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**A Prediction Model of Airline Passenger Preference:
Identifying factors that predict passenger preference between low cost and
legacy carriers.**

by

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A dissertation submitted to the College of Aeronautics
Florida Institute of Technology
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for the degree of

Doctor of Philosophy
in
Aviation Sciences

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A Prediction Model of Airline Passenger Preference:
Identifying factors that predict passenger preference between low cost and legacy
carriers.

by

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ABSTRACT

TITLE: A Prediction Model of Airline Passenger Preference:
Identifying factors that predict passenger preference
between low cost and legacy carriers.

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The purpose of the study was to identify factors that influence a commercial airline passenger's preference between low-cost and legacy airline carriers. In turn a prediction model of passenger preference was created for American travelers. The study utilized a correlational design with linear multiple regression analyses as the statistical analyses to build the prediction model. The study was conducted in two stages utilizing two independent samples totaling 936 participants (379 females), all from the United States. Data from the first sample was used to create the regression equation for passenger preference. Data from the second sample was used to test the regression equation and thereby validate the prediction model.

Each stage conducted backward stepwise regression analyses on the independent samples using the same instrument. Nine factors were selected to be tested to determine whether they had a significant influence on passenger preference between airline types. These nine factors were age, gender, income,

education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

The results of this study suggested that frequency of travel, income, seat type, and education level significantly predict an American passenger's preference between low cost and legacy carriers. Despite certain limitations, the study has several practical benefits specifically for the commercial airline industry and provides a foundation for future research in this field.

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Dedication

To my parents, Ayesha and Mahiar, my rocks. The only people I have always been able to rely on knowing they are there to pick me up when I stumble and guide me when I am lost.

To my grandparents, Tehmi, Bomi, Dhunji and Totty. The love, and encouragement that I received made this journey possible in more ways than one. My only regret is that all of you were not here to see me complete this journey.

To my Delta Tau Delta Fraternity, and all my brothers. I owe so much to this beautiful organization that helped mold me as a man. Through this experience I have been blessed with a lifelong family.

To the love of my life, I dedicate this to you and our future. The biggest driving force that helped me to the end was the dream of our future. I hope I have made you proud.

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This journey though seemingly shorter in years was long and ever arduous in its own ways. There were times where the end seemed out of reach, and quitting seemed like the only option. I wouldn't be writing this if it weren't for certain people that helped me achieve this goal.

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Chapter 1

Introduction

Purpose Statement

The purpose of this study is to identify factors that influence a commercial airline passenger's preference between low-cost and legacy airline carriers. The end goal of this research is to create a prediction model of passenger preference on airline type choice. This prediction model should be of value to commercial airlines in order to understand better which demographics of passengers fly on their types of airlines.

In Chapter 1, I will begin with explaining the background of the problem and the rationale behind the choice of this research topic. In an effort to ensure clarity for all readers, especially those outside the aviation industry, all relevant terms will be operationally defined in the context of this study. In addition, this chapter will focus on the specific research questions and hypotheses of the study. Finally, this chapter will conclude with explaining the significance of the study, as well as addressing the relevant limitations and assumptions that were considered in preparing to conduct the study.

Background and Rationale

The end goal of this research which was previously mentioned, is to create a prediction model of passenger preference on airline type choice, namely low cost or legacy airlines. The aviation industry is a consumer centric business and depends

heavily on passenger demand. Over the years, even with the exponential growth of the airline industry, competition for passengers and percentage of market share is still an aspect of the industry. The competition in the airline industry has created an environment of very narrow profit margins (Borenstein, 2011; Williams, 1994). Airlines are always trying to attract new passengers and maintain loyalty with their existing customers.

In this atmosphere of stiff competition, the value of understanding the customers and the consumer base cannot be understated. Better understanding of any company's customer base is beneficial to the bottom line of the business. This research provides an in depth analysis into one aspect of the consumer decision-making process. By identifying factors that may influence passenger choice between low cost and legacy airlines, this research could potentially allow airlines to better understand the demographic of passengers that fit their airline type. This can also assist airlines in better focusing their marketing efforts towards passenger demographics that are more likely to fly on their type of airline.

Consumer research as a field of study is fairly extensive, and several lines of research exist on a variety of different aspects. Aviation consumer research on the other hand is not as extensive. Research in this field has focused on different aspects of consumer willingness, trust and differentiating demographics. Research has been conducted on factors that differentiate airline passengers and their choices, but no current study was identified that creates a prediction model of airline type

choice for US passengers. This study seeks to fill the gap in the existing literature. In later sections, in depth explanations and analyses will be detailed regarding the reasons for researching the factors of interest and the theoretical grounding of their relationship to the study. The factors being researched for their potential predictive influence on passenger preference are age, gender, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

The creation of the prediction model in the form of a regression equation is the unique aspect of this study. This model or regression equation can potentially be used by airlines to predict the likelihood of a person to fly on their type of airline. This is likely to be a major benefit to the airline industry and has several practical applications. As this prediction model is used and more data is collected by the industry, it can be refined further to increase accuracy of prediction.

Operation Definitions of Terms

1. *Carrier* refers to a United States commercial air service operator or airline.

In the context of this study, the term carrier and airline may be used interchangeably as they both refer to the same context. In this study the two types of airlines/carriers being referred to are low cost and legacy carriers.

2. *Low Cost Carriers* are defined as airlines that have lower ticket fares, and offer less amenities as standard, but allow passengers to pay for the selected extra amenities that they prefer. These airlines usually fly domestic routes,

and have smaller fleets. Some examples of low cost carriers are: JetBlue Airways, Frontier Airlines, Southwest Airlines, Spirit Airlines, and Allegiant Air.

3. *Legacy Carriers* are defined as large full service airlines offering more amenities on board, with major city hubs, large fleets, often fly to international destinations, and usually have more expensive ticket options. Some examples of legacy carriers are: American Airlines, United Airlines, and Delta Air Lines.
4. *Passenger Preference* refers to the participants'/passengers' preference between legacy and low cost airlines. This is measured from the average of the scores from the preference questions. The passengers' preference between legacy and low cost airlines will be measured using participants' scores on the slider scales of the questions referring to the same.
5. *Age* refers to the participants' age measured in years.
6. *Gender* refers to the participants' gender, either male or female.
7. *Income* refers to the participants' yearly salary measured in United States Dollars per year.
8. *Education level* refers to the participants' highest degree earned, either HS, associate's degree, 4-year bachelor's degree, master's degree, or doctorate.
9. *Seat type* refers to the participants' class of seat purchased, namely, either economy, business or first class. This may be presented to the participants

in terms of upper and lower tiers in order to account for differences in amenities offered by different airlines in the same type of seat. Some airlines may not offer first class and some may not offer business class. For this reason, seat type will be identified as upper tier, and lower tier seats.

10. *Type of travel* refers to the participants' purpose of travel, either business travel or personal/pleasure.
11. *Frequency of Travel* refers to the number of times participants travel by air per year. The unit of measurement may be adjusted as needed during the literature review process.
12. *Category of frequent flier program* refers to the tier, class, or level of a frequent flier program that participants belong to with their predominant airline of choice. The participants will likely be presented with a choice that resembles the following; highest tier (maximum benefits), middle tiers (some benefits), lowest tier (little to no benefits), and not a member of any frequent flier program.
13. *Risk-taking tendencies* refers to the participants' score on a Likert-type question regarding their self-evaluation of risk-taking tendencies.

Research Questions (RQ)

1. RQ1: Is age a significant predictor of passenger preference when controlling for gender, income, education level, seat type, type of travel,

frequency of travel, category of frequent flier program, and risk-taking tendencies?

2. RQ2: Is gender a significant predictor of passenger preference when controlling for age, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies?
3. RQ3: Is income a significant predictor of passenger preference when controlling for age, gender, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies?
4. RQ4: Is education level a significant predictor of passenger preference when controlling for age, gender, income, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies?
5. RQ5: Is seat type a significant predictor of passenger preference when controlling for age, gender, income, education level, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies?
6. RQ6: Is type of travel a significant predictor of passenger preference when controlling for age, gender, income, education level, seat type frequency of travel, category of frequent flier program, and risk-taking tendencies?

7. RQ7: Is frequency of travel a significant predictor of passenger preference when controlling for age, gender, income, education level, seat type, type of travel, category of frequent flier program, and risk-taking tendencies?
8. RQ8: Is category of frequent flier program a significant predictor of passenger preference when controlling for age, gender, income, education level, seat type, type of travel, frequency of travel, and risk-taking tendencies?
9. RQ9: Is risk-taking tendencies a significant predictor of passenger preference when controlling for age, gender, income, education level, type of travel, frequency of travel, and category of frequent flier program?

Research Hypotheses

Null Hypothesis 1

H₀₁: Age is not a significant predictor of passenger preference when controlling for gender, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

Alternative Hypothesis 1

H_{A1}: Age is a significant predictor of passenger preference when controlling for gender, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

Null Hypothesis 2

H₀₂: Gender is not a significant predictor of passenger preference when controlling for age, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

Alternative Hypothesis 2

H_{A2}: Gender is a significant predictor of passenger preference when controlling for age, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

Null Hypothesis 3

H₀₃: Income is not a significant predictor of passenger preference when controlling for age, gender, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

Alternative Hypothesis 3

H_{A3}: Income is a significant predictor of passenger preference when controlling for age, gender, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

Null Hypothesis 4

H₀₄: Education level is not a significant predictor of passenger preference when controlling for age, gender, income, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

Alternative Hypothesis 4

H_{A4}: Education level is a significant predictor of passenger preference when controlling for age, gender, income, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

Null Hypothesis 5

H₀₅: Seat type is not a significant predictor of passenger preference when controlling for age, gender, income, education level, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

Alternative Hypothesis 5

H_{A5}: Seat type is a significant predictor of passenger preference when controlling for age, gender, income, education level, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

Null Hypothesis 6

H₀₆: Type of travel is not a significant predictor of passenger preference when controlling for age, gender, income, education level, seat type frequency of travel, category of frequent flier program, and risk-taking tendencies.

Alternative Hypothesis 6

H_{A6}: Type of travel is a significant predictor of passenger preference when controlling for age, gender, income, education level, seat type frequency of travel, category of frequent flier program, and risk-taking tendencies.

Null Hypothesis 7

H₀₇: Frequency of travel is not a significant predictor of passenger preference when controlling for age, gender, income, education level, seat type, type of travel, category of frequent flier program, and risk-taking tendencies.

Alternative Hypothesis 7

H_{A7}: Frequency of travel is a significant predictor of passenger preference when controlling for age, gender, income, education level, seat type, type of travel, category of frequent flier program, and risk-taking tendencies.

Null Hypothesis 8

H₀₈: Category of frequent flier program is not a significant predictor of passenger preference when controlling for age, gender, income, education level, seat type, type of travel, frequency of travel, and risk-taking tendencies.

Alternative Hypothesis 8

H_{A8}: Category of frequent flier program is a significant predictor of passenger preference when controlling for age, gender, income, education level, seat type, type of travel, frequency of travel, and risk-taking tendencies.

Null Hypothesis 9

H₀₉: Risk-taking tendencies is not a significant predictor of passenger preference when controlling for age, gender, income, education level, type of travel, frequency of travel, and category of frequent flier program.

Alternative Hypothesis 9

H_{A9}: Risk-taking tendencies is a significant predictor of passenger preference when controlling for age, gender, income, education level, type of travel, frequency of travel, and category of frequent flier program.

Significance of the Study

The consumer research field is fairly extensive. Decades have been spent researching and understanding the mindset and decision-making processes of consumers. Details of the background relating to consumer research will be outlined in later sections of Chapter 2.

As mentioned before, this study looks to identify factors that could predict passenger preference between airline types in order to create a prediction model. Consumer differences and influencing factors have been researched in various different industries, including aviation. Several studies which will be explained in detail later have researched the influencing differences of various demographics of airline passengers on decision-making and choice (Atilgan & Akinci, 2003; Carlsson & Löfgren, 2006; Dresner, 1995; Espino, Martín, & Román, 2008; Hess & Polak, 2005; Kim, Lehto & Morrison, 2007; Lu & Shon, 2012; Nako, 1992; Ong & Tan, 2010; Windle and Proussaloglou, & Koppelman, 1999).

This study is different in that it combines a lot of the concepts researched by these studies in the past in order to create a conclusive analysis of the major factors that influence passenger choice between low cost and legacy carriers. None of the research studies found in the current body of literature were found to analyze factors that influenced the choice between these two types of airlines. Additionally, no previous study was found to create a prediction model of passenger preference.

All these missing gaps in the current literature are sought to be filled by the current study, which is one of the main significances of the research.

Times change, and passengers' needs, wants, and mindsets evolve over time. Another benefit of this research study is that it collects the most recent and relevant information in order to create a prediction model of today's passengers. Studies conducted years ago, may not be valid today due to the evolution of times and the changes seen in the airline industry. This is one of the main benefits of this study, but could require future research to ensure that it is still relevant in years to come.

The most obvious significance of this study is the practical benefit it provides to the commercial airline industry and airline operators. Being a consumer oriented industry, airlines are always trying to understand which type of consumers fit their particular business model so as to be able to better serve the customers and fend off competition. Better understanding and serving customers has an indirect but significant impact on the economics and profitability of any airline.

The last significance of the study comes in terms of its addition to the current body of knowledge. As mentioned, no current research was found to create a prediction model for airline passengers. This study could serve as a foundation for future research to continue in this field by replicating the study in future years and in other countries to create additional prediction models. The study can also be

used as a template to replicate the methodology in order to create prediction models in other industries and fields of research as well.

Study Limitations and Assumptions

Limitations

As with any research endeavor, there are some limitations of this study that must be detailed. In this section attention will be given to the prevalent limitations of this research and the considerations given to the addressing them.

The primary limitation of this research lies in the sampling strategy and procedure of recruiting participants. The study will utilize an online questionnaire, and participants will be recruited using Amazon's ® Mechanical Turk ® (MTurk). This online methodology of participant recruiting has several benefits. The first being the ease of data collection, and the possibility to collect large sample sizes relatively quickly and economically. However, the researcher must relinquish control of the environment as one of the tradeoffs. The data are exposed and the risk associated with said exposure cannot be eliminated as there is no supervision from the side of the researcher.

The benefit of this online tool using convenience sampling is that it allows the collection of a large sample of potential aviation consumers, which can help with the representativeness and generalizability of the findings. The benefits in this case outweigh the cons and therefore this was chosen to be the avenue used for participant recruitment. Additionally, with the increase in popularity of online tools

such as MTurk, research has been conducted in to the reliability of the data collected from these sources. Buhrmester, Kwang, and Gosling (2011), and Germine, et al. (2012) stated that data collected from MTurk was as reliable as data collected in a traditional laboratory setting.

Aviation is a global industry with airlines competing with each other all over the world and with passengers from almost every country around the globe. This research only utilizes participants from the United States, and therefore can only be generalizable to understand the preference of US passengers. Although the US passengers do make up the majority of passengers flying on low cost airlines, as they are predominantly domestic carriers, legacy carriers often fly to countries all over the world and have passengers from all over the world. This research does not account for these passengers nor does it account for foreign passengers that may be flying domestically within the US. This is a known limitation, but was deemed acceptable in order to narrow the scope of the research for the sake of feasibility. Future research may seek to collect data from other countries and create unique prediction models for those passengers.

One aspect of the aviation industry that will be discussed again in future sections is the further demarcation of the airline types in recent years. In the past the airline industry has been segmented into two categories, namely legacy and low cost carriers. The descriptions of each are provided in other sections. However, in recent years a new category of airlines has emerged with a slightly different

business model, Airlines that were once considered the cheapest and were therefore called low cost carriers, are no longer the cheapest but are rather the mid-tier category, and a new category called ultra-low cost carriers has emerged. This study due to methodology constraints does not analyze passenger preference between all three categories and only deals with the original two of legacy and low cost. This is a limitation as it does not account for the evolution in the industry and the changing landscape. However, this does open up another avenue of future research to be explored.

The study does not discriminate based on whether a person has flown on an airline flight in the past or not. This meaning that a participant who has never flown on an airline flight would still be permitted to participate in the study. The limitation arises due to the fact that someone that has never experienced airline travel may be allowed to participate and thereby influence the overall findings which may not be representative of typical airline consumers. This limitation was deemed acceptable due to the fact that even if a person has not flown on an airline in the past, they may choose to do so in the future and thereby could be classified as potential airline consumers. In this case, even these participants' preference is important to understand and can be considered part of the overall preference of current and future airline passengers.

Another limitation arises in that the subjects are being compensated for their time and participation in the study. Subjects that are participating in such studies

for the compensation may be inclined to hurry through the questionnaires in order to complete them quickly and increase earnings. A limitation of this study is that the assumption is made that participants are completing the questionnaire truthfully and giving the questions appropriate amounts of thought and consideration.

Finally, the questionnaire/instrument used in this study will be created by the researcher for the purpose of this research. No existing instrument was found to be available that had been previously validated and tested for reliability. This is a limitation as the questionnaire that will be created is assumed to be reliable. One of the steps to account for this limitations is that a Cronbach's Alpha and Guttman's split half tests will be conducted on the five questions that will be averaged to provide the value for the dependent variable. These tests will be conducted to test for internal consistency and reliability, which are said to exist if greater than 0.7.

Assumptions of Regression

This research study will employ the use of regression analyses in order to create a final prediction model. In this section, the assumptions of regression analyses will be outlined in order to provide a clear understanding of the assumptions made in order to conduct this research. The regression assumptions will be stated in this section, and will be referred to once again in Chapter 4 when testing the data to ensure that they satisfy these assumptions. The seven assumptions of regression are:

- Assumption 1: There is one continuous dependent variable.

- Assumption 2: There is one continuous independent variable.
- Assumption 3: There is a linear relationship between the dependent and independent variables.
- Assumption 4: There is independence of observations.
- Assumption 5: There are no significant outliers
- Assumption 6: There is homoscedasticity and no multicollinearity within the data.
- Assumption 7: The residuals of the regression line are normally distributed.

