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The University of Southern Mississippi

RISK PROPENSITY AND THE AVIATOR SHORTAGE

by

Timothy Seales

A Thesis
Submitted to the Honors College of
The University of Southern Mississippi
in Partial Fulfillment
of the Requirements for the Degree of
Bachelor of Science in Business Administration
in the Department of Management

May 2014

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Abstract

This is an exploratory research study of the possible similarities in risk propensity between aviators and potential aviators and to determine the feasibility of using focused marketing strategies to increase the number of annually issued pilot certificates. This exploratory research was chosen for its significance in that there is a steady decline in the number of pilot certificates being issued annually (Blair, 2012), and there is also a dramatic increase in the number of airline pilots reaching the mandatory retirement age of 65 (Cary, 2012). The result of these two combined circumstances may cause an acute aviator shortage in the airline industry.

The researcher for this exploratory study hopes to provide preliminary evidence of a relationship between the people in the population who are more willing to accept risk and interest in gaining more information about getting a pilot's license and flying a plane. Once a particular population can be identified as distinct from the rest of the population then marketing actions can be considered by airlines, flight schools, and advertising agencies in order to help mitigate the effects of the upcoming aviator shortage for airlines. (Cary, 2012) As an exploratory study, the hope is to provide a suitable framework upon which future research can examine this topic.

Key Terms: risk, aviation, aviator shortage, pilot shortage, risk propensity

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Literature Review

Description of Key Terms

The following terms and descriptions are accredited to Bernd Rohrmann's research, *Risk Attitude Scales: Concepts, Questionnaires, Utilizations*

Risk:

The possibility of physical or social harm/detriment/loss due to a hazard.

This is the (dominating) 'negative' perspective; however, there is also a neutral perspective, i.e., risk = uncertainty about the outcomes (good and/or bad ones) of a decision; and a positive perspective, i.e., risk can mean: 'thrill' (danger-induced feelings of excitement)

Risk Attitude:

A generic orientation (as a mind-set) towards taking or avoiding a risk when deciding how to proceed in situations with uncertain outcomes.

Risk propensity:

Attitude towards taking risks.

Risk Aversion:

Attitude towards avoiding taking risk.

Risk Behavior:

The actual behavior of people when facing a risk situation.

Introduction

This is an exploratory research about the possible similarities in risk propensity between aviators and potential aviators and to hopefully provide rudimentary marketing strategies designed to increase the number of annually issued pilot certificates.

This exploratory research was chosen for its significance in that there is a steady decline in the number of pilot certificates being issued annually (Blair, 2012), and there is a dramatic increase in the number of airline pilots reaching the mandatory retirement age of 65. (Cary, 2012). The result of these two combined circumstances may cause an acute aviator shortage by airlines.

The researcher for this exploratory study hopes to deduce rudimentary marketing actions to be considered by airlines, flight schools, and advertising agencies in order to help mitigate the effects of the upcoming aviator shortage for airlines. (Cary, 2012). These potential rudimentary actions will hopefully be garnered from potential indications from the results of this exploratory research. In order for airlines, flight schools, and advertising agencies to acquire more developed marketing strategies and have access to a more firm market analysis, a more thorough, in-depth research with a national sample must take place on the topic.

This research began as a descriptive study; however, due to unforeseen study limitations that will be discussed later in this thesis, and after careful deliberation between the researcher and the advisor for this project, the research was scaled back to an exploratory research upon which further research could build.

A descriptive study is defined by the Office of Human Research Protections (OHRP) as any research that is not truly experimental. These studies can be considered "observational" in that the data collected is not manipulated in any manner; rather, the data is simply observed to locate trends and correlation among data. Exploratory research differs from a descriptive study in that it allows for more "wiggle room" for collecting data and is used more for the furtherance of research on the topic and usually not for drawing firm conclusions on the results. It could be said that exploratory research is used as a way to begin exploring a new topic and pave the way for future research. Despite the fact that conclusions are not usually drawn from the results of exploratory research, they can, however, provide profound insight to the topic, and greatly assist future research on the topic. (University of Guelph).

Another reason why this exploratory research is significant is that there are only a handful of literary sources that research various personality aspects of pilots; moreover, even fewer articles and studies have been conducted on the aviator's level of risk propensity. Because previous research has ignored the chosen topic and left it seemingly unstudied, this thesis delves into a, now previously, unexplored topic with almost no assistance from prior research.

This researcher hopes to add to the woeful lack of research on the matter and provide airlines, flight schools, and advertising agencies another perspective on attracting young, new, potential pilots to the industry. Moreover, this researcher hopes that this exploratory research will raise awareness of the topic and the need for further research and serve as a foundation upon which future research can build.

In order to assist the reader grasp the significance of this topic, the role the airline industry plays in the American economy will be provided.

One might ask why the airline industry is extremely important to travel in the US. To give the reader an idea of the amount of business that is generated by a single airline, on an average day, American Airlines alone will fly about 275,000 passengers and fly about 3,400 flights. (American Airlines, 2013). This rather exorbitant number is provided by just one of many airlines operating in the U.S.

Due to recent federal mandates, all pilots, including newly hired pilots, will be required to have at least 1,500 hours of flight experience. "U.S. airlines are facing what threatens to be their most serious pilot shortage since the 1960s, with higher experience requirements for new hires about to take hold just as the industry braces for a wave of retirements." (Cary, 2012). Also, according to Cary, a study conducted by the University of North Dakota's Aviation Department found that roughly 60,000 pilots will need to be hired by 2025 by major airlines to replace departures and cover expansion. If there are not enough pilots to meet demand, then it will greatly affect how business meetings are conducted and how families travel on vacation.

Baby boomers, those born between the years of 1946 and 1964, are approaching retirement, and they will want to travel. Research shows that baby boomers account for 36 percent of all leisure travel conducted in the U.S. (U.S. Travel Association), and they have been using public transportation more frequently than in the past. This will cause a continual increase in demand for airlines, and subsequently, the airlines will have an increase in demand for pilots.

The potential impact that the aviator-deprived airline industry will have on our economy has been briefly covered in order to give the reader an idea of the looming crisis that will only worsen if the aviator shortage continues to grow.

