

## Research Article

# Low-Cost Carrier Passengers' Willingness to Pay for the Seat Preselection Service: A Case Study on the Taiwan-Japan Route

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Due to the rising of consumer awareness, consumers not just pay more attention to leisure activities but also demand more on the related service quality. In recent years, low-cost carriers (LCCs) have continued to expand their routes, and traditional aviation is no longer the only choice for travel abroad. Different from the traditional way of operation, LCCs focus on reducing nonessential expenses. The concept of payment by service offers passengers the options for relatively low ticket price. To continuously operate in the highly competitive aviation industry, most airlines have introduced distinctive “value-added additional services” to attract air passengers. This study discusses the seat preselection, value-added service, and behavior of Taiwanese passengers who take low-cost flights to Japan. The results indicate that passengers who have experienced purchasing preselected seats are more willing to purchase this additional service and spend higher amount of money for that service. In addition, the result also indicates that younger people are more willing to accept novel services. These findings could be used as an importance reference for LCCs to guide managerial strategy in the future.

## 1. Introduction

At present, airlines are divided into full-service carriers (FSCs) and low-cost carriers (LCCs) based on their operating modes. Although the fare of the average LCC is lower than that of the average FSC, the fare only includes the price of a basic seat (not self-selected). If passengers want to enjoy additional services, they must pay to purchase the services. Therefore, most sources of revenue for LCCs are additional services. Additional services that passengers need to pay for in the LCC model include items such as preselected seats, meal, checked baggage allowances, entertainment facilities, and in-flight Wi-Fi. Among them, preselected seats are a special item because passengers typically only have a small basic seat (not selected by themselves) when buying tickets. Hence, when passengers want to enjoy more space, they will buy the additional service of preselecting seats.

In addition, in recent years, the FSC operating model has been gradually moving closer to that of the LCC. For

example, EVA Air announced that starting from March 5, 2019, selecting a seat in its economy class will also require an additional fee. This trend clearly shows that the LCCs' operating model effectively affects the FSCs' operating model that has long been unchanged. Therefore, the price of seat preselection has become a hot topic for discussion. This study hopes not only to explore the factors that affect passengers' purchase of preselected seats but also to understand how much passengers are willing to pay for seat preselection. This study's recommendations can provide reference guidelines for airlines in the future.

According to Taiwan's Tourism Bureau (MOTC) Annual Report [1], the number of Taiwanese people going abroad each year increased from 13,182,976 in 2015 to 14,588,923 in 2016, an increase of 10.66%. In addition, according to 2016 domestic destination (Asia) statistics, most travelers go to Japan. As such, this study takes the Taiwan-Japan route as its focus. There are currently five LCCs operating this route, namely, Tigerair Taiwan, Vanilla Airlines, Peach Aviation,

Scot Airlines, and Jetstar Airlines. This study's researchers conducted a questionnaire-based survey on customers' willingness to pay for preselected seats at the Taoyuan Airport.

This study will focus on the LCC passengers' willingness to pay (WTP) for the preselection of different kinds of seats (such as forward zone seats, extra legroom seats, and so on). This study uses the double-hurdle model to simultaneously investigate the factors influencing passengers' purchase of preselected seats and the price they are willing to pay. Double-hurdle is an extension of the Tobit model. The only difference between the two models is that double-hurdle can exclude respondents who have zero expenditures, which can estimate the real willingness to pay of respondents. Therefore, double-hurdle is used to estimate passengers' WTP for preselection of different kinds of seats.

## 2. Literature Review

*2.1. Optional Service Fees on Flights.* Rouncivell et al. [2] conducted a study that employed a stated preference method to explore customer WTP for seat selection fees on UK domestic flights. An issue highlighted by earlier analysis of customer preferences regarding seat selection was that no passenger wants to sit in the middle seat. Hence, Rouncivell et al. used a survey consisting of two scenarios: respondents were asked to state their WTP for two adjacent seats (anywhere on the aircraft) for business and nonbusiness travel. The results indicated that a higher proportion of respondents were willing to pay for two consecutive seats for nonbusiness travel. However, business travelers were willing to pay a statistically significant amount more for adjacent seats than those traveling for nonbusiness purposes. To sum up, for both business and nonbusiness travel, over 50% of passengers expressed a WTP for preferred seat selection on UK domestic air services.

Chang and Sun [3] used a stated-choice modeling approach to analyze Taiwan-China air passengers' decisions between nonstop and indirect flights with traditional FSCs and nonstop flights with LCCs and passengers' WTP for the additional LCC services. The results showed that fare, luggage restrictions, and destination airport have a statistically significant influence on travelers' flight choice. Passenger experience and socioeconomic variables were also found to significantly influence their choice. Nonbusiness travelers tend to be more willing than business travelers to pay for luggage services and daytime arrival, and in particular, they are more willing to use a secondary airport.

Scotti et al. [4] analyzed the association of baggage fees with airline operational service outcomes, as measured by flight delays, mishandled baggage rates, and the rate of customer complaints. They collected data from the US domestic air transport market for the period 2004 to 2012. The results indicate that baggage fees are associated with fewer mishandled baggage reports and a lower rate of airline-caused flight delays. No significant relationship is found with customer complaints. The imposition of baggage fees is associated with improved operational outcomes for airlines. Hence, the baggage fees appear to be good for the airlines.

Mumbower et al. [5] investigated the factors that influence airline customers' seat purchasing behavior; their study used a database of revealed preference data from JetBlue's website. The results of this study indicate that Even More Space (EMS) seat purchases are influenced by several passenger characteristics, including whether it is a group booking, the day of the week a booking is made, and how far in advance of departure the customer books a flight. Additionally, when faced with reserving a seat on a nearly full plane, passengers are between 2 and 3.3 times more likely to purchase EMS seats.

*2.2. Willingness to Pay.* Regarding WTP in the airline context, Kuo and Jou [6] investigated how much air travelers are willing to pay to upgrade to premium economy class; their collected data indicated that many survey participants were unwilling to pay any extra. Because participants' WTP can be zero, most researchers use the spike model to overcome the problem of finding zero WTP; Kuo and Jou used the spike model to investigate travelers' WTP for premium economy class. Saffarzadeh et al. [7] used multinomial logit (MNL) and nested logit (NL) models to investigate and predict Iranian passengers' choice behavior in relation to possible changes in competition among five types of carriers. The results showed that ticket fare and availability of travel on the desired date and time are significant variables that affect passengers' choice of carrier. Furthermore, the results indicated that business travelers are more willing than nonbusiness travelers to pay extra for flights on their desired date and time.