Assumption 1 and 2 refer to the nature of the variables used in the study and their respective scales of measurement. These assumptions stipulate that at least one of the IVs and one of the DVs is a continuous variable, inferring that they are not categorical or dichotomous choice variables. This is necessary in order to conduct a linear regression analysis and produce a regression equation.

Assumption 3 requires that there is a linear relationship between the dependent and independent variables. This assumption is tested by visually inspecting the scatterplot of the residuals against the case numbers. This can also be examined by analyzing how closely the Lowess fit line converges onto the zero line in order to determine linearity. Assumption 4 states that there should be independence of observations. In this case residuals of the regression analyses are tested for independence in order to determine that a residual is not providing information about another residual. This is also tested by plotting the residuals

against the case numbers. If there is independence of residuals, the Lowess fit line will not deviate from the 0-line. This assumption is also tested using the Durbin-Watson test. Using the Durbin-Watson test for 1st order autocorrelation, scores that indicate independence of observations can range from 0-4. A score of 2 using the Durbin-Watson test is preferred which indicates that there is no correlation between residuals.

Assumption 5 states that there should be no significant outliers. Outliers can skew the data, and therefore outlier analyses will be conducted to ensure there are none. If outliers do exist, attention will be given to how they will be addressed. Assumption 6 states that there should be homoscedasticity and no multicollinearity within the data. This infers that the variance of the residuals is constant across all the independent variables and that no variables are highly correlated with each other. These are tested using scatterplot of the residuals vs. the predicted values, and the correlation and VIF scores. Once again the fit of the Lowess line on the zero line is analyzed. Assumption 7 states that the residuals are normally distributed. This is tested by using either a histogram with a superimposed normal curve or a normal probability plot (p-p plot).

Summary

Chapter 1 dealt with setting up the research and describing in detail the predominant purpose, research questions and hypotheses of this study. Chapter 1 also outlined the need for the study and the limitations associated with the same. In

Chapter 2, I will review the current literature in relation to this research study. The purpose of Chapter 2 is to provide an in depth analysis of the current body of knowledge in this topic area, and also to identify the gaps in the literature that can possibly be filled by this study. Chapter 2 will also provide a brief summary of the airline industry and the historical progression that lead to the current state of the industry. Additionally, chapter will provide theoretical grounding for the overarching concepts in this study as well as concrete rational for the relevance of each of the nine potential predictive factors to consumer/passenger preference.

Chapter 2

Review of Related Literature

Introduction

The airline industry is a complicated and intricate system that operates with narrow margins and hinges on a delicate balance. All the parts of the system must run together like a well-oiled machine for the industry to be successful. One of the major aspects of the commercial airline market is that it is first and foremost a consumer centric business model. The industry is reliant on the perceptions, and feelings of the travelling public. Therefore, all that is done within the commercial airline sphere should be done with an eye towards keeping the passengers' needs, wants, and demands at the forefront. In this section, I will go in detail to enumerate and explain the nuances of the airline industry and the differentiating characteristics of both Legacy and Low Cost airline business models.

The purpose of this study is to create a prediction model for passengers' preference between the two types of airlines. As such, I will be accounting for the nine factors being tested in this research study, and how they relate to passenger preference and consumer decision making. These factors will be tested due to their connection to the supporting theories in the field of consumer research. Lastly, I will be discussing the appropriateness of using multiple linear regression in the creation of the prediction equation, using the foundation laid down by previous studies in prediction modelling research.

Sources

To gather the information needed for the literature review, several sources, and portals were utilized in order to research the current body of knowledge in this topic area. To begin, the predominant portal used for sourcing information was Google Scholar. In addition, the Florida Institute of Technology's library portal was used to search additional databases for certain information. Some of the databases used for research the current literature were ProQuest, PsycINFO, Wiley Online, amongst others. From these portals and databases, information was found in peer-reviewed journal articles, books, and reports put out by different agencies. To collect the information needed, several different keywords were used, depending on the topic being researched. Some of these keywords/phrases include: Low cost airlines, legacy airlines, airline history, airline industry deregulation, airline passenger differences, age, gender, income, education level, frequent flier, risk-taking, risk perception, risk tendencies, consumer theory, decision making, value theory, business travelers, economy seats, travel frequency, repeated choice decision making, consumer differences, regression analyses, and prediction models.

Airline Industry

The complex economic nature of the United States' airline industry is based on an oligarchical system. Oligarchy comes from the Greek word oligarkhía, which is devised from olígos, meaning "few", and arkho, meaning "to rule or to command". An oligarchy is a structure of industry set up wherein a small collection

of people, groups, or companies, control a majority of the power and market share (Winters, 2011). The United States' airline industry is a prime example of this power structure at work.

The airline industry within the United States has evolved and morphed several times in order to operate in its current form. The roots of the airline industry can be traced back to 1914, and the first commercial fixed wing airplane flight for an eighteen-mile journey in western Florida. Passengers in those days paid \$5, for such an experience (Morrison, & Winston, 2010). In 2017, there is almost no limitation on distance that an airline passenger can travel. In just over a hundred years, human beings have gone from barely being able to go from one neighboring city to the next in an airplane for a 24-minute flight, to flying across the globe in under 24 hours.

From 1914 onwards, small commercial operators began service throughout the country, and the world, transporting passengers over short distances. Commercial aviation at this point however was not the primary mode of transportation, essentially due to the high expense and relative small distances covered by aircraft. It would not be until many years later that the airline industry really became a viable and vital mode of transporting people and materials. Through the 1920s and 1930s, many air service operators and airlines started to emerge, some of which are still in business today. Some of these include, Delta Air Lines, American Airlines, Pan Am, United Airlines, and many more (Cook, 1996).

The airline industry as a whole remained profitable through most of its inception and early decades, even during the great depression. The margins of profit and profitability of the airline industry today is somewhat of a concern and will be discussed shortly following.

Moving forward into the 1940s and 1950s, the airline industry saw the establishment of different agencies to govern different aspects of this increasingly complex system. The Civil Aeronautics Board was established in 1938 for the purpose of regulating seats fares, as well as assigning routes of travel to airlines. 1958 saw the establishment of the Federal Aviation Agency (now the Federal Aviation Administration) which was responsible for addressing safety and security concerns that began arising in the industry (Cook, 1996). The nature of the airline industry was completely changed in 1978 into the form in which it operates today. This was the result of the enactment of the Airline Deregulation Act of 1978.

In this post deregulation environment, airlines were now allowed to fly any routes they desired and be responsible for setting their own fares (Morrison & Winston, 2010). This set up a free market which encouraged competition. The industry expanded exponentially, with new airlines being set using various kinds of business models to set themselves apart. This expansive free market competition led to significant reductions in fares and much narrower profit margins (Williams, 1994). Major airlines that had previously dominated, but that were now unable to adapt, saw their demise in the wake of this stiff competition.

The airline industry grew steadily overcoming economic and political hurdles over the 1980s and 1990s. It wasn't until the attacks of September 11, 2001 that the airline industry suffered severe negative effects. The events of that day set the stage for a perfect storm as it were. Travel decreased significantly, as passengers were afraid to travel, and the economic environment at the time had seen labor and fuel costs see dramatic increases. It took the airlines almost five years to recover from the continuous quarters of not making profits with the help of approximately \$5 billion bailout from the federal government.

The industry has lost approximately \$60 billion between deregulation in 1978 and the late 2000s (Borenstein, 2011). The airline industry was also affected in 2009-2011 with the economic recession. Many airlines filed for Chapter 11 bankruptcy protection following these turbulent times. Chapter 11 bankruptcy allows for the organization to restructure themselves and restart operations without the liquidation of assets (Ciliberto, & Schenone, 2012). American Airlines was one of the largest airlines to go down this road in 2011. Though airlines may file for bankruptcy, they sometimes come out of those difficult times and return to profitability. As of today, American Airlines is the world's largest airline based off of fleet size. This was in part due to the merger with US Airways in 2013 (Barros, Liang, & Peypoch, 2013).

Mergers are one of the common traits of the airline industry. As mentioned earlier, the airline industry is oligarchy, and this is predominantly due to the

mergers that exist within the industry. Mergers although having their benefits, offer less choice to passengers due to reduced competition. A few very large airlines dominating the airspace is not in the best interest of the passenger. The profit margins in the airline industry are small, and many airlines struggle to make profits (Borenstein, 2011). This is in part due to the high competition and fare reduction wars that occurred for airlines to keep their passengers. It is somewhat of a vicious circle where free competition lead to reductions in fare prices, which leads to either bankruptcy or mergers which leads to reduced competition. This in turn allows a few large companies to set the standards for prices.

One way airlines stayed competitive and relevant during periods of tough economic times or high competition, was to create unique features in their business models to set themselves apart from the rest. This lead to the creation of two distinct segments of the airline industry. The two groups that have been the main categories of the airline industry are often referred to by aviation professionals as ‘legacy airlines’ and ‘low-cost airlines’.

Legacy and Low-Cost Airlines

First it is critical to mention that for the purpose of this research study, I will only be categorizing the airline industry into these two segments of legacy and low-cost airlines. In recent years there has been the emergence of a new segment within the airline with different business model ideologies, being classified as ultra-low cost airlines. Research using this new category is being set aside for the sake of

ease of understanding and statistical strength of analyses, but will be mentioned once again as a potential avenue for future research.

By definition, a legacy airline, is a carrier that had established interstate flights prior to the enactment of the Airline Deregulation Act of 1978. Deregulation allowed for free and open competition amongst airlines, and led to the formation of several new carriers that the older more established airlines had to compete with. This in turn caused a lot of airlines to go bankrupt and cease service operations. The airlines that managed to survive in this competitive climate were therefore unofficially recognized as legacy airlines. Examples of legacy airlines would be American Airlines, United Airlines, and Delta Air Lines (transcontinental), in addition to Alaska Airlines and Hawaiian Airlines (regional).

In contrast, low cost airlines, refer to those airlines that generally have lower ticket fares, but offer less amenities and services to passengers as standard inclusions in tickets (Malighetti, Paleari, & Redondi, 2009). Instead, these airlines allow passengers to avail of these extra services or comforts by paying extra for the specific items that individual passengers may desire. Low cost airlines began to emerge as viable competitors after the enactment of the Airline Deregulation Act of 1978. Examples of low cost airlines would be JetBlue Airways, Frontier Airlines, Spirit Airlines, Southwest Airlines, Allegiant Air, and many more. As mentioned earlier, airlines like Frontier, Spirit and Allegiant are beginning to identify themselves as part of a new category of carriers termed Ultra-Low Cost.

Legacy carriers are often termed full service carriers. This is due to the fact that they often times do not charge extra for many services or amenities, but those are included with the price of the ticket, although these tickets are usually more expensive (Pels, 2008). Low cost carriers, as mentioned do not offer as many amenities as standard, and this business model was designed to differentiate themselves from the old standing business models of the legacy airlines. The concept was driven by the idea to allow passengers to pay for the services they wanted or needed and not for the ones that did not interest them (Alamdari, & Fagan, 2005). Some airlines even marketed themselves with their business model as no-frills, discount, or budget airlines, in order to attract customers to use air travel that otherwise believed it to be unaffordable. A study has suggested however that when presented with hypothetical packages involving flight options with varying levels of service, quality and amenities, passengers are willing to more for increased service quality (Balcombe, Fraser & Harris, 2009). This study was conducted in the context of low cost airlines.

Legacy airlines typically have larger fleet sizes, with longer range aircrafts and service many domestic and international destinations. They conduct their operations using a hub and spoke network connection system (Pels, 2008). Hub and spoke networks imply that the legacy airlines pick one or a few major hubs through which all their aircraft fly through and then connect to other airports. An example would be Delta Air Lines, where on the east coast of the United States lies their

primary hub of Atlanta International Airport. Most flights will fly into Atlanta first before connecting onwards. This hub and spoke system was designed to deter competition between legacy airlines at their hubs where those airlines maintain a stronghold (Aguirregabiria, & Ho, 2010). Low cost airlines typically are smaller in size and generally do not fly international routes. Additionally, they operate on a point to point system of network connection, rather than a hub and spoke. This offers them greater flexibility in choosing routes that will be the most profitable, but it does not lend itself to high intercity connectivity (Dobruszkes, 2006).

O'Connell, and Williams (2005) stated that the already stiff competition between legacy airlines and low-cost carriers was intensifying across the world, and that in the American and European markets, legacy airlines had already lost a significant section of their customer base to low cost carriers. Although low cost carriers have lower ticket fares, legacy carriers can compete better due to their larger networks and better connectivity (Stavins, 2001). One response to the difficult economic times as well as the competition in the market was the agreement of airlines to merge. As mentioned earlier, several major airlines have merged in recent years just to attempt to survive and still compete. The most recent major merger created one of the largest legacy airlines in the world, namely the merger between American Airlines and US Airways (Peterman, 2014).

There has been another response that has emerged in recent years. Legacy airlines have been entering the low cost markets by either creating their own

subsidy low cost carriers, forming partnerships and tie-ups with existing low cost carriers, and in some cases absorbing and purchasing other low cost carriers to become subsidy airlines (Graham, & Vowles, 2006; Morrell, 2005). This has created some areas of interest and some points for concern. The legacy airlines may be able to learn and adapt certain useful aspects of the low cost business model. However, with the largest airline companies that already own such large market shares absorbing more airlines and in turn more market share, the airline industry is becoming less of a free competition market and more of an oligarchy. This could lead to a situation where a small group of companies monopolizes most of the market.

Low cost carriers are also adapting their practices in order to stay relevant and compete with the legacy carriers. The airline industry has become flexible where business models are more fluid and can be adapted significantly. New opportunities have presented themselves where low cost carriers are beginning to offer long haul service (Wensveen & Leick, 2009). Long haul flights have mostly been provided by legacy full service carriers that offer international destinations as part of their rout network. Long haul flights are generally between 6-12 hours long.

Airlines are trying to improve and differentiate themselves from their competitors. In addition to product differentiation, consumer understanding is also necessary. The airlines themselves are keen to understand their customers better. This allows for research like this study to be of interest and value to the industry.

Airlines are interested to know which types of customers are more likely to choose their type of airline, and it is for this reason that I have chosen to study the factors that predict consumer preference and choice.

Consumer Research

The aim of this study is to identify factors that can help the industry predict passengers' preference between the options of legacy and low cost carriers. It has been mentioned previously, the differences between these two types of airline operations. It is therefore indicative that there would be differences in the types of passengers that are drawn to each option. This section will deal predominantly with reviewing the literature related to consumer theories, and the different theories that could lay the foundation for making these predictions, identifying different factors, and understanding the decision making strategies and processing behind consumer choice and preference.

Consumer theory research spans a vast period of time, and has evolved with the needs of consumers and with the economic climate. One of the primary basis and foundations of consumer theory is the 'theory of value' put forth by Debreu (1959). The theory states that the value of items or goods are based on consumers' preference of the same. There exists a price point though after which excess demand from one can be transferred over to another choice in order to maintain equilibrium in a market. The theory of consumer choice states that every choice a person makes is in some way an attempt to satisfy one of the five basic needs of a

human, namely, love and belonging, power, freedom, survival, and fun (Glasser, 1998). Another consumer choice theory predicts that consumers will make rational decisions in their choices in order to maximize the benefit or outcome, based on their assessment of the expected utility of the product and/or choice (Von Neumann & Morgenstern, 1944).

Some of the postulations of these theories have been refuted where economists suggest that in decision making and consumer choice scenarios these theories predict how consumers should choose but not necessarily how they do choose. Kahneman and Tversky (1979) put forth prospect theory in an attempt to highlight some of the inadequacies of expected utility theory of consumer choice. The theory states that people make decisions based on the expected value of losses or gains, and not on the final outcome as some normative decision making theories like expected value theory state. The theory demonstrates that people use heuristics when making decisions involving a dichotomous choice such as in gambling. The theory finds that gains are treated differently as compared to losses and that the way problems are framed has an influence on choice.

Based on previous research, it has been widely accepted that consumer perceptions of price, value, and quality of the product significantly influence a consumer's shopping behavior and product choice (Bishop, 1984; Doyle, 1984; Schechter, 1984). Zeithaml (1988) expanded on this research by properly describing the concepts of the consumers' perspective on price, value and quality.

In doing so these concepts were related to a model for better understanding. The author proposed a Means-End model relating price, quality and value. The model differentiated attributes into lower and higher level attributes based on their perceived importance. The model also suggested that reputation of a particular brand name influenced perception of the same.

Bauer (1960) first put forth the idea that consumer behavior should be studied from the perspective of risk-taking. Taylor (1974) expands on this concept by creating a comprehensive theory or 'systematic explanation' of risk-taking in consumer behavior. Taylor explains that consumer behavior is basically a choice between products. The issues arise as the outcome of the choice is uncertain and therefore involves some level of risk. This level of risk however is not constant, as it is each consumers' own perception of the risk level. To some consumers the risk may not be perceived as high, and the choice is not as complex. To others however, it may be perceived as extremely risky and can even cause anxiety in making such a choice. The author further divides the two aspects of risk as the uncertainty of the outcome, and the uncertainty of the consequences.

Edwards (1954) put forth an analyses on the concepts related to decision-making. Of interest to this study's context, Edwards discusses the theory of riskless choices and the theory of risky choices. As it relates to decision making however, the aspect of interest that helps lay the foundation for this study is that different people have different decision making strategies and aspects that are given more

weight. In general, individual characteristics and differences can be seen as reasons why people choose different options (Thaler, 1980).

Although there are countless works of research hypothesizing different theories of consumer choice and preferences, the basic highlights have been addressed here in order to lay the foundation for the choice of the predicting factors for the study. Practical research has been used to support the decision to include each of the predicting factors in the analysis of this research study.

