EPFL
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Airline Itinerary Case

These data come from an Internet choice survey conducted by the Boeing Company in the Fall of 2004. Boeing was interested in understanding the sensitivity that air passengers have toward the attributes of an airline itinerary, such as fare, travel time, transfers, legroom, and aircraft. It was executed on a sample of the customers of an Internet airline booking service. The Internet service takes a specific user request for travel in a city pair and interrogates the web sites of airlines that provide service in that market, returning to the user a compiled list of available itineraries. While that interrogation is taking place, randomly selected customers were recruited to be surveyed.

A typical page of the survey instrument is shown in Figure 1. The respondent was offered three choices based on the origin-destination market request that the respondent entered into the itinerary search engine. The first alternative is always a non-stop flight, the second always a flight with 1 stop on the same airline, and the third is always a flight with 1 stop and a change of airline. The respondent was asked to rank the available choices and was also given the option to decline all of the presented options. Demographic data collected included age, gender, income, occupation, and education. Situational variables that were identified included: a) the desired departure time; b) trip purpose; c) who is paying for the trip; and d) the number in the travel party. All trips were for origin-destination city pairs in the United States.

There are 3609 respondents, each providing 1 SP response. Descriptions of the available variables are reported in Tables 1 to 4 and some descriptive statistics are given in Tables 5 and 6.

## Pick Your Preferred Flight

Three flight options are described for your trip from Chicago to San Diego . These are options that might be available on this route or might be new options actively being considered for this route as well as replacing some options that are offered now. The options differ from each other in one or more of the features described on the left.

Please evaluate these options, assuming that eveything about the options is the same except these particular features. Indicate your choices at the bottom of the appropriate column and press the Continue button.

| FEATURES | Non-Stop (Option 1) | 1 Stop (Option 2) | 1 Stop (Option 3) |
|---|---|---|---|
| Departure time (local) | 6:00 PM | 4:30 PM | 6:00 PM |
| Arrival time (local) | 8:14 PM | 8:44 PM | 9:44 PM |
| Total time in air | 4 hr 14 min | 4 hr 44 min | 4 hr 44 min |
| Total trip time | 4 hr 14 min | 6 hr 14 min | 5 hr 44 min |
| Legroom ☐ | typical legroom | 2-in more of legroom | 4-in more of legroom |
| Airline [Airplane] | Depart Chicago Continental Airlines [B737] to San Diego | Depart Chicago Southwest Airlines [A320], connecting with Southwest Airlines [MD80] to San Diego | Depart Chicago Northwest Airlines [MD80], connecting with American Airlines [DC9] to San Diego |
| Fare | $565 | $485 | $620 |
| 1. Which is MOST attractive? | ⦿ Option 1 | ⦿ Option 2 | ⦿ Option 3 |
| 2. Which is LEAST attractive? | ⦿ Option 1 | ⦿ Option 2 | ⦿ Option 3 |

3. If these were the ONLY three options available, I would NOT make this trip by air.  ⦿ Yes  ⦿ No

Figure 1: Example of Survey Instrument

| Variable | Description |
|---|---|
| SubjectId | Unique identifier for each respondent. |
| q17_Gender | 1 if male, 2 if female, 99 or -1 if missing. |
| q15_Age | Age, (1 = Less than 18 years, 2 = 18-24 years, 3= 25-34 years, 3.5 = 25-44 years, 4 = 35-44 years, 5 = 45-54 years, 6 = 55-64 years, 7 = 65-74 years, 8 = 75 years or older, 99 or -1 if missing) |
| q19_Occupation | Occupation (01 = Executive and Managerial, 02 = Professional, 03 = Technicians and related support, 04 = Sales, 05 = Administrative support, 06 = Services, 07 = Precision production, craft, repair, 08 = Machine operators, assemblers, inspectors, 09 = Transportation and material moving, 10 = Handlers, cleaners, helpers, 11 = Farming, forestry, and fishing, 12 = Armed forces, 99 or -1 if missing) |
| q16_Income | Discrete income (14 different levels); -1 or 99 if missing information |
| Cont_Income | Annual income in 1000$; -1 if missing information |
| q20_Education | Education (01 = Less than High School Diploma, 02 = High School Graduate, 03 = Some college, No Degree, 04 = Associate Degree - Occupational, 05 = Associate Degree - Academic, 06 = Bachelors Degree, 07 = Masters Degree, 08 = Professional Degree, 09 = Doctorate Degree, 99 or -1 if missing) |
| q11_DepartureOrArrivalIsImportant | Importance of punctuality of departure or arrival (1 = departure is important; 2= arrival is important; otherwise, not important) |

Table 1: Description of Respondent Specific Variables

| Variable | Description |
|---|---|
| BestAlternative_X | The chosen alternative is X |

Table 2: Description of Survey Responses

| Variable | Description |
| --- | --- |
| q02_TripPurpose | Trip purpose (1=business, 2=leisure, 3=attending conference/seminar/training, 4=both business and leisure, 0=trip purpose missing) |
| q03_WhoPays | 1 if the traveler is paying for the trip, 2 if it is his employer, 3 if it is a third party, 0 if missing |
| q12_IdealDepTime | Respondents ideal departure time (minutes after midnight), -1 indicates a missing value |
| q13_IdealArrTime | Respondents ideal arrival time (minutes after midnight), -1 indicates a missing value |
| q14_PartySize | Number of persons traveling, -1 and 99 indicate missing values |
| OriginGMT | Origin city time zone (minutes from GMT (Greenwich Mean Time)) |
| DestinationGMT | Destination city time zone (minutes from GMT) |
| Direction | Direction of itinerary (1=East to West, 2=West to East, 3=North-South, 0=missing) |