Balcombe et al. [8] explored consumer choices with respect to the bundle of services on offer when deciding to purchase a flight. They used the Bayesian method to estimate a mixed logit specification; their results indicate that higher income respondents exhibit significantly higher WTP for seat comfort. When the study considered gender, it found that females have greater WTP for seat width and males for seat pitch. Finally, higher levels of education are related to lower WTP for seat pitch but much higher WTP for seat width. In order to understand how to improve the use of air-rail intermodal products, Chiambaretto et al. [9] used conjoint analysis to measure the WTP of intermodal passengers for different versions of intermodal services. Their study found differences in the reservation prices passengers were willing to pay corresponding to several socio-demographic characteristics. Business travelers are unwilling to pay as much for a baggage check at a train station compared with leisure travelers. There are also distinct differences between the attitudes of business and leisure travelers regarding what they seek from intermodal air/rail services. For a meal during a round trip, business passengers have greater WTP compared with their leisure counterparts. Lu and Shon [10] surveyed the general public to elicit WTP for offsetting carbon footprints during air travel or family vacations. Their results indicate that the cost of an air trip, purpose of sightseeing, class of seats, subsidies offered, frequency of trips abroad, and age are the key factors that determine WTP for an emission offset. Choi and Ritchie [11] measured the

pricing of aviation carbon mitigation to identify major factors that influence air travelers' willingness to undertake voluntary climate action. Their findings suggest that female travelers place a higher value on carbon mitigation than their male counterparts. In addition, climate skeptics who are less likely to be carbon offsetters tend to in fact have a higher WTP value than nonskeptical travelers.

Tsamboulas and Nikoleris [12] applied a probit model to estimate how much more a passenger is willing to pay to reduce travel time by minimizing the time spent on ground travel to access an airport. Data were collected employing a stated preference model from passengers at the Athens International Airport; their results indicate that the main factors that determine passengers' WTP are ground travel time required to access the airport and mode used to arrive at the airport. Molin et al. [13] conducted preference experiments using regression and panel mixed logit models. Their results indicate that WTP for improving safety decreases with higher initial safety levels. Merkert and Beck [14] applied mixed logit choice models to explore the value of travel time savings and WTP for regional air services in Australia; they found that regional airlines have a strong interest in expanding patronage by simply charging less than the revealed premium. Moreover, regional aviation is not only invaluable to the regions but also of high value to residents and business travelers residing in metropolitan areas.

The contingent valuation method (CVM) is the most common way to identify the maximum amount of money respondents are willing to pay for certain goods [15]. CVM can be implemented through four formats: open-ended, iterative bidding, multiple-bounded dichotomous choice, and payment card. It has been broadly applied in different areas, such as the environment [16–18] and transportation, including traffic accident costs [19], parking prices [20], carbon offsets [10, 21, 22], and air pollution [23, 24]. In this study, CVM is used to determine the maximum amount of money that Taiwanese passengers are willing to pay for LCCs' additional services.

This study's survey on WTP identified a large number of respondents who were unwilling to pay (zero WTP), generating a large proportion of observed values censored at zero and resulting in samples that apparently do not follow normal distributions. The classic ordinary least squares regression cannot provide consistent and unbiased estimates of parameters [25]. To address this issue, some studies have used the Tobit model [26], which was developed to recognize that WTP values are censored at zero and minimize the resulting bias and inconsistency of parameter estimates.

Although the Tobit model is suitable for handling the problem of censored dependent variables, it has two limitations. First, it assumes that the zeros arise purely; that is, they constitute a corner solution since it also assumes that the zeros are the result of the respondents' economic circumstances [27]. Second, it cannot separate the variables affecting the probability of the participation decision and the level of a positive observation (the expenditure decision). In order to address these shortcomings, this study uses the double-hurdle model developed by Cragg [28] and

previously applied by Eakins [29]. The model postulates that two hurdles must be overcome before we can observe a positive expenditure amount. The first hurdle corresponds to factors affecting participation in the market for the good, and the second, to the level of expenditure on the good. That is, the model may be more reasonable in allowing the factors of the two decisions to differ.

The application of the double-hurdle model in empirical research began with Jones [30]; Yen and Su [31]; and Goodwin et al. [32]; and it can also be seen in more recent studies [33]. Their studies indicate that with the double-hurdle model, an individual has to overcome two hurdles in order to achieve a positive expenditure. First, the individual decides whether or not to participate in the market, a stage known as the participation stage (of a potential consumer); next, the individual decides on the level of expenditure, a stage referred to as the expenditure stage.

### 3. Questionnaire Design and Model Framework

*3.1. Questionnaire Design and Data Collection.* The questionnaire consists of three parts. The first part asks about the socioeconomic characteristics of the respondents; the second part is about characteristics of the respondents' travel habits; the third part explores different service selection scenarios and the prices respondents are actually willing to pay for the service items.

In the first part, questions focus on the social and economic backgrounds of the respondents, including gender, marital status, educational level, age, occupation, and personal monthly income. The second part asks the respondents about their travel habits; the questions include the average number of trips traveled by air in a year (a round trip is counted as once), purposes of the flights, airlines taken, reasons for choosing that airline, destinations, flight cabins, who paid for the tickets, whether the passenger had a membership with the airline, the rationale for the ticket purchase decision-making process, source of information about the airline, the number of passengers, the amount of baggage, any additional services purchased, and the cost of the air tickets. The third part of the questionnaire was designed to understand responses to scenarios presenting opportunities to purchase additional services; this part is divided into two procedures. The respondent is first asked whether he or she is willing to purchase a specific service; if the respondent answers "Yes," then he/she proceeds to the second procedure; if the respondent answers "No," then he/she is asked to check to select the reason for the unwillingness, thus completing the questionnaire. The second procedure assumes that respondents are willing to purchase the additional services. After they have answered whether they are willing to pay a reference price for the service, they are asked to note the maximum amount that they are actually willing to pay. The reference price is based on prices from the official websites of domestic LCCs since most passengers book tickets through an airline's official website. More detailed description of questionnaire and scenarios is addressed in the Supplementary Materials.

The seat preselection items in this scenario are samples of options implemented by current LCCs that fly the Taiwan-Japan route. This study collected seat preselection prices from various LCCs. This study is divided based on the size of the seat space in question: standard seat, forward zone seat (located closer to the doors and enables passenger to be among the first in economy class to disembark the plane), and extra legroom seat (provide more room to stretch legs as well as a wider seat pitch). Currently, Taoyuan International Airport, Kaohsiung International Airport, and Songshan Airport offer flights from LCCs. According to 2016 statistics on ROC nationals' destinations abroad (Asia), the most-visited destination was Japan because of its geographic proximity to Taiwan: 4,295,240 visits occurred that year. Currently, five LCCs—Tigerair, Vanilla Air, Peach Aviation, Scoot, and Jetstar—are operating on this route. Given the increase in supply and demand, this study used Taiwanese travelers on the Japan route as participants in the questionnaire. As Taoyuan International Airport has the most LCC route entries and exits, this study used it as the questionnaire survey site. The questionnaire was designed to understand the WTP and intent of Taiwanese residents traveling from Taiwan to Japan on LCCs with respect to additional services.

