium economy class showed that 84.3% of travellers had not heard of it. Because airlines have only introduced the premium economy class in recent years, nearly 95.6% of travellers had not taken it. Approximately 70% of travellers remained unclear about the premium economy class. However, after receiving an explanation from the surveyors, all the participants showed a basic understanding of the premium economy class. Approximately 44.8% of short-haul, economy class travellers, 31.3% of medium-haul, economy class travellers, and 29.9% of long-haul economy class travellers, respectively, were not willing to pay extra for premium economy class (see Table 2).

In addition, based on the statistical results of the study, airfare remains the primary factor to travellers in choosing the premium economy class. And travellers ranked the two most important service features in the premium economy class as follows: seat pitch & seat width, audio/video on demand (AVOD). Travellers ranked supplies of travel necessities as the least important factor. The results reflected that distance between front and back of seat, seat width remains the primary factor to travellers in choosing the premium economy class. With respect to the travellers' ranking of distance between front and back of seat, seat width, we can speculate that travellers desire more personal space in a comfortable environment with entertainment to distract them during a long flight. Therefore, factors such distance between front and back of seat, seat width are very important to travellers.

5. Model estimation

5.1. Univariate model estimation

To further capture the travellers' WTP to upgrade to premium economy class with different travel distances, three spike models of each travel distance category are respectively developed with detailed discussions of influential variables. Table 3 shows the prices that travellers are willing to pay for short, medium, and long hauls to upgrade to premium economy class. As shown in Table 3, the WTP is US$ 89 for short hauls, US$303 for medium hauls, and US$461 for long hauls. In other words, based on the average round-trip, economy class fare of US$440 for a short haul, travellers are willing to pay US$ 89, i.e., approximately 20% of the economy class fare to upgrade to premium economy class. Based on the average round-trip, economy class fare of US$1322 for a medium haul, travellers are willing to pay US$ 303, i.e., approximately 23% of the economy class fare to upgrade to premium economy class. Based on the average round-trip, economy class fare of US$1668 for a long haul, travellers are willing to pay US$ 461, i.e., approximately 28% of the economy class fare to upgrade to premium economy class. The result indicates that the price long-haul travellers are willing to pay is the highest, followed by that of medium- and short-haul travellers. Travellers decide how much they are willing to pay based on their travel distances. The possible reason for this result is that the longer the trip, the longer the time travellers must spend on board. Therefore, long-haul travellers hope for a more comfortable seating environment and sophisticated services during the flight and are thus more willing to pay extra for those features.

5.2. Multivariate model estimation

Table 4 shows how much short-haul travellers are willing to pay to upgrade to premium economy class. As shown in Table 4, WTP is US$138 in the multivariate model estimation. The higher the positive t value, the higher the significance level, indicating a positive impact-i.e., participants are willing to pay extra to upgrade to premium economy class. Conversely, a negative impact means that

[3] Non-stop flight time from Taipei to Bangkok is around 3 h 30 min; Non-stop flight time from Taipei to Sydney is around 9 h 15 min; Non-stop flight time from Taipei to Los Angeles is around 13 h 55 min.

[4] A round trip ticket between Taipei and Sydney cost approximately US$1353. A round trip ticket between Taipei and Los Angeles cost approximately US$1574.