What factors may be playing a role in the aviator shortage? Perhaps risk propensity is playing a role, however small, in the shortage. Risk propensity is a person's attitude toward taking risks. For example, a person with a higher risk propensity will indicate a more favorable response to taking risks when compared with a person with a lower risk propensity. (Rohrmann, 2005).

Since the number of aviators has been dwindling since the 1980s, even with massive marketing campaigns (Fiorino, 1997), it is worth examining studies about the psychological differences of aviators. Wakcher, of California State University, performed a personality study of pilot incumbents, pilot applicants, and general population norms. "Pilots, regardless of their aviation status and training background, seem to have personality characteristics in common with each other, but not with the general population. According to the personality profile found in these samples, the type of person that is drawn to the occupation of airline pilot is substantially more reserved, intelligent, emotionally stable, dominant, enthusiastic, conscientious, bold, trusting, self-assured, conservative, socially precise, and relaxed than is the general population." (Wakcher, 2003).

The Wakcher article, although useful for this research in that it shows similarities in personality between pilots, does not measure risk propensity specifically. Rather, it measures the applicants across Cattell's Sixteen Personality Factor Questionnaire (16PF).

The 16 personality factors measured in the questionnaire are:

1. Reserved/cool vs Warm/outgoing
2. Concrete-thinking/Less intelligent vs Abstract-thinking/More Intelligent
3. Emotional/Easily Annoyed vs Emotionally Stable/Mature
4. Submissive/Humble vs Dominant/Assertive
5. Sober/Restrained vs Enthusiastic/Spontaneous
6. Expedient/Disregards Rules vs Conscientious/Moralistic
7. Shy/Hesitant vs Bold/Venturesome
8. Tough-minded/Self-reliant vs Tender-minded/Sensitive
9. Trusting/Accepting Conditions vs Suspicious/Distrustful
10. Practical/Steady vs Imaginative/Absent-minded
11. Forthright/Genuine vs Shrewd/socially aware
12. Self-assured/Secure vs Apprehensive/Self-blaming
13. Conservative/Traditional vs Experimenting/Open to change
14. Group-oriented/Listens to others vs Self-sufficient/prefers own decisions
15. Undisciplined/careless of social rules vs Following self-image/socially precise
16. Relaxed/tranquil vs Tense/Frustrated

As shown above, the 16PF measures aviators across a whole host of personality characteristics; however, risk propensity is not one of the personality characteristics directly measured. It may be possible to form a hypothesis on an aviator's level of risk propensity with the personality characteristics measured, but there is not enough evidence for a conclusion to be drawn from the given data. That being said, if pilots show markedly similar personality traits over 16 personality factors, they may be very likely to show similarities in risk propensity as well. Risk propensity should definitely be further examined for this research.

Wakcher further states that, "Utilizing the airline pilot profile of the 16PF, Bartram (1995) found that 320 men who were enlisted in the army and were seeking flight training were similar to Cattell's sample of 360 airline pilots and substantially different (statistical significance was not reported) from the general population norm. Furthermore,

the army sample's personality profile was similar to that of 62 civilians (individuals not enlisted in the army) who were also seeking flight training. These findings suggest that individuals interested in fight training possess similar personality structures, regardless of military status." The question is will similar findings will be made with the surveys that will be conducted in this research? Perhaps individuals that show an increased desire to become pilots will show similar levels of risk propensity to the pilots that are surveyed.

The research conducted by Elke Weber, *A Domain-specific Risk-attitude Scale: Measuring Risk Perceptions and Risk Behaviors*, was similar to Wakcher's research in that it measures personality; however, it differs from Wakcher's research in that it does not measure the personality of aviators, but instead focuses on breaking risk attitude down into 5 domains: health/safety, recreational, ethical, social, and financial decisions. Weber's risk propensity test was extremely helpful to this research because it provided a template on which this researcher could construct a risk propensity test for both aviators and college students.

Weber states in his article that risk propensity varies depending on the domain. He also states in his article that, "Women appeared to be more risk-averse in all domains except social risk." Risk aversion differs from risk propensity in that it measures a person's tendency to avoid risk. For example, a higher risk-averse subject will avoid risk more than a lower risk-averse subject; whereas, a subject with higher risk propensity will take more risks than a subject with lower risk propensity.

In an article by Bernd Rohrmann, *Risk Attitude Scales: Concepts, Questionnaires, Utilizations*, Rohrmann states, "The results so far indicate that risk attitudes are multi-dimensional, that individual risk orientations are not necessarily consistent across

domains, and that the motivations for accepting risks vary considerably, depending on the type of hazard." Rohrmann's theory seems to back up Weber's study in the idea that a person's risk propensity varies depending on the domain.

This research will hopefully provide some indications as to whether or not an aviator's and a potential aviator's (possibly similar) level of risk propensity is playing a role in increasing the shortage. It is theorized in this exploratory research that the role of risk propensity may be affecting the shortage by creating the need of marketing schemes specifically tailored to attract an aviator's specific recreational risk attitude. This research will also hopefully serve as a good catalyst for future research on the topic.

For the purposes of keeping the survey brief and improving respondent completion, the risk assessment test in this exploratory research will be restricted to only the recreational subgroup. The recreation subgroup is designed to measure the respondent's willingness to engage in specific activities (e.g. skydiving, motorcycle-riding, scuba diving, or traveling without making prior arrangements). The recreational subgroup was chosen over the other four subgroups because this research hopes to locate a pattern in aviator, and potential aviator, lifestyles and the likelihood of the aviator participating in the given recreational activities.

Goals

This exploratory research proposes to utilize surveys to ask certified aviators various risk-propensity questions to gauge their level of risk propensity, and potential marketing strategies will be discussed from the results in order to further the discussion

of how more people may be drawn into the aviation industry through specialized marketing techniques. This research will fall within the validation research strategy category.

There is a decline in the number of certified pilots that has persisted despite recruitment oriented marketing campaigns. Additionally, nine-tenths of student pilots drop the training before they finish (Fiorino, 1997), and studies have shown that there is a noticeable psychological difference between the majority of pilots and the majority of the general public (Wakcher, 2003).

There are other potential reasons for a pilot shortage that will not be investigated here. For example, Fiorino stated that many pilots discontinue their training because of the large number of aviation acronyms and "techno-babble" thrown at the pupil at the beginning of training.