Predictive Factors of Interest to this Study

Through the process of reviewing the current body of literature, this study identifies nine different potential factors that could be significant predictors of passenger preference between the two airline options. These predictors, as mentioned, are grounded in theory, previous research, and prior experience of aviation experts. The nine factors being tested for inclusion in the prediction model are age, gender, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

Age

Age in this context refers to the age of the participant measured in years. All participants of this study are assumed as potential airline passengers, and so age in turn refers to the age of airline passengers in this section. In this section, age is studied as a potential predictor to influencing passengers' preference between the two airline option types.

To begin, we must analyze the relationship between age and decision-making. Research suggests that age plays an influencing role in information processing and so in turn decision-making. This is not to say that older individuals are less capable of processing information or making decisions (Taylor, 1975). It is important to restate that in the context of this study, decision-making as it relates to age is more associated with preferences rather than knowledge or judgment. Johnson (1990) also conducted a study to research differences in information processing and decision-making as it related to age, but this study focused on a consumer purchase decision of a vehicle. The results are relevant to this study due to the similarities in context with regards to consumer preference. The study found that older participants used and analyzed fewer pieces of information to arrive at their decision as compared to their younger counterparts.

Another study sought to research the demographic and predictive factors that influenced consumers' willingness to pay for domestic corn-fed beef versus international grass-fed beef. This study too found several demographics as statistically significant predictors of this consumer choice, and one of those significant predictors was the participants' age (Umberger, Feuz, Calkins, & Killinger-Mann, 2002). It is necessary to realize that while trying to identify the grounding of age as a predictive factor on preference, people of different ages and age groups have different priorities, viewpoints, needs, and even capabilities. This affects their preference and choice.

Lu and Shon (2012) found that younger airline passengers were more willing to pay a higher amount of carbon offset fees when travelling as compared to older travelers. This study was conducted using 1000 Taiwanese nationals as participants, but their travels did include the United States, and would be potentially users of American airliners. This reinforces the notion that there are differences in priorities regarding certain topics areas between different age groups of airline passengers. Research on airline preferences has also been conducted by Aksoy, Atilgan, and Akinci (2003). These researchers sought to identify passenger differences in airline choice by studying Turkish Passengers' decision to fly on domestic run airlines or international run airlines. This study too found significant differences in passenger demographics that could be used to predict future passengers' choice, and one of the significant factors was found to be age.

Age clearly has a role to play in consumer decision making, and research has shown that this holds true even for the aviation consumer. It is for this reason that age has been included as a potential predictor of interest for this research endeavor.

Gender

For the purpose of this study, gender refers to the gender of the participant/prospective passenger and is limited to just two options of male and female. This section attempts to research whether the gender of the traveler has a significant predicative influence on passengers' choice between legacy and low

cost airlines. Similar to age, there is expected to be differences in the way members of each gender make decisions and choices. Gender is known in the marketing field as one of the most common and efficient ways of segmenting a consumer field (Kim, Lehto, & Morrison, 2007). Due to the fact that this study is mainly aimed at understanding and marketing towards airline consumers, gender is an appropriate variable to be studied. Before addressing decision making and differing preferences between males and females, we must look at some of the differences between the two genders.

A majority of the research on gender differences relates to differences in risk-taking tendencies of the two genders, and the stereotypes between the genders. Females are statistically found to be less risk seeking than their male counterparts, specifically as they related to financial decision-making and financial risk assessment (Powell & Ansic, 1997). Byrnes, Miller, and Schafer (1999), found through their meta-analysis of risk-taking tendencies, that males were significantly more risk-taking in 14 out of the 16 categories of tasks being studied. The authors of this paper did state that these gender differences reduced drastically with significantly older participants. Gender stereotypes on the other hand oftentimes categorize males and females into life roles such as workers and child raisers respectively (Hoffman & Hurst, 1990).

Men are perceived to be in charge, and more dominant, whereas women are perceived to be more emotional. Research suggests compliance with these

stereotypes where agreeableness, openness to feelings, warmth, and neuroticism were areas where women self-reported themselves to be higher as compared to males. Whereas, openness to ideas and assertiveness were aspects in which males reported themselves to be higher as compared to females (Costa, Terracciano, & McCrae, 2001). One aspect of researching gender differences is the influence of culture on said differences. Research conducted by Costa, Terracciano, and McCrae (2001) suggested that amount of gender differences varied with respect to culture, and somewhat surprisingly, these gender differences were prominent in American and European cultures.

A study conducted by Kim, Lehto, and Morrison (2007) suggested that there are significant differences in males' and females' preferences as they relate to travel searches. As with the research cited with respect to differences in consumer preference as it relates to age, there are also similar differences that arise with respect to gender. However, the study conducted by Umberger, Feuz, Calkins, and Killinger-Mann (2002) on willingness to pay for domestic corn-fed beef versus international grass-fed beef did not find gender as a significant predictor. On the other hand, Aksoy, Atilgan, and Akinci (2003) did conclude that similar to age, gender did have a significant influence on passenger choice on domestic versus foreign run airlines.

Tying into the concept of differences between the two genders with respect to risk-taking tendencies, research conducted on airline passengers' willingness to

fly on board an aircraft with a completely autonomous cockpit (no human pilots on board) showed female passengers to be significantly less willing to fly (Mehta, Rice, Winter, & Oyman, 2014). Similar findings of gender differences were seen when studying passengers' willingness to fly when presented with the possibility of cabin depressurization being used as a possible hijacking mitigation tactic (Mehta, Rice, Winter, & Buza, 2017). Based on the literature and the previous research regarding differences in gender preference and choice, gender is believed to also play a predicting role in this current research, and therefore has been included as a variable to be analyzed.

Income

Income as it relates to the context of this study refers to the participants' annual revenue generation, most likely their yearly salary or its equivalent. Being that participants are from the United States, this variable will be measured in United States (US) Dollars earned yearly. Income in this circumstance is of importance as the study seeks to identify if available monetary resources has an impact on passenger preference. This is based on the assumption that between two otherwise seemingly equivalent individuals, the one with a higher yearly income will have more money/monetary resources available when making purchasing decisions such as buying an airline ticket.

The United States Census Bureau estimated the median household income to be \$55,775 in 2015 (Posey, 2016). As mentioned earlier, increased income

suggests an increased amount of resources that could make available options that were otherwise unaffordable. Research has shown this to be consistent in that people with higher incomes tend to research and choose to send their children to private schools rather than public schools (Altenhofen, Berends, & White, 2016). When analyzing customer shopping patterns and choices, researchers found that different factors were the driving forces for different consumers based on income. One of the findings showed that people with significantly lower income or those who were unemployed were basing their product selection decisions based primarily on price, but those from higher income households were more concerned with eating healthier and often ate more fruits and vegetables (Lennernäs, Fjellström, Becker, Giachetti, Schmitt, de Winter, & Kearney, 1997).

A study was conducted in Columbia, South Carolina to examine the effect of consumer income on shopping behaviors (Lloyd & Jennings, 1978). The results suggested that consumers from higher income families tended to frequent grocery stores that were near other stores that they shopped at (shopping centers), whereas lower income consumers shopped at grocery stores that were closer to their homes. This once again shows the differences that income has on consumer choice. The study went on to suggest that consumers with higher incomes may decide not to frequent certain stores due to the perception that they are lower income/ 'cheap' stores frequented by certain racial groups, even if these stores are more conveniently located near their homes. It is suggested that consumers do this due to

societal pressure and perception. This is interesting and could be a driving factor in passengers' airline choice, due to social pressures of higher end airlines vs. low cost airlines.

Income has been a factor in aviation consumer research as well. When analyzing passengers' airport choice in a region, a study suggests that passengers with higher incomes are more concerned with access times and convenience and are less sensitive to fare increases (Hess, & Polak, 2005). This is important in understanding the mindset of passengers. It also supports the concept, although indirectly, that airline passengers' decisions vary based on a variety of personal demographics. This is not to say that lower income passengers do not prefer ease of access, shorter access times, and more convenience, but rather are limited by their budgetary constraints and so do not have the luxury of affording to pay more for the increases in convenience. Research has been conducted to examine the driving forces behind leisure airline traffic. Graham (2006) suggests that airline demand has in recent years become less sensitive to differences in passenger income. The results also suggest that the percentage of income being spent on airline tickets has not increased as well. The author concludes that these changes imply that demand in the airline industry is less driven by income differences and more so by price reductions.

Another study on traveler choices and decision making found that low-cost airline options sometimes impact low income individuals', namely students',

destination choices (Grigolon, Kemperman, & Timmermans, 2012). This is an interesting addition to the overview analysis on airline passenger decision-making. The accepted thought process suggests that passengers decide where they want or need to go and then attempt to find the most suitable option that fits them. However, the study mentioned above suggests that students look for low fare options, and based on the cost decide where to make their travel destinations. Based on the review of the current literature it is hypothesized that income could have significant predicting influence on passengers' choice between legacy and low-cost carriers. Income has therefore been included as a potential variable to be analyzed in this current research study.

Education level

Education level in the context of this study refers to the participants' highest degree earned. This will be categorized and presented to the participants with a choice between the following options: high school diploma, associate's degree, 4-year bachelor's degree, master's degree, or doctorate. Increased education is oftentimes, whether correctly or incorrectly, associated with more knowledge and understanding. This is not to say that more educated people always make better decisions, but rather that there is a difference in the thought processes of individuals based on their level of education. This section will attempt to shed some light on the relationship between education levels and decision making.

Research in the medical field found that among other factors, education level was suggested to be a significant predictor with respect to patients' desire to take an active role in the decision making process. More educated patients were more likely to prefer an active role in decision making rather than preferring the physicians to make the decisions (Levinson, Kao, Kuby, & Thisted, 2005). Moving back to the consumer realm, education level has also found be a factor that influences consumer choice. Differences were cited in consumers' choice of broiler meat with respect to education level (Pouta, Heikkilä, Forsman-Hugg, Isoniemi, & Mäkelä, 2010). Education level also was found to show some differences between shoppers' preference on retail format, namely, specialty grocers, traditional supermarkets, supercenters, warehouse clubs, or internet grocers (Carpenter, & Moore, 2006).

Research on consumer preferences between organic and conventionally produced foods suggests that the amount of knowledge a consumer has about the topic area or its benefits impacts their decision making and choice (Yiridoe, Bonti-Ankomah, & Martin, 2005). This suggests that not only is education level important, but also the amount of knowledge the consumer has in that particular field. Research has shown that a connection exists between more educated consumers and their propensity to educate themselves on all aspects of a topic before making a decision (Sprotles & Kendall, 1986). Consumers with higher

education levels tend to conduct more self-research before making decisions (Balderjahn, 1988).

A study conducted at Penang International Airport, Malaysia, sought to identify factors that determined passengers' choice between Malaysia Airline, and Air Asia. Air Asia in the study was classified as a low cost competitor, whereas Malaysia airlines would be considered more of a full service carrier, the equivalent of a legacy carrier in the United States. Surprisingly, education level was found to be one of the only significant predictors of passengers' choice between the two options (Ong, & Tan, 2010). Aksoy, Atilgan, and Akinci (2003), once again found education level to a factor that influences airline passengers' choice amongst airline types.

Higher levels of education are oftentimes associated with higher income, and therefore a large part of the previous section on income as a predictor also applies in this case. (Center for Household Financial Stability, 2015). On the other hand, the same report does also imply that educated people are frugal with the way they spend money as well. Based on the findings of the current literature which further corroborate the relevance of this factor, it has been deemed fit for inclusion in this current study.

Seat type

This section will refer to the class of seat that a participant usually purchases when using airline travel. Examples of seat types or classes are economy,

business or first class. It is relevant to note that there may be more classes or even many sub-classes within each of the above mentioned seat types, but for the sake of this research, the focus will predominantly lie on the economy class and the upper classes of business and first class, or their equivalents. Some airlines offer what is known as premium economy as their intermediate option, and some airlines do not offer an intermediate option with only an economy and a first class option. Additionally, some carriers with unique business models, do not offer any differentiating seat types and may only have economy seats or only have business class seats. These airlines are few in number, and do not represent a vast majority of the airline market. This study focuses on the predominant standards seen in aviation.

The important point to make in this section is how seat type ties into the other factors already being addressed. Upper classes of seats are significantly more expensive than economy seats, sometimes costing up to 10 times as much (Vasigh, Fleming, & Tacker, 2013). It can be assumed that individuals with higher incomes would be able to afford upper level seat classes. Hess and Polak (2005), as cited earlier found class of tickets (equivalent to seat type in this study) to be factors that influenced passenger choice. Research conducted on passenger preferences of airline travel, found seat type to be a significant predictor when dealing with Korean and Australian case studies as well (Park, 2007).

It has been mentioned that services and amenities vary vastly among different airlines and certainly between legacy and low-cost categories of airlines. Although seat type is the variable of interest, it is also undeniably connected to services offered in association with these particular seat types. If a particular service is not offered by an airline or a category of airlines, it would most certainly influence some peoples' choice. Similarly, if an airline does not offer a business class or upper tier option, some passengers may choose not to fly with that airline. It is for these reasons, that seat type has been included as a factor to be analyzed to be a potential predictor in the final prediction model.

Type of travel

Type of travel varies significantly in meaning from seat type as it refers to the purpose or the need for the airline flight. The two categories of interest in this research's context are business travel, or leisure travel, i.e., personal, vacation, or pleasure. It is important to note that even though many high net worth, highly educated, and upper level management professionals may fly for the purpose of business and purchase business class seats, this is not always the case. A large percentage of people fly on economy seats for the purpose of business. Conversely, people travelling on vacation may purchase business class seats or higher. It is important to make this distinction before delving further into the topic area.

Firstly, people travelling for the purpose of business are most often not paying for the ticket, but rather the organization that they work for will be covering

said costs. This is important as people behave differently and make different choices when they are using other peoples' money (Friedman, 2007). This is seen often in the financial investment field, where people make different decisions based on whose money is at stake (Jones, 2013). It therefore is of interest to this study to identify whether type of travel has an impact on passenger preference. It must also be noted however, that not all people travelling for business have their tickets being bought by someone else, as there may be people who are self-employed, etc.

Gender of the passenger has been discussed in a previous section, but a study was conducted analyzing the perceptions of airlines relating to businesswomen. Competition has been stated as a major attribute of the airline industry. Unfortunately, there seems to be a lack of focus by the airline industry effectively cater to women in the business sphere (Westwood, Pritchard & Morgan, 2000). In the 1990s there were exponential increases in women business travelers, but the airline experience did not adapt to account for the same. The airline industry markets its product as a gender neutral service, but the authors suggest that more efforts should be taken to more effectively cater to businesswomen.

As mentioned earlier one of the differences in amenities and services between legacy and low-cost carriers is whether the airline charges for checked luggage or not. Dresner (2006) states that one of the differences between leisure and business travelers is the need for checked luggage. Business travelers are often away for short periods of time and so checked bags are not as important as

compared to families flying for longer vacations. One study suggests that due to pressure from organizations for employees to cut down on travel costs and with the emergence of low-cost carriers, more business travelers are using low-cost airlines (Mason, 2000). Another difference that speaks to how type of travel may impact choice and decision making is the differences that arise when choosing an airport in a region with multiple air service airports. A study found that airports with decreased access time and additional flight frequencies were more important to business travelers as opposed to their counterparts (Windle, & Dresner, 1995).

Previous studies that have researched differences in passenger choices amongst airlines have also found purpose of travel (equivalent to type of travel), to be significant factors of the same (Aksoy, Atilgan, & Akinci, 2003; Hess, & Polak, 2005). Thus, type of travel has been including as a variable of interest in the regression analysis for creation of a prediction model of passenger preference.

Frequency of Travel

Frequency of travel, in this research, studies the number of times participants use airline travel in a year. Even though the participants may travel to different destinations, use different airlines, and for different purposes, it is believed that the more often people travel, the more it influences their preferences. The key to mention for all aspects of these variables in the study is that the research is looking at overall preferences. There may be times where passengers' first preference is not available or not feasible, and that may sway the final decision.

The basis for this relationship is founded in the relationship between frequency of use and decision making. Research has found that as it relates to intuitive decision making, the more often a business professional is faced with a particular type of decision, it in turn affects not only their overall choice but also the efficiency of the decision making process (Burke, & Miller, 1999). A theory that applies to this context is the theory of planned behavior (Ajzen, 1991). The theory stipulates that a person's behavior and intentions (and choices) are influenced by their attitudes towards, norms and control. Bamberg, Ajzen, and Schmidt (2003) applied this theory to consumer decision making in travel mode choice. The authors suggest that based on this theory past behavior is the best predictor of future actions. The conclusions state that choice of travel mode is influenced by changed attitudes, and perceptions of control. This is because travel mode choice is believed to be a reasoned decision. The results suggest that future behavior in travel choice can be predicted by past choices.

Windle and Dresner (1995) found similar statistically significant results when studying passengers' airport choice. They saw that when passengers had used one particular airport, with all other variables remaining the same, they tended to use the same airport the next time. It is therefore logical to assume that the same would hold true for airline choices. This was in fact part of the findings of airline preference research conducted by Aksoy, Atilgan, and Akinci (2003), and Lu and Shon (2012).

A study was conducted in order to find the factors that could be considered as determinants of passengers' willingness to pay improving service quality in the context of choosing an airline. Although this is slightly different from the focus of this study, the premise remains that similar factors influence passengers' preference as it relates to a wide gamut of choices that travelers face and have to make during the course of a trip. The study found that as passengers travelled more frequently, they were more willing to pay for improving service quality (Espino, Martín, & Román, 2008). A similar study was conducted in the San Francisco Bay area, and found frequency of use to be a significant factor in passenger choice (Pels, Nijkamp, & Rietveld, 2001). Based on the findings of previous studies it is believed that frequency of travel could be a potential predictor variable in this context of passenger choice as well and has therefore been included for the statistical analysis.