The survey period was from June 20 to July 7, 2016, a total of 18 days; the survey time frame was from 09:00 a.m. to 6:00 p.m. every day. The survey sites were the passenger check-in counter in the first terminal, the food court, and the passenger lounge area at the Taoyuan International Airport.

The survey was conducted on a one-on-one interview basis via a questionnaire. In this study, 509 questionnaires were returned. After screening, there were 503 valid questionnaires. The criteria for determining invalid questionnaires were that entered content was illogical. The sample size was calculated according to the following formula:

$$\text{sample size} = \frac{(Z - \text{score}) \times \text{StdDev} \times (1 - \text{StdDev})}{(\text{margin of error})^2} \quad (1)$$

By assumption, we chose a 95% confidence level, 5 standard deviation, and a margin of error (confidence interval) of  $\pm 5\%$ . Then, the sample size is 385; the detailed calculation is as follows. Therefore, the sample size of 509 in our study is sufficient statistically.

**3.2. Theoretical Framework of the Model.** Cragg [28] proposed the double-hurdle model based on a two-stage approach (deciding whether to participate and how much to pay) that represents the decision-making of the research subject and that its calibration process can be affected by different variables. In this study, the first and second stages of the decision-making equation are summarized in formulas (2) and (3).  $D_i^*$  is an unobserved variable, indicating whether respondent  $i$  will participate in the decision-making process (willing or unwilling to pay the fee for an additional service);  $Y_i^*$  is a potential variable, indicating what price the individual is willing to pay.

$$D_i^* = \chi_{1i}\alpha_i + u_i, \quad u_i \sim N(0, \sigma^2), \quad \text{participation decision-making process,} \quad (2)$$

$$Y_i^* = \chi_{2i}\beta_i + v_i, \quad v_i \sim N(0, \sigma^2), \quad \text{expenditure decision-making process.} \quad (3)$$

In the formula,

$$(u_i, v_i) \sim BVN(0, \Sigma), \quad \Sigma = \begin{bmatrix} 1 & \sigma\rho \\ \sigma\rho & \sigma^2 \end{bmatrix}. \quad (4)$$

$\chi_i$  is an explanatory variable vector that explains the personal characteristics of the two-stage decision. This study assumes that participation and expenditure decisions have the same single explanatory variable, i.e.,  $\chi_{1i} = \chi_{2i} = \chi_i$ , while  $\alpha$  and  $\beta$  are the parameters for the first and second stages. Potential variables  $D_i^*$  and  $Y_i^*$  are expressed as follows:

$$\begin{aligned} Y_i &= Y_i^*, \quad \text{if } Y_i^* > 0 \text{ and } D_i^* > 0, \\ &= 0, \quad \text{if } Y_i^* \leq 0 \text{ and } D_i^* > 0, \\ &\quad \text{or } Y_i^* > 0 \text{ and } D_i^* \leq 0, \\ &\quad \text{or } Y_i^* \leq 0 \text{ and } D_i^* \leq 0. \end{aligned} \quad (5)$$

In formula (5), when  $Y_i^*$  and  $D_i^*$  are greater than zero, the WTP price  $Y_i$  of respondent  $i$  will be equal to the actual amount  $Y_i^*$  that the respondent is willing to pay; in contrast, if  $Y_i^*$  is negative or zero, all will be represented by a zero value. Therefore, the zero observation value here represents two meanings. One is that the actual WTP is zero; the other is that the actual WTP is a negative value.

The following is a sample likelihood value of the model:

$$\begin{aligned} L &= \prod_0 \{1 - F(u_i > -x_{1i}\alpha, v_i > -x_{2i}\beta)\} \\ &\quad \prod_+ \{F(u_i > -x_{1i}\alpha, -x_{2i}\beta) f(v_i | u_i > -x_{1i}\alpha, v_i > -x_{2i}\beta)\}. \end{aligned} \quad (6)$$

In the formula, 0 represents a zero observation and + represents a positive observation. According to the study

conducted by Gao et al. [34], formula (6) may be simplified as follows:

$$L = \prod_0 \left\{ 1 - \Phi \left( -x_{1i}\alpha_i, -\left( \frac{x_{2i}\beta_i}{\sigma} \right), \rho \right) \right\} \\ \times \prod_+ \left\{ \Phi \left( x_{1i}\alpha_i + \frac{\rho}{\sigma_i} \frac{(Y_i^* - x_{2i}\beta_i)}{\sqrt{1-\rho^2}} \right) \frac{1}{\sigma} \phi \left( \frac{Y_i^* - x_{2i}\beta_i}{\sigma_i} \right) \right\}. \quad (7)$$

#### 4. Data Analysis

The profiles of the respondents are summarized in Table 1. Most were females, accounting for 60.2%; most were unmarried (63.6%); most had a university education (college) (66.6%); most were aged 21 to 30 years (41.4%), followed by 31 to 40 years (28.2%). In terms of profession, students accounted for the highest proportion (30.2%). The most common personal monthly income was in the range of NTD (New Taiwanese Dollar) 40,001–60,000 (22.9%). To avoid excessive layering, which can result in the desired number of samples being less than 5, the following variables were merged. In terms of age, the three age groups of 51 to 60 years (inclusive), 61 to 64 (inclusive), and 65 and older (inclusive) were merged into “51 years and older (inclusive).” In terms of occupation, agriculture, forestry, fishery, unemployed, and retired were merged into “Other.” Incomes in the range of NTD 80,001–200,001 (inclusive) were merged into “NTD 80,001 (inclusive) or more.”

The sample data on travel frequency characteristics collected as shown in Table 2 showed that most respondents (66.6%) go abroad 1 to 2 times a year, on average, and mostly (85.1%) for sightseeing. Among the respondents who took airlines, most took Peach Aviation (41.7%), followed by Vanilla Air (34.0%). A possible reason why the proportions taking certain airlines were high is that the interviewers conducted a survey in the airport during a fixed daily time frame. They could only collect information about passengers on the same flights within that timeframe. For the other airlines that fewer respondents used, it is possible that the flight time was near lunch time (noon), so the passengers were less willing to do the survey. The main reasons for choosing an airline were lower fares (accounting for 60.1%), followed by good timing and more offers (respectively, 17.5% and 16.3%). It is thus clear that ticket prices remain the most important factor for passengers. All (100%) took the economy class cabin because most LLCs offer only economy class; only a few LLCs provide a business class cabin. Ticket costs were mostly borne by the travelers themselves (84.3%). From the questions on airline membership, most respondents did not have membership with an airline (86.3%), as LCC membership systems, unlike most traditional airlines do not allow passengers to exchange cumulative mileages for additional benefits. Thus, most travelers do not apply specifically to become a member. Regarding the channel of booking, most used the Internet (94%), among whom most booked tickets from the official

websites of the airlines. The reason is that most LLCs put offers on their official websites; in addition, in order to reduce costs, the fares on the Internet are usually cheaper than those offered through other channels. Therefore, most travelers chose to book tickets via the Internet; the reasons were convenience and speed (56.2%) and cheaper fares (41.0%), accounting for 97.2% and indicating the benefits of booking tickets on the Internet. Most ticket decisions were made by travelers themselves (78.5%), while others were based on recommendations by relatives and friends.