According to the Aircraft Owners and Pilots Association (AOPA), there has been a decline in the total number of active certified pilots from 827,000 in 1980 to 624,000 in 2009 (AOPA). Moreover, there has been a decline in the number of certified private pilots from 130,000 in 1980 to 58,000 in 1997 (Fiorino, 1997). Fiorino states that in the spring of 1997, over 100 businesses in the aviation industry formed a coalition and launched a national ad campaign in order to increase the industry's pilot-base.

Hypotheses

Perhaps risk propensity differences between aviators, potential aviators, and the general population have played a role in the seemingly small success of these marketing

campaigns described by Fiorino. This idea leads to a hypothesis that will hopefully be tested further in future research in order to obtain a more concrete result than what this exploratory research may be able to generate.

1. Similar risk propensity levels possibly exist between aviators and potential aviators, and these levels differ from the general population risk propensity norms. It is feasible that this fact has played a role in creating the apparent lack of success in marketing campaigns.

Consider the statement, "A risk-averse decision maker is more likely to tend to and weigh negative outcomes, thus overestimating the probability of loss relative to the probability of gain and requiring a higher probability of gain to tolerate exposure to failure." (Sitkin, 1992).

So, with this in mind, a risk-averse decision maker will probably be less likely to undergo flight training because of the perceived risk—even if taking flight lessons is something that the person indicates interest in doing.

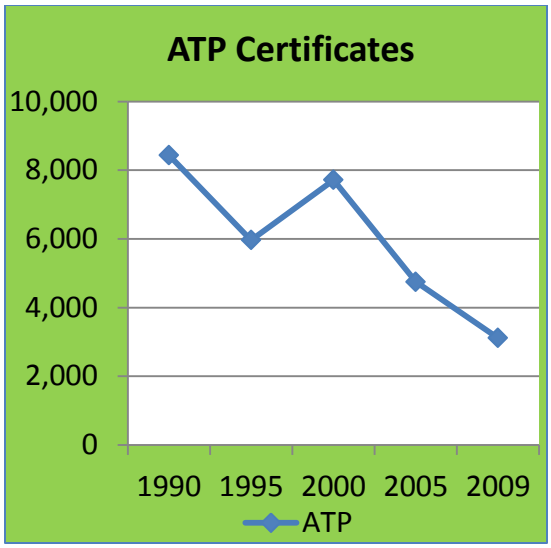
The research by Wakcher has also engendered in this exploratory research several more hypotheses.

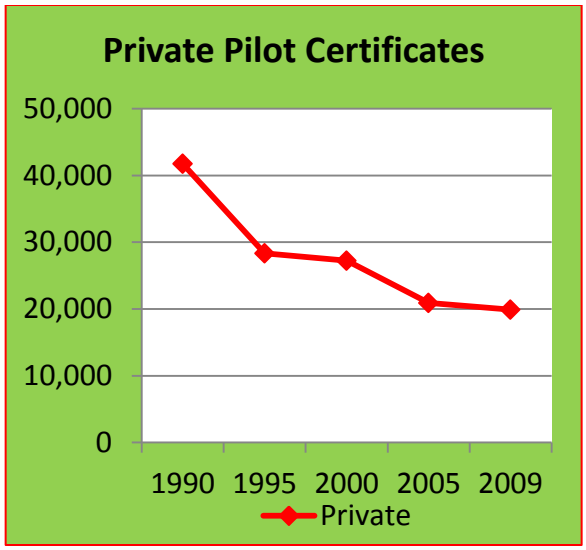
2. One hypothesis for this research is that pilots who take the survey might show a similar, higher risk propensity than the average college student. In Wakcher's study, the aviators had similar personality traits that were markedly different from general population norms.
3. Another hypothesis is that not only will aviators indicate a likelihood for demonstrating similar risk propensity levels, but college students who may

express an interest in a career in aviation will also have higher average levels of risk propensity when compared to the average college student. Therefore, similar to Wakcher's study that concluded that aviation applicants had similar personality traits when compared to aviators, it is hypothesized that this raised level of risk propensity may be present in respondents that indicate an interest in learning more about the aviation industry.

This researcher desires to ensure that the significance of this aviator shortage and the need for not only this exploratory research, but also the need for a more, in-depth examination by future research, is clearly communicated to the reader. Therefore, the effect of the baby boomers reaching retirement will be mentioned, and the decline in the annual number of pilot certificates issued will also be further examined.

There has been a decrease in the number of ATP (Airline Transport Pilot) certificates and Private Pilot certificates issued annually since the 1990s. (Blair, 2012). Blair & Freye found that in 1990, there were 41,749 private certificates issued and there were 8,437 ATP certificates issued. However, in 2009, there were only 19,893 private certificates issued and only 3,113 ATP certificates issued. The number of private certificates issued in 2009 is less than half of the number of private certificates issued in 1990. The numbers are even worse for the ATP certificates, with the number of ATP certificates issued in 2009 being a little over one-third of the number it was in 1990.





Baby boomers are getting ready to retire and, when they do, they will want to travel—the airlines will see a spike in demand. The number of trips conducted annually by baby boomers in private vehicles has been declining since 1995; however, the number of trips conducted annually by baby boomers using public transit has been increasing since 1997 (McGuckin). Older baby boomers (those born from 1946 to 1954) make up 15 percent of leisure travelers, and younger baby boomers (those born from 1955 through 1964) represent 21 percent of all U.S. leisure travelers (U.S. Travel Association, n.d.). If these baby boomer trends persist, then the aviation industry will see a rapidly increasing demand by baby boomers as they continue to age.

Airline pilots are also aging. As an example, the average age of American Airline (AA) pilots is 51.6 years, but the average age of AA Captains is 54.4 years. There are 83 AA pilots who are under 40 years old, but there are 560 AA pilots over 60 years old (Maxon, 2011). These 560 pilots will hit the mandatory retirement age of 65 within 5 years, and most of these pilots are captains. These 560 pilots will need to have adequately trained replacements within 5 years—and this is just for AA. Every airline

that operates within the rules of the FAA will soon be demanding a plethora of new pilots as their current pool of pilots reaches the mandatory retirement age of 65.