Category of frequent flier program

Frequent flier programs are essentially loyalty programs, which are a fairly universal concept, and can be seen in so many consumer industries not only in the United States, but around the world. For the purpose of this study, participants will be asked to identify which tier of a frequent flier program they belong to. The options will be presented as follows: highest tier (maximum benefits), middle tiers (some benefits), lowest tier (little to no benefits), and not a member of any frequent flier program. In frequent flier programs, points can be accumulated and calculated

in many different ways. The two most predominant ways in which airlines award points are based either on the number of miles flown, or the amount of money spent. These two methods account for the majority of frequent flier programs. The higher the points the higher the tier that the passenger earns. With each tier or category of points earned, come certain perks or benefits, such as priority check-in, or free bags, etc. Points can also be redeemed later for free flights, special amenities, or even other products.

Loyalty programs have been found to be extremely effective in maintaining customer bases (Uncles, Dowling, & Hammond, 2003). The reward and the desire to obtain some product or service for free encourages consumers to stick with the same brand and maintain loyalty. Loyalty programs are based on psychological rewards that emphasize the importance of special treatment (Melnik & Van Osselaer, 2012). Consumers now have a vested interest in staying loyal and have tangible benefits in return for doing so. This in turn helps existing competitors safeguard themselves from new market entries with more attractive pricing options (Dowling, & Uncles, 1997). This theory and concept definitely resonates within the aviation industry, with airlines doing whatever is necessary to safeguard the loss of customers to competitors.

Gender differences have already been discussed previously, but one specific gender difference has been studied in relation to loyalty programs. The experiment analyzed the different effects two types of rewards had on males and females

(Melnik & Van Osselaer, 2012). The two categories of psychological rewards were high status, and personalization with different levels of visibility to other customers. The results suggested that men preferred and responded more positively to higher status as compared to their female counterparts. However, this only held true when their higher status had higher visibility with other customers. Women on the other hand responded more positively to personalization, but only in private settings.

From research cited earlier by Windle and Dresner (1995), we have already seen that passengers tend to choose one airport over another when they have used that airport previously. Similarly, it is conceivable to apply that same logic to airline choices, whether it be for reasons of familiarity, brand loyalty, or a desire accumulate points in order to be redeemed as rewards. Research has also shown that passengers are willing to pay higher rates for airline tickets just to fly with an airline in which they are members of the frequent flier program (Proussaloglou, & Koppelman, 1999). Nako (1992) studied the effect of frequent flier programs on airline choice specifically for business travelers. The study also stated that the effect varied across airlines and the effectiveness of the frequent flier program varied with the presence the airline had in a particular city that the passenger was to do business in. A study also showed that out of 144 passengers surveyed at an airport, 97 stated that their membership in a frequent flier program influenced their airline choice (Toh & Hu, 1988).

Carlsson and Löfgren (2006) studied the relationship between passenger airline choice and the costs associated with switching choices. The authors use the term switching costs in reference to the cost for a consumer to switch from one company to another. The cost of switching choices increases substantially when the choice is made more frequently. Carlsson and Löfgren's study analyzed switching costs for domestic airline routes in Sweden from 1992-2002. Several factors were found to be influencing factors in the passengers' perceived switching costs. One of the factors that played heavily into the decision to switch was the cost associated with switching frequent flier programs. The authors also end by presenting a connection between switching costs and habit formation. This ties back into the previous section of frequency of travel impacting perceptions and choices.

It is therefore foreseeable that the further along someone is in their frequent flier program, the more likely it is that they will pick that airline or in this context that type of airline in subsequent scenarios so as to continue to build points in order to gain benefits down the road. It is conceivable that someone just beginning to fly or someone that rarely flies and without or with very few frequent flier miles (not enough miles to reap benefits) will not feel as tethered to one particular airline or type of airline. It is for this reason that the category of frequent flier programs has been included as a variable of interest in this research study.

Risk-taking tendencies

For the purpose of this study, risk-taking tendencies refer to the participants' self-rating on their risk-taking nature/tendency on a Likert type scale. Self-evaluation and rating of these tendencies is the only viable option to measure the same, and although this is a limitation, the benefits of its inclusion could prove valuable. It has already been mentioned that there is a connection between risk-taking and decision making. This relationship is based on an individual's risk assessment of a situation or a product. Variables that relate to passenger demographics like age and gender have been tied in some way to risk assessment as it relates to decision making by previous research (Gardner, & Steinberg, 2005).

Chou, Lee and Ho (2007) conducted research to study the effect of mood on risk-taking tendencies. They also analyzed if this effect was influenced by participant age. The authors studied the risk-taking tendencies of younger and older participants when in positive, neutral or negative moods. The participants were shown happy, neutral or sad movie clips in order to induce the respective moods. Regardless of age, the results suggested that people in happier moods showed higher risk-taking tendencies. Although risk-taking tendency is an important factor to be researched, it is likely that the current mood of the individual has a significant influence on decision making and choice as well. Mood was not included as a factor of interest for this study but may be analyzed in future research.

Consumer perception of risk is a known influencer of customer choice and preference. Research conducted on consumer willingness to pay for pork sandwiches based on the type of food irradiation performed, it was found that consumer perception of risk and assessment of the same significantly impacted willingness to pay (Fox, Hayes, & Shogren, 2002). Another study conducted on consumer risk perceptions found that there was an increase in perceived risk when using an online reservation system for booking tickets (Cunningham, Gerlach, Harper & Young, 2005). The authors did however suggest that this perceived increased risk did not affect usage levels or a passengers' ultimate decision to fly. Passenger risk assessment plays a role in the airline industry as well, evidenced by the stark decrease in passengers after the attacks of September 11, 2001. From the time of the attacks till the end of the year, air travel decreased approximately 20% in the United States, as compared to the same time frame during the previous year (Blunk, Clark, & McGibany, 2006).

The reason this construct is included in the study is because there exists a perception of the airline industry, whether accurate or not, that low-cost carriers are in some ways not as safe. This idea is supported by research conducted involving airline passengers, where low cost carriers are perceived to spend less on several items, one of which is maintenance, and therefore are able to charge less for air service, which implies to passengers that they may be less safe, and therefore riskier choices (Rhoades, & Waguespack Jr, 2004). Low-cost airlines also often use

smaller and/or older aircraft which, are also perceived to be less safe (Janic, 2000). This may not necessarily be true and this is not to say that low cost carriers are unsafe, but rather than oftentimes they may be perceived as less safe as compared to their legacy counterparts.

The level of innovativeness of a consumer has been shown to be related to risk-taking tendencies. A study showed that more innovative consumers perceived risk differently in the context of online banking usage (Aldás-Manzano, Lassala-Navarre, Ruiz-Mafe, & Sanz-Blas, 2009). This can also be connected to consumers' acceptance of advanced technology and automation (Mehta, Rice & Winter, 2014). Airlines are consistently being upgraded with new technology and automation. However, there have been skeptical perceptions of the safety of increased automation in aviation.

The capability exists for pilotless, completely autonomous aircraft, but passengers do not seem to be ready to accept the same. Rice, et al. (2014) conducted a study to examine consumer perceptions of autonomous auto-pilot use in commercial airline cockpits. The study presented three groups of participants with three different cockpit configurations. The configurations were completely autonomous cockpits with no human intervention, a remote control system with a human pilot on the ground, or a human pilot in the cockpit. Participants had significant negative feelings of trust, comfort, and willingness to both options that did not include a human pilot in the cockpit. The significant finding here is the

participants perception of risk of these new technologies being implemented in commercial air travel.

The perception of riskier choices plays into the rationale of risk-taking tendencies to be included in this prediction analysis. Passenger tendencies to indulge in risk-taking decision making may therefore also influence their decisions in airline choice. It is appropriate that risk-taking tendencies are included as a variable of interest, not only due to perceptions of safety of low cost carriers, but also the tendency for risk-taking to influence decision making as a whole.

Regression and Prediction Models

This study focuses on the creation of a prediction equation for passenger preference between the two categories of airlines so as to be of practical use to the commercial airline industry. The nine factors that could potentially be elements of the research equation are: age, gender, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies. The details of relevance to each factor have already been established through the grounding in literature and theory. The details and explanations of the technique and methodology behind using regression and creating prediction models will be provided in later sections. This section however, will focus on previous researchers' use of similar methodology to conduct prediction research.

Bellman, Lohse, and Johnson (1999) created a regression equation that would be used to predict consumers' online buying behavior. The study found

months online, number of daily emails, look at product information, work online at work every week, read news online at home every week, total household working hours, and clicks on banners to be significant predictors of buying versus not buying online. Consumer willingness research has also used regression analyses for creating predictive equations. Cremer, Rice, Mehta, and Oyman (2015) conducted a study to analyze passengers' attitudes towards the reuse of water at airports.

Multiple regression analyses were conducted of which one was as follows:

$$Y = 0.404 + 0.370X_1 - 0.263X_2 - 0.112X_3 - 2.989E-6X_4$$

Where Y is the predicted acceptance score for using recycled water to wash hands and X_1 through X_4 are Knowledge of Environmental Science, Knowledge of Water Reuse, Political Preference, and typical individual Water Usage in gallons per day respectively. Similar regression equations were developed for the use of recycled water for flushing toilets and for drinking water.

The first step of the research will involve the creation of a prediction model, and the second stage will involve the collection of a second sample to test the equation using the technique of cross validation in order to create a valid prediction model (Kohavi, 1995). It is for this reason that linear multiple regression seems to be an appropriate method of creating a valid prediction model.

Summary

The purpose of Chapter 2 is to review the current body of knowledge in this particular field. In doing so, certain gaps in the literature were identified that

provided a framework for the need of this study. The chapter also provided an in depth analysis of each of the nine potential predictive factors and their relevance of inclusion in this research. In Chapter 3, I will provide the details regarding the methodology involved in the study. This chapter will explain the necessary information regarding research design, population and sample, instrumentation, procedures, variables, and the data analysis tools expected to be used. This is done to give the reader sufficient detail for understanding the study and to facilitate any replication studies.

Chapter 3

Methodology

Introduction

In this chapter, I will discuss the methodology used to conduct the study. In addition, all the steps, and tools used to design the study will be explained. This chapter will provide details that explain the research design used to construct the study. I will also include sufficient details regarding the population, sample and estimated statistical power of the future analyses in order to facilitate replication. While explaining the methodology, attention will be given to the instrumentation used, the procedures followed to conduct the study, the independent and dependent variables, and the analyses expected to be conducted after the collection of data. Lastly, this chapter will address and explain what measures will be taken to protect participants' identity and to ensure all legal and ethical considerations are abided by during the course of this research.

Research Design

This study seeks to create a prediction model of passenger preference. The design of the study will be a quantitative research study using a correlational design with multiple linear regression analysis as the statistical procedure for data analysis. The use of a correlational design is the most appropriate design in order to create a prediction model. Within the category of correlational designs, linear regression was deemed to be the most appropriate for the purpose of this study due

to the practical benefits for creating a regression equation that could potentially be used by the airline industry.

Population and Sample

Population

The aim of this study is to create a prediction model of passengers' preference between legacy and low cost airlines. Through this study, the target is to generalize the findings of the study that utilizes the sample of the consumer participants to the views of the populations. There are several benefits to the aviation industry in better understanding the mindset of the commercial airline passenger population. In the context of this study, the population refers to all airline consumers that have access to internet and are users of Amazon's ® Mechanical Turk ® (MTurk). The population is limited to only American airline consumers.

Sample

The sample used in the study will be a convenience sample of aviation consumers recruited using Amazon's ® Mechanical Turk ®. Participants in the study will be compensated for their participation in the research study. The study will utilize 144 participants in total in order to have representative samples of the travelling public. As mentioned earlier, the sampling methodology will be convenience sampling, and although this is a limitation, it is necessary in order to complete the study and to gain large sample sizes. The study does not prohibit

people that have never flown on an airliner from participating in the study, as they could be potential future airline consumers/passengers.

Power Analysis

An a-priori power analysis was conducted to determine the appropriate sample size for the study. This is done in an effort to ensure the validity of the results and the strength of the study. A statistical analysis tool G*Power 3.0.10 was used to complete the calculation. The following were the inputted parameters for the calculation: default medium effect size of .25, power (beta) of .80, and alpha level of significance .05 using nine predictors that need to be analyzed. The results from power analysis show that a minimum of 72 participants is needed per step of study. The two steps being referred to are, the initial creation of the regression equation and the secondary study to test the equation to create a prediction model. The total minimum number of participants is therefore 144.

Research methodology

Instrumentation

As mentioned earlier, participants will be recruited using Amazon's ® Mechanical Turk ® (MTurk), and will complete the study's questionnaire online. The questionnaire will be developed and presented to the participants using Google Forms ®. The participants will be presented with certain instructions and information and then asked the questions. A complete version of the study

instrument is presented in Appendix A. The participants will be presented with the following information:

“In this questionnaire, you will be asked your predominant preference or most often used choice between airline types. The two airline types we will be discussing are legacy airlines, and low cost airlines.

Legacy airlines are often defined as large full service airlines offering more amenities on board, with major city hubs, large fleets, often fly to international destinations, and usually have more expensive ticket options. Some examples of legacy carriers are: American Airlines, United Airlines, and Delta Air Lines.

Low cost airlines are often defined as airlines that have lower ticket fares, and offer less amenities as standard, but allow passengers to pay for the selected extra amenities that they prefer. These airlines usually fly domestic routes, and have smaller fleets. Some examples of low cost carriers are: JetBlue Airways, Frontier Airlines, Southwest Airlines, Spirit Airlines, and Allegiant Air.”

The participants will first be asked five questions relating to their personal preference between legacy and low cost airlines. The participants will have to use the linear scales to answer each of the questions. The linear scales will be quantified from 1 to 10, with low cost airlines being represented on the lower end of the scales and legacy airlines by the higher end of the scales. This implies that a

higher preference for low cost airline will have numbers closer to 1 with higher preference for legacy airlines having scores closer to 10. The scores from each of the five questions will be averaged into one final score that measures their preference and will be the final values used. The questions will be as follows:

“Please rate your preference using the questions below:

- 1. My airline type of preference is:*
- 2. The airline type I use most often is:*
- 3. The airline type I like to fly on is:*
- 4. The airline type I most prefer to fly is:*
- 5. The airline type I choose to fly is:”*

Following this, the participants will be asked a series of questions relating to the variables of interest to the study, which also demographic questions and others. These questions will include:

- 1. Please state your age in the box provided below*
- 2. Please state your gender below*
- 3. Please state your yearly income in the box provided below*
- 4. Please state the highest education level you have achieved below*
- 5. Please state the seat type that you predominantly purchase when flying*
- 6. Please state the type of travel that is the predominant purpose for using air travel*

7. *Please state how many times you use air travel in a year on average in the box below*
8. *Please state the category of frequent flier program that you have achieved with your airline of choice*
9. *Please rate your own risk-taking tendencies on the scale below”*

Procedures

The questionnaire explained previously will be the primary tool and sole instrument used to collect data in this research endeavor. As mentioned before, participants will be solicited using Amazon’s ® Mechanical Turk ® (MTurk). MTurk is an online service that allows users to be compensated for their completion and participation in a number of different activities including research questionnaires like the one used in this study. The study will be conducted in two stages, with a minimum sample size of 72 being required at each stage in order to have sufficient statistical power. The total number of participants in the study will be 144.

The aim of the study is to create a prediction model, and therefore a two stage approach is necessary. The first stage will involve presenting the questionnaire to 72 participants and using the data collected through this stage to create a regression equation. The second stage will be a complete replication of the first using a new set of participants, thereby creating a secondary data set or sample. This secondary data set will be used to test the regression equation and

determine whether the data fit the model, thereby validating the model. Following each stage, participants will be given instructions to collect their payment and then be dismissed. The completion of the questionnaire should take no longer than five minutes. Each participant is anticipated to be paid approximately 20 cents (US).

Variables

Independent Variables

The independent variables in this study are the nine factors that are being tested for having a predictive influence on the dependent variable. These nine factors are age, gender, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

The first independent variable, age, will be an open-ended demographic question where participants will be asked to list their age in years, and will be treated as a continuous variable in the regression analysis. The second independent variable, gender, will be presented as a dichotomous choice demographic question. The two levels of this IV will be male and female, and will be treated as a categorical variable in the data analysis. The third independent variable, income, will be an open-ended demographic question where participants will be asked to state their income in US Dollars earned yearly, and will be treated as a continuous variable in the regression analysis.

The fourth independent variable, education level, will be presented as a restricted choice demographic question. The five levels of this IV will be high

school diploma, associate's degree, 4-year bachelor's degree, master's degree, and doctorate, and will be treated as a categorical variable in the data analysis. The fifth independent variable, seat type, will be presented as a dichotomous choice question. The two levels of this IV will be Lower Tier (Economy class or its equivalent) and Upper Tier (Business or First Class), and will be treated as a categorical variable in the data analysis. The sixth independent variable, type of travel, will be presented as a dichotomous choice question. The two levels of this IV will be leisure travel and business travel, and will be treated as a categorical variable in the data analysis.

The seventh independent variable, frequency of travel, will be an open-ended demographic question where participants will be asked to state the number of times they travel by air in a year, and will be treated as a continuous variable in the regression analysis. The eighth independent variable, category of frequent flier program, will be presented as a restricted choice demographic question. The four levels of this IV will be highest tier (maximum benefits), middle tiers (some benefits), lowest tier (little to no benefits), and not a member of any frequent flier program, and will be treated as a categorical variable in the data analysis.

The ninth and final independent variable, risk-taking tendencies, will be measured as the participants' scores based on the responses to a Likert-type question of their risk-taking tendencies. Participants will be asked to rate themselves on a scale ranging from 1 (extremely risk averse) to 7 (extremely risk-

taking). The scale of measurement for this IV along with all the other continuous variables is ordinal, but the data will be treated as an interval scale of measurement. This assumption can be made as values of equal magnitude difference are assigned to each response of the Likert type scale (Göb, McCollin, & Ramalhoto, 2007). The scale of measurement for each of the other categorical independent variables is nominal.

