An Examination of Economic Metrics as Indicators of Air Force Retention

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Abstract

Fluctuations in the economy can cause military recruitment and retention plans to go awry. By focusing on various economic metrics, it is possible to anticipate changes in retention rates for specific Air Force Specialty Codes (AFSCs). To address the challenge of maintaining a robust and mission capable Air Force, a correlation analysis is employed to determine the relationship between certain economic indicators and AFSC retention rates. As one might suspect, retention rates follow the trend of decreasing when the economy is strong. Of interest, we found two AFSCs which go against this trend. Namely, the retention rates for officers in the Intelligence and Chaplain AFSCs are higher during a flourishing economy. Ultimately, the correlation tables revealed which economic metrics were important to specific AFSCs and the relationship between them.

This research is dedicated to my friends and family.

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AN EXAMINATION OF ECONOMIC METRICS AS INDICATORS OF AIR FORCE RETENTION

I. Introduction

1.1 Problem Background

The United States Air Force (USAF), a part of the Department of Defense (DoD), consists of a voluntary force of officers and enlisted personnel. Maintaining the correct size and rank composition of this force relies on the recruitment of new personnel and retention of its current members. While enlisted members sign on for a set period of time, commissioned officers have a period of active duty service commitment, at the end of which they have the option of continuing their service or leaving the Air Force. The rate at which officers continue is known as the retention rate [1]. The challenge is to predict fluctuations in retention rates in order to maintain a robust and mission capable Air Force.

The United States military is the foremost leader in defense technology and training of its troops. The USAF focuses on the air, space and cyberspace components of the military, and helps to maintain global dominance as a leading world power. To maintain the USAF's war-fighting capabilities, the USAF focuses on having the optimal number of personnel to accomplish the mission of the Air Force. The sustainment of personnel within the USAF is crucial to the upkeep of freedom in the midst of the changing global environment.

Every year Congress proposes a defense budget which impacts DoD's ability to balance the readiness, capacity and capability of its services [2]. Some years this

results in a need for additional personnel while in other years it results in a reduction via "force shaping," which cuts down the size of the military. This causes the loss of experienced workers and limits the total number of new recruits allowed into the military. These mandated size limitations make the retention of skilled individuals essential to maintaining a healthy Air Force. By being able to identify factors which could affect retention rates in the future, the Air Force would be able to respond proactively to any changes.

Within the Air Force, personnel are classified by different ranks and specialty codes called Air Force Specialty Codes (AFSCs). These AFSC's "establish personnel-classification boundaries according to the work performed and the required skills, education, and training"[3]. Each AFSC has a specific mission comprising of career specific jobs and duties which help the Air Force carry out its mission. Both officer and enlisted AFSCs as well as career development are managed by the Air Staff at Headquarters Air Force, which provides recommendations regarding force shaping.

Human resource planning which consists of putting the right number of people into the correct job is critical to achieving the goals of an organization. An important aspect of this is the turnover of personnel within an organization's structure. This turnover can occur when an employee retires, decides to leave the company, or gets promoted within the corporate hierarchy. While in general an organization is able to hire employees of any skill level to replace someone higher up, this is not the case with the military. The military structures its officers in a hierarchical fashion, ranked from O-1 to O-10, with O-7 to O-10 consisting of its General Officers. With the exception of specialty professions such as doctors, lawyers and chaplains, all newly recruited officers come into the Air Force as an O-1 and need to work their way up the ranks. When a high ranking officer position needs a replacement, the job can only be filled from within the military. This personnel method can cause deficits in higher level

positions within the Air Force because there might not be a suitable replacement available and trained at the appropriate level.

Currently, the Air Force uses sustainment lines to manage the size of its officer and enlisted personnel within their respective AFSCs. This graph illustrates the sustainment requirement of officers in the Air Force, and shows how the lines are grouped by commissioning year date.

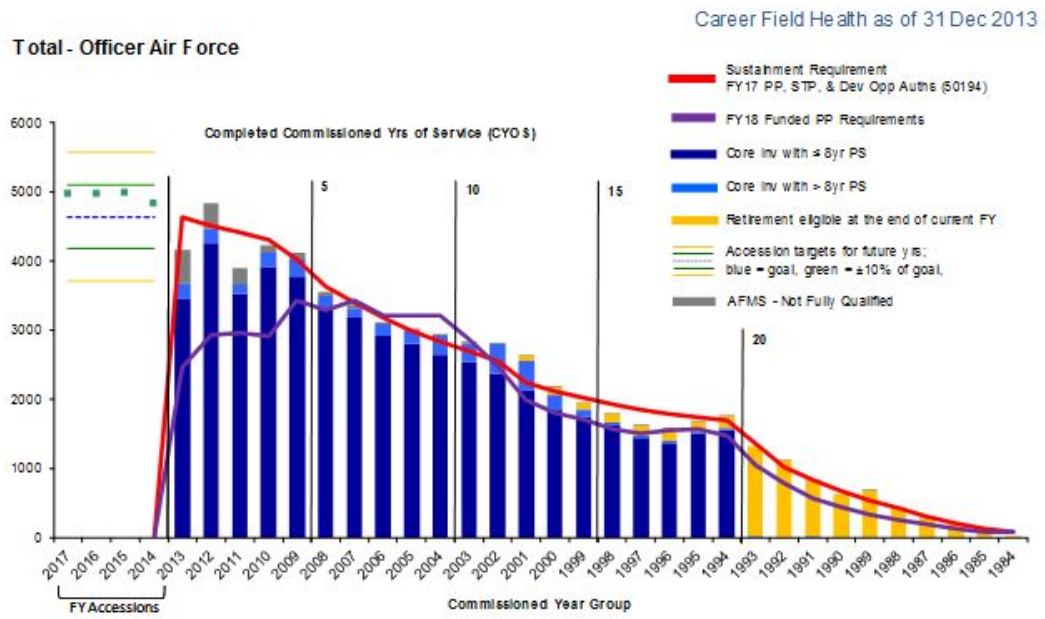

Figure 1. Example Sustainment Line (Schofield, 2015)