Methodology

The advisor for this project, Dr. William Smith, suggested that the AOPA (Airplane Owners and Pilot Association) should be contacted about administering a survey. Many associations, such as AOPA, conduct surveys via email, and it was originally planned that AOPA would be asked if, for the purposes of this project, they would allow a survey to be sent to their mailing list. The researcher for this thesis contacted AOPA multiple times; however, AOPA was unwilling to assist this research. Therefore, a large aviator database to which a survey could be sent was made unreachable, and subsequently, local Hattiesburg aviators were surveyed instead. In order to achieve a control measure, 10 aviators were given a risk-aversion survey; the aviator respondents were all male but varied in age from 18, all the way to 60 plus.

It was also planned that the aviator survey and the student survey would contain several flight-training commercials (provided by the airlines); from which both the aviator and student respondents would choose the most and least appealing advertisement. However, after contacting Delta, ExpressJet, and British Airways, no flight training commercials were able to be acquired. Subsequently, the college respondents were given a brief risk propensity test and were given several questions about their level of knowledge and attraction to the aviation industry. Because the

aviator respondents were already aware of and involved in the aviation industry, they were not surveyed about the aviation industry.

These surveys were devised using a similar framework to Weber's risk propensity survey. Weber measured risk propensity across 5 dimensions including health, finance, social, safety, and recreation. His risk propensity test, however, took an average of 1.5 hours to complete, so for the purposes of reducing the required time to take the survey, recreation was the only measured domain of risk propensity. Recreational risk propensity was chosen in order to possibly gain a better understanding of the hobbies and interests of current and potential pilots. This understanding can potentially lead to improved marketing tactics by flight schools. For example, if current and potential pilots indicate an increased willingness to ride motorcycles, flight schools can partner with and advertise at local motorcycle shops to gain the attention of potential pilots.

A total of ten aviators were analyzed for the first survey. These ten aviators were located at the Bobby Chain Airport when they were asked by the researcher if they would be interested in participating in a brief survey. All ten aviators agreed to participate in the survey, and they completed it using pen and paper. Seven out of the ten aviators have their commercial pilot's license and fly commercially. The other three aviators are all working toward obtaining their commercial pilot's license and desire to fly commercially in the future. These aviators are not considered to be representative of commercial aviators; this survey serves only as a convenience sample for this exploratory research.

The basic breakdown of the aviator survey is as follows:

1. The respondent was asked about their basic demographic information:

- *Question: "What is your age?"*

- *Question: "What is your gender?"*

2. The respondent indicated their level of experience in the aviation industry

- *Question: "How long have you been a licensed pilot?"*

3. The respondent was asked to respond to 10 risk-propensity questions

These are the 10 risk propensity questions:

Question 1—"If you were presented with an all-expenses-paid, 1 week trip to Australia, but you had to fly out the next morning, would you go? (Assume that your normal responsibilities could be deferred for the duration of the trip)"

Question 2—"Would you ride a motorcycle, if you could?"

Question 3—"Would you explore an unknown city or section of town?"

Question 4—"Would you ride along with the Blue Angels during a show, if given the option?"

Question 5—"Would you go on a guided hunt in Alaska?"

Question 6—"Would you go scuba diving?"

Question 7—"Would you go on a vacation in a foreign country without booking accommodations prior to the trip?"

Question 8—"Would you jump off of a 10 meter diving board?"

Question 9—"Would you go skydiving?"

Question 10—"Would you go to a new restaurant without knowing anything about it?"

As opposed to the aviator survey, which was simply handed out to be completed with paper and pencil, the survey website Qualtrics was used for administering the second survey to college students. Also differing from the aviator survey, the respondents were not identified directly by the researcher; rather, they were identified through email by USM professors. Several professors sent out emails to their students, and those emails contained a link to the online Qualtrics survey.

The first survey to the aviators was more straight-forward than was the second survey. In the second survey, the student respondents initially were not aware of what the survey was about; in fact, the purpose of the survey was not explained to them—they only knew what they could infer from the questions. After the students finished the demographic information and indicated career interests, they were then given the ten risk-propensity questions. At the end of the risk-propensity questions, the students were asked about their knowledge of the aviation shortage and asked if they would like to pursue a career as an aviator. Once the students finished their survey, the results were instantly saved to the Qualtrics database where the results could be observed and analyzed. The basic break-down of the second survey is as follows:

1. They were given a list of career industries to select, and they were asked which of the following they considered as a possible career choice. "Aviation" was an option, but the applicant did not yet know that the survey was about the aviation industry.

The following questions are the demographic questions and the questions pertaining to the respondent's educational and career interests.

Question 1—"What is your age?"

Question 2—"What is your gender?"

Question 3—"What is your USM classification?"

Question 4—"What is your major?"

Question 5—"In which of the following industries have you ever considered working?" (The career list included the following industries: Business, Aviation, Oil & Gas, Healthcare, Education, Construction, and None of the Above).

Question 6—"What is your current desired career choice?"

2. The college survey-taker was then given the same 10 question risk propensity test that was given to the aviators in order to determine his or her level of risk-propensity.

For the list of risk propensity questions, refer to the previous page.

3. After completing the risk-assessment test, the respondent was asked about their level of interest in aviation and their knowledge of the aviator shortage.

The following 4 questions analyzed the respondent's potential interest in aviation.

Question—"Have you ever considered working in the aviation industry as a pilot?"

Question—"To what degree does the idea of getting paid to fly a plane sound appealing?"

Question—"Did you know that airlines are facing a pilot shortage, and there will soon be a big demand for pilots?"

Question—"Would you like to learn more about the aviation industry and how to begin a career as a pilot?"

The survey was completed by the respondent immediately after answering the questions about the respondent's level of interest in the aviation industry and becoming a pilot.

After the survey data was gathered, aviator responses were measured alongside college student responses in order to find a potential correlation among the respondents.

The following tests were run in order to measure if the sample results indicated a degree of similarity/difference between groups were indeed significant findings, using an **alpha value of 0.1:**

Two Group t-test

Chi-squared analysis

ANOVA (analysis of variance) with the Scheffe multiple contrasts procedure

These three tests are described in the results section of this manuscript.

Results

Two Surveys were administered for this exploratory research: one survey to pilots and one survey to college students

- There were 10 respondents for the pilot survey: 10 Male; 0 Female.
- There were 44 respondents for the college student survey: 21 Male; 23 Female.