Dependent Variable

The dependent variable for this study is the passengers' preference between legacy and low cost airlines. This is measured from the average of the scores from the preference questions. The passengers' preference between legacy and low cost airlines will be measured using participants' scores on the linear scales of the questions referring to the same. As mentioned in the instrumentation section, the scores from the five questions referring to preference between the two choices will be averaged into one score and used as the DV for this study. Internal consistency and reliability are said to exist if the Cronbach Alpha and Guttman's split half tests have scores greater than 0.7. The scale of measurement for the DV is interval as well.

Data Analysis

The study will primarily employ a correlational design, using a multiple linear regression analysis to analyze the relationship between the factors and

passenger preference. The second part of the study which includes the model testing will analyze the second data set to determine the cross validated R.

Using this form of a standard multiple linear regression analysis is the most appropriate as I will be able to generate a regression equation with a regression coefficient for each independent variable that has a significant relationship with passenger preference. In the second part of the study I will be testing the model with the new data set. Inputting the values of each of the IVs into the regression equation, I will obtain a predicted value for the passenger preference variable. These predicted scores will be analyzed against the actual scores of the participants in the second data set. This data analysis will be used to test and create the prediction model for passenger preference.

Standard multiple linear regression is appropriate as no clear variable entry order can be determined from the current body of knowledge and therefore hierarchical multiple regression is not appropriate.

Participants' Eligibility Requirement

To be eligible to participate in this research study, it will be a requirement that participants affirm that they are at least 18 years of age. This research study should pose no physical or mental harm to any of the participants. It is a priority of the researcher that all possible precautions be taken to ensure the same. In addition, all requirements of the Institutional Review Board (IRB) will be followed including the receipt of approval from the IRB to conduct the above mentioned research

study. A copy of the IRB application and approval notices are attached in Appendix B.

Participants' Protection

Participants will be recruited through an online surveying tool that provides participants with monetary compensation for their completion of Human Intelligence Tasks (HITs). The participants will be recruited via Amazon's ® Mechanical Turk ® (MTurk) through the use of convenience sampling. MTurk does not require the participants to provide any confidential information to the researcher conducting the survey. This ensures that participants' responses are completely anonymous and confidential, which ensures the complete protection of the participant. This is of the utmost importance to the researcher to ensure that the participants' protection is maintained to the highest standard and that all handling of confidential information is performed to the highest degree possible.

Legal and Ethical Consideration

There are no expected or known risk of participating in this research study to any of the human subjects. As mentioned previously, the soliciting of participants will be accomplished through the online tool Amazon's ® Mechanical Turk ®, which is responsible for vetting all participants. Ethically, the researchers require that the study does not include any minors, as the participants will be at least 18 years of age. In addition, the study will be constructed in such a way that

completion of the same will not expose participants to any legal, physical, psychological, or social risks.

Summary

The purpose of this chapter is to provide the reader with sufficient detail regarding the methodology involved in the study. There are many considerations that go into explaining the methodology, and therefore must be taken into account. This chapter therefore provides adequate detail to any reader on the topics of research design, population and sample, instrumentation, procedures, variables, and the data analysis tools expected to be used. All these should provide any reader with a framework of reference in order to conduct any replication studies. The final purpose for Chapter 3 is to set the reader up for the following sections. In Chapter 4, I will present the results from the data analysis performed on the collected data set.

Chapter 4

Data Analysis

Introduction

The purpose of this study was to create a prediction model of passenger preference between low cost and legacy carriers. In order to create such a prediction model, two regression analyses were performed. The previous section outlined all the steps involved in constructing the study and the methodology of the research endeavor, including legal and ethical considerations involved in conducting the study. After the collection of data, this section will present the findings of the data analyses in the form of inferential statistics, along with descriptive statistics that will help explain the context and demographics of the sample. Additionally, a Cronbach's alpha and Guttman's split half analyses were conducted on the dependent variable questions of the instrument to test for internal consistency and reliability. Internal consistency and reliability must be tested because the instrument was specifically created for this study and not previously validated. These concepts are explained further in the coming sections. All data analyses were conducted using the statistical analysis tool IBM SPSS Statistics Software.

General Design

As detailed in Chapter 3, this study utilized a correlational research design. The study used a regression analysis to create a regression equation in an effort to

determine which factors influenced passenger preference between low cost and legacy carriers. The study tested nine factors that could have a predictive influence on passenger preference. The independent variables were the nine factors: age, gender, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies. The dependent variable was the passengers' preference between legacy and low cost airlines measured from the average of the scores from the preference questions. Once the regression equation was created, a secondary sample was used to test the equation and create a prediction model of passenger preference.

Research Tool and Instrument

To collect the data for this prediction model, a questionnaire was developed. The questionnaire was created using Google Forms ®. A copy of the instrument presented to the participants is attached in Appendix A. The questions were either asked on a linear scale ranging from either 1 to 10 or 1 to 7 (depending on the question), or on multiple choice system for categorical variables. The instrument was administered on two separate occasions independently. The first to collect the primary sample used to generate the regression equation, and the second to collect a secondary sample used to test the prediction model. The questionnaire remained unchanged through both steps of the process. The participants for each stage were independently recruited at different times through Amazon's ® Mechanical Turk ®

(MTurk). Participants in both samples were paid 25 cents (USD) as compensation for completing the questionnaire.

Descriptive Statistics

As mentioned in previous sections, this research study was conducted in two stages. The first stage was to create the regression equation of passenger preference between low cost and legacy carriers. The second stage conducted was to test the regression equation created in the previous stage, and thereby validate the prediction model. In this section descriptive statistics are presented with respect to the samples from each of the two stages. The total sample size of the study was $N = 936$ (379 females).

Stage 1

In the first stage, the sample size was $N = 504$. Of the 504 participants in the first sample, 196 were female. The mean age of the sample was 32.41 ($SD = 8.84$). The mean income was USD42,055.11 ($SD = USD35,863.66$). The mean frequency of travel per year was 2.79 ($SD = 3.75$). The highest education levels achieved by the participants were broken down as follows: 25% High School Diploma ($N = 128$), 15% Associate's Degree ($N = 75$), 45% Bachelor's Degree ($N = 227$), 11% Master's Degree ($N = 56$), and 4% Doctorate Degree ($N = 18$).

Two percent ($N = 11$) of the sample stated that they fly in upper tier seats (Business/First class rather lower tier seats (Economy/Economy Premium). Ten percent ($N = 52$) of the sample stated that they use air travel for business purposes

rather than for pleasure/personal reasons. The frequent flier categories that participants belonged to were as follows: 51% ($N = 259$) were not a member of any frequent flier program, 32% ($N = 161$) were members of the lowest tier (little to no benefits), 16% ($N = 78$) were members of middle tiers (some benefits), and 1% ($N = 6$) were members of a highest tier (maximum benefits). Finally, the mean scores of the participants' risk-taking tendencies (scale of 1 to 7) was 3.37 ($SD = 1.41$). A summary of stage 1 descriptive statistics is provided in Table 1.

Table 1
Summary of Stage 1 Descriptive Statistics

Variable		N	M	SD
Age		504	32.41	8.84
Income		504	42055.11	35863.66
Frequency of Travel		504	2.79	3.75
Risk-taking Tendencies		504	3.37	1.41
Gender	Male	308 (61%)		
	Female	196 (39%)		
Education	High School	128 (25%)		
	Associate's	75 (15%)		
Level	Bachelor's	227 (45%)		
	Master's	56 (11%)		
	Doctorate	18 (4%)		
Seat Type	Lower Tier	493 (98%)		
	Upper Tier	11 (2%)		
Purpose	Personal/Pleasure	452 (90%)		
	Business	52 (10%)		
Frequent Flier	Not a member of any	259 (51%)		
	Lowest Tier	161 (32%)		
Category	Middle Tier	78 (16%)		
	Highest Tier	6 (1%)		

Stage 2

In the second stage, the sample size was $N = 432$. Of the 432 participants in the first sample, 183 were female. The mean age of the sample was 33.90 ($SD = 10.02$). The mean income was 47111.73 ($SD = 92815.74$). The mean frequency of travel per year was 4.47 ($SD = 29.61$). The highest education levels achieved by the participants were broken down as follows: 29% High School Diploma ($N = 125$), 14% Associate's Degree ($N = 62$), 44% Bachelor's Degree ($N = 189$), 11% Master's Degree ($N = 48$), and 2% Doctorate Degree ($N = 8$).

Five percent ($N = 22$) of the sample stated that they fly in upper tier seats (Business/First class rather lower tier seats (Economy/Economy Premium). Eleven percent ($N = 46$) of the sample stated that they use air travel for business purpose rather than for pleasure/personal reasons. The frequent flier categories that participants belonged to were as follows: 51% ($N = 220$) were not a member of any frequent flier program, 30% ($N = 130$) were members of the lowest tier (little to no benefits), 17% ($N = 75$) were members of middle tiers (some benefits), and 2% ($N = 7$) were members of a highest tier (maximum benefits). Finally, the mean scores of the participants' risk-taking tendencies (scale of 1 to 7) was 3.37 ($SD = 1.56$). A summary of stage 2 descriptive statistics is provided in Table 2.

Table 2
Summary of Stage 2 Descriptive Statistics

Variable		N	M	SD
Age		432	33.90	10.02
Income		432	47111.73	92815.74
Frequency of Travel		432	4.47	29.61
Risk-taking Tendencies		432	3.37	1.56
Gender	Male	249 (58%)		
	Female	183 (42%)		
Education	High School	125 (29%)		
	Associate's	62 (14%)		
Level	Bachelor's	189 (44%)		
	Master's	48 (11%)		
	Doctorate	8 (2%)		
Seat Type	Lower Tier	410 (95%)		
	Upper Tier	22 (5%)		
Purpose	Personal/Pleasure	386 (89%)		
	Business	46 (11%)		
Frequent Flier	Not a member of any	220 (51%)		
	Lowest Tier	130 (30%)		
Category	Middle Tier	75 (17%)		
	Highest Tier	7 (2%)		

Inferential Statistics

Sample Sizes, Effect Size and Observed Power

The convenience sampling methodology used for this study recruited online participants from Amazon's ® Mechanical Turk ®. In previous sections, a-priori power analyses were conducted in order to determine adequate sample sizes.

Appropriate sample sizes provide strength to the findings of the study. The a-priori analysis suggested a minimum sample size of 72 participants per stage with a total

of 144 participants, using a medium effect size of .25, power (beta) of .80, and alpha level of significance .05 with the nine predictors.

The a-priori analysis used a generic medium effect size of .25. However, post hoc tests of actual effect size can be calculated with the overall R^2 of the model. The overall $R^2 = .096$. Effect size can be calculated using the following formula for regression: $\text{Effect size} = R^2 / (1 - R^2)$. Through these calculations, the post hoc actual effect size for the study was found to be .11, which is relatively small and preferred.

As mentioned earlier, the minimum sample sizes were conservative estimates that were anticipated to be easily achieved, and much larger sample sizes were the ultimate goal. The study utilized 936 participants in total with 504 in the primary stage, and 432 in the secondary stage. The post-hoc achieved power analysis using the post hoc effect size mentioned earlier, showed that the observed power for both stages was $>.99$. All power analyses were conducted using the statistical analysis tool G*Power 3.0.10.

Internal Consistency and Reliability

First, a Cronbach's alpha test and a Guttman's split half test were conducted on the five dependent variable questions of the instrument in order to test for internal consistency and reliability. This was conducted as the questionnaire was specifically created for this study, and has not been used before or previously validated. Cronbach's alpha is the coefficient of internal consistency and this test is

the recognized standard for the same (Schweizer, 2011). Guttman's Split Half test is a measure of the test-retest reliability and is the standard for testing instrument reliability (Guttman, 1945).

The five preference questions can be averaged to obtain one continuous score of preference if internal consistency and reliability between the questions exist. These are said to exist if the test produces a value of .70 or higher. The internal consistency scores for the Cronbach's alpha tests were .94, and .96 for the two samples, respectively. The reliability scores for the Guttman's split half tests were .92, and .95 for the two samples, respectively. The tests produced high values of internal consistency and reliability, and therefore it was acceptable for the scores from the five questions to be averaged into one score to be used as the continuous dependent variable.

Assumptions of Regression

Due to the fact that the primary statistical analyses being conducted in this study were regression analyses, it was vital that the data meet all of the assumptions of regression. Only if all of the assumptions of regression are met can the regression analyses be appropriately used and the findings of study be considered valid. Explanations for each of the assumptions were provided in Chapter 1. In this section, the results are presented regarding whether the data satisfied each of the assumptions. The seven assumptions of regression are:

- Assumption 1: There is one continuous dependent variable.

- Assumption 2: There is one continuous independent variable.
- Assumption 3: There is a linear relationship between the dependent and independent variables.
- Assumption 4: There is independence of observations.
- Assumption 5: There are no significant outliers
- Assumption 6: There is homoscedasticity and no multicollinearity within the data.
- Assumption 7: The residuals of the regression line are normally distributed.

Assumption 1 was satisfied as the five linear scale preference questions were averaged into one score that was used as the dependent variable. This score was treated as interval data, and is a continuous variable. Assumption 2 was similarly satisfied, as there were four continuous variables which were treated as interval scale of measurement, out of the nine factors being tested. These were, age, income, frequency of travel, and risk-taking tendencies.

Assumption 3 was satisfied because a linear relationship existed between the dependent and independent variables. This was tested using the residuals and the corresponding line of best fit. The assumption was met as the line of best fit shows a linear relationship within the data shown in Figure 1. Assumption 4 was satisfied in two ways. Firstly, by referring to Figure 1, it was noted that the Lowess Fit line converged onto the zero line in most places. Secondly, using the Durbin-Watson test, a score of 1.96 was obtained thereby indicating independence of

observations shown in Table 3. With the Lowess Fit line not deviating significantly from the Zero line, linearity was not perfect, but it was considered to be satisfactory along with the independence of observations thereby satisfying assumptions 3 and 4.

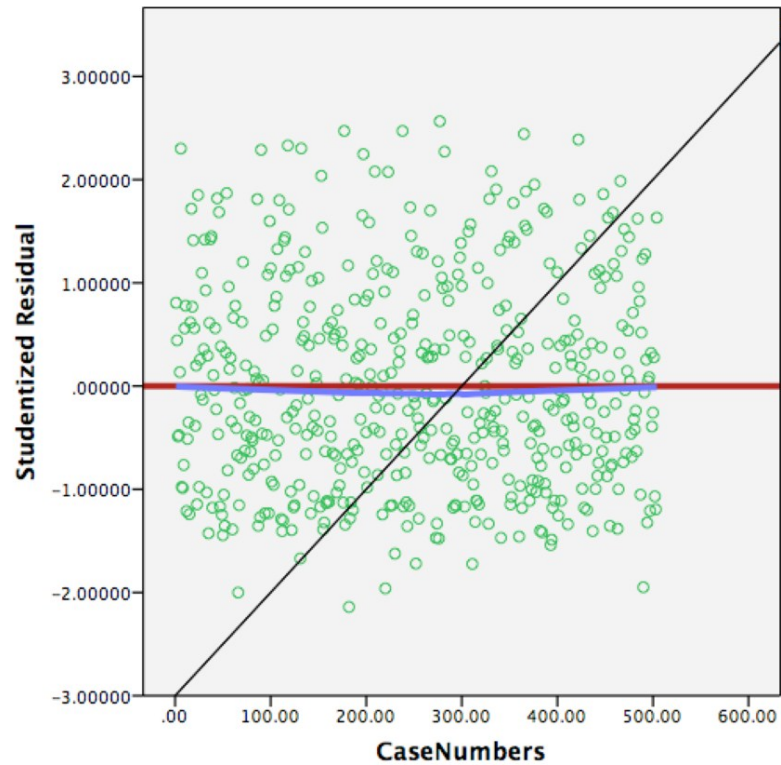


Figure 1. Residuals Lowess Fit line (blue) vs. Zero Line (red) vs. Line of Best Fit (black)

Table 3
Model Summary with Durbin-Watson Test

Model ^e	R	R ²	Adjusted R ²	Durbin-Watson
1	.229 ^a	.052	.050	
2	.273 ^b	.074	.071	
3	.297 ^c	.088	.083	
4	.309 ^d	.096	.088	1.963

a Predictors: (Constant), Frequency
b Predictors: (Constant), Frequency, Income
c Predictors: (Constant), Frequency, Income, SeatType
d Predictors: (Constant), Frequency, Income, SeatType, EL_4
e Dependent Variable: Preference

Assumption 5 dealt with the presence of outliers. In the analysis, presence of outliers, and significant points were tested in multiple ways. First, outliers were tested through the use of ‘Casewise Diagnostics’ in SPSS, where each case’s standardized residual was tested to determine if it was greater than ± 3 standard deviations from the mean. If so, it was deemed to be an outlier. No such cases were found using ‘Casewise Diagnostics’. Following this, each case’s studentized deleted residual, were inspected to determine if any cases had values greater than ± 3 standard deviations. The scores ranged from -2.15 to +2.58, thereby reconfirming the absence of outliers.

Next, leverage values were examined for each case in order to test for significant influence. Values $< .2$ are deemed to be safe, values from $.2 - .5$ are risky, and values $> .5$ are dangerous. All but two cases had leverage values less than .13, with one case at .25 and one case at .35. These cases were noted with caution, but not removed as they could represent real world cases. The final test of influence

was Cook's distances, which are preferred to be less than 1. There were no cases with Cook's distances greater than 1, with the highest being .09, and therefore it was determined that there were no significantly influential cases or outliers. Based on all these tests, it was determined that assumption 5 was satisfied.