The main source of information about airlines was the Internet (64.1%); additional information came through recommendations from relatives and friends. The number of travelers was mainly two (32.3%); most carried baggage (98.8%), most had one carry-on baggage (67.0%), and baggage check-in also mostly included one bag (62.2%). Most respondents had not selected to purchase the additional services of baggage allowance, seat preselection, and meals (60.0%, 80.7%, and 96.6%, respectively). It is thus clear that, in the highly cost-sensitive LCC market, most passengers do not need to purchase additional services. Most tax-inclusive one-way fares were in the range of NTD 1,001–5,000 (75.5%). To avoid excessive layering that causes the desired number of samples to be less than 5, the following variables were merged. Items with high accuracy were merged into other items. In terms of who paid the ticket fee, the relatives and other items were merged. The two items for ordering tickets through voice booking or a travel agency were merged into an “Other” item. The reasons for choosing the booking channel of “Not knowing how to use the Internet” and “Not familiar with the booking process” were merged into an “Other” item. The ticketing decision-making process based on “Marketing ads” was merged into the “Other” item.

Regarding the additional purchase of service items, in addition to the checked baggage weight allowance entered by the respondents, the additional amounts of purchases made by the respondents during the flight were investigated by item. Table 3 lists the average costs of the additional services purchased by respondents.

At the beginning of the scenario presented in the survey, the respondents were asked whether they were willing to make additional purchases. Table 4 lists the statistics on the prescenario willingness to make additional purchases. As shown in the table, most passengers did not have an intention to additionally purchase seat preselection.

The questionnaire also asked respondents for reasons why they were unwilling to make additional purchases in the scenario; Table 5 lists the statistics on the reasons. Among them, most people specified that they did not need to use it. Other respondents’ answers were (1) unwilling to bear additional costs and (2) in the case of an additional purchase, people who order at the same time need to make additional selections together.

In the scenario, in addition to asking whether a passenger is willing to purchase additional services, the respondents willing to make additional purchases were asked about the maximum amount they were actually willing to pay. Table 6 lists the average, highest, and lowest amounts

TABLE 1: Socioeconomic characteristics data analysis.

Basic information-socioeconomic characteristics	Item	Number of samples	Percentage
Gender	Male	200	39.8
	Female	303	60.2
Marital status	Married	183	36.4
	Unmarried	320	63.6
Education level	High school (vocational) or below	45	8.9
	University (college)	335	66.6
	Institute or above	123	24.5
Age	18–20 (inclusive) years	41	8.2
	21–30 (inclusive) years	208	41.4
	31–40 (inclusive) years	142	28.2
	41–50 (inclusive) years	87	17.3
	51 (inclusive) years or older	25	5.0
Occupation	Industrial	37	7.4
	Commercial	72	14.3
	Military, civil servant, teacher, police	80	15.9
	Service industry	82	16.3
	Student	152	30.2
	Housekeeping	21	4.2
	Self-employed	24	4.8
	Other	35	7.0
Income	NTD 5,000 or less	106	21.1
	NTD 5,001–10,000	38	7.6
	NTD 10,001–20,000	37	7.4
	NTD 20,001–40,000	109	21.7
	NTD 40,001–60,000	115	22.9
	NTD 60,001–80,000	65	12.9
	NTD 80,001 (inclusive) or more	33	6.6

TABLE 2: Travel frequency characteristics data analysis.

Basic information- travel frequency characteristics	Item	Number of samples	Percentage
Average number of flight times a year (a round trip counted as once)	First time going abroad	58	11.5%
	1–2 times	335	66.6%
	3–6 times	75	14.9%
	7–10 times	13	2.6%
	11 times or more	22	4.4%
Purpose of flight	Business	20	4.0%
	Sightseeing	428	85.1%
	Visit relatives and friends	18	3.6%
	Returning home	16	3.2%
	Study	16	3.2%
	Other	5	1.0%
Airlines taken	Jetstar	34	6.8%
	Tigerair	47	9.3%
	Peach Aviation	210	41.7%
	Vanilla	171	34.0%
	Scoot	10	2.0%
	V Air	31	6.2%
Reason for selecting this airline (multiple options)	Cheap ticket	416	60.1%
	More benefits	113	16.3%
	Good service	14	2.0%
	Frequent flights	11	1.6%
	Suitable flight time	121	17.5%
	Other	17	2.4%
Heading for	Tokyo Narita	181	36.0%
	Osaka	195	38.8%
	Tokyo Haneda	16	3.2%
	Other	111	22.1%

TABLE 2: Continued.

Basic information- travel frequency characteristics	Item	Number of samples	Percentage
Cabin took and so on	Economy class	503	100%
Who pay the ticket fee	Myself	424	84.3%
	Company	7	1.4%
	Relatives	54	10.7%
	Other	18	3.6%
Airline member or not	Yes	69	13.7%
	No	434	86.3%
The way of ordering tickets	The Internet (united ordering platform)	62	12.3%
	Internet (airline's official website)	411	81.7%
	Other	30	6.0%
Reasons for choosing this booking method (multiple options)	Quick and convenient booking procedures	374	56.2%
	Cheaper tickets	273	41.0%
	Other	19	2.9%
Ticket decision-making process mainly based on (multiple options)	Up to myself	398	78.5%
	Introduction by travel agency	18	3.6%
	Evaluation is given on the Internet	63	12.4%
	Other	28	5.5%
The main source of information of airlines (multiple options)	TV/radio	18	2.7%
	Travel agency	29	4.4%
	Airport	26	3.9%
	Newspaper/magazine	19	2.9%
	Network	427	64.1%
	Regular customer plan (e-mail)	21	3.2%
	Mobile APP	68	10.2%
Other	58	8.7%	
Total number of travelers	1 person	103	20.5%
	2 persons	162	32.2%
	3 persons	69	13.7%
	4-6 persons	134	26.7%
	7 or more persons	35	7.0%
Baggage carried or not	Yes	497	98.8%
	No	6	1.2%
Number of carried baggage (portable)	0	51	10.1%
	1	337	67.0%
	2	115	22.9%
Number of carried baggage (checked-in)	0	110	21.9%
	1	313	62.2%
	2	49	9.7%
	3	19	3.8%
	4 or more	12	2.4%
Additional purchase of "baggage allowance" made or not	Yes	201	40.0%
	No	302	60.0%
Additional purchase of "seat preselection" made or not	Yes	97	19.3%
	No	406	80.7%
Additional purchase of "meal" made or not this time	Yes	17	3.4%
	No	486	96.6%
Ticket amount (one-way, including tax)	NTD 1,000 (inclusive)	7	1.4%
	NTD 1,001-5,000	380	75.5%
	NTD 5,001-10,000	116	23.1%

that the respondents were willing to pay. If the case in which the minimum amount is zero is dismissed, the average WTP amount is close to the reference price possibly because the majority of the respondents, with the reference price as a benchmark, indicated only slight increases or decreases.