The sustainment line for each AFSC is based off comparing historical attrition rates to current manpower requirements, then aggregating it within year-groups. It is used to enable decision makers to determine the correct number of personnel needed to sustain the career field over a thirty-year period. Sustainment lines are important because they can affect many different decisions within the Air Force. They determine the number of officers commissioned into each career field. They also aid in locating career fields which might be over-manned or undermanned and thus guide personnel cuts and hirings.

Sustainment lines are based on realized attrition rates; it would be beneficial to

know the line before the attrition occurs. Such clairvoyant capability might come by finding the conditions, either inside or outside the military, that indicate (with some confidence) future retention trends.

Indicators are anything that can be used to predict future trends. The use of leading and lagging indicators could help create a model which would be able to predict when fluctuations might occur within Air Force retention. A leading indicator signals future events. They are seen as precursors of an event and could signify a trend. A lagging indicator follows in the wake of an event.

This research focuses on various economic metrics and examines whether these metrics have any predictive capability with respect to USAF retention rates. By being able to anticipate retention trends, the Air Force would be able to recruit for certain career fields before a shortage occurs within a specialty.

1.2 Thesis Outline

Chapter 2 reviews the literature surrounding retention within the military, factors that could have an impact on retention, leading and lagging indicators, and the different models used. Chapter 3 explains the data source used in this study and the preparation that went into cleaning the data before the analysis could begin. Chapter 4 describes the analysis of the correlation values and what it means to the retention rates of each AFSC. Chapter 5 concludes the study and gives recommendations for future research.

II. Literature Review

2.1 Introduction

Retention in the US military is a critical issue. Retaining military personnel is essential to preserving unit readiness and decreasing personnel costs related to recruiting and training replacements. The military makes large investments in personnel training, which is why measures of retention are closely scrutinized by policy-makers. Numerous studies over the years have examined retention. This chapter examines retention trends of the military, focusing primarily on the factors affecting retention and the retention models employed.

2.2 Factors

Factors used to model retention depend on the retention analysis focus. This research examines a broad overview of all Air Force personnel, to include all Air Force Specialty Codes (AFSCs), officers and enlisted. When looking at factors affecting pilots, it has been documented that there are both internal and external factors affecting pilot retention. Coughlin analyzed these internal and external factors and their impact on naval aviator retention rates [4]. He found that the un-weighted logit models yielded the best modeling results in predicting continuation rates for each specific cohort (commissioning year group) factor [4]. The insights gained from the study were that civilian unemployment rates, Voluntary Separation Incentive/ Selective Separation Bonus (VSI/SSB) program, Aviation Continuation Pay (ACP) program and airline hiring rates have significant effects on retention in the various aviation communities [4]. These factors surrounding the pilot career field could prove very influential on the retention of Air Force pilots, and might also provide an indicator of attrition rates.

Numerous methodologies pertaining to military retention investigate the effects of national economic indicators on the specific subgroup analyzed. Lommen focused on civilian unemployment rate and an index of 11 leading economic indicators [5]. He used linear regression to create a model to predict future enlisted retention rate changes. His research indicated "there is a strong relationship between the fluctuations of the economy and the fluctuation in the retention rate of these personnel" [5].

Basalla focused on economic indicators affecting officer retention such as airline hiring rates, consumer sentiment index, and other fiscal data [6]. Basalla's study used the Modified Miller's Method for variable selection, which uses the stepwise procedure of least-squares regression modeling. The model for pilots provided the best fit, explaining over 82 % of the total variation and proving that "there is a true statistical relationship between the retention rate and certain econometric predictor variables" [6]. Using this model, the results indicated that at least half of the reasoning behind an officer's decision to stay or leave is based on economics [6]. While enlisted personnel have different circumstances regarding retention than officers, the economic indicators analyzed by Lommen and Basalla could prove useful in officer retention modeling and warrant further consideration.

Beck examined job satisfaction factors such as the assignment system, pay, promotion system, availability of civilian jobs and leadership factors [7]. His work found that many of the problems leading to lower retention rates could fall into the category of quality of life issues which apply to the Air Force in general, not just on a single sub-group such as pilots [7].