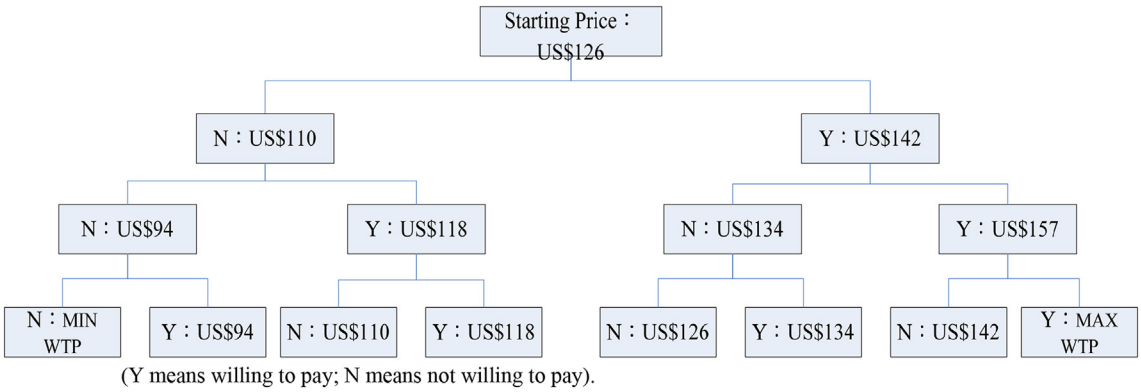

Fig. 1. Premium economy class WTP (WTP) scenario diagram: an example of short-haul route.

participants are not willing to pay extra to upgrade to premium economy class.

Seat pitch and seat width show a positive impact. We speculate that the reason for this result is that short-haul travellers are very concerned about the comfort level of their seats, as reflected by the positive impact relationship with seat pitch and seat width. Therefore, those travellers are willing to pay extra to upgrade to premium economy class. Table 4 also shows a negative impact of that factor when travellers have little knowledge about the premium economy class. We speculate that the reason for this result is that travellers consider other factors when trying new things. According to Rogers (1983), in considering whether to try new things, people generally consider many factors such as relative advantages, compatibility, and observability. Therefore, travellers also consider the following: how much better premium economy class is compared to economy class, whether premium economy class fits their personal needs, and how others observe and describe premium economy class. All these factors have an impact on whether travellers are willing to pay extra to upgrade to premium economy class. When travellers have not travelled in or are not sure about the premium economy class, they tend not to try it, thereby showing a negative impact. Moreover, when airfare is a key consideration, travellers' sensitivity level to price is relatively higher. Thus, such travellers are less willing to pay to upgrade to premium economy class.

Medium-haul travellers expressed a WTP US$309 more than the economy class fare. Seat pitch and seat width had a positive impact.

Table 1
Socio-economic backgrounds of the respondents.

Socio-economic characteristics		Number of samples (people)	Percentage (%)
Sex	Male	254	51.9
	Female	235	48.1
Marital status	Married	296	60.5
	Single	193	39.5
Education level	Below senior high school	72	14.7
	College	373	76.3
	Beyond graduate school	44	9.0
Age	18-20 (including) years old	30	6.1
	21-30 (including) years old	223	45.6
	31-40 (including) years old	160	32.7
	41-50 (including) years old	59	12.1
	51-60 (including) years old	13	2.7
	61-65 (including) years old	2	0.4
	Above (including) 65	2	0.4
Occupation	Farming, forestry, fishing animal husbandry	4	0.8
	Labor	40	8.2
	Business	63	12.9
	Military, civil servants, teachers and police	73	14.9
	Service industry	136	27.8
	Student	115	23.5
	Housekeeping	24	4.9
	Unemployed	11	2.2
	Retired	4	0.8
	Freelance	19	3.9
Monthly salary	Under NTD 20,000	119	24.3
	NTD 20,001–40,000	216	44.2
	NTD 40,001–60,000	105	21.5
	NTD 60,001–80,000	29	5.9
	NTD 80,001–100,000	10	2.0
	NTD 100,001–120,000	6	1.2
	NTD 120,001–140,000	2	0.4
	NTD 140,001 and above	2	0.4
Total		489	100%

Table 2
Traveling characteristics of the respondents.

Traveling Characteristics		Number of samples (people)	Percentage (%)
Average annual flight times (A round-trip is considered as once)	Once or twice	390	79.8
	3-6 times	94	19.2
	7-10 times	3	0.6
	Over 11 times	2	0.4
Flight purpose	Business	78	16.0
	Tourism	294	60.1
	Family visit	63	12.9
	Return home	22	4.5
	School	22	4.5
	Others	10	2.0
The continents of this trip	Asia	426	87.1
	Europe	30	6.1
	America	25	5.1
	Oceania	6	1.2
	Africa	2	0.4
Membership of carriers	Yes	26	5.3
	No	463	94.7
Number of travel companions	1	91	18.6
	2	150	30.7
	3	62	12.7
	4	56	11.5
	5 and above	130	26.6
Hand luggage quantity	0	22	4.5
	1	294	60.1
	2	170	34.8
	3	2	0.4
	4 and above	1	0.2
Checking luggage	0	26	5.3
	1	293	59.9
	2	151	30.9
	3	15	3.1
	4 and above	4	0.8
Total		489	100%

Table 3
Univariate model estimated result of WTP for premium economy class.