A significant difference is assumed if the alpha value is less than or equal to 0.1

Description of Formulas, Terms, and Survey Clarification

The alpha value (significance level) indicates the probability of making a type 1 error. A type 1 error concludes that the null hypothesis is false when it is, in fact, true. An alpha value of 0.1 means that there exists a 10% likelihood of making an error. The alpha value of 0.1 was chosen over a more restrictive value (such as 0.05) because of the limited respondent size.

t-test:

The t-test takes two independent means from two separate, distinct groups, and it tests the null hypothesis to determine if the two samples have the same mean. The null hypothesis is rejected if the measured value is greater than the previously-set alpha value (in this case, it is 0.1). (University of Minnesota).

Null Hypothesis:

The null hypothesis is that the two sample means are equal to each other.

Chi-Square analysis:

"The Chi-Square analysis is used to answer the following question: Is the observed association between the variables in the cross-tabulation statistically significant? Cross-tabulation represents a form of associative data analysis." (Rajiv Grover, 2006).

Analysis of Variance (ANOVA):

"The basic idea of analysis of variance (ANOVA) is to compare the between-treatment groups sum of squares (after dividing by degrees of freedom to get the mean square) with the within-treatment group sum of squares (also divided by the appropriate number of degrees of freedom). This is known as the F statistic." (Rajiv Grover, 2006).

In other words, the ANOVA tests to see if all sample means are equal, or if at least one group's mean is significantly different at the .10 significance level.

Scheffe Post-Hoc Comparison:

Usually run after the ANOVA; whenever an ANOVA model is used to examine the difference among more than 2 groups, a Scheffe post-hoc procedure can be used to compare differences between all pairs of means. (Rockloff).

10 Risk Propensity Question survey:

Ten risk propensity questions were administered for both the aviator and student surveys (to clarify, more questions were asked of both the pilot and student respondents; however, only 10 questions measured risk propensity). These questions were measured on a mean risk propensity scale of 1 – 5. 1 is the lowest level of risk propensity; 5 is the highest level of risk propensity.

Students (NOT AVIATORS) were asked the following question:

"Would you like to know more about the aviation industry and how to begin a career as a pilot?"

The students could answer the preceding question with one of two options: "**YES**," or "**NO**."

Those Students who answered **"YES"** to the preceding question are referred to as **"Respondent (I)"**

Those students who answered **"NO"** to the preceding question are referred to as **"Respondent (NI)"**

Both Pilots and Students were asked to gauge the likelihood of their participation in each of the following 10 Risk Propensity Questions with a 1 – 5 scale: 1 being very unlikely, 5 being very likely.

For each of the following tests sample members were compared across several groupings:

Female College Students and Male College Students

College Students Interested in More Information and Pilots

Survey Questions

Question 1—If you were presented with an all-expenses-paid, 1-week trip to Australia, but you had to fly out the next morning, would you go? (Assume that your normal responsibilities could be deferred until the end of the trip).

For this question, the males indicated a mean risk propensity of 4.48; whereas, the females indicated a mean risk propensity of 4.04 (a mean difference of 0.44 between male and female respondents; according to the t-Test, this difference is not significant with an **alpha value of 0.223**).

We compared the results of the respondents who were interested in learning more about aviation [these respondents will be referred to as "Respondent (I)"] and those who were not interested in learning more about aviation [these respondents will be referred to as "Respondent (NI)"]. Respondent (I) had a mean risk propensity level of 4.36, and Respondent (NI) indicated a mean risk propensity level of 4.21 (a mean difference of 0.15; according to the t-Test, this difference is not significant with an **alpha value of 0.718**).

The aviators indicated a mean risk propensity level of 4.2 for this question. Oddly enough, the aviator's mean risk propensity level most closely resembles Respondent (NI)'s mean risk propensity level for this question in particular.

Question 2— Would you ride a motorcycle, if you could?

The mean difference between males and females is minimal—the male respondents scored a mean of 3.95, and the females scored a mean of 4.00 (a 0.05 mean difference; according to the t-Test, this difference is not significant with an **alpha value of 0.887**).

Respondent (I) indicated a mean level of 4.73 for riding a motorcycle; however, Respondent (NI) has a mean level of 3.73 (a 1.00 difference in mean risk propensity; according to the t-Test, this difference is significant with an **alpha value of .00017**).

The aviators indicated a mean risk propensity level of 4.7. For this question, the aviator's mean risk propensity level is quite similar to Respondent (I)'s risk propensity level with only a 0.03 difference in means.

Question 3— Would you explore an unknown city or section of town?

There is not a big difference in mean risk propensity between males and females for question 3; however, that being said, the females do indicate a slightly higher mean compared to males. Females have a mean risk propensity of 4.30, but the males only have a mean risk propensity of 4.05 (a 0.25 difference in mean risk propensity; according to the t-Test, this difference is <u>not significant</u> with an **alpha value of 0.375**).

There is a slightly larger difference in mean risk propensity between Respondent (I) and Respondent (NI) than there was between males and females. Respondent (I) indicated a mean of 4.55, and Respondent (NI) indicated a mean of 4.06 (a 0.49 difference in mean risk propensity; according to the t-Test, this difference is <u>not significant</u> with an **alpha value of 0.143**)

The aviators indicated a mean risk propensity level of 4.1 for this question. Once again, the aviator respondents' mean risk propensity level resembles that of Respondent (NI) more closely than it does that of Respondent (I). Compared to Respondent (NI), there is a 0.04 difference in means; whereas, when compared to Respondent (I), there is a 0.45 difference in means.

Question 4— Would you ride along with the Blue Angels during a show, if given the option?

Male respondents indicated a mean risk propensity level of 4.00 for this question; whereas, females indicated a mean risk propensity level of 3.52 (a 0.48 difference in

mean risk propensity; according to the t-Test, this difference is not significant with an **alpha value of 0.232).**

The difference in mean risk propensity between Respondent (I) and Respondent (NI), on the other hand, was definitely significant. The Respondent (NI) possessed a mean risk propensity level of 3.45; however, Respondent (I) possessed a mean risk propensity level of 4.64 (a difference of 1.19; according to the t-Test, this difference is significant, as it possesses an **alpha value of 0.001**).