Figure 2 [7] illustrates that the 10 year point was usually where the shift from leaning to leave the Air Force to making the Air Force a career happened. Beck found that for the junior officer category, deployments were the key source of dissatisfac-

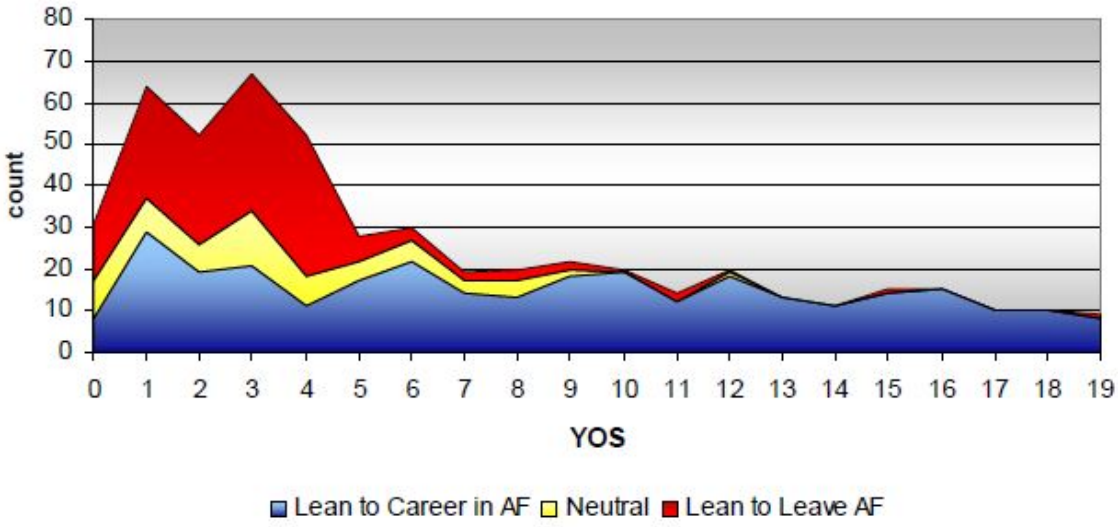

Figure 2. Career Intentions vs Years of Service (YOS) [7]

tion, followed closely by job satisfaction, leadership opportunities, and the Officer Performance Report (OPR) system. While Beck did not create a model of retention, the statistical analysis provides several suitable indicators of retention that could be relevant to this thesis.

Lakhani [8] discussed the effect of pay and retention bonuses on quit rates in the U.S. Army. Lakhani found that the quit rates were negatively related to pay level, and even more so, to the size of the bonus offered. He examined the civilian labor market to determine the marketability of Army soldiers having a job relating to combat and whether this marketability affected their reenlistment decision. Lakhani found that a greater percentage of combat soldiers continued to serve than non-combat personnel [8]. While the relationship between pay, bonuses and retention are useful in identifying potential indicators, the data used to create the model are not relevant to this thesis because the Air Force and the Army have different combat occupations.

Demirel [9] sought to examine whether an officer's commissioning source had any bearing on their retention rates by observing them at two different points in their careers: after the initial service commitment was fulfilled and at the ten-years of

service mark. Figure 3 (from [9]) shows that the probability P or the expected value of Y (the dependent variable) will equal one given the set of independent variables (X_{1i}, X_{2i}). In this study P is the probability of an officer staying in the service past the minimum service requirement and Y is the dependent variable used, such as gender, race, commissioning source and service branch to name a few [9].

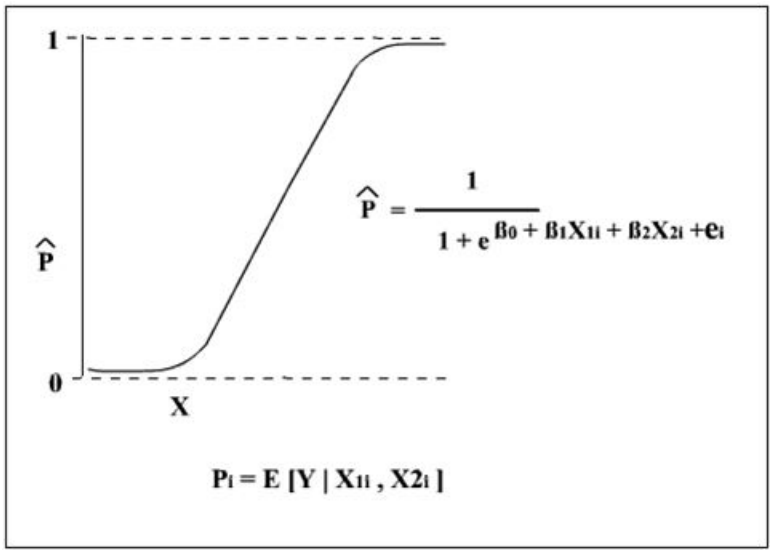

Figure 3. Logit Model displaying probability of an officer staying in the service

Demirel found that "the commissioning source affects the retention decisions of officers at the end of the initial commitment" [9]. The study Demirel conducted included data from all four services, individually and collectively, using logit regression modeling. His results indicated that retention behavior varied across commissioning programs for all military services, with the difference of the retention effect varying across services. Officers commissioning from Service Academies incur a five-year initial commitment, while Reserve Officer Training Corps (ROTC, a university based program) and Officer Training/Candidate School (OTS/OCS, a 12-week commissioning program) graduates incur a commitment of at least four years. Direct appointment officer commitments depend on branch and career field. The difference seen in the retention behavior between the officers coming from different commissioning

sources are shown to continue well into an officer's career, indicating that they are an important factor in retention rates.