Variable	Short distance	Medium distance	Long distance
Constant	0.22 (2.45)[a]	0.82 (8.50)[b]	0.89 (9.12)[b]
Bid	−2.01 (−10.12)[b]	−1.23 (−14.17)[b]	−0.84 (−13.96)[b]
Log-likelihood	−483.19	−496.12	−498.36
Wald statistic (p value)	684.02 (0.00)	692.87 (0.00)	644.59 (0.00)
Spike value (t value)	0.44 (19.93)[b]	0.31 (14.98)[b]	0.30 (14.46)[b]
SD	0.039	0.064	0.096
WTP (t value)	US$ 89 (10.24)	US$ 303 (15.03)	US$ 461 (15.24)
Total sample	489		

Note: t-values are given in parentheses.
[a] 5% significance level.
[b] 1% significance level.

Table 4
Multivariate model estimated result of WTP for premium economy class.[51]

Variable	Short distance	Medium distance	Long distance
Constant	2.05 (3.54)[c]	3.22 (5.69)[c]	1.75 (4.66)[c]
Scenario price bid	−2.13 (−10.07)[c]	−1.32 (−13.89)[c]	−0.87(-13.89)[c]
Emphasis on seat pitch and width	1.05 (2.99)[c]	0.09 (2.67)[c]	–
Emphasis on ticket price	−0.54 (−4.60)[c]	–	–
Unknown and no experience in premium economy class	−0.67 (−3.32)[c]	−0.51 (−2.39)[b]	–
Air travel less than three times per year	–	0.68 (3.08)[c]	–
Student with emphasis on free baggage allowance	–	0.89 (1.89)[a]	–
Emphasis on dedicated check-in counters	–	0.08 (1.84)[a]	–
Emphasis on travel necessities supply	–	0.14 (3.22)[c]	0.09 (2.41)[b]
Understand but never heard about premium economy class	–	–	0.91 (2.70)[c]
More than 51 years of age with emphasis on seat pitch and width	–	–	1.04 (1.90)[a]
Student with emphasis on ticket price	–	–	−0.35 (−1.73)[a]
Spike (t-value)	0.30 (7.56)[c]	0.27 (6.04)[c]	0.22 (6.79)[c]
Log-likelihood	−467.34	−476.70	−489.23
Wald statistic (p-value)	352.16(<0.00)	607.06 (<0.00)	536.02 (,0.00)
SD	0.072	0.126	0.175
WTP (t-value)	US$138(7.77)	US$309(7.76)	US$ 546(9.92)
Total sample	489		

Note: t-values are given in parentheses.
[a] 10% significance level.
[b] 5% significance level.
[c] 1% significance level.

We speculate that the reason for this result is that travellers in medium haul tend to be concerned about legroom. Therefore, these travellers see seating comfort as very important and are thus more willing to pay extra for premium economy class. Travellers who have never travelled in and are not sure about the premium economy class tended to reject trying premium economy class, thus indicating a negative impact-that is, travellers were not willing to pay extra for premium economy class. The factor of an average number of three or more trips in a year shows a positive impact. Moreover, when travellers are frequent medium-haul flyers and have accumulated a great deal of mileage, the time those travellers spend on trips are relatively longer than the time spent by short-haul travellers. Therefore, medium-haul frequent flyers were more willing to pay extra for premium economy class to enjoy a higher comfort level and in-flight services.