## 5. Model Estimation Results

This research adopted the double-hurdle model as the theoretical basis to discuss passengers' choice behavior and WTP for seat preselection service for LCC routes to Japan. In

TABLE 3: Average cost of purchasing additional services this trip.

Services additionally purchased this trip	Average cost (NTD)	Number of samples
Checked baggage allowance	10 kg	486
	15 kg	677
	20 kg	750
	25 kg	836
	30 kg	982
	35 kg	1,150
	40 kg	2,044
	41 kg or above	2,700
Subtotal	—	201
Seat preselection	257	97
Additional purchase of meal	319	17
Total of additional services	998	—
Total number of samples	—	503

TABLE 4: Analysis of additional purchases in the questionnaire scenario.

The intention of additional purchase	Number of samples	Percentage
Willing	173	34.4
Unwilling	330	65.6
Total number of samples	503	

TABLE 5: Reasons for being unwilling to make additional purchases in the questionnaire scenario.

Reason for being unwilling	Number of samples	Percentage (%)
No need to use	322	97.6
Unclear about this item	5	1.5
Others	3	0.9
Subtotal	330	100
Total number of samples	503	

TABLE 6: Average WTP the fees in the questionnaire scenario.

Scenario	Reference price in the scenario (NTD)	Highest WTP amount (NTD)	Willing to pay the amount including NTD 0		Willing to pay the amount excluding NTD 0	
			Average WTP amount (NTD)	Lowest WTP amount (NTD)	Average WTP amount (NTD)	Lowest WTP amount (NTD)
Standard seat	150	500	116		147	50
Forward zone seat	300	500	163	0	274	50
Extra legroom seat	600	1,500	298		496	100
Total number of samples			503			

In addition to the double-hurdle model, the Tobit model was added for comparison purposes. As described in Chapter II, because the Tobit model only considers respondents' WTP without considering whether they are willing to pay for such service, it tends to generate estimation errors and inconsistencies. In the subsequent section of this research, the calibration results of the Tobit and double-hurdle models for three seat preselection services are presented, and the WTP for seat preselection is discussed.

The variables in this study are divided into two categories: variables in the questionnaire and crossed variables. Among the variables mentioned above, this research conducted a correlation coefficient analysis for the two variables "Payer of the air ticket this time—own self" and "Basis for a decision on ticket purchase—one's own decision" to explore whether there is a correlation between the two variables. In general, when the correlation coefficient is 0.00–0.25, it signifies no or a slight correlation; 0.25–0.5 signifies mild

correlation; 0.5–0.75 signifies moderate correlation; and above 0.75 signifies strong correlation. The results showed that the correlation coefficient was only 0.08; hence, there is absolutely no correlation between the two variables, as shown in Table 7. The two variables were further collated into new variables to assess whether these four types of decision-makers and/or payers have any significant effect on the various services. The four types of new variables are as follows:

- (1) Complete participant: one who paid for his/her own air ticket; the ticket purchase based on his/her own decision shall be indicated as 1; otherwise, 0
- (2) Nonparticipant: one who did not pay for his/her own air ticket; the ticket purchase not based on his/her own decision shall be indicated as 1; otherwise, 0
- (3) Payer only: one whose ticket purchase was not based on his/her own decision but whose ticket amount was paid by him/her; it shall be indicated as 1; otherwise, 0
- (4) Decision-maker only: one who did not pay for the air ticket on his/her own but whose basis for purchasing the ticket was his/her own decision; it shall be indicated as 1; otherwise, 0

After several consecutive calibrations through trial-and-error, the following crossed variables were selected:

- (1) One who purchased additional baggage allowance and referred to online reviews as the basis for ticket purchase; it shall be set as 1; otherwise, it shall be 0
- (2) One who paid for the air ticket on his/her own and whose academic experience is graduate school and above; it shall be set as 1; otherwise, it shall be 0
- (3) One whose monthly income is NTD 40,000 and above and is 18–60 years of age; it shall be set as 1; otherwise, it shall be 0.

The model estimation results section is divided into three parts based on seat preselection service. In addition to the average WTP obtained from the respective estimates, the most significant factors affecting WTP are further examined.

*5.1. Standard Seat.* According to Table 8, the following factors have a positive impact on LCC passengers' WTP for preselection of a general standard seat: monthly income greater than NTD 40,000, purchased preselected seat and is 18–30 years of age, and purchased preselected seat and goes abroad 3 times or more a year.

When a passenger's monthly income is greater than NT 40,000, they will be more likely to purchase preselected seats. The reason may be that passengers with relatively high incomes are less sensitive to prices. Therefore, when advance seat selection has a fee, such passengers are more willing to pay to prereserve their seats. In addition, the results show that passengers who purchased preselected seats for their impending flight and are 18–30 years old are more willing to purchase preselected standard seats in general. As these passengers are relatively young, they may be more excited

about new services, and because they have experience with additional purchases, they may be more willing to make the additional purchase of preselected standard seats. The results show that when passengers go abroad 3 times or more a year, they have a lesser willingness to purchase preselected standard seats, showing that when passengers' frequency of going abroad is higher, there is less willingness to make the additional purchase of preselected standard seats. However, when passengers had purchased seat preselection for their impending flight and traveled abroad more than 3 times a year, their willingness to purchase preselected seats in general increased. The results of the study show that passengers who travel more frequently abroad have more positive intentions to purchase preselected seats when they have past experience purchasing preselected seats. Hence, their experience of preselected seat purchase may be an important aspect of frequent flyers' decision to purchase preselected standard seats.

As for the expenditure equation, this study shows that the two variables "company paid the ticket fee" and "purchased preselected seat and is 18–30 years of age" are both positive signs and statistically significant. Such passengers may be willing to spend a higher amount of money to purchase the preselected standard seats than others because they did not pay the ticket fee. In addition, when respondents are relatively young, they may be more accepting of when additional services need to be charged and hence willing to pay higher amounts. Furthermore, this study shows that when passengers have no decision-making power over the purchase of tickets, the amount they are willing to pay for additional services is lower than that of other people. The reason may be that because the passenger did not participate in the ticket purchase, they have less understanding of the seat preselection service and so are not willing to pay as much.

*5.2. Forward Zone Seat.* According to Table 9, three variables—"ticket fee paid by company," "purchased preselected seats and went abroad alone," and "purchased preselected seats and is 31–50 years of age" have a significant impact on LCC passengers' WTP for preselection of a forward zone seat. In addition, "ticket fee paid by company" is a positive and significant variable in expenditure equation. Because such passengers are not paying for their tickets, they seem more willing to prepurchase a forward zone seat and pay higher amounts than other passengers.