Conzen [10] investigated whether military-sponsored graduate education impacted the retention of Naval officers. The study looked at two different types of degrees: graduate degrees obtained from the Naval Postgraduate School (fully funded) and partially funded degrees from civilian graduate schools. He used logit regression to determine if officers continued their service within the Navy after their educational service obligation ended. He found "that although funded graduate education may have an effect on promotion possibilities, its impact on retention past the ten-year point in an officer's career is not detectable" [10]. When this study was conducted, officers were highly encouraged to obtain a Master's degree as soon as possible in order to be seen as competitive for promotion. Within the Air Force, to promote to Major and above, it was considered a requirement to have a Master's degree. Since the Air Force sends officers to AFIT and to civilian graduate schools, this factor could prove to be an important indicator of retention rates.

Zinner [11] analyzed factors influencing the retention of "male, junior Marine Corps officers who were serving within their initial period of obligated service" [11]. He used a multivariate logistic regression model to determine the important organizational and individual behavioral factors explaining the retention behavior of these officers. Zinner's study is unique because he examined the relationship between a more complete set of explanatory variables and retention behavior instead of attempting to capture the effect of one particular factor. The resulting factors which influenced retention included commissioning source, occupational specialty, intrinsic job satisfaction and civilian employment concerns following a drawdown. While the Marine Corps has fundamentally different vocation specialties, career fields could prove to be a significant indicator for attrition.

Castro and Huffman [12] used a Chi Square Automatic Interaction Detection (CHAID) model to predict career intentions by using survey data obtained from 289 US Army soldiers stationed in Italy and Germany. Questions ranged from operations tempo, work climate, and leadership to family issues and career intentions, while also tracking each service member's years of service, rank, gender, ethnicity and age. While the demographic data only needed years in service in the model, the results showed that behavioral factors were needed in the retention models [12]. The data received from the surveys should be seen as subjective data since the survey respondents may not have taken the survey as seriously as they should have. The demographic data used by Castro and Huffman could prove useful to this thesis in terms of retention prediction.

Perry [13] analyzed the effect of an officer's primary military occupational specialty (PMOS) on retention and promotion patterns to Major (O-4) and Lieutenant Colonel (O-5) of mid-grade officers in the U.S. Marine Corps. She used logistic regression and Cox Proportional Hazard models to estimate the effects career fields have on promotions and retention. The results of the study indicated that "retention and promotion rates of Marine Corps officers differ significantly among individual PMOSs and also among occupational fields" [13]. Her results indicate that PMOSs have a statistically significant effect on whether an officer reaches the 10 year mark [13]. While the Marine Corps officer career options are different than the Air Force's, career fields could prove to be an important indicator of retention.

A study conducted by Ceralde and Czepiel [14] looked at particular designator categories and how they pertain to Navy female officer retention. Using a multivariate logistical regression model and a survey, the results indicate that the probability of female officers retaining increases with the proportion of women in certain career fields. Their study's findings "confirm that for some occupations, the perception

of women with regards to factors such as career plateau and turnover intention are affected by the proportion of women within their occupational groupings" [14]. While the Navy's designator categories are quite different than those of the Air Force, career fields could prove to be a significant factor in retention and warrant consideration in this thesis.

Pierce [15] investigated those factors contributing the most to women's decision to leave or remain in military service. Stratifying a sampling of 638 women based on component of the Air Force (active duty, reserve, guard), deployment (in theater, elsewhere), and parental status (nonparents, parents) resulted in around 525 candidates. They were then located and provided information regarding their decision to either remain or leave the service [15]. The collected data was then analyzed and the findings showed that "the greatest attrition occurred among women who gave birth to a child between the beginning of the war and time of the survey, those reporting greater financial strain, and those holding a more negative view of military service as a result of their Gulf War experience" [15]. The findings also suggest that issues of family support and work environment are more important to retention than deployment. These factors could be significant to attrition rates and warrant further consideration.

Zangaro [16] explored factors influencing the decisions of Army, Navy and Air Force nurses between the ranks of O-1 to O-6 to remain on active duty. Based on survey data from 2,574 participants (Army = 996; Navy = 590; Air Force = 988), a statistical analysis was completed using descriptives and structural equation modeling. He found that "the most significant predictor of job satisfaction and intent to stay on active duty across all 3 services was promotional opportunity" [16]. The relocation of families, while not as significant as job satisfaction, played a role across all 3 services. Similar to Pierce's study [15], Zangaro found that most service members

were happy to deploy and saw this as part of their mission and patriotic duty [16]. Zangaro found that deployments were not an important factor when determining intent to retain. This could prove useful to this thesis in regards to what factors of retention to examine.

2.3 Leading Indicators

Most commonly seen in economics, a leading indicator is something that predicts future events and tend to change ahead of that event. It can sometimes be used as a predictor, which would be useful to the U.S. Air Force in terms of predicting the retention rates. A US Army War College (USAWC) Strategy Research Project by Dewey analyzed lagging, coincident, and leading indicators to determine their validity for measuring readiness [17]. Dewey [17] found that the DoD uses "recruiting and retention forecasts along with survey results and labor market effects such as unemployment rate and relative military compensation" as leading indicators for meeting personnel strength goals. He found that "identifying the relationship between cause and effect using lagging, leading and coincident indicators increases the chances of getting a clearer picture of readiness" [17].

Broach and Dollar [18] worked with the FAA (Federal Aviation Administration) to see if intent to leave, as reported by survey responses, might help with predicting the loss of employees allowing management to make plans to offset the losses. Using historical loss rate as a lagging indicator, they posited that employee intent to leave could be used as a leading indicator. They defined intent to leave as a person's "stated intention to leave the organization within some specific time period" [18]. The analysis concluded that while intent to leave may not be an accurate predictor of actual turnover, it might still be an indicator of employee disengagement, thus allowing management to focus on issues to improve organizational performance [18].