The aviators indicated a mean of 5.0 for this question—there is a mean difference of 0.34 between pilots and Respondent (I); however, there is a mean difference of 1.55 between aviators and Respondent (NI) for this question. Aviators indicated the maximum level of mean propensity for this question.

Question 5— Would you go on a guided hunt in Alaska?

Once again, the male respondents demonstrate a higher mean risk propensity compared to female respondents for question five. The male respondents have a mean risk propensity of 3.95; the female respondents, on the other hand, have a mean risk propensity of 3.52 (a 0.43 difference in risk propensity mean; this difference is not significant with an **alpha value of 0.315**). There is a significant difference in the results from Respondent (I) and Respondent (NI). Respondent (I) indicated a mean risk propensity of 4.55. Respondent (NI), on the on the other hand, indicated a mean risk propensity of 3.45 (a mean difference of 1.1; according to the t-Test, this difference is considered significant with an **alpha value of 0.002**).

Aviators indicated a mean risk propensity level of 4.9 for this question. For this question, there is a 0.35 mean difference between pilots and Respondent (I), but there is a 1.45 mean difference between aviators and Respondent (NI).

Question 6— Would you go scuba diving?

There is no significant difference between male and female respondents for this question. Male respondents for this question indicated a mean risk propensity of 4.00; female respondents for this question indicated a mean risk propensity of 3.65 (a mean difference of 0.35; according to the t-Test, this mean difference is considered not significant with an **alpha value of 0.434**).

There is a significant difference; however, between Respondent (I) and Respondent (NI). Respondent (I) demonstrated a mean risk propensity of 4.64; Respondent (NI), however, demonstrated a mean risk propensity of 3.55 (a 1.09 difference in mean risk propensity; according to the t-Test, this difference is considered significant with an **alpha value of 0.002**).

Aviators indicated a mean risk propensity level of 4.8 for this question. There is a 0.16 difference in mean risk propensity between aviators and Respondent (I); however, there is a 1.25 difference in mean risk propensity between aviators and Respondent (NI).

Question 7— Would you go on a vacation in a foreign country without booking accommodations prior to the trip?

There is very little difference between male and female respondents for this question. The males scored a mean of 2.67, and the females scored a mean of 2.70 (a mean difference of 0.03; according to the t-Test, this difference is not significant with an **alpha value of 0.946**)

This question is also the question for which male respondents indicated the lowest level of risk propensity (2.67). In fact, both the males and females scored a mean risk propensity much lower than their overall, average mean risk propensity (3.80 male; 3.51 female) for this question.

Interestingly enough, this is also the question that Respondent (I) scored the lowest level of mean risk propensity at 3.27. Respondent (I) still scored higher than Respondent (NI); Respondent (NI) scored a mean risk propensity level of 2.48 (a difference of 0.79; according to the t-Test, this difference is also not significant with an **alpha value of 0.109**).

Aviators indicated a mean risk propensity of 3.2 for this question. The aviators' results are similar to Respondent (I)'s results with a difference in mean risk propensity of only 0.07; however, pilots differ with Respondent (NI)'s mean risk propensity by 0.72.

Both Respondent (I) and the aviators indicate that this is the question for which they have the lowest level of mean risk propensity.

Question 8— Would you jump off of a 10 meter diving board?

There is a noticeable difference between males and females for question 8; however, this difference is not significant. Male respondents scored a mean risk propensity of 3.24; female respondents scored a mean risk propensity of 2.52 (a mean difference of 0.72; according to the t-Test, this difference is not significant with an **alpha value of 0.112**).

There is a significant difference between Respondent (I) and Respondent (NI). Respondent (I) scored a mean risk propensity of 4.00; Respondent (NI), however, scored

a mean risk propensity of 2.48 (a mean difference of 1.52; according to the t-Test, this difference is also considered significant with an **alpha value of 0.002**).

Aviators indicate a mean level of risk propensity of 4.5 for this question. Aviators indicate a 0.5 difference in mean risk propensity when compared with Respondent (I), and they indicate a 2.02 mean difference when compared with Respondent (NI).

Question 9—Would you go skydiving?

This is the only question where male and female respondents showed a significant difference in their mean risk propensity. Male respondents showed a mean risk propensity of 3.38; female respondents showed a mean risk propensity of 2.48 (a mean difference of 0.90; according to the t-Test, this difference is also significant with an **alpha value of 0.065**). This is also the question that the female respondents indicated the lowest level of mean risk propensity.

Respondent (I) and Respondent (NI) also show a significant difference in mean risk propensity. Respondent (I) indicates a mean risk propensity of 4.27; whereas, Respondent (NI) indicates a mean risk propensity of 2.45 (a mean difference of 1.82; according to the t-Test, this difference is also significant with an **alpha value of 0.001**). This is also the question where Respondent (NI) indicated the lowest level of mean risk propensity.

It is interesting to note that both females and Respondent (NI) indicate a common question for which they have the lowest level of mean risk propensity.

Aviators indicated a mean level of risk propensity of 4.1 for this question. There is a 0.17 difference in mean risk propensity between aviators and Respondent (I);

however, there is a difference in mean risk propensity of 1.65 between aviators and Respondent (NI).

Question 10—Would you go to a new restaurant without knowing anything about it?

There is a negligible difference between male and female respondents for this question. Male respondents indicated a mean level of risk propensity of 4.29; female respondents indicated a mean level of risk propensity of 4.35 (a mean difference of 0.06; according to the t-Test, this difference is not significant with an **alpha value of 0.819**). This is also the question that female respondents indicated the highest level of risk propensity.

There is little difference between Respondent (I) and Respondent (NI) for this question. Respondent (I) indicate a mean level of risk propensity of 4.55; Respondent (NI) indicate a mean level of 4.24 (a difference of 0.26; according to the t-Test, this difference is not significant with an **alpha value of 0.330**). This is also the question that Respondent (NI) shows the highest level of mean risk propensity.

Both female respondents and Respondent (NI) have a common question for which they have a maximum mean risk propensity level (the restaurant), and also for which they have a minimum mean risk propensity level (going skydiving).