In order to satisfy assumption 6, multicollinearity and homoscedasticity were tested. Multicollinearity was tested by analyzing the correlation coefficients and the VIF/Tolerance scores from the data analysis. From the data analysis, it was evident that none of the independent variables had correlation coefficients greater than .7 as shown in Table 4. When dealing with Tolerance and VIF values, a collinearity issue is said to exist if scores of less than .1 and 10 are observed, respectively. As shown in Table 5, all that Tolerance scores were greater than .1, ranging between .87 and .96. Similarly, VIF scores were far below 10, ranging between 1.04 and 1.15. Based on these tests, it can be stated that collinearity was not an issue with this data set.

Table 4
Summary of Correlations between Variables

	Pref	Age	Gen.	Inc.	EL_1	EL_2	EL_3	EL_4	ST	Purp	Freq	FFP_1	FFP_2	FFP_3	RTT
Pref	1	0.029	-0.003	0.207	-0.015	0.046	0.05	0.155	0.141	0.15	0.229	0.068	0.146	0.149	0.106
Age	0.029	1	0.186	0.17	0.024	-0.017	0.039	0.113	0.01	-0.018	-0.046	0.049	0.014	0.063	-0.07
Gen.	-0.003	0.186	1	-0.145	0.078	0.03	-0.088	0	-0.036	-0.097	-0.039	-0.066	-0.004	-0.05	-0.178
Inc.	0.207	0.17	-0.145	1	-0.05	0.054	0.194	0.236	0.086	0.273	0.284	0.106	0.228	0.272	0.111
EL_1	-0.015	0.024	0.078	-0.05	1	-0.379	-0.148	-0.08	0.014	0.06	-0.054	-0.011	0.052	-0.046	-0.006
EL_2	0.046	-0.017	0.03	0.054	-0.379	1	-0.32	-0.174	-0.108	-0.071	0.056	0.132	-0.112	-0.026	0.092
EL_3	0.05	0.039	-0.088	0.194	-0.148	-0.32	1	-0.068	0.034	0.067	0.05	0.083	0.145	-0.039	-0.034
EL_4	0.155	0.113	0	0.236	-0.08	-0.174	-0.068	1	0.191	0.146	0.082	0.006	0.065	0.176	-0.012
ST	0.141	0.01	-0.036	0.086	0.014	-0.108	0.034	0.191	1	0.039	0.059	-0.102	0.199	0.359	0.076
Purp.	0.15	-0.018	-0.097	0.273	0.06	-0.071	0.067	0.146	0.039	1	0.332	0.047	0.234	0.143	0.055
Freq	0.229	-0.046	-0.039	0.284	-0.054	0.056	0.05	0.082	0.059	0.332	1	0.08	0.251	0.329	0.166
FFP_1	0.068	0.049	-0.066	0.106	-0.011	0.132	0.083	0.006	-0.102	0.047	0.08	1	-0.293	-0.075	0.102
FFP_2	0.146	0.014	-0.004	0.228	0.052	-0.112	0.145	0.065	0.199	0.234	0.251	-0.293	1	-0.047	0.168
FFP_3	0.149	0.063	-0.05	0.272	-0.046	-0.026	-0.039	0.176	0.359	0.143	0.329	-0.075	-0.047	1	0.062
RTT	0.106	-0.07	-0.178	0.111	-0.006	0.092	-0.034	-0.012	0.076	0.055	0.166	0.102	0.168	0.062	1

Table 5
Summary of Collinearity Statistics

Model	Collinearity Statistics	
	Tolerance	VIF
(Constant)		
Frequency	.918	1.089
Income	.873	1.145
SeatType	.961	1.041
EL_4	.915	1.093

Homoscedasticity was tested by analyzing the residuals vs. the predicted values, and the fit of Lowess line on the Zero Line. The scatter plot of the residuals and predicted values is shown in Figure 2. Homoscedasticity exists if there is no increase or decrease in spread of the scatterplot. From visual inspection, there appears to be a slight decrease, however due to the fact that the observed power through large sample size was high, the decision was made not to remove any high influencing cases, the Lowess Fit line and Zero line converged closely, and that

there was no multicollinearity, it was acceptable to cautiously claim that assumption 6 was satisfied.

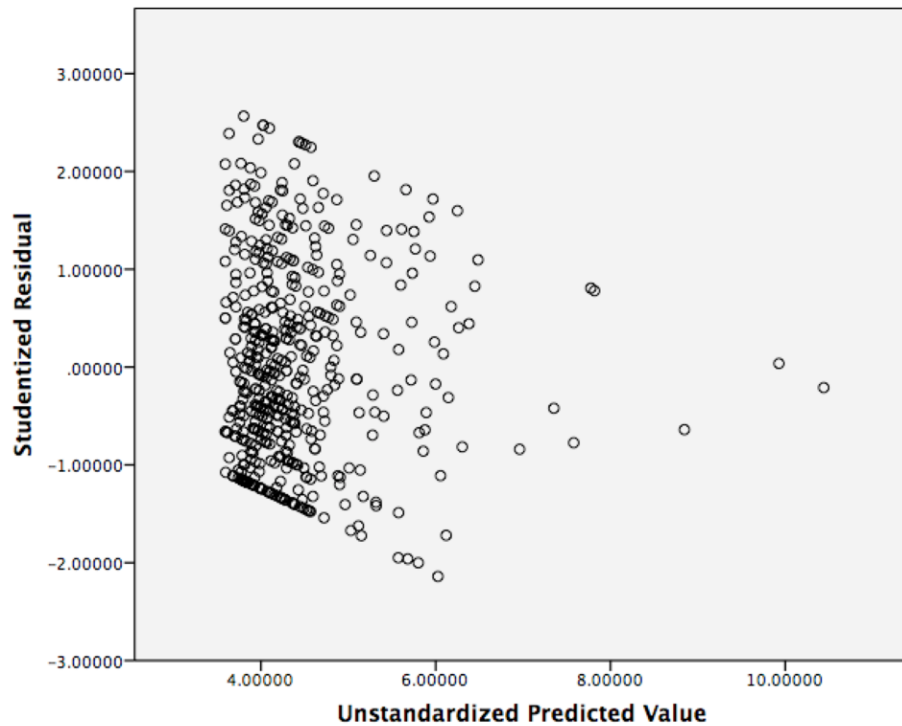


Figure 2. Residuals vs. Predicted

Assumption 7 tested that the residuals were normally distributed. Normality of the residuals was tested in two ways. The first through the use of a histogram with a superimposed normal curve. The second by a normal probability plot (p-p plot). Figure 3 shows the frequency distribution of the residuals in the form as histogram. Although not perfectly normally distributed, the residuals were roughly normally distributed to a satisfactory degree. The Normal Probability (p-p) plot of residuals shown in Figure 4 indicated that although the residuals did not perfectly align they were sufficiently close to the diagonal normal, thereby indicating the

presence of normality amongst the residuals. Based on both these tests, it was acceptable to state that assumption 7 was satisfied.

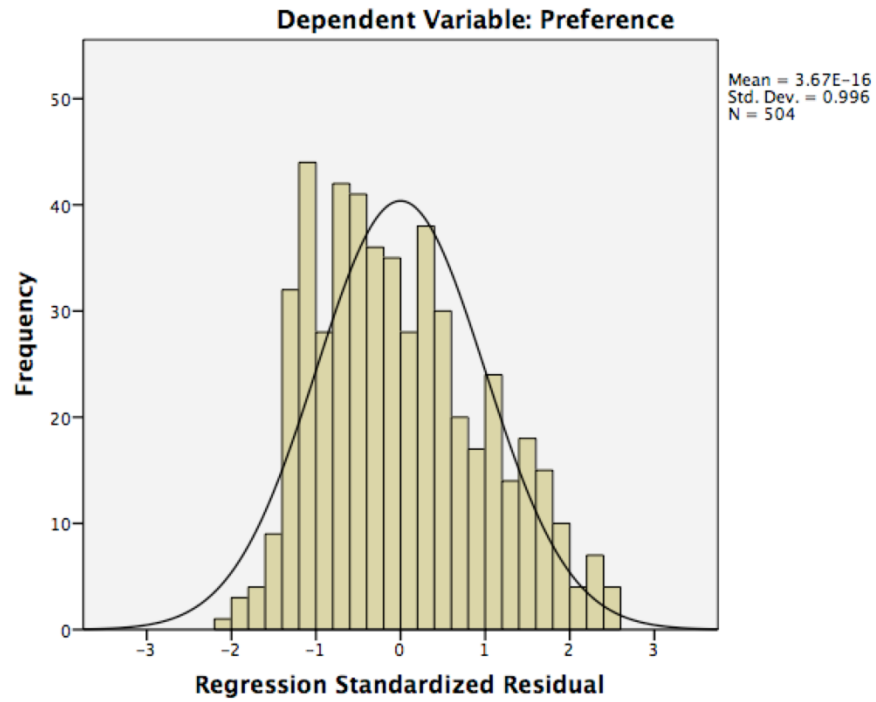


Figure 3. Frequency Distribution Histogram of Residuals

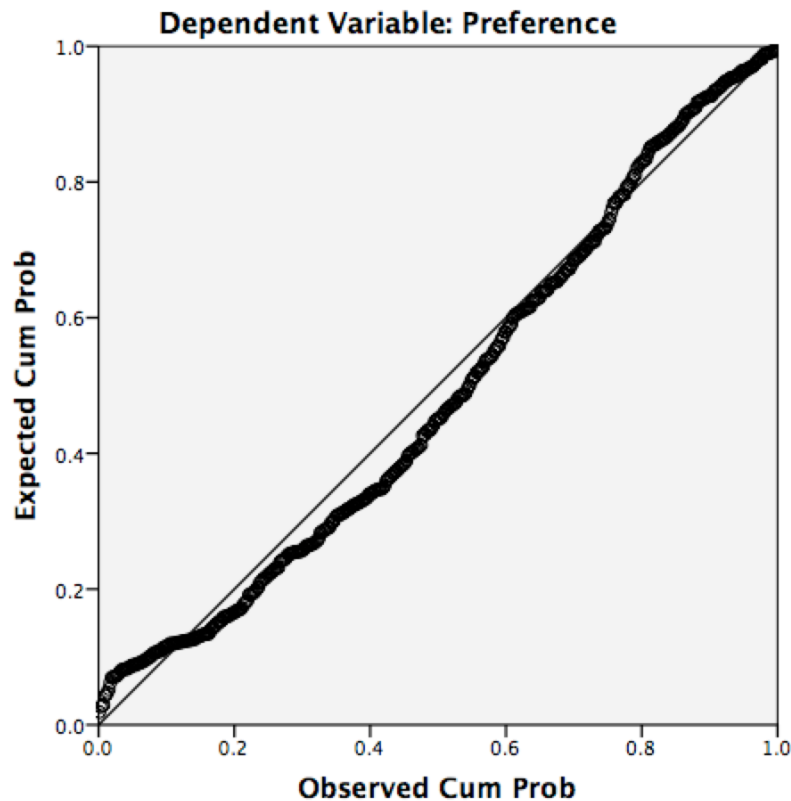


Figure 4. Normal Probability Plot (p-p plot)

As mentioned earlier, the assumptions of regression must be met in order for the study to be valid, and appropriately conduct regression analyses. Based on the results, all the assumptions were met to a satisfactory degree. Some assumptions were not perfectly satisfied. However, due to the robust nature of the study, the large sample size, and additional tests conducted to test the unsatisfied assumptions, it was determined that these minor irregularities would not jeopardize the analyses. Overall, it was determined that the assumptions of regression were met and the data could be appropriately analyzed.

Stage 1

The purpose of the first stage was to collect a sample to be used to create the regression equation of passenger preference between low cost and legacy carriers. In this section the results from the data analysis of the first sample are presented including the generated regression equation.

In this stage of the study, a regression analysis was conducted of the primary dataset with respect to participants' preference as it related to type of airline. The predictors being tested were age, gender, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies. A backward stepwise regression was employed to eliminate statistically insignificant predictors. The resulting model included four significant predictors, frequency of travel, income, seat type, and education level, out of the original nine predictors. The regression equation created as a result of this analysis was:

$$Y = 3.59 + 0.12X_1 + 0.00000893X_2 + 1.78X_3 + 1.23X_{4d}$$

where Y is predicted preference score between Low Cost and Legacy, and X_1 , X_2 , X_3 , and X_{4d} are frequency of travel, income, seat type, and education level (doctorate), respectively.

The data analysis revealed an $R^2 = .096$ (adjusted $R^2 = .088$). This means that if given the passengers' frequency of travel, income, seat type, and education level, the study has 9.60% (8.80% adjusted) of the information needed to perfectly

predict their preference between low cost and legacy carriers. In other words, the passengers' frequency of travel, income, seat type, and education level accounted for approximately 9.60% (8.80% adjusted) of the variance in the airline type preference. The model was statistically significant as $F(4,499) = 13.20, p < .001$. Tables 6, and 7 present the overall model summary, and the F values of significance, respectively.

Table 6
Model Summary (Model 4)

Model ^e	R	R ²	Adjusted R ²	Std. Error of the Estimate
1	.229 ^a	.052	.050	2.46980
2	.273 ^b	.074	.071	2.44329
3	.297 ^c	.088	.083	2.42745
4	.309 ^d	.096	.088	2.41989

a Predictors: (Constant), Frequency
b Predictors: (Constant), Frequency, Income
c Predictors: (Constant), Frequency, Income, SeatType
d Predictors: (Constant), Frequency, Income, SeatType, EL_4
e Dependent Variable: Preference

Table 7
F-Values of Significance (Model 4)

Model ^a		Sum of	df	Mean	F	Sig.
1	Regression	169.114	1	169.114	27.724	.000 ^b
	Residual	3062.148	502	6.1		
	Total	3231.262	503			
2	Regression	240.469	2	120.234	20.141	.000 ^c
	Residual	2990.793	501	5.97		
	Total	3231.262	503			
3	Regression	284.999	3	95	16.122	.000 ^d
	Residual	2946.263	500	5.893		
	Total	3231.262	503			
4	Regression	309.173	4	77.293	13.199	.000 ^e
	Residual	2922.089	499	5.856		
	Total	3231.262	503			

a Dependent Variable: Preference

b Predictors: (Constant), Frequency

c Predictors: (Constant), Frequency, Income

d Predictors: (Constant), Frequency, Income, SeatType

e Predictors: (Constant), Frequency, Income, SeatType, EL_4

The regression analysis produced certain significant predictors, the coefficients of which can be found in Table 8. These predictors were frequency of travel, income, seat type, and education level (doctorate). The results revealed that holding all other variables in the overall model constant, for every additional flight a participant travels on in a year, their preference score between low cost and legacy carriers will increase by .12 units on average. The coefficient was significant, $t(499) = 4.04, p < .0001$. Holding all other variables in the overall model constant, for every \$10,000 increase in a participant's yearly income, their preference score between low cost and legacy carriers will increase by .0893 units on average. The coefficient was significant, $t(499) = 2.77, p = .006$. Holding all

other variables in the overall model constant, participants that fly in upper tier seats (Business/First class) on average, have preference scores 1.78 units higher than those that fly in lower tier seats (Economy/Economy Premium). The coefficient was significant, $t(499) = 2.36, p = .019$. Holding all other variables in the overall model constant, participants with doctorate degrees, on average, have preference scores 1.23 units higher than those that do not. The coefficient was significant, $t(499) = 2.03, p = .043$.

Table 8
Regression Coefficients (Model 4)

Model ^a		Unstandardized coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error				Zero-order	Partial	Part
1	(Constant)	3.957	0.137		28.838	.000			
	Frequency	0.155	0.029	0.229	5.265	.000	0.229	0.229	0.229
2	(Constant)	3.58	0.174		20.546	.000			
	Frequency	0.125	0.03	0.185	4.123	.000	0.229	0.181	0.177
	Income	1.10E-05	0	0.155	3.457	0.001	0.207	0.153	0.149
3	(Constant)	3.57	0.173		20.619	.000			
	Frequency	0.122	0.03	0.18	4.047	.000	0.229	0.178	0.173
	Income	1.03E-05	0	0.146	3.272	0.001	0.207	0.145	0.14
4	SeatType	2.043	0.743	0.118	2.749	0.006	0.141	0.122	0.117
	(Constant)	3.592	0.173		20.771	.000			
	Frequency	0.121	0.03	0.179	4.04	.000	0.229	0.178	0.172
	Income	8.93E-06	0	0.126	2.773	0.006	0.207	0.123	0.118
	SeatType	1.775	0.753	0.102	2.358	0.019	0.141	0.105	0.1
	EL_4	1.234	0.607	0.09	2.032	0.043	0.155	0.091	0.086

a Dependent Variable: Preference

Stage 2

The purpose of stage 2 was to test the regression equation created in the previous stage. This was done in order to validate the findings and therefore create

a prediction model passenger preference between low cost and legacy carriers. An independent sample of 432 participants was used for stage 2 to test the regression equation created in stage 1. The regression equation was tested in a number of ways, using a cross validated R^2 , shrinkage, t-tests, as well correlations between actual and predicted scores.

First, the regression equation from the first stage was applied to the second sample in order to obtain predicted scores of passenger preference. These scores were compared with the actual scores of participants in the sample of stage 2. The first test used to validate the regression equation was a t-test. A t-test was performed between the two sets of data (i.e., actual participant preference scores and predicted preference scores using the regression equation). The results of the analysis revealed a statistically insignificant difference between the actual and predicted scores of passenger preference, $t(862) = -.48, p = .63$. The results are shown in Table 9. The lack of a statistical significant difference showed that the predicted scores were not vastly different from the actual scores. This suggests that the prediction model is valid, but was verified by additional tests.