The use of lagging indicators to identify leading indicators could prove useful to this thesis.

2.4 Retention Models

Retention rate is defined as the ratio of personnel who remain in service, divided by the total number in that specific group for a particular amount of time. There are various methods for modeling retention rates, depending on if the model is meant to predict future retention rates, or to analyze existing rates. A commonly used method to modeling the stay/leave decision of an individual focuses on the impacts economic and personnel policies have on the individual. Another approach is to group the military personnel into specific categories and then analyze the impact of these same factors on the comprehensive group retention rate. An example of this would be if a unit started out with a 1000 enlisted, and 850 reach the end of a four year period of service, the retention rate would be $850/1000 = 0.85$.

Regression analysis is a commonly used statistical tool to model relationships among variables to make predictions and forecasts. Most retention models using regression analysis use a multiple regression since multiple independent variables help predict retention. Using n factors in m dimensions, the model estimates a linear relationship between factors and responses, finding a "best fit" equation to minimize the estimation error. By calculating the prediction error of the model and the proportion of variability explained by the model, the accuracy of the regression equation is determined.

Logistic regression analysis, or logit, is a regression model where the response outcome is dichotomous instead of discrete or continuous. For the binary result, 1 usually indicates that the outcome of interest is present while 0 indicates that the outcome of interest is absent. For example, the binary response could be success/fail-

ure or yes/no in accordance to the data being studied. In the relevant military studies on retention, the binary response is stayed in/got out. The logit model provides a probability for being in either state.

Schofield used logistic regression to determine which factors were significant to predicting non-rated Air Force line officer retention [19]. The binary response variables were combined to create a cohort based on year groups. Within these cohorts, each officer was represented by one line of data containing all the variables examined. The logistic regression indicated that yeargroup, gender, commissioning source, prior years of service, career field grouping and whether an officer was a distinguished graduate (DG) from their commissioning source as significant factors in explaining retention [19]. The results of the sustainment model created from logistic regression show it to be about as effective as the current model used by HAF/A1PF, and could be useful to this thesis.

Survival analysis is generally defined as a set of methods for analyzing data where the outcome variable is the time until the occurrence of an event of interest. It differs from the other stochastic techniques because events are typically positive numbers. Moreover, survival analysis handles the censoring of observations. Censoring can be described as deriving a fraction of information from each observation, and is an important issue in survival analysis, representing a certain type of missing data [20]. Despa [20] illustrates censorship by using a medical trail as an example: "A patient who does not experience the event of interest for the duration of the study is said to be right censored. The survival time for this person is considered to be at least as long as the duration of the study." Another description is that "a subject is observed, in an origin state, for a duration or episode until that subject leaves the origin state through an event, or is censored and cannot be further observed" [21]. Censored data are those that remain in beyond the time interval under consideration. In a military

sense, studies could be performed considering the number of years of commissioned service as "survival time" and apply survival analysis for those that retain beyond the period of time considered.

A forecast model's primary function is to predict the future. Retention forecasting uses quantitative models based on past numerical data while assuming that some of the patterns seen in the data will continue in the future. Oliver studied the Air Force's current forecasting model FAMMAS (Funding/Availability Multi-Method Allocator for Spares), which predicts overall mission capable rates for each type of aircraft it has in its inventory. "While the FAMMAS model does an excellent job of predicting mission capable rates based on funding data and other associated planning factors, it does not explain the key drivers that influence mission capable rates, which limits its effectiveness as a management and decision-making tool" [22]. To develop an explanatory and predictive model, Oliver [22] first used a correlation analysis to examine the strength of the relationship between each independent variable and the dependent variable to determine which variables needed to be included in the explanatory and forecasting regression models. To create the models, he used multiple linear regression analysis, specifically backwards stepwise regression analysis. His first version of the forecasting model focused on minimizing point estimate error whereas the second version of the forecasting model focused on minimizing the prediction error. This methodology could be useful for predicting Air Force retention.

Simpson [23] developed a model that more accurately forecasted the voluntary retention rates in the short term for Air Force pilots using predictors in the form of leading indicators. The strength of the economy, the growth of the airline industry, and indicators of the relative wage difference between the military and the civilian labor force were some of the main indicators Simpson collected to run a regression analysis [23]. This analysis was then used to predict the pilot retention rates using

the leading indicators previously gathered. The model found that "unemployment rate and the pay compensation measure were significant leading indicators of pilot retention rates" [23], and could prove useful in this thesis.

Hall [21] applied parametric modeling (specifically survival analysis) to develop a more efficient forecasting tool to predict the transition rates among personnel entering and exiting the enlisted and officer ranks of the Marine Corps. The forecasting model currently used by the Marine Corps forecasts enlisted attrition annually, and the model created by Hall forecasts enlisted attrition monthly within occupational field. He found that "the use of survival analysis could be beneficial to not only forecast attrition, but also provide a descriptive assessment of attrition rates amongst occupation fields without loss of information due to averaging or weighting probabilities" [21]. The model constructed by Hall could prove useful in this thesis.