Aviators indicated a mean level of risk propensity of 4.5 for this question. There is a difference of 0.05 in mean risk propensity when compared with Respondent (I), and there is a mean difference of 0.26 when aviators are compared with Respondent (NI).

In addition to the t-Test and Chi-square analysis, ANOVA was also calculated for several questions.

The ANOVA was run for three groups = Male, Female, and Aviators.

The ANOVA tests to see if all sample means are equal or if at least one group's mean is significantly different at the .10 significance level.

When tests measuring differences in mean are repeated, there can be a tendency to find a significant difference, when, in fact, a significant difference does not exist. Therefore it is appropriate to utilize the **Scheffe post-hoc** procedure to insure the mean difference calculation holds true at the given significance level of 0.10 for this exploratory research.

The Scheffe post-hoc procedure was run for three questions:

1. *"Would you ride along with the Blue Angels?"*
2. *"Would you go on a guided hunt in Alaska?"*
3. *"Would you jump off of a 10-meter diving board?"*

Here are the results of the first question for which the Scheffe post-hoc procedure was run:

Blue Angels

Scheffe

Gender	N	Subset for alpha = 0.10	
		1	2
Female	23	3.52	
Male	21	4.00	
Aviator	10		5.00
Sig.		.532	1.000

There is a significant difference in this question between aviators and both male and female college student respondents; however, there is not a significant difference between male and female college student respondents.

Alaska

Scheffe

Gender	N	Subset for alpha = 0.10	
		1	2
Female	23	3.52	
Male	21	3.95	3.95
Aviator	10		4.90
Sig.		.644	.127

The Scheffe post-hoc test was conducted for the Alaska question. The results for this question are:

Aviators are found to have a significant mean difference when compared with female respondents.

Aviators are found not have a significant mean difference when compared with male respondents.

Male respondents do not have a significant mean difference when compared with female respondents.

The final question measured by the Scheffe Post-Hoc test is the question on jumping of the 10-meter diving board.

10 meter

Scheffe

Gender	N	Subset for alpha = 0.10	
		1	2
Female	23	2.52	
Male	21	3.24	
Aviator	10		4.80
Sig.		.332	1.000

For this question, aviators indicate a significant difference between male and female college student respondent means. Once again, there was not a significant difference between the male and female college student respondents.

Discussion

Study Limitations

There were several limitations to this research that were unanticipated. The first limitation was that the researcher for this thesis assumed that AOPA would be thrilled to assist with a survey about aviation; however, this assumption was proved wrong. It was also assumed that finding commercial promoting flight training would be relatively easy—this assumption was also highly erroneous.

A Delta representative indicated that they [Delta] had no such flight training commercials in their database. He recommended that the researcher contact one of their affiliate companies, such as ExpressJet, who deal with more young pilots who have less experience than Delta's pilots. ExpressJet was then contacted; however, they were of little help as well, and no flight training advertisement was to be found.

It was assumed at the beginning of this research that AOPA and Delta would be more than willing to help with this honors thesis, especially with the looming pilot crisis at their front-door, but they both were of little assistance. AOPA and Delta's lack of assistance came as a surprise to both this researcher and the advisor for this research—after all, given the timeliness of this research, it was assumed that both AOPA and Delta would be more than willing to assist with this research; however, this idea was proven false.

Another limitation to this research was the lack of both aviators and student respondents. It was assumed at the beginning of the thesis that obtaining sizeable survey

samples would be a non-issue; however, this proved not to be the case. AOPA was not willing to send out a survey, and also, the researcher had difficulty obtaining a sizeable sample of student respondents. Emails were sent to over 200 students by several instructors; however, only 44 responses were obtained.

Observations

Respondent (I) scored an increased mean risk propensity for all 10 risk propensity questions when compared to the Respondent (NI). The Respondent (I) indicated an overall mean level of 4.35 on the 1-5 risk propensity scale; whereas, Respondent (NI) indicated an overall mean-level of 3.41. This is an overall 0.94 difference in risk propensity between the interested and non-interested respondents for this risk propensity survey.

For six of the 10 risk propensity questions, the respondents indicated a mean difference of at least 1.0 between Respondent (I) and Respondent (NI). The two questions of those that posed the biggest mean difference between the Respondent (I) and Respondent (NI) was the 10-meter diving board, with a mean difference of 1.52, and skydiving, with a mean difference of 1.82.

There was found to be a significant difference between males and females on their desire to know more about aviation. Of the 21 male respondents, 9 of them (43%) indicated that they would want to know more about aviation (these 9 male respondents were added to the Respondent (I) sample). Conversely, out of the 23 female respondents, only 2 of them (9%) indicated that they would like to know more about aviation (these 2

female respondents were added to the Respondent (I) sample). According to the chi-square analysis, there is a significant difference between male and female respondents who are interested in aviation (an **alpha level of 0.009** was reported by the chi-square analysis).

One male respondent indicated pilot as their chosen career choice, and he did not want any additional information about aviation—one could assume from the fact that his chosen profession was aviation that he was indeed interested in aviation despite the fact that he answered "NO" on the question asking if he wanted additional information. This means that 5 male respondents[12], who were ever-so briefly made aware of a pilot shortage and the possibility of having a career as a pilot, became interested in learning more about the aviation industry and how to begin a career as a pilot simply because they received a trivial amount of information about the industry through the survey.

As stated earlier in the literature review, "if aviators showed markedly similar personality traits over 16 personality factors under Wakcher's research, they may be very likely to show similarities in risk propensity as well." The results from the aviator survey seem to indicate that aviators do indeed express similar levels of mean risk propensity. The only risk domain measured; however, was recreation, so it is uncertain as to whether aviators seem to express similar levels of risk propensity across different domains and not just recreation.

[1] Clarification: the other 5 male respondents of the Respondent (I) sample indicated at the beginning of the survey that they had already considered a career in aviation.
[2] Four of the 5 male respondents were part of the Respondent (I) sample; however, the fifth male respondent was not included in the Respondent (I) sample because he answered, "NO" to the question about learning more about aviation.

Earlier in the literature review, this researcher stated, "Perhaps individuals that show an increased desire to become aviators will show similar levels of risk propensity to the aviators that are surveyed." Because this is an exploratory research, none of the results of these surveys and equations are conclusive; however, the results do indicate that individuals interested in learning more about aviation [Respondent (I)] have similar levels of risk propensity to aviators when compared to the rest of the college respondents.