In addition, the factors of student status and free checked baggage show a positive impact. We speculate that the reason for this result is that students tend to become homesick when studying overseas. To overcome such emotions and settle quickly into a new culture, students tend to travel with more personal belongings and baggage. Therefore, the factor of free checked baggage is relatively more important to students, indicating that student participants are more willing to pay extra for premium economy class. The factor of a dedicated check-in counter also shows a positive impact. We speculate that the reason for this result is that some travellers are concerned about timeliness, and priority check-in allows them to save time. Therefore, timeliness-concerned travellers are willing to pay extra for premium economy class. The provision of travel necessities also has a positive impact. The speculated reason for this result is that medium-haul travellers spend more time on a flight, and if travel necessities are provided (such as toothbrush, toothpaste), travel comfort is enhanced. Therefore, travellers are more willing to pay extra for premium economy class if personal necessities are provided, thus indicating a positive impact.

Long-haul travellers were willing to pay US$ 546 to upgrade to premium economy class. As observed from Table 4, the impact is positive if travellers have heard about the fourth class (premium economy class). This positive relationship indicates that participants were willing to pay extra to upgrade to premium economy class if they had learned about and clearly understood the fourth class (premium economy class) as the result of mass-media reports. Both seat pitch and ages of 51 and older have a positive impact. We speculate that people aged 51 and older tend to have a lower tolerance level for over-sitting and become uncomfortable more easily than other age groups. People who are 51 and older hope for more space and comfort room during a long flight. Therefore, this group of travellers is willing to pay extra for premium economy class because seat pitch and seat width is important features to those travellers.

Providing travel necessities also has a positive impact. We speculate that this result is because long-haul flights are unbearably long. Providing travel necessities can enhance the comfort level during flight, thus creating a positive impact on the WTP extra for premium economy class. There is a negative impact when

travellers are students and airfare is of primary concern. We speculate that this is because most students do not have stable incomes and are therefore concerned about airfare. The higher the students' financial obligations, the more difficult it is for them to pay for an upgrade. In order words, students concerned about airfare are unwilling to pay extra for premium economy class. In the multivariate model estimation in which other variables are introduced into the estimation, price change is not the only variable that has an impact on WTP for premium economy class; there are other variables introduced into the estimation that also have an impact. Together, all these variables lead to a higher WTP. In addition, the spike model can eliminate bias in over-forecasting the WTP when there is a high proportion of zero WTP. A more meaningful WTP can be generated using the spike model.

6. Conclusions

It is widely perceived that many more airlines will introduce a premium economy class in the future on their long haul aircraft in order to target both the price sensitive business traveller and comfort seeking leisure passengers. Cindy and O'Connell (2015) even think that premium economy class could very well become a sustainable product in the landscape of long haul travel in the near future. This study sought to examine how much air travellers are willing to pay to upgrade from economy to premium economy class. Statistical inferences based on convenience samples, approximately 44.8% of short-haul travellers, 31.3% of medium-haul travellers, and 29.9% of long-haul travellers, respectively, were not willing to pay extra for premium economy class. Research results indicate that the percentage of short-haul travellers who were not willing to pay for upgrade is the highest compared to travellers on other types of flight distances. The possible reason for this result is that the shorter the flight trip, the shorter the time travellers spend on board. Therefore, flight distance is a crucial factor that impacts whether travellers are willing to pay extra to upgrade. Additionally, due to a great portion of respondents reporting they are not WTP at all, this study applies a spike model in order to avoid estimation errors.

The results of this model indicate that the travellers' WTP to upgrade to premium economy class for long-haul travel is higher than that for medium and short-haul travel (US$ 461, US$ 303 and US$ 89, respectively). Increased prices respectively are approximately 20%, 23% and 28% of the round-trip economy class fare. Research results indicate that participants consider flight distance when deciding whether they are willing to pay extra for premium economy class and they could be prepared to pay significantly more on long-haul travel. Therefore, we suggest that airlines use flight distances of short, medium, and long as the basis for service level classifications to enhance the percentage of and revenue from upgrades from economy class.

The factors of seat pitch and seat width, lack of experience and certainty related to the premium economy class, and concern about airfare were considered in assessing short-haul, economy class travellers' WTP using the multivariate estimation. The estimated results indicate a WTP of US$ 138. In addition, concern about seat pitch and seat width show a positive impact. Lack of experience and certainty related to the premium economy class and concern about airfare show a negative impact.