Table 9
T-Test between Actual and Predicted Scores

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig.	Mean Diff.	Std. Error Diff.	95% Confidence Interval	
Equal Variances Assumed	61.573	.000	-.479	862	.632	-.10713	.22388	-.5465	.3323

The next test performed was a correlation between the actual preference scores and the predicted preference scores. This was once again done in an effort to show that these data sets were similar and not significantly different. The results of the correlation showed slight positive correlation between actual and predicted scores, $r(431) = .10$, $p = .018$. Even though the strength of the correlation was not high, the correlation was statistically significant, thereby adding support to the decision that the prediction model was valid. Table 10 shows the results of the correlation analysis (1-tailed). Subsequent tests required the use of the R^2 created through this correlation. The R^2 from the correlation between actual and predicted scores was .01.

Table 10
Correlation Analysis Actual vs. Predicted

		Actual	Predicted
Actual	Pearson	1	.101
	Sig.		.018
	N	432	432
Predicted	Pearson	.101	1
	Sig.	.018	
	N	432	432

Another analysis that was conducted involved the calculation of shrinkage. The concept of shrinkage is used to determine if two different samples may be combined for a regression model. This can be done if shrinkage is small, i.e., less than .10. Although in this study, the two samples were not being combined, this analysis was an addition means to validate the prediction model. Shrinkage is calculated as the difference between the overall R^2 (.096) from initial sample and

the R^2 (.01) from the correlation between the actual scores and predicted scores mentioned above. From the calculations, shrinkage was .086. In this study, shrinkage was less than .10 and therefore satisfied the criteria for validating the original model.

The final analysis that was conducted was the cross validated R^2 . This analysis is conducted to determine how well the regression equation would apply to the population or to other samples from the population. The cross validated $R'^2 = 1 - (1 - R^2)[(n+k)/(n-k)]$, where R^2 is overall R^2 from the initial model, n is the sample size of the primary sample in stage 1, and k is the degrees of freedom. The calculations revealed that the $R'^2 = .082$. This indicated that if we were to apply the primary sample's prediction equation to the population, or to another sample acquired from the same population, then we would be able to explain about 8.20% of the preference variance in the population or from the new sample. This was not an extremely strong model, however, it was a statistically significant. The model can therefore be considered to be validated and was fairly good/robust considering the low difference between the overall R^2 and the cross validated R'^2 .

Summary

The purpose of this study was to create a prediction model of passenger preference between low cost and legacy airlines. This was achieved in two stages. This section detailed the data analysis performed by each stage in creating the regression equation and validating the prediction model. The results of the data

analysis showed that a significant prediction model was created that accounted for 9.60% of the variance in passenger preference. Although this does leave a fair bit of variance unexplained, it was a very useful place to start for the industry to better understand the traveling public. The variance percentage was slightly lower than hoped, but still a significant finding for the industry in general, and is therefore a good building block for future research. The regression analysis showed four significant predictors to passenger preference, namely frequency of travel, income, seat type, and education level (doctorate). The prediction model is of value to the commercial airline industry, and these benefits, along with other discussions in regards to practical implications, limitations, and rational behind why certain predictors were significant and others were not, will detailed in Chapter 5.

Chapter 5

Discussion

Overview

The purpose of this study was to identify factors that influence a commercial airline passenger's preference between low-cost and legacy airline carriers. This was in part researched through the creation of a prediction model of passenger preference. Previous sections operationally define each of the terms and provide justification regarding the choice of the predictors that were tested.

The study utilized 936 participants (379 females), all from the United States, in two stages. The first stage was used to collect data in order to build the regression equation for passenger preference. The second stage was used to collect data in order to test the regression equation and thereby validate the prediction model. Two independent samples were utilized, and in each stage participants were given the identical instrument. Details of the study instrument were provided in Chapter 3 and a copy of the instrument is located in Appendix A.

The research was conducted using a correlational design with linear multiple regression analyses as the statistical analyses to build the prediction model. The independent variables in this study were the nine factors that are being tested for having a predictive influence on the dependent variable. These nine factors were age, gender, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.

The dependent variable for this study was the passengers' preference between legacy and low cost airlines. The research hypotheses were as follows:

- H_{A1}: Age is a significant predictor of passenger preference when controlling for gender, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.
- H_{A2}: Gender is a significant predictor of passenger preference when controlling for age, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.
- H_{A3}: Income is a significant predictor of passenger preference when controlling for age, gender, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.
- H_{A4}: Education level is a significant predictor of passenger preference when controlling for age, gender, income, seat type, type of travel, frequency of travel, category of frequent flier program, and risk-taking tendencies.
- H_{A5}: Seat type is a significant predictor of passenger preference when controlling for age, gender, income, education level, type of travel,

frequency of travel, category of frequent flier program, and risk-taking tendencies.

H_{A6}: Type of travel is a significant predictor of passenger preference when controlling for age, gender, income, education level, seat type frequency of travel, category of frequent flier program, and risk-taking tendencies.

H_{A7}: Frequency of travel is a significant predictor of passenger preference when controlling for age, gender, income, education level, seat type, type of travel, category of frequent flier program, and risk-taking tendencies.

H_{A8}: Category of frequent flier program is a significant predictor of passenger preference when controlling for age, gender, income, education level, seat type, type of travel, frequency of travel, and risk-taking tendencies.

H_{A9}: Risk-taking tendencies is a significant predictor of passenger preference when controlling for age, gender, income, education level, type of travel, frequency of travel, and category of frequent flier program.

This chapter will focus on the discussion of the findings of the study based on the results found in Chapter 4. In addition, this chapter will outline the practical implications of the findings of this study for the aviation industry. As with any

research study, there are certain limitations that cannot be avoided that are discussed and accounted for when discussing findings of a study. In conjunction with discussing the limitations, this chapter will also discuss some of the potential areas for future research.

Summary of Findings

The study was conducted in order to create a prediction model that would be of practical value to the airline industry in the United States. The results of the regression analyses and the final prediction model created by this study were detailed in Chapter 4.

The results of the primary stage using stepwise backward regression analysis revealed four significant predictors of passenger preference. Frequency of travel, income, seat type, and education level were found to have a significant influence on a passenger's preference between legacy and low cost carriers. The regression analysis that was created in stage 1 was tested in stage 2 in order to create the prediction model. The regression equation was tested in a number of ways, using a cross validated R^2 , shrinkage, t-tests, as well correlations between actual and predicted scores.

The results of the data analysis showed that the prediction model accounted for 9.60% of the variance in passenger preference. The results of the secondary analysis revealed a statistically insignificant difference between the actual scores from stage 1 and predicted scores from stage 2 of passenger preference, $t(862) = -$

.48, $p = .63$. The results of the correlation showed slight positive correlation between actual scores from stage 1 and predicted scores from stage 2, $r(431) = .10$, $p = .018$. The calculations revealed that the cross validated was $R'^2 = .082$ and therefore can be considered to be validated considering the low difference between the overall R^2 and the cross validated R'^2 .

All these statistical tests and procedures revealed strong favorable results indicating the validity of the regression equation, thereby lending strength to the overall prediction model. Rationale for plausible explanations as to why these particular factors were found to be significant and why others were not will be discussed in the following section.

General Discussion

The purpose of this section is to interpret the findings of the study. The results of the research were put forth in detail in Chapter 4, however it is important to the overall value of the study to interpret these results with the plausible explanations and implications of said findings. This study provides new insights into this field and therefore it is important to fully understand the findings to be of practical value to airline carriers in the U.S.

This study is unique in its approach and choice of variables being studied. However, it is not a completely new line of research and therefore calculated predictions were made based on the findings of previous research and the existing literature. Additionally, theoretical foundations were consulted in order to generate

the hypotheses of this study. Based on the results of the backward stepwise regression analyses, not all the predictions were supported by the data, but some were, and all the findings will be discussed in this section.

The first hypothesis predicted that age would be a significant predictor of passenger preference when controlling for all other variables. The results of the regression analyses did not support this hypothesis. This prediction was based on the findings of previous studies within the aviation field and in fields of general consumer behavior characteristics (Aksoy, Atilgan & Akinci, 2003; Lu & Shon, 2012; Umberger, Feuz, Calkins, & Killinger-Mann, 2002). However, contrary to the findings of previous studies, age was not found to be a significant predictor in this situation.

A plausible explanation for this could be the particular sample being used. As mentioned earlier, the sample utilizes participants from MTurk, and therefore there may not be a significant variation in age to produce an influence on the overall passenger preference. Additionally, age may not play an influencing role in the decision-making process of choosing between airline types as other factors such as income, may be more pressing or have an overpowering effect on decision making. It is plausible to consider that airline travel has become such a widely used means of transport that the perceptions of it are similar to people of all ages, and therefore age is no longer a significant factor in passenger preference.

The second hypothesis predicted that gender would be a significant predictor of passenger preference when controlling for all other variables. The results of the regression analyses did not support this hypothesis. This prediction was based on the existing literature on the differences between males and females in decision-making and as consumers (Aksoy, Atilgan & Akinci, 2003; Kim, Lehto & Morrison, 2007; Powell & Ansic, 1997; Umberger, Feuz, Calkins, & Killinger-Mann, 2002). Despite these previous results, gender was not found to be a significant predictor in this situation.

A plausible explanation for this could be that in the context of choosing between low cost and legacy carriers, gender once again is not a deciding factor, and there may be other factors that are more pressing such as income or frequency of travel. Although as consumers, males and females have differences in preferences and product types, it would appear that when it comes to airline travel, people operate the same way regardless of gender. This could be different when using a different sample from a different population, but for American participants on MTurk, gender does not appear to play an influencing role.

The third hypothesis predicted that income would be a significant predictor of passenger preference when controlling for all other variables. The results of the analyses supported this hypothesis. This prediction was based on studies in the consumer behavior field analyzing the characteristics of peoples' decision-making (Altenhofen, Berends, & White, 2016; Grigolon, Kemperman, & Timmermans,

2012; Hess & Polak, 2005). In this situation as well, the findings suggest that income has an influencing role in passengers' preference between low cost and legacy carriers.

The results suggested that as participants' yearly income rose, their preference was more inclined towards legacy carriers. A plausible explanation for this is that since legacy carrier flights usually cost more and provide more amenities, passengers with more available income or spending power will be able to afford these tickets more easily, and therefore choose to fly on these airlines more often. Higher income affords people a greater flexibility in choice between the two airline types.

It can be viewed that legacy carriers are perceived to be luxury brands and with an increase in income comes an increased desire for better products. This is not to say that people with lower incomes do not have the desire for luxury products, or increased amenities, or more convenience, but rather are limited by their budgetary constraints and so do not have the ability to afford to pay more for the increases in convenience or service.

If a passenger wants the amenities like meal service on board a flight or a checked bag, and is able to afford these items due to a higher income, they may prefer to fly on legacy carriers that include these amenities as standard within the price of the ticket. This may be to avoid the hassle of having to pay for each

amenity individually and therefore the convenience is valued greater than the cost differential.

The fourth hypothesis predicted that education level would be a significant predictor of passenger preference when controlling for all other variables. The results of the regression analyses supported this hypothesis. This prediction was based on the findings of previous research that suggested that education level influenced a person's decision making, and ultimately their overall choices as a consumer (Aksoy, Atilgan, & Akinci, 2003; Levinson, Kao, Kuby, & Thisted, 2005; Ong, & Tan, 2010; Pouta, Heikkilä, Forsman-Hugg, Isoniemi, & Mäkelä, 2010). In the context of this study, the findings suggest that one education level has a significant influence on passenger preference as compared to the other levels of education.

The findings suggest that individuals with doctoral degrees were found to more prefer legacy carriers more than their counterparts with lower education levels. A plausible explanation for this could be linked back to the previous factor that was found to be a significant predictor of passenger preference, namely income. It could be suggested that people with doctoral degrees have more specialized careers that maybe have higher salaries, and therefore have the ability to afford and prefer to fly on legacy carriers. However, it is interesting to note that none of the other education levels had a significant influence on preference between the airline types.

The fifth hypothesis predicted that seat type would be a significant predictor of passenger preference when controlling for all other variables. The results of the regression analyses supported this hypothesis. This prediction was based on the the current literature, which suggests a difference in the behavior of passengers when typically using upper tier (business or first class) and lower tier (premium economy or economy class) seats (Hess & Polak, 2005; Park, 2007). In the context of this study, predominant seat type choice, or class of travel was found to be a significant influencer of passengers' preference between low cost and legacy carriers.

The results of the study suggested that participants that fly in upper tier seats (Business/First class) on average, have preference scores 1.78 units higher than those that fly in lower tier seats (Economy/Economy Premium). A plausible explanation for this is that oftentimes low cost carriers do not offer business or upper class seats. If a particular airline or category of airline types does not offer business class seats, it will clearly have an influence on a passenger's choice of airline. It is therefore likely that participants that prefer to fly in upper tier seats with the added luxury and amenities offered will prefer or choose to fly on legacy carriers.

Tying back to the idea that income is a significant predictor of preference or choice, Vasigh, Fleming, and Tacker (2013) stated that upper tier seats can cost up to 10 times as much as lower tier seats. It this therefore plausible to make the

connection that individuals with higher incomes are more likely able to afford upper tier seats and therefore more likely to prefer them.

The sixth hypothesis predicted that type of travel would be a significant predictor of passenger preference when controlling for all other variables. The results of the regression analyses did not support this hypothesis. This prediction was based on studies that showed the differences exhibited in human behavior when performing tasks for their profession and for their person lives (Aksoy, Atilgan, & Akinci, 2003; Dresner, 2006; Friedman, 2007; Windle, & Dresner, 1995). Unlike previous literature in this field of study, type or purpose of travel was not found to be a significant predictor of passenger preference between low cost and legacy carriers.

As mentioned earlier by Friedman (2007) and Jones (2013) people behave differently and make different choices when other people's money is at stake. However, the findings of this study suggested that there was no significant influence of purpose of travel on preference. A plausible explanation for this could be that in this sample, and therefore more representatively in the business market today, more people may be self-funding their own business travel. This could be that more people are self-employed in this sample. Alternatively, it could be that organizations are trying to cut down on costs and are therefore requiring their employees that are travelling to spend less, which is in turn influencing their

ultimate choice. This could infer that the type of airline is inconsequential in the decision, as long as it is the cheapest flight available.

The seventh hypothesis predicted that frequency of travel would be a significant predictor of passenger preference when controlling for all other variables. The results of the regression analyses did not support this hypothesis. This prediction was based on the findings of previous research that studied the influence of repetition and repeat usage of a particular service on consumer decision making and choice (Bamberg, Ajzen, & Schmidt, 2003; Burke & Miller, 1999; Espino, Martín, & Román, 2008; Windle & Dresner, 1995). This study too found frequency of travel to be a significant influencer of passenger preference between low cost and legacy carriers.

The results of this research suggest that as participants' frequency of travel in a year increased, their preference was more inclined towards legacy carriers. A plausible explanation for this occurrence could be that if a person is travelling more often they could be looking for a more comfortable experience and therefore looking for the most amenities and services provided. This suggests the use of a legacy carrier that offer such a product. If a person is only flying once a year or not on a regular basis, the perceived inconvenience or lack of amenities may not be of a high priority to such a passenger.

Another plausible explanation for this could be indirect. If a person is hypothetically flying significantly more frequently, it could be that they are

travelling to several different locations, and as such legacy carriers are the preferred option as they have more routes, destinations, and flight choices.

The eight hypothesis predicted that category of frequent flier program would be a significant predictor of passenger preference when controlling for all other variables. The results of regression analyses did not support this hypothesis. This prediction was based on the body of existing knowledge on pertaining to customer behavior in relation to frequent flier programs and loyalty programs in general (Carlsson, & Löfgren, 2006; Melnyk & Van Osselaer, 2012; Nako, 1992; Proussaloglou, & Koppelman, 1999; Toh & Hu, 1988). However, the results of this study suggested that the category of a frequent flier program that a passenger was a member of was not a significant predictor of airline type choice.

A plausible explanation for this could be that the category of frequent flier program that the passenger is a member of is not the influencing factor, but instead whether they are a member of a legacy carrier's program or a low cost carrier's program. If a passenger is a member of a legacy carrier's frequent flier program it might influence their choice where they choose to continue using that particular airline instead of an alternative such as a low cost airline. Future research could seek to alter the way in which this variable was tested in order to determine if it has an influencing effect on preference.

The ninth hypothesis predicted that risk-taking tendencies would be a significant predictor of passenger preference when controlling for all other

variables. The results of the regression analyses did not support this hypothesis. This prediction was based on the existing literature on the subject of human risk analysis, decision making and perception, and consumer behavior as it relates to the perception of risk (Cunningham, Gerlach, Harper & Young, 2005; Fox, Hayes, & Shogren, 2002; Gardner, & Steinberg, 2005; Rhoades, & Waguespack Jr, 2004). In the context of this study, risk-taking tendencies were not found to have a significant influence on passenger preference between low cost and legacy carriers.

It was suggested that participants perceive low-cost airlines to be less safe due to the use of some smaller and/or older aircraft (Janic, 2000). A plausible explanation for the fact that this factor was not found to be significant could be that in today's commercial airline environment, passengers may no longer perceive smaller aircraft to be less safe. This could be due to the advancements in technology, or simply a greater understanding and subsequently greater trust in these aircraft.

As mentioned earlier, the predictions for all the hypotheses were grounded in theory, based on the findings of previous research, and found in the existing literature. Four of the nine predictions were supported by the data, resulting in those four variables being used to generate this prediction model of passenger preference between low cost and legacy carriers.

Practical Implications

Although the purpose of the study was to identify factors that influence a commercial airline passenger's preference, the real aim of such an endeavor was to create a prediction model that is of practical use to the airline industry and can be used to enhance commercial airline operations. Research studies are predominantly performed to enhance the scientific understanding of a particular topic area and expand the existing literature of the topic. However, the real world impact of many studies is a significant contributing factor. The value of the practical implications of this study therefore are one of the primary benefits of this research.

This study was not the first to study influencing factors on passengers' airline choice. However, no study was found in the existing literature that studied all these variables together in order to create a prediction model. The prediction model can be used by the airlines to determine whether a passenger is more likely to prefer a legacy airline over a low cost airline. This can in turn help airlines focus their time, efforts, resources on obtaining and retaining passengers that fit their airline demographic. As more data are collected through the real world use of the prediction model, the overall model can be improved and eventually become an invaluable tool for U.S. airline carriers. As stated earlier, the results showed a prediction model that included four significant predictors, namely, frequency of travel, income, seat type, and education level.