It was observed that sometimes the Aviator mean would be closer to Respondent (NI)'s mean than it would be to Respondent (I)'s mean. It is interesting to note; however, that the only questions where Respondent (NI)'s mean was closer to the Aviator mean than was Respondent (I)'s mean, was when there was not a significant difference in means between Respondent (I) and Respondent (NI). In every instance where Respondent (I) and Respondent (NI) had a significant difference in mean (determined by the t-Test), Respondent (I)'s mean would most closely match that of the Aviator's mean.

One of the goals of this research was to, "provide some indications as to whether or not an aviator and a potential aviator's (possible) similar level of risk propensity is playing a role in increasing the shortage." Due to the constraints on the research, a definitive answer cannot be given for this goal. It was also stated that, "It is theorized in this exploratory research that the role of risk propensity may be affecting the shortage through the need of marketing schemes tailored to attract an aviator's specific recreational risk attitude."

As stated previously in this research, the reason why recreational risk propensity was the domain chosen to be measured in lieu of the other 4 subgroups is because the researcher wanted to gain insight into the hobbies, activities, sports, and lifestyles in

which both Aviators and Respondent (I) participate. After more thorough research is conducted on the topic, information gleaned from the recreational risk propensity can be used by airlines, flight schools, and advertising agencies to determine the best way to advertise to potential aviators.

Among the students that had previously considered working as a pilot, there was, yet again, a significant difference between males and females. Of the 21 male students who participated in the survey, 8 of them (38%) indicated that they had previously considered working as a pilot. Of the 23 female students that participated in the survey, 3 of them (13%) indicated that they had previously considered working as a pilot.

The current pilot population is comprised of mostly males, but there are an ever-increasing number of females joining the aviator-populous. The women in this survey who show interest in the aviation industry represent a compelling market to attract for airlines as they strive to increase diversity amongst its workforce. As of December 31, 2010, according to an article by Women in Aviation, only 6.72% of all private pilots, and only 3.92% of airline transport pilots are women. The number of female airline transport pilots has increased dramatically—up from 2.62% in 1996. The amount of female private pilots has remained roughly the same—up from 5.85% in 1996. (Women in Aviation).

Conclusion

Both Weber and Rohrmann indicate that risk attitudes vary based upon the domain. In order to keep the survey short, the risk propensity test was contained only to recreational risk propensity. However, perhaps another possible cause of the shortage is

that aviators demonstrate a lower risk propensity for financial risk. Flight training is expensive; in fact, the average cost for an individual to obtain their Private Pilot's License is about $8,000. Private pilots cannot fly for hire, so if an individual is wishing to obtain a Commercial Pilot's License, which will allow them to be paid to fly, it will cost an average of about $22,000 beyond the cost of the Private pilot's license—a total of $30,000. (Pilot Outlook).

For future research, it would be worth examining an aviator's financial risk propensity to determine if aviators have similar risk propensity traits for finances, in addition to recreation. If both an aviator and a potential aviator's level of risk propensity for financial risk is significantly less than their recreational risk, then the cost of obtaining the pilot's license may be one of the driving factors of the shortage.

It was surprising to see such a large number of significant differences between Male, Female, Respondent (I), Respondent (NI), and Aviator means given the fact that this research was contained to only 10 respondents for the aviator survey, and a mere 44 respondents for the college student survey. This research question definitely needs to be studied by future researchers in order to gain an even better understanding of the aviator and potential aviator risk attitude. It also needs to be furthered in order to provide more reliable data that can then be used by airlines, flight schools, and advertising agencies to craft well-designed marketing strategies that will be appealing to those that possess the aviator risk attitude.

Assuming that knowledge of an activity leads to an increased desire to participate in said activity, even this newly-found, exploratory market data can be extremely useful to airlines and advertising agencies. The student respondents did not have much exposure

to the aviation industry in the survey—they merely had a few career choices and a few questions asking them about their level of interest in the aviation industry. Even that little tidbit of information, however, indicated to several respondents that that they were interested in the aviation industry. Therefore, the results from this exploratory research suggest that in order for airlines and marketing agencies to increase the number of interested potential pilots, they merely have to get the information out to the individual for them to assimilate.

The results of the survey suggest that students with higher levels of risk propensity are, on average, more likely to consider a career in aviation than students with a lower risk propensity level. Also, it seems likely that students with higher levels of risk propensity are more aware of events within the aviation industry. If the aviator shortage is to be mitigated by attracting new aviators, airlines, flight schools, and advertising agencies will have to raise awareness of the upcoming need for aviators, and the results of the surveys seem to suggest that an organization should advertise in locations that individuals with higher degrees of risk-propensity are likely to be found—dive shops, motorcycle shops, and drop zones, for example.

Since these potential aviators all seem to express higher interest in riskier activities compared to college students, it may conclude that flight schools should also partner with, advertise and inform of the upcoming pilot demand at other local businesses that cater to more inherently risky activities. Such businesses may include motorcycle shops, dive shops, sporting goods stores, ski resorts, and skydiving facilities.

As flight schools implement these tactics, the research suggests that they should see an increased number of inquisitive potential student pilots. Flight schools can then

begin replacing the aging pilot populous with new, well-trained pilots—thus accomplishing two amazing feats. The first feat is that the pilot shortage will be mitigated by the new, increased supply of pilots, and the American economy will suffer less from a strengthened airline industry. The second, more extraordinary feat, in this researcher's opinion, is that these flight schools will be enabling talented individuals with a superior level of risk-propensity to live out their lifelong dream of becoming an aviator.

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Appendix

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INSTITUTIONAL REVIEW BOARD
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NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
  Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **14040704**
PROJECT TITLE: **Honors Thesis**
PROJECT TYPE: **New Project**
RESEARCHER(S): **Timothy Seales**
COLLEGE/DIVISION: **College of Business**
DEPARTMENT: **Management and International Business**
FUNDING AGENCY/SPONSOR: **N/A**
IRB COMMITTEE ACTION: **Expedited Review Approval**
PERIOD OF APPROVAL: **04/17/2014 to 04/16/2015**

Lawrence A. Hosman, Ph.D.
Institutional Review Board