In addition, when passengers go abroad alone, they only have to bear personal expenses, so this type of passenger seems relatively willing to prepurchase forward zone seats. As for passengers who have experience purchasing preselected seats and are between 31–50 years old, it is possible that their greater life experience and financial foundation make them more willing to prepurchase the forward zone seats. However, the results of the study also pointed out that for passengers who go abroad 3 times or more a year, regardless of willingness to prepurchase forward zone seats or the amount they are willing to pay, the estimated coefficients are all negative. This type of passenger may go abroad

TABLE 7: Correlation coefficient analysis results.

	Ticket purchase is one's own decision	This air ticket is paid by own self
<i>Ticket purchase is one's own decision</i>		
Pearson correlation	1	0.08*
P value	—	0.05
Sample size	503	503
<i>This air ticket is paid by self</i>		
Pearson correlation	0.08*	1
P value	0.05	—
Sample size	503	503

\*5% significance level.

TABLE 8: Estimated result of the model for seat preselection (general standard seat).

Variables	Coef.	t-ratio
<i>Participation equation</i>		
Constant	-0.719	-8.99***
High-income (personal monthly income is NTD 40,000 and above)	0.250	2.38**
Goes abroad 3 times or more a year	-0.333	-2.55**
Purchased preselected seat and is 18–30 years of age	0.616	2.87***
Purchased preselected seat and goes abroad 3 times or more a year	0.774	2.46**
<i>Expenditure equation</i>		
Constant	0.917	3.12***
Company paid the ticket fee	0.376	2.29**
Purchased preselected seat and is 18–30 years of age	0.145	1.87*
Nonparticipant	-0.297	-2.87***
$\sigma$	0.243	2.01**
$\rho$	0.893	11.96
Expected WTP excluding 0 (NT\$)		92
Expected WTP including 0 (NT\$)		25
Number of observations		503
LL (0)		-269.02
AIC		562.0

\*10% significance level; \*\*5% significance level; \*\*\*1% significance level.

TABLE 9: Estimated result of the model for seat preselection (forward zone seat).

Variables	Coef.	t-ratio
<i>Participation equation</i>		
Constant	-0.915	-11.61***
Goes abroad 3 times or more a year	-0.350	-2.04**
Ticket fee paid by company	1.195	2.75***
Purchased preselected seat and went abroad alone	0.571	2.30**
Purchased preselected seat and is 31–50 years of age	0.734	4.10***
<i>Expenditure equation</i>		
Constant	2.254	8.22***
Goes abroad 3 times or more a year	-0.367	-1.87*
Ticket fee paid by company	1.109	1.93*
Traveled for sightseeing purposes and is a nonparticipant	-0.557	-2.82***
$\sigma$	0.727	8.70***
$\rho$	0.585	2.96***
Expected WTP excluding 0 (NT\$)		217
Expected WTP including 0 (NT\$)		42
Number of observations		503
LL (0)		-338.89
AIC		699.8

\*10% significance level; \*\*5% significance level; \*\*\*1% significance level.

TABLE 10: Estimated result of the model for seat preselection (extra legroom seat).

Variables	Coef.	t-ratio
<i>Participation equation</i>		
Constant	-1.133	-10.56***
High-income (personal monthly income is NTD 40,000 and above) and 31–50 years of age	0.451	3.13***
Purchased preselected seat and is 18–30 years of age	0.585	2.13**
Purchased preselected seat and goes abroad 1-2 times a year	0.833	3.49***
Purchased preselected seat and is a complete participant	0.420	1.88*
<i>Expenditure equation</i>		
Constant	4.962	2.70***
Traveled for sightseeing purposes and goes abroad 1-2 times a year	0.772	2.03**
$\sigma$	1.608	3.69***
$\rho$	0.333	1.59
Expected WTP excluding 0 (NT\$)		544
Expected WTP including 0 (NT\$)		120
Number of observations		503
LL (0)		-390.73
AIC		801.5

\*10% significance level; \*\*5% significance level; \*\*\*1% significance level.

TABLE 11: The estimated results of WTP for different sizes of seat space (unit: NT\$).

Model	Reference price questionnaire	Double-hurdle (truncate)	
		WTP	WTP (nonzero)
Standard seat	150	25	92
Forward zone seat	300	42	217
Extra legroom seat	600	120	544

frequently, so considering that preselecting seats requires more expenditure, so they would be less willing and willing to pay less than other passenger. Finally, when a passenger traveled for sightseeing purposes and also did not participate in the ticket purchase process, the estimated result in the expenditure equation shows a negative value. This implies that when passengers travel for sightseeing, they want to reduce travel expenses, so they choose low-cost carriers. Therefore, this type of passenger is more sensitive to air ticket price, and the amount they are willing to pay to repurchase forward zone seats is relatively low compared with those of other passengers.

**5.3. Extra Legroom Seat.** In this part, the factors “monthly income above NTD 40,000 and 31–50 years of age,” “purchased preselected seat and is 18–30 years of age,” “purchased preselected seat and goes abroad 1-2 times a year,” and “purchased preselected seat and is a complete participant” all have a positive impact on LCC passengers’ WTP for preselection of an extra legroom seat.

Based on the research results, when income is relatively high and because young- and middle-aged people (aged 31–50) have relatively stable incomes and are less sensitive to prices, they are willing to pay for better services. This is demonstrated by their greater willingness to purchase the extra legroom seat. When passengers have experience purchasing preselected seats and are young people aged 18–30, they are also more willing to purchase the extra

legroom seat. It may be that young people have more experience with value-added additional services and have a higher degree of acceptance of the service. In addition, when passengers go abroad 1-2 times a year and have experience purchasing seat preselection services, they are more willing to buy the extra legroom. The possible reason is that these passengers have a certain degree of understanding of airline services, so they are more willing to purchase this service because they see its value. Similarly, when passengers make ticket purchase decisions themselves, they better understand details about the ticket, and when they have experience in purchasing preselected seats, their willingness to purchase an extra legroom seat is relatively higher than other passengers. In addition, Table 10 shows the results of the expenditure equation; when a passenger goes abroad 1-2 times a year and traveled for sightseeing purposes, the amount they are WTP for the extra legroom seat is higher than those of other passengers. The possible reason is that when passengers go abroad infrequently, they hope that travel abroad will be more comfortable, so they are willing to pay a higher amount.

Finally, the estimated results of passengers’ WTP for different seating spaces are consolidated in Table 11. Because the double-hurdle model can filter the willingness of respondents to participate, it can estimate the willingness and price of potential passengers who are actually interested in the seat preselection service. As can be seen from the table, compared with the estimates including zero WTP, the estimates of WTP price that exclude zero WTP samples are

TABLE 12: Recommended prices for various services.

Scenario	Recommended price (NTD)
Standard seat	92–150
Forward zone seat	217–300
Extra legroom seat	544–600

closer to the reference price. The estimated prices excluding zero WTP for preselected standard seat, forward zone seat, and extra legroom seat are NTD 92, 217, and 544, respectively; the estimation results of the samples including zero WTP for preselected standard seat, forward zone seat, and extra legroom seat are NTD 25, 42, and 120, respectively. The nonzero price is not much different from the current market price.