Table 3: Description of Trip Specific Attributes

| Variable | Description |
| --- | --- |
| DepartureTimeHours_X* | Option X: Departure time, local (hours after midnight) |
| ArrivalTimeHours_X* | Option X: Arrival time, local (hours after midnight) |
| FlyingTimeHours_X* | Option X: Total time in air (hours) |
| TripTimeHours_X* | Option X: Total trip time (hours) |
| Legroom_X | Option X: Legroom , 1 = 2 inches less than typical, 2 = typical, 3 = 2 inches more than typical, 4 = 4 inches more than typical |
| AirlineFirstFlight_X | Option X: Airline for first leg (only known to arbitrary airline number for proprietary reasons) |
| AirlineSecondFlight_X | Option X: Airline for second leg (if there exists a second leg) (only known to arbitrary airline number for proprietary reasons) |
| AirplaneFirstFlight_X | Option X: Airplane for first leg (only known to arbitrary airplane number for proprietary reasons) |
| AirplaneSecondFlight_X | Option X: Airplane for second leg (if there exists a second leg) (only known to arbitrary airplane number for proprietary reasons) |
| Fare_X | Option X: Fare ($) |

Table 4: Description of Alternative Specific Attributes where X Corresponds to Choice Option (1),(2) and (3)

* For variables DepartureTimeHours_X, ArrivalTimeHours_X, FlyingTimeHours_X and TripTimeHours_X there is an additional variable measuring the time in minutes where the variable name in each case substitutes '...Hours_X' for '...Mins_X'.

| Variable | Average | St. Dev. | Min | Max |
|---|---|---|---|---|
| SubjectId | 1807.50 | 1043.41 | 1.00 | 3613.00 |
| q17_Gender | 1.46 | 0.50 | 1.00 | 2.00 |
| q15_Age | 3.95 | 1.15 | 1.00 | 8.00 |
| q19_Occupation | 2.54 | 1.90 | 1.00 | 12.00 |
| q16_Income | 8.09 | 3.53 | 1.00 | 14.00 |
| Cont_Income | 108.20 | 87.63 | 10.00 | 350.00 |
| q20_Education | 5.88 | 1.71 | 1.00 | 9.00 |
| q02_TripPurpose | 2.04 | 0.76 | 1.00 | 4.00 |
| q03_WhoPays | 1.20 | 0.46 | 1.00 | 3.00 |
| q14_PartySize | 1.70 | 0.99 | 1.00 | 5.00 |
| OriginGMT | 382.18 | 82.08 | 300.00 | 480.00 |
| DestinationGMT | 397.34 | 82.87 | 300.00 | 480.00 |
| Direction | 1.59 | 0.49 | 1.00 | 2.00 |
| BestAlternative_1 | 0.69 | 0.46 | 0.00 | 1.00 |
| BestAlternative_2 | 0.16 | 0.37 | 0.00 | 1.00 |
| DepartureTimeHours_1 | 11.72 | 3.34 | 6.00 | 18.00 |
| ArrivalTimeHours_1 | 15.21 | 3.35 | 7.67 | 21.63 |
| FlyingTimeHours_1 | 3.74 | 1.59 | 0.67 | 6.35 |
| TripTimeHours_1 | 3.74 | 1.59 | 0.67 | 6.35 |
| Legroom_1 | 2.46 | 1.12 | 1.00 | 4.00 |
| AirlineFirstFlight_1 | 4.61 | 2.56 | 1.00 | 11.00 |
| AirlineSecondFlight_1 | 0.00 | 0.00 | 0.00 | 0.00 |
| AirplaneFirstFlight_1 | 4.52 | 2.30 | 1.00 | 8.00 |
| AirplaneSecondFlight_1 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fare_1 | 405.66 | 199.87 | 80.00 | 1330.00 |

Table 5: Descriptive Statistics of Variables

| Variable | Average | St. Dev. | Min | Max |
|---|---|---|---|---|
| DepartureTimeHours_2 | 11.67 | 3.35 | 6.00 | 18.00 |
| ArrivalTimeHours_2 | 16.92 | 3.36 | 9.17 | 24.10 |
| FlyingTimeHours_2 | 4.24 | 1.59 | 1.17 | 6.85 |
| TripTimeHours_2 | 5.50 | 1.68 | 1.83 | 8.85 |
| Legroom_2 | 2.48 | 1.13 | 1.00 | 4.00 |
| AirlineFirstFlight_2 | 4.68 | 2.65 | 1.00 | 11.00 |
| AirlineSecondFlight_2 | 0.00 | 0.00 | 0.00 | 0.00 |
| AirplaneFirstFlight_2 | 4.51 | 2.29 | 1.00 | 8.00 |
| AirplaneSecondFlight_2 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fare_2 | 407.07 | 200.96 | 80.00 | 1390.00 |
| DepartureTimeHours_3 | 11.66 | 3.34 | 6.00 | 18.00 |
| ArrivalTimeHours_3 | 16.89 | 3.41 | 9.25 | 24.03 |
| FlyingTimeHours_3 | 4.24 | 1.59 | 1.17 | 6.85 |
| TripTimeHours_3 | 5.48 | 1.67 | 1.92 | 8.85 |
| Legroom_3 | 2.53 | 1.13 | 1.00 | 4.00 |
| AirlineFirstFlight_3 | 4.65 | 2.59 | 1.00 | 11.00 |
| AirlineSecondFlight_3 | 4.65 | 2.65 | 1.00 | 11.00 |
| AirplaneFirstFlight_3 | 4.50 | 2.31 | 1.00 | 8.00 |
| AirplaneSecondFlight_3 | 4.50 | 2.28 | 1.00 | 8.00 |
| Fare_3 | 405.20 | 197.68 | 80.00 | 1275.00 |

Table 6: Descriptive Statistics of Variables