Another salient aspect in reference to the chosen predictors was that they all relate to the passengers' demographics and perceptions and do not include external factors such as ticket price, etc. This is of importance to the practical implications of this study as it helps airlines determine the demographic of passengers that suit their airline type regardless of airline influencers. One of the practical implications of this research and its findings was that it replicates the methodology of using regression analyses to create prediction models. This can therefore be of use to other researchers as a foundation to base the use of this methodology for other prediction models.

Limitations

This section will reiterate the limitations of this research study. Understanding the limitations of the study is key for two reasons. The first is that the limitations must be kept in mind when interpreting the findings of the study and considering the real world implications of these findings in the industry. The second is that the limitations of this study lay the groundwork for future research and identify which areas can be strengthened or amended in future studies.

As mentioned earlier, the primary limitation of this study was the use of Amazon's ® Mechanical Turk ® (MTurk) as the online tool for recruiting participants. This sampling strategy provided an invaluable advantage in such prediction model creation research as large sample sizes are relatively easy to obtain. However, the limitation that existed was that the researcher was not in

control of the environment that the participant was in when completing the questionnaire. The data were exposed to certain risks because the researcher was not there to supervise the data collection.

Additionally, the findings of this study can only be generalized to MTurk users in the United States and not necessarily the entire U.S. population. This was a limitation and therefore must be kept in mind when interpreting the results of the study. This limitation was offset by the fact that large sample sizes could be collected with this tool. Additionally, research by Buhrmester, Kwang, and Gosling (2011), and Germine, et al. (2012) both state that MTurk data are as reliable as laboratory data.

The participants recruited through MTurk were compensated 25 cents each for their completion of the questionnaire. The limitation associated with this compensation is that participants could have completed the questionnaire just to collect the payment and may not have put a great deal of thought into their responses. This is a limitation with a lot of research and cannot be eliminated.

Another limitation of the study was that the sample chosen to conduct this research comprised only of American participants. Therefore, the generalizability of the findings can only extend to the U.S. passengers. U.S. passengers may be the majority of the travelers on domestic or low cost airlines, but are certainly not all of the passengers, and even less so on major legacy carriers that have international operations. Aviation is a global industry with every airline carrying passengers

from different countries around the globe. This prediction model can only be used to predict the preference of U.S. passengers between low cost and legacy carriers. This was done to narrow the scope of the research in order to not compromise the large sample sizes. If more nationalities were utilized sample sizes may have gone down which would have in turn affected the strength of the overall prediction model.

Referring back to the generalizability of the study, another limitation that arose was that the study did not discriminate based on whether a person has flown on an airline or not. The perceptions of someone that has never experienced airline travel before could influence the results of the study. This limitation was deemed acceptable as people that have never travelled before does not preclude them from flying in the future, and therefore their perceptions are equally important and are representative of the future flying public.

An issue mentioned earlier was that in recent a new category of airlines has emerged with a slight new approach. The predominant categories have been legacy and low cost carriers. However, low cost carriers that were once considered the cheapest are no longer the cheapest, and a new category called ultra-low cost carriers has emerged. This study did not take this new category into consideration due to methodology restrictions, and so the limitation is that this model may not be completely representative of the entire aviation industry but is representative of the majority of the industry.

Lastly, a limitation existed with respect the the instrument used in the study. The questionnaire was created specifically for the purpose of this study as no validated instrument could be found or adapted to conduct this study in its entirety. Steps were taken to test the validity of the instrument through a Cronbach's Alpha and Guttman's split half of internal consistency and reliability respectively. Both these tests were satisfied and therefore the limitation was noted but deemed acceptable.

Future Research

As detailed earlier, there were certain limitations associated with this research that could not be avoided. These limitations were accepted due to the need for practicality and convenience, but were noted, and must be kept in mind when interpreting the results of this study. The limitations however, did provide a framework for building future studies in this line of research. By addressing the limitations of this study, future studies can be conducted to either eliminate or minimize the effect of said limitations.

One of the primary limitations of the prediction model created in this study was that it was created using American participants. Therefore, it is only usable on U.S. passengers in regards to their choice between U.S. legacy and low cost airlines. Aviation is a global industry with passengers from all over the world flying on airlines in almost every country. Future research can address this limitation by conducting replication studies with different samples, and participants

from different countries. By creating different prediction models for different countries of origin, information can be analyzed as to which factors influence people of different nationalities. This could eventually lead to universal prediction models being created that could be applied to all passengers.

The second largest concern of this study relates to the evolution of the airline industry and a rise of a new category of airline types, namely, ultra-low cost carriers. As mentioned earlier, this study did not take this into account and only dealt with the two predominant airline types, legacy and low cost. In the coming years, as this demarcation within the industry becomes more prevalent, future research may seek to replicate the purpose of this study but with respect to the preference between low cost and ultra-low cost. This would likely be of interest to several airlines in the industry as it is further dividing what was considered to be one demographic of passengers into two. There could be value in understanding the demographic factors that predict a passenger's choice between low cost and ultra-low cost carriers.

Another limitation addressed earlier explained that this study did not account for non-passenger demographic factors such as ticket price. This research focused solely on the differentiation factors between passengers when all other factors remained equal. Future research can explore the other end of the spectrum as well and add in potential factors that can be tested. This in turn may result in a creation of a new prediction model or an improvement to the existing model. There

are several variables that were not tested in this study as it would not be feasible or practical to do so, but several studies in the future may look to address these gaps. This in turn could create an entire line of research studies to be conducted.

Along with different variables being researched, future studies could look to test the variables used in this research but use an alternative approach. An example would be that of frequent flier programs. This study sought to find whether the level or category of a frequent flier program was a predictor. This was not found to be the case. Alternatively, future studies could determine whether if a passenger is a member of a legacy carrier's program or a low cost carrier's program is the influencing factor. Additionally, future research could seek to replicate these findings especially since the number of doctoral degree holding passengers was a limited number. Future replication studies could seek to utilize university networks and sample a larger number doctoral degree holders to apply this model.

Lastly, going back to the contribution of this study to the existing body of literature, this study has replicated the methodology for creating prediction models using regression. Future studies can use this research as a foundation and replicate the methodology in order to create additional prediction models. This is also not limited to the aviation industry, but can be far reaching and applied to almost any topic area. Prediction models have great value especially to consumer centric industries such as aviation, as they increase the efficiency of spending resources, and in effect can therefore improve overall profitability.

Conclusion

The results of this study suggested that frequency of travel, income, seat type, and education level significantly predict an American passenger's preference between low cost and legacy carriers. The study was able to arrive at this conclusion through the use of two backward stepwise regression analyses of 936 participants from the United States. This study expanded this area of research by attempting to analyze several different possible predictors in order to create a well-rounded prediction model.

The study has several practical benefits to the airline industry, aviation in general, and the scientific community. Despite the presence of some limitations, this study lays a foundation for future research to further expand on this prediction model and improve it for more precise understanding of passengers' preference between airline types.

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Appendices

Appendix A – Study Instrument

PPPM

Airline Type Preference

* Required

1. Are you at least 18 years old? *

Mark only one oval.

- ☐ Yes Skip to question 2.
☐ No Skip to question 16.

PPPM

Airline Type Preference

In this questionnaire, you will be asked your predominant preference or most often used choice between airline types. The two airline types we will be discussing are legacy airlines, and low cost airlines.

Legacy airlines are often defined as large full service airlines offering more amenities on board, with major city hubs, large fleets, often fly to international destinations, and usually have more expensive ticket options. Some examples of legacy carriers are: American Airlines, United Airlines, and Delta Air Lines.

Low cost airlines are often defined as airlines that have lower ticket fares, and offer less amenities as standard, but allow passengers to pay for the selected extra amenities that they prefer. These airlines usually fly domestic routes, and have smaller fleets. Some examples of low cost carriers are: JetBlue Airways, Frontier Airlines, Southwest Airlines, Spirit Airlines, and Allegiant Air.

Please rate your preference using the questions below:

2. My airline type of preference is *

Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Low Cost Airlines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Legacy Airlines

3. The airline type I use most often is: *

Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Low Cost Airlines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Legacy Airlines

4. The airline type I like to fly on is: *

Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Low Cost Airlines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Legacy Airlines

5. The airline type I most prefer to fly is: *

Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Low Cost Airlines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Legacy Airlines

6. The airline type I choose to fly is:" *

Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Low Cost Airlines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Legacy Airlines

Demographics

7. Please state your age in the box provided below *

8. Please state your gender below *

Mark only one oval.

☐ Male
☐ Female

9. Please state your yearly income (US Dollars) in the box provided below *

10. Please state the highest education level you have achieved below *

Mark only one oval.

- ☐ High School Diploma
- ☐ Associate's degree
- ☐ 4-year Bachelor's degree
- ☐ Master's degree
- ☐ Doctorate

11. Please state the seat type that you predominantly purchase when flying *

Mark only one oval.

- ☐ Lower Tier (i.e., Economy, Economy Premium, or equivalent)
- ☐ Upper Tier (i.e., Business Class or First Class)

12. Please state the type of travel that is the predominant purpose for using air travel *

Mark only one oval.

- ☐ Personal/Pleasure Travel
- ☐ Business Travel

13. Please state how many times you use air travel in a year on average in the box below *

14. Please state the category of frequent flier program that you have achieved with your airline of choice *

Mark only one oval.

- ☐ Highest tier (maximum benefits)
- ☐ Middle tiers (some benefits)
- ☐ Lowest tier (little to no benefits)
- ☐ Not a member of any frequent flier program

15. Please rate your own risk taking tendencies on the scale below *

Mark only one oval.

	1	2	3	4	5	6	7	
Extremely risk averse	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Extremely risk taking

Thank you for completing our questionnaire. You are done now.

16. Please input your initials followed by your age.
For example, if your name is John Smith and
you are 23 years old, then you put down: JS23

Please return to MTurk and enter this code (that you generated above) into the appropriate place so that you can be paid for your time.

Appendix B – IRB Documentation



Florida Institute of Technology

Institutional Review Board

Notice of Exempt Review Status Certificate of Clearance for Human Participants Research

Principal Investigator: Rian Mehta
Date: April 20, 2017
IRB Number: 17-074
Study Title: A prediction model of airline passenger preference

Your research protocol was reviewed and approved by the IRB Chairperson. Per federal regulations, 45 CFR 46.101, your study has been determined to be minimal risk for human subjects and exempt from 45 CFR 46 federal regulations and further IRB review or renewal unless you change the protocol or add the use of participant identifiers.

All data, which may include signed consent form documents, must be retained in a secure location for a minimum of three years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained on a password-protected computer if electronic information is used. Access to data is limited to authorized individuals listed as key study personnel.

The category for which exempt status has been determined for this protocol is as follows:

2. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior so long as confidentiality is maintained.
 - a. Information is recorded in such a manner that the subject cannot be identified, directly or through identifiers linked to the participant and/or
 - b. Subject's responses, if known outside the research would not reasonably place the subject at risk of criminal or civil liability or be damaging to the subject's financial standing, employability, or reputation.

This form shall be used if there is **minimal risk** to human subjects; one of the categories on the next page applies to the research. If there is more than minimal risk associated with the research (none of the conditions apply) or if the research utilizes a special population (children, prisoners, institutionalized individuals, etc.), please use the expedited/full application form found on the IRB website.

You should consult the university's document "Principles, Policy, and Applicability for Research Involving Human Subjects" and instructions on the IRB Committee website prior to completion of this form.
<http://www.fit.edu/research/committees/irb>

Submit via email to FIT_IRB@fit.edu.

IRB Contact Information:

Dr. Lisa Steelman
IRB Chairperson
lsteelma@fit.edu or FIT_IRB@fit.edu
321-674-7316

INVESTIGATOR INFORMATION

Title of Project A Predication Model of Airline Passenger Preference
Date of Submission 4/12/17
Expected Project Start Date 4/24/17 Expected Project Duration Six Months - 1 year
Principal Investigator Rian Mehta
Title PhD Candidate, GSA
Academic Unit Aeronautics
Phone 321-914-2518 Email rmehta2009@my.fit.edu

List all co-investigator(s). Please include name, title, academic unit/affiliation and email.

CATEGORIES OF EXEMPT RESEARCH

Research must choose one:

- ☐ Research conducted in established or commonly accepted educational settings, involving **normal educational practices**, such as:
 - a. research on regular and special education instruction strategies, or
 - b. research on the effectiveness of or the comparison among instruction techniques, curricula or classroom management methods.
- ☒ Research involving the use of **educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior** unless:
 - a. the subjects can be identified, directly or through identifiers linked to the subjects and
 - b. any disclosure of subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability or reputation.

Note: This exemption does not apply to survey procedures or interviews involving minors.
- ☐ Research involving the use of educational tests, survey or interview procedures, or observation of **public behavior** if:
 - a. the subjects are elected or appointed public officials or candidates for public office, or
 - b. the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.
- ☐ Research involving the **collection or study of existing data, documents, records or specimens** if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, indirectly or through identifiers linked to the subjects.
- ☐ Research and demonstration projects that are conducted by or subject to the approval of department or agency heads and that are designed to study, evaluate or otherwise examine:
 - a. **public benefit or service programs**,
 - b. procedures for obtaining benefits or services under those programs,
 - c. possible changes in or alternatives to those programs or procedures, or
 - d. possible changes in methods or levels of payment for benefits or services under those programs.
- ☐ **Taste and food quality evaluation** and consumer acceptance studies if:
 - a. wholesome foods without additives are consumed, or
 - b. food is consumed that contains food ingredients found to be safe by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture.

RESEARCH FUNDING

If any part of this study will be funded by an external funding source, you must note the funding source and award/solicitation number below:

N/A

ANSWER THE FOLLOWING QUESTIONS AS THOROUGHLY AS POSSIBLE.

1. List the objectives of the proposed project.

The purpose of this study is to identify factors that influence a commercial airline passenger's preference between low-cost and legacy airline carriers. The end goal of this research is to create a prediction model of passenger preference on airline type choice. The factors being tested are: age, gender, income, education level, seat type, type of travel, frequency of travel, category of frequent flier program, and risk taking tendencies.

2. Describe the research project design/methodology. Discuss how you will conduct your study, and what measurement instruments you are using. Attach all research materials to this application. Please describe your study in enough detail so the IRB can identify what you are doing and why.

The research methodology that will be used in this study is a survey design using a correlational design for regression analyses. A survey will be completed via Google Forms and administered to selected participants. The instrument (attached for review) will attempt to gain participants' preference between low cost and legacy airlines. Participants' responses to the nine factors (demographics) will be used for the prediction model.

3. Describe the characteristics of the participant population, including number, age, sex and recruitment strategy (attach actual recruitment email text, recruitment fliers, etc).

The population of this study will be American participants from Amazon's Mechanical Turk (MTurk). Participants will be solicited from MTurk and linked to the instrument via Google Forms. After completing the study, participants will receive between 10-30 cents of compensation for their time.

4. Describe any potential risks to the participants (physical, psychological, social, legal, etc.) and assess their likelihood and seriousness. Describe steps that will be taken to mitigate each risk.

The proposed study is not anticipated to pose any risk greater than normal daily activities.

5. Describe the procedures you will use to maintain the confidentiality and privacy of your research participants and project data. If video or audio recordings will be made, you must review the video/audio recording policy found on the IRB website and address precautions you will take in this section.

Participant's confidentiality is of the highest concern to the researchers. No identifying data will be collected on the survey or during the course of the study.

6. Describe your plan for informed consent (attach proposed form).

The proposed study requests a waiver of informed consent consistent with Title 45 CFR 46.116(d). Instructions are included with the survey questions and will be read by participants at the beginning of the study. The study produces minimal risk to participants.

7. Discuss the importance of the knowledge that will result from your study (benefits to the field and to society) and what benefits will accrue to your participants (if any). Include information about participant compensation if appropriate.

The knowledge gained from the current study may provide insights into airline passenger choice/preference/decision-making. This could be of great value to the airline industry to better understand their passenger base and improve their targeting to consumers that would be more likely to fly on their airline type. While there may be no immediate benefit to the participants, each participant will receive a small amount of compensation for completion of the study.

8. Explain how your proposed study meets criteria for exemption from Institutional Review Board review (as outlined on page 2 of this form).

This study has minimal risk to participants. Participant confidentiality and anonymity will be protected, and all participants may choose to opt out of the study. The study also uses traditional survey procedures and instruments to collect research data. All participants will be 18 years or older.

SIGNATURE ASSURANCES

I understand Florida Institute of Technology's policy concerning research involving human participants and I agree:

1. to accept responsibility for the scientific and ethical conduct of this research study,
2. to obtain prior approval from the Institutional Review Board before amending or altering the research protocol or implementing changes in the approved consent form,
3. to immediately report to the IRB any serious adverse reactions and/or unanticipated effects on participants which may occur as a result of this study.

PI Signature R.M. Muto Date 4/12/17

ADVISOR ASSURANCE: IF PRIMARY INVESTIGATOR IS A STUDENT

This is to certify that I have reviewed this research protocol and that I attest to the scientific merit of the study, the necessity for the use of human subjects in the study to the student's academic program, and the competency of the student to conduct the project.

Major Advisor John E. Deaton Date 4/12/17
Major Advisor (print) John Deaton

ACADEMIC UNIT HEAD: IT IS THE PI'S RESPONSIBILITY TO OBTAIN THIS SIGNATURE

This is to certify that I have reviewed this research protocol and that I attest to the scientific merit of this study and the competency of the investigator(s) to conduct the study.

Academic Unit Head [Signature] Date 4.13.17

FOR IRB USE ONLY

IRB Approval _____ Date _____
IRB # _____