Gjurich [24] investigated a way to predict Surface Warfare Officer retention levels through the validation of a conceptual model using logistic regression and Classification and Regression Tree analysis. Currently, the Navy forecasts officer retention and attrition by extrapolating historical trends. Gjurich recommends to replace this with either a logistic regression or classification trees. He found that "manpower analysts can use this model to predict whether certain groups of officers, with a given set of characteristics, are more likely to remain in military service" [24]. Identified by both the logistic regression and classification tree models, officers who either had no dependents or only a spouse were more likely to leave the Navy, suggesting that family care could have a significant impact on whether the officer decides to stay or leave [24].

2.5 Summary

This literature review found that the main factors authors chose to focus on when considering retention were economic indicators, career fields, civilian job market, job satisfaction, bonuses, commissioning source and graduate education. For the authors who focused on a specific career field such as pilots, airline hiring data was a prominent factor with respect to their retention. Regression was the most frequently used technique to look at retention, particularly logit regression. Different approaches to analyzing and predicting retention rates were introduced and the significant factors found were highlighted for each author.

III. Data Source and Prep

3.1 Introduction

Understanding the data; where it comes from, what it includes, and its idiosyncrasies is a critical component in the analytical process. This chapter provides a full explanation of the data used in this research. Data was provided by Headquarters Air Force/ A1PF and collected from online economic sites such as the Bureau of Economic Analysis and Quandl Financial and Economic Data.

3.2 HAF/A1PF

The Force Management and Enterprise Readiness Analysis Division of A1PF provided the data sets on Air Force personnel used in this research. The data provided by A1PF are extracted from a database called the Military Personnel Data System (MilPDS). This database is where all Air Force personnel data are stored, with each individual airman allotted over 300 data record fields which can be filled out throughout their career. These fields span a broad range of data points: full name, identification number, DoB (date of birth), AFSC (to include all earned), gender, duty status, flying hours, dates of service, military awards, etc. These values are not inputted by the individual, but rather by trained personnelists, or they are automatically updated within the system (e.g., "age" will automatically increment when the DoB passes). Documentation is required by an individual when changing any information located within MilPDS.

A database spanning hundreds of thousands of personnel is constantly changing, with hundreds of inputs coming in 24 hours a day from locations all over the world. This means that the data as a whole is never as up-to-date as it could be. Some problems that occasionally arise with the data include incomplete or incorrect records.

This is mostly attributed to human error since much of the data is manually inputted into the database by Air Force personnelists. These mistakes can appear in various forms, most likely occurring during the creation of a new record, the updating of an existing record, or the failure to notify personnel of a change to a record. Eventually most mistakes are caught and corrected, resulting in an ever-changing Air Force database.

HAF/A1PF provided data extracted from MilPDS, data which are consistently extracted at the end of each month. This means that any data pulled before an error is corrected within MilPDS will include the errant data. HAF/A1PF has developed programs to automatically search their extracted data for erroneous or missing data entries and to fix them. An example of this would be if an individual's marital status was missing, the program would automatically look back at previous extracts for the missing value in case it was deleted by accident. These extracts are called "snapshots" since the database is ever-changing, and are saved in Statistical Analysis System (SAS) format. SAS is the most commonly used statistical program by personnel analysts.

For this research, HAF/A1PF provided a data sheet containing the retention rate of officers, summarized by AFSC. The data ranges from 2010 to 2014, covering over 100 different officer AFSCs. Each AFSC is broken up into years of service (YOS), showing the retention rate from 0 years in service up to a high of 29 years in service. The continuation rate (CR), also known as retention rate, shows the percent of personnel who stayed in for that specific YOS. It is calculated by taking the number of personnel lost divided by the total number of personnel, subtracted from 1. Some AFSCs only appear in later years, while others only have one entry. AFSCs containing minimal data points were discarded, while smoothing occurred on AFSCs that did not contain a complete compilation of years of service.

3.3 BEA

The Bureau of Economic Analysis (BEA) is an agency of the Department of Commerce, and is a part of the Department's Economics and Statistics Administration. The BEA produces economic statistics by collecting source data and conducting research and analysis. It works with national, regional, industry, international and supplemental data accounts. Within these accounts, the BEA examines a variety of areas such as the Gross Domestic Product (GDP) and Consumer Spending, with many of these estimates being released monthly, quarterly and annually.

For this research, the data pulled from this site were available in two excel files, containing the annual and quarterly percent change of the GDP and the annual and quarterly current-dollar and "real" GDP, ranging from 1929 to 2014.

3.4 Quandl

The Quandl Financial and Economic Data site is a data platform where data from hundreds of publishers are hosted. The financial and economic data are provided in a variety of different formats such as API, Python, R, Excel and Ruby. Within the Quandl Economics tab, their data are separated out into dropdowns: Growth, Employment, Inflation, Capital Markets, Government Finances, Industry and Business, Productive Sectors, International Trade, Balance of Payments and Tax Structure. These dropdowns include related economic data sets for 20 countries, such as GDP, Real GDP Growth, GDP per Capita, etc. Much of the data is sourced from www.opendataforafrica.org/legal/termsofuse, where it's offered under an open data license. They also receive economic data from the National Statistical Office Latest actual data, International Monetary Fund (IMF) Cross Country Macroeconomic Statistics and the World Bank Cross Country Data. The data are expressed in annual terms for some data sets and monthly for others. Only data relating to the United

States was extracted.