When the factors of seat pitch, lack of experience and certainty related to the premium economy class, average number of three or more trips per year, student status and concern about free checked baggage weight limits, dedicated check-in counter, and supplies of travel necessities were included in assessing medium-haul, economy class travellers' WTP using the multivariate estimation, the results indicate a WTP of US$ 309. Among all the factors listed, seat pitch, average number of three or more trips in a year, student status and concern about free checked baggage weight limits, dedicated check-in counter, and supplies of travel necessities all show a positive impact. Conversely, lack of experience and certainty about the premium economy class shows a negative impact.

When the factors of knowledge and certainty about the premium economy class, concern about seat pitch and seat width for ages 51 or older, provision of travel necessities, and concern about airfare for students were included in assessing long-haul, economy class travellers' WTP using the multivariate estimation, the results indicate a WTP of US$ 309. Among all the factors listed, knowledge and certainty about the premium economy class, concern about seat pitch and seat width for people over 51, and the provision of travel necessities all show a positive impact. Student status and concern about airfare show a negative impact.

Subsequent research could segment travellers into groups versus individual travellers and domestic versus international. Determining the differences in WTP in each group. Finally, business class travellers' choice behaviour in selecting premium economy class can be examined, and the results can provide valuable references to airlines for future operation.

There are several limitations of the current study that need to be addressed. First, the sample of this study is only obtained from general travellers may impact the generalization of these findings. Future studies should extend different groups, such as nationals and foreigners, so that the results of this study can better be generalized. which can be put into comparison. Second, Because of the limited time, this study cannot carry out long-term and continuous questionnaire; this is a cross-sectional study without testing the effects on subsequent behaviour. In order to get a complete picture of travellers' needs, a longitudinal rather than a cross-sectional design would strengthen future studies. Finally, due to time constraints and funding constraints, this study was conducted only at the Taoyuan International Airport and Kaohsiung International Airport as a questionnaire. In the future, we hope to have the assistance of relevant organizations to conduct surveys in all international airports throughout Taiwan, so as to help airlines better understand passengers.

Acknowledgements

The authors are grateful to the Ministry of Science and Technology (MOST), Taiwan, for financial support (NSC 102-2221-E-156 -007 -).

References

Anastasopoulos, P.Ch, Tarko, A.P., Mannering, F.L., 2008. Tobit analysis of vehicle accident rates on interstate highways. Accid. Analysis Prev. 40 (2), 768–775.
Anastasopoulos, P.Ch, Mannering, F.L., 2011. An empirical assessment of fixed andrandomand random parameter logit models using crash– and non–crash–specific injury data. Accid. Analysis Prev. 43 (3), 1140–1147.
Balcombe, K., Fraser, I., Harris, L., 2009. Consumer willingness to pay for in–flight service and comfort levels:a choice experiment. J. Air. Transp. Manag. 15 (5), 221–226.
Chang, L.Y., Sun, P.Y., 2012. Stated–choice analysis of willingness to pay for low cost carrier services. J. Air Transp. Manag. 20, 15–17.
Chiambaretto, P., Baudelaire, C., Lavril, T., 2013. Measuring the willingness–to–pay of air–rail intermodal passengers. J. Air Transp. Manag. 26, 50–54.
Cindy, H.D., O'Connell, J.F., 2015. The rationale for implementing a premium economy class in the long haul markets – evidence from the transatlantic

[5] It should be noted that, according to Kriström (1997), the very pioneer study of Spike model, multivariate model can be used for further application instead of univariate model. The reasons are: (1) the standard error of SPIKE value is smaller in multivariate model and (2) multivariate model contains more explanatory variables which is more behaviourally attractive.