## 6. Conclusions and Recommendations

*6.1. Conclusions.* This study used an open-ended inquiry to ask about the actual price that passengers are willing to pay for preselected seats and used the double-hurdle model to estimate the price that passengers are willing to pay. It also explores the factors that affect passengers' participation in payment.

The results of this research show that for the three different kinds of preselected seats, there are several common characteristics that will affect passengers' purchase. Passengers who have experience purchasing preselected seats will have a relatively higher willingness to purchase this additional service and spend a higher amount of money to do so. Speculatively, additional purchase experience can provide a relatively greater degree of understanding of the service, which increases willingness to purchase and perceived value. However, passengers who do not participate in the decision-making process are unwilling to pay higher amounts because they lack power to make the decision. Furthermore, when the air fare is paid by a company, the passenger's willingness to purchase preselected seats and spend more is relatively high. This shows that when passengers do not pay for their own air ticket, they may be able and want to enjoy better service; hence, they will be more willing to partake and pay more than passengers who paid for their ticket themselves. The characteristic of high income also increased the willingness of respondents to purchase the seat preselection service, showing that with lower economic pressures, passengers may want to enjoy more cabin space and are willing and able to pay for it. In addition, the results of this study also pointed that the more often passengers traveled abroad, the lesser their willingness to purchase preselected seats. When passengers travel more frequently and purchase preselected seats every time, the cost of travel will increase accordingly. Therefore, the willingness of passengers to purchase this service decreases.

Finally, the research also shows that respondents aged 18–30 have a higher purchase intention and WTP amount than other respondents. It is possible that younger people are more willing to accept novel services; therefore, their willingness to purchase and the amount they are willing to pay are higher than those of other passengers. The results of this

study are similar to those of Wittmer [35], whose study mainly explored the acceptance of self-service check-in machines by passengers at Zurich Airport. Wittmer's results showed that respondents of different age groups have different preferences and different levels of satisfaction after use. The respondents who were most interested in the self-check-in kiosks were those aged 20–30, and at the same time, they were more satisfied with the kiosk experience. This is similar to result presented here, showing that younger people have a higher acceptance of and preference for novel services, and therefore, they are more willing to increase the price at which they will purchase preselected seats. It also shows that for this additional service, young travelers can be recognized as the main marketing targets in the future. In addition, this study found that passengers aged 31–50 may prefer larger space seats (forward zone seats or extra legroom seats) as they are more willing to purchase preselected seats with larger space than other age groups. For the WTP, the double-hurdle model estimates that there is little difference between the reference price and the WTP price that excludes zero WTP samples. This means that most of the respondents are amenable to the current price of preselected seat. As far as the model is concerned, the advantage of the double-hurdle model is that it can estimate the WTP of respondents who are willing to purchase that service. Therefore, the estimated result can better reflect consumers' actual WTP for preselected seats. The results of this study can be used as a reference for airlines' future pricing of preselected seats.

*6.2. Suggestions.* Relevant suggestions are hereby provided with regard to the results of this research so as to facilitate subsequent research and revision of relevant policies. As shown in Table 12, this study compiled passengers' WTP for different seat preselection scenarios. It is suggested that airlines can refer to the results of this study in the future to set or adjust seat preselection prices for each type of seat. In addition, since the passenger's flight experience is an important factor, airlines can give frequent-flying passengers discounts through a membership system and accumulated mileage to increase passenger willingness to purchase extra services. In addition, it is found that a passenger's previous experience in purchasing additional services is an important influencing factor. Therefore, this study suggests that airlines can individually inquire about the satisfaction of passengers with their previous experiences purchasing additional services and then adjust the additional purchase items according to the results. Hierarchical marketing based on different age groups is also a topic worth discussing. The conclusions of this study suggest that the young age group (18–30 years old) likes to experience new services, while the middle-aged group (31–50 years old) prefers the forward zone seats and extra legroom seats with more space. Stratified separate marketing may bring more benefits to airlines in the future. In terms of prices, this study finds that when a reference price is provided, survey respondents will answer questions based on the reference price, and passengers' truest WTP certain prices will not be obtained. This suggests that future research should avoid providing a

reference price so as to not interfere with the survey. Finally, the passengers were provided the reference prices which were obtained from the official website. Although it is a feasible way to start with, it could still bias the estimated value. Further research may be considered to obtain it from a pretest.

## Data Availability

The data used to support the findings of this study are available from the corresponding author on request.

## Additional Points

**Summary.** This study used Taiwanese travelers on the Japan route as participants in the questionnaire. As Taoyuan International Airport has the most LCC route entries and exits, this study used it as the questionnaire survey site. The questionnaire was designed to understand the WTP and intent of Taiwanese residents traveling from Taiwan to Japan on LCCs with respect to additional services. The survey period was from June 20 to July 7, 2016, a total of 18 days; the survey time frame was from 09:00 a.m. to 6:00 p.m. every day. The survey sites were the passenger check-in counter in the first terminal, the food court, and the passenger lounge area at the Taoyuan International Airport. The survey was conducted on a one-on-one interview basis via a questionnaire. In this study, 509 questionnaires were returned. After screening, there were 503 valid questionnaires.

## Disclosure

The data of this research had been used to analyze different issues (baggage check-in additional service). Please refer to the following source for further reference [36]: [https://link.springer.com/chapter/10.1007%2F978-3-030-02683-7\\_82](https://link.springer.com/chapter/10.1007%2F978-3-030-02683-7_82).

## Conflicts of Interest

The authors declare that they have no conflicts of interest.

## Supplementary Materials

More detailed description of questionnaire and scenarios is provided in Supplementary Materials. (*Supplementary Materials*)