3.5 Data Prep

Before any analysis on the data, the HAF/A1PF data needed to be thoroughly examined and prepped. The important information from this data set is the continuation rate (CR) based on AFSC and years in service (YOS). This research focuses on YOS ranges 5-7, 10-12, and 17-19, since these years are often when the decision to stay in the service or to leave are made. The first grouping of years 5-7 are often when regular line officers' initial service commitments are up, giving them the option to leave or stay on active duty. The second grouping of 10-12 years is often when rated officers, such as pilots, have fulfilled their commitment and have the option to leave. The third and last grouping of years 17-19 is frequently when officers start to think of retirement, so there is often a change in retention for these years. Before the change in retention was calculated, each AFSC was examined to determine if all three groupings were present for the years 2010, 2011, 2012 and 2013. If an AFSC was missing any YOS, then that AFSC was discarded. Upon completion, a total of 70 AFSCs were discarded from the potential data set, leaving 45 AFSCs. These remaining AFSCs were then separated into their broader ASFC designators. For example, instead of separating 44E, 44F, and 44K, they now all fall under the variable AFSC 44.

The change in retention rate was calculated for the remaining AFSCs. This was done by finding each YOS grouping for the years 2010, 2011, 2012 and 2013. The median for each YOS grouping was identified first (YOS 6, 11, 18), and if that was not found, then the search was expanded to the rest of the YOSs within each grouping. Once a YOS was found for each year, the change in retention was calculated by subtracting the CR for 2011 by 2010, 2012 by 2011 and 2013 by 2012. This resulted

in three numbers per YOS grouping, for a total of nine data points for each individual AFSC.

The economic indicator variables were also examined and prepped for compatibility with the AFSC data. To consider lagged indicators, each of the economic indicators was broken out into year, year −1 and year −2.

	Employment (in Millions of people)		
Y	x1: year	x2: year-1	x3: year-2
Y6(10-11)	139.077	139.894	145.373
Y6(11-12)	139.882	139.077	139.894
Y6(12-13)	142.467	139.882	139.077
Y11(10-11)	139.077	139.894	145.373
Y11(11-12)	139.882	139.077	139.894
Y11(12-13)	142.467	139.882	139.077
Y18(10-11)	139.077	139.894	145.373
Y18(11-12)	139.882	139.077	139.894
Y18(12-13)	142.467	139.882	139.077

Figure 4. Example of Economic Indicator Format

Figure 4 shows how each X variable is developed. Under the Y column, Y6 stands for YOS grouping 5-7, Y11 for YOS grouping 10-12 and Y18 for YOS grouping 17-19. The (10-11) stands for the change between year 2010 and 2011, (11-12) stands for the change between year 2011 and 2012, and (12-13) stands for the change between year 2012 and 2013. The "year" stands for whatever year is at the beginning of the change in years. So for Y6(10-11), x1: year is the number of people employed in 2010, while x2: year −1 is the number of people employed in 2009, and x3: year −2 is the number of people employed in 2008.

Once the examination and preparation of the data sets was completed, each broad

AFSC was placed into a JMP file along with the economic indicators. JMP is a statistical software focusing on exploratory analysitcs. Subsequent analysis is presented in the next chapter.

IV. Analysis

4.1 Multivariate

The first step in the analysis process was to use the multivariate platform within JMP to explore how the change in retention rates relate to the lagged economic indicators. The multivariate report summarizes the strength of the linear relationships among specified variables using the correlations table. It also identifies dependencies, outliers and clusters using the scatterplot matrix, but for this analysis these plots were disregarded in favor of the correlation table. A correlation table for each AFSC variable was calculated and compiled. Reference Appendix A to view all the AFSC correlations. Located in the front of the Appendix is a key defining each AFSC and economic indicator.

Correlation.

Correlation values range between negative 1 and positive 1. A negative number indicates a negative linear relationship between the two variables, in this case, between a specific lagged economic indicator and a specific AFSC retention rate. A positive number indicates a positive linear relationship between the lagged economic indicator and the AFSC retention rate. The closer the number is to 1 or -1, the stronger the linear relationship. A "1" specifies a perfect relationship, while a 0 indicates that there is no linear relationship. For this analysis, the highest numbers on each AFSC correlation table are circled and possible explanations are given for why a certain AFSC had high or low correlations to certain indicators or in general.

4.2 Findings

Each AFSC correlation table was examined and 12 had correlations below 0.5, meaning that they had weak linear relationships with the economic indicators.

Correlations

	Change in CR (AFSC=11)
Change in CR (AFSC=11)	1.0000
x1: year	-0.3100
x2: year-1	-0.4127
x3: year-2	0.0188

Figure 5. Example Correlation Table

Figure 5 shows the correlations between the economic indicator Employment (x1 through x3) and AFSC 11, which includes bomber, fighter, mobility and reconnaissance pilots. For this analysis, we ignore the correlation of 1 at the top of the column since its comparing the retention rate to itself. Out of the three different correlation values for Employment, the largest magnitude correlation is -0.4127, which is employment lagged one year. This indicates a moderate negative linear relationship, which means that when employment goes down, retention rates for pilots go up. An in-depth exploration of each AFSC correlation table was summarily conducted.

Many of the significant economic indicators are the same from AFSC to AFSC. One possible reason that the correlations are not stronger for certain AFSCs is that personnel could get out of the Air Force and then be rehired to the same position as a contractor to the United States Government. The issue with this is that there is no data available to examine this conjecture. This means that the economic indicators have little to no bearing on the retention rates of these AFSCs, so additional data sources would be needed to draw inferences.