market. J. Air. Transp. Manag. 47, 11–19.
Del Saz-Salazar, S., Garcia-Mendez, L., 2001. Willingness to pay for environmental improvements in a large city. Environ. Resource. Econ. 20 (2), 103–112.
Doganis, R., 2010. Flying off Course: Airline Economics and Marketing, fourth ed. Routledge, London.
Espino, R., Martin, J.C., Roman, C., 2008. Analyzing the effect of preference heterogeneity on willingness to pay for improving service quality in an airline choice context. Transp. Res. E–Log 44 (4), 593–606.
Gkritza, K., Mannering, F.L., 2008. Mixed logit analysis of safety–belt use insingle– and multi–occupant vehicles. Accid. Analysis Prev. 40 (2), 443–451.
Hagmann, C., Semeijn, J., Vellenga, D.B., 2015. Exploring the green image of airlines: passenger perceptions and airline choice. J. Air Transp. Manag. 43, 37–45.
Halvorsen, B., Saelensminde, K., 1998. DifferencesDifferences between willingness–to–pay estimates from open-ended and discrete–choice contingent valuation methods: the effeffects of heteroscedasticity. Land Econ. 74 (2), 262–282.
Hu, W., 2006. Use of Spike models in measuring consumers' willingness to pay for non–GM oil. J. Agric. Appl. Econ. 38 (3), 525–538.
Hugon-Duprat, C., O'Connell, J.F., 2015. The rationale for implementing a premium economy class in the long haul markets: evidence from the transatlantic market. J. Air Transp. Manag. 47, 11–19.
Jou, R.C., Wang, P.L., 2013a. The intention and willingness to pay moving violation citations among Taiwan motorcyclists. Accid. Anal. Prev. 49, 177–185.
Jou, R.C., Chiou, Y.C., Kuo, C.W., Tan, H.I., 2013b. Freeway drivers' willingness to pay for an on-board unit under Electronic Toll Collection System. Transp. Res. C-Emer. 27, 16–24.
Jou, R.C., Chien, J.Y., Wu, Y.C., 2013c. A study of passengers' willingness to pay for business class seats of high–speed rail in Taiwan. Transp. A Transp. Sci. 9 (3), 223–238.
Jou, R.C., Liu, Y.H., Wang, W.C., 2007. A study on international airline choice behavior between LCC and FSC—from Taipei to Singapore. Transp. Plan. J. 36 (3), 307–332.
Jou, R.C., Chiou, Y.C., Chen, K.H., Tan, H.I., 2012. Freeway drivers' willingness to pay for an on-board unit under Electronic Toll Collection System. Transp. A Transp. Sci. 46, 549–559.
Kriström, B., 1997. Spike models in contingent valuation. Am. J. Agric. Econ. 79 (3), 1013–1023.
Lee, D., Luengo–Prado, M., 2004. Are passengers willing to pay more for additional legroom. J. Air. Transp. Manag. 10, 377–383.
Lu, J.L., Shon, Z.Y., 2012. Exploring airline passengers' willingness to pay for carbon offsets. Transp. Res. Part D. Transp. Environ. 17, 124–128.
Miller, K.M., Hofstetter, R., Krohmer, H., Zhang, Z.J., 2011. How should consumers' willingness to pay be measured? – an empirical comparison of state–of–the–art approaches. J. Mark. Res. 48 (1), 172–184.
Morancho, A.B., Fuertos–Eugenio, A.M., Saz–Salazar, S., 2005. A comparison of empirical models used to infer the willingness to pay in contingent valuation. Empir. Econ. 30 (1), 235–244.
Orme, B., 2010. Getting Started with Conjoint Analysis: Strategies for Product Designing and Pricing Research. Research Publisher LLC., Madison.
Quigley, C., Southall, D., Freer, M., Moody, A., Porter, M., 2001. Anthropometric Study to Update Minimum Aircraft Seating Standards. EC1270. ICE Ergonomics Ltd.
Rogers, E.M., 1983. Diffusion of Innovation. The Free Press, New York.
Strazzera, E., Scarpa, R., Calia, P., Garrod, G.D., Willis, K., 2003. Modelling zero values and protest responses in contingent valuation surveys. Appl. Econ. 35 (2), 133–138.
World Tourism Organization, 2012. UNWTO annual report. http://dtxtq4w60xqpw.cloudfront.net/sites/all/files/pdf/annual_report_2012.pdf.
Yoo, S.H., Shin, C.O., Kwak, S.J., 2006. Inconvenience cost of spam mail: a contingent valuation study. Appl. Econ. Lett. 3 (14), 933–936.
Zhang, Y., 2012. Are Chinese passengers willing to pay more for better air services? J. Air Transp. Manag. 25, 5–7.