## References

- [1] Tourism Bureau Annual Report, *Visitor Arrivals by Purpose of Visit (Asian Area)*, Organization of the Tourism Bureau, Taipei, Taiwan, 2017, <http://admin.taiwan.net.tw/statistics/year.aspx?no=134>.
- [2] A. Rouncivell, A. J. Timmis, and S. G. Ison, "Willingness to pay for preferred seat selection on UK domestic flights," *Journal of Air Transport Management*, vol. 70, pp. 57–61, 2018.
- [3] L.-Y. Chang and P.-Y. Sun, "Stated-choice analysis of willingness to pay for low cost carrier services," *Journal of Air Transport Management*, vol. 20, pp. 15–17, 2012.
- [4] D. Scotti, M. Dresner, and G. Martini, "Baggage fees, operational performance and customer satisfaction in the US air transport industry," *Journal of Air Transport Management*, vol. 55, pp. 139–146, 2016.
- [5] S. Mumbower, L. A. Garrow, and J. P. Newman, "Investigating airline customers' premium coach seat purchases and implications for optimal pricing strategies," *Transportation Research Part A: Policy and Practice*, vol. 73, pp. 53–69, 2015.
- [6] C.-W. Kuo and R.-C. Jou, "Willingness to pay for airlines' premium economy class: the perspective of passengers," *Journal of Air Transport Management*, vol. 59, pp. 134–142, 2017.
- [7] M. Saffarzadeh, A. Mazaheri, M. Z. Tari, and S. Seyedabrishami, "Analysis of Iranian passengers' behavior in choosing type of carrier in international air travel to East Asia," *Journal of Air Transport Management*, vol. 56, pp. 123–130, 2016.
- [8] K. Balcombe, I. Fraser, and L. Harris, "Consumer willingness to pay for in-flight service and comfort levels: a choice experiment," *Journal of Air Transport Management*, vol. 15, no. 5, pp. 221–226, 2009.
- [9] P. Chiambaretto, C. Baudelaire, and T. Lavril, "Measuring the willingness-to-pay of air-rail intermodal passengers," *Journal of Air Transport Management*, vol. 26, pp. 50–54, 2013.
- [10] J.-L. Lu and Z. Y. Shon, "Exploring airline passengers' willingness to pay for carbon offsets," *Transportation Research Part D: Transport and Environment*, vol. 17, no. 2, pp. 124–128, 2012.
- [11] A. S. Choi and B. W. Ritchie, "Willingness to pay for flying carbon neutral in Australia: an exploratory study of offsetter profiles," *Journal of Sustainable Tourism*, vol. 22, no. 8, pp. 1236–1256, 2014.
- [12] D. A. Tsamboulas and A. Nikoleris, "Passengers' willingness to pay for airport ground access time savings," *Transportation Research Part A: Policy and Practice*, vol. 42, no. 10, pp. 1274–1282, 2008.
- [13] E. Molin, J. Blangé, O. Cats, and C. Chorus, "Willingness to pay for safety improvements in passenger air travel," *Journal of Air Transport Management*, vol. 62, pp. 165–175, 2017.
- [14] R. Merkert and M. Beck, "Value of travel time savings and willingness to pay for regional aviation," *Transportation Research Part A: Policy and Practice*, vol. 96, pp. 29–42, 2017.
- [15] R. C. Mitchell and R. T. Carson, *Using Surveys to Value Public Goods: The Contingent Valuation Method*, Resources for the Future, Washington, DC, USA, 1989.
- [16] S. V. Ciriacy-Wantrup, "Capital returns from soil-conservation practices," *Journal of Farm Economics*, vol. 29, no. 4, pp. 1181–1196, 1947.
- [17] E. Thunberg and L. Shabman, "Determinants of landowner's willingness to pay for flood hazard reduction," *Journal of the American Water Resources Association*, vol. 27, no. 4, pp. 657–665, 1991.
- [18] A. Bengochea-Morancho, A. M. Fuertes-Eugenio, and S. Del Saz-Salazar, "A comparison of empirical models used to infer the willingness to pay in contingent valuation," *Empirical Economics*, vol. 30, no. 1, pp. 235–244, 2005.
- [19] R.-C. Jou and T.-Y. Chen, "Willingness to pay of air passengers for carbon-offset," *Sustainability*, vol. 7, no. 3, pp. 3071–3085, 2015.
- [20] Z. Guo and S. McDonnell, "Curb parking pricing for local residents: an exploration in New York City based on willingness to pay," *Transport Policy*, vol. 30, pp. 186–198, 2013.
- [21] R. Brouwer, L. Brander, and P. Van Beukering, "'A convenient truth': air travel passengers' willingness to pay to offset their CO<sub>2</sub> emissions," *Climatic Change*, vol. 90, no. 3, pp. 299–313, 2008.

- [22] G. J. MacKerron, C. Egerton, C. Gaskell, A. Parpia, and S. Mourato, "Willingness to pay for carbon offset certification and co-benefits among (high-) flying young adults in the UK," *Energy Policy*, vol. 37, no. 4, pp. 1372–1381, 2009.
- [23] F. Lera-López, J. Faulin, M. Sánchez, and A. Serrano, "Evaluating factors of the willingness to pay to mitigate the environmental effects of freight transportation crossing the Pyrenees," *Transportation Research Procedia*, vol. 3, pp. 423–432, 2014.
- [24] H. Wang and J. Mullahy, "Willingness to pay for reducing fatal risk by improving air quality: a contingent valuation study in Chongqing, China," *Science of the Total Environment*, vol. 367, no. 1, pp. 50–57, 2006.
- [25] T. Amemiya, "Tobit models: a survey," *Journal of Econometrics*, vol. 24, no. 1-2, pp. 3–61, 1984.
- [26] J. Tobin, "Estimation of relationships for limited dependent variables," *Econometrica*, vol. 26, no. 1, pp. 24–36, 1958.
- [27] R. Martínez-Españeira, "A box-cox double-hurdle model of wildlife valuation: the citizen's perspective," *Ecological Economics*, vol. 58, no. 1, pp. 192–208, 2006.
- [28] J. G. Cragg, "Some statistical models for limited dependent variables with application to the demand for durable goods," *Econometrica*, vol. 39, no. 5, pp. 829–844, 1971.
- [29] J. Eakins, *An Application of the Double Hurdle Model to Petrol and Diesel Household Expenditures in Ireland*, pp. 1–44, Surrey Energy Economics Centre (SEEC) School of Economics University of Surrey, Guildford, UK, 2014.
- [30] A. M. Jones, "A double-hurdle model of cigarette consumption," *Journal of Applied Econometrics*, vol. 4, no. 1, pp. 23–39, 1989.
- [31] S. T. Yen and S.-J. Su, "Modeling U.S. butter consumption with zero observations," *Agricultural and Resource Economics Review*, vol. 24, no. 1, pp. 47–55, 1995.
- [32] B. K. Goodwin, L. A. Offenbach, T. T. Cable, and P. S. Cook, "Discrete/continuous contingent valuation of private hunting access in Kansas," *Journal of Environmental Management*, vol. 39, no. 1, pp. 1–12, 1993.
- [33] S. D. Saz-Salazar and P. Rausell-Köster, "A double-hurdle model of urban green areas valuation: dealing with zero responses," *Landscape and Urban Planning*, vol. 84, no. 3, pp. 241–251, 2008.
- [34] X. M. Gao, E. J. Wailes, and G. L. Cramer, "Double-hurdle model with bivariate normal errors: an application to U.S. rice demand," *Journal of Agricultural and Applied Economics*, vol. 27, no. 2, pp. 363–376, 1995.
- [35] A. Wittmer, "Acceptance of self-service check-in at Zurich airport," *Research in Transportation Business & Management*, vol. 1, no. 1, pp. 136–143, 2011.
- [36] R.-C. Jou, C.-W. Kuo, and Y.-C. Chiu, "LCC passengers' willingness-to-pay for the baggage check-in additional service: a case study on the Taiwan-Japan route," in *Proceedings of the Future Technologies Conference (FTC) 2018*, pp. 1125–1139, Vancouver, Canada, 2018.