AFSC11 - Pilot.

The correlation table for this AFSC did not have any numbers above ±0.46, so significant indicators were classified as ±0.4 or higher. Only seven indicators were above the ±0.4 cutoff, with five negative correlations and two positive correlations. The important negative economic indicators were employment lagged one year, GDP current price lagged two years, general government total expenditure lagged one year, household final consumption expenditure lagged two years, and real GDP growth lagged two years. The significant positive economic indicators were unemployment rate lagged one year and youth unemployment lagged one year. The lower correlations within the table could be explained by pilots having different motivations for leaving the Air Force besides just the economy. Outside information that should be to take into consideration is airline hiring. Many pilots go into the commercial sector after getting out of the Air Force, so possible incentives by airlines could impact the retention rates of Air Force pilots.

AFSC12 - Combat Systems Officer (CSO).

This AFSC had one of the lowest correlation tables of all the AFSCs examined. The highest any correlation got was ±0.16, so significant indicators were categorized as greater than ±0.15. This resulted in only six significant indicators. The important negative indicators were GDP current price lagged two years, general government total expenditure lagged one year, household final consumption expenditure lagged two years, and real GDP growth lagged two years. The important positive indicators were unemployment rate lagged one year and youth unemployment lagged one year. These results show that the economy has a very low impact on the retention rates of combat systems officers. There is probably data that aligns with AFSC 12 retention but it has not been collected and this is not included in this analysis. It can also

indicate that they have different motivations for staying besides the state of the economy. Some possible reasons for such a low correlations table might be due to the lack of CSO equivalent in the civilian market, or that they transition to co-pilots or pilots for commercial airlines.

AFSC13 - Space and Missile, Air Battle Manager.

The correlations table for this AFSC involves correlations greater than ±0.4, with the highest number being ±0.50. This limit implies 10 significant economic indicators. The important negative indicators were employment, GDP current price lagged two years, general government total expenditure lagged one year, gross national savings, household final consumption expenditure lagged two years, and real GDP growth lagged two years. The important positive indicators were industry lagged two years, unemployment rate lagged one year and youth unemployment lagged one year. While Missile jobs are most likely non-transferable to the commercial sector, employees working within the Space field could find employment with large companies connected to satellite and space operations. It could also be possible that they could leave the Air Force but be rehired to the same job as a civilian contractor.

AFSC14 - Intelligence.

The correlation table for the Intelligence AFSC involved correlations greater than ±0.5. The highest number within the table was ±0.78, with 36 significant indicators falling above the ±0.5 threshold. Since many of the significant indicators include the year, the lagged one year, and the lagged two year, only the year with the highest correlation was listed as a significant economic indicator. A more thorough coverage of the notable indicators is available in Appendix A, AFSC 14. The important negative indicators were employment lagged two years, general government revenue lagged

two years, gross national savings lagged two years, industrial production lagged two years, industry lagged one year, real interest rate, and services. The important positive indicators were GDP current price lagged one year, general government total expenditure lagged two years, household final consumption expenditure, population lagged two years, real GDP constant price lagged one year, real GDP Growth lagged one year, unemployment rate lagged two years and youth unemployment lagged two years. The intelligence career field usually transitions to DoD intelligence establishments such as the DIA, CIA, NSA, ect. In addition to the civilian intelligence institutions, companies like to hire former military who have their Top Secret (TS) clearance or higher. Having a TS clearance is a marketable item for officers who leave the Air Force.

AFSC15 - Weather.

The weather officers correlation table involved correlations greater than ± 0.5, with the highest number being ± 0.86. Similar to the AFSC 14 table, this meant 36 significant indicators. Using the same logic applied above, only the year with the highest correlation was listed as a significant economic indicator. The important negative indicators were GDP current price lagged one year, general government total expenditure lagged two years, household final consumption expenditure, population lagged two years, real GDP constant price lagged one year, real GDP growth lagged one year, services lagged two years, unemployment rate lagged two years, and youth unemployment lagged two years. The important positive indicators were employment lagged two years, general government revenue lagged two years, gross national savings lagged two years, industrial production lagged two years, industry lagged one year, and real interest rate. The correlations table indicates that these economic indicators are important to the retention rates of weather officers within the Air Force.

AFSC17 - Cyberspace Operations.

The correlation table for cyberspace operations involved correlations greater than ±0.5, with the highest correlation number being ±0.77. This table contained 34 significant indicators, with at least one or more or the correlation values coming from the same economic indicator group. Only the year with the highest correlation was listed as a significant economic indicator. The important negative indicators were GDP Current Price lagged one year, general government revenue, general government total expenditure, gross national savings lagged one year, household final consumption expenditure, industrial production lagged one year, industry, population lagged two years, real GDP constant price lagged one year, real GDP growth lagged one year, and unemployment rate lagged two years. The important positive indicators were employment lagged two years, real interest rate lagged two years, services lagged one year, and youth unemployment. The correlations table indicates that these economic indicators are important to the retention rates of cyberspace operations officers within the Air Force. Cyber is also in high demand within the civilian sector, so officers from this career field are most likely picked up soon after they leave the Air Force. Company hirings of this position can depend on the economy, so that might be why there are so many significant economic indicators.

AFSC21 - Aircraft/Munitions and Missile Maintenance, Logistics Readiness.

This correlation table had only 6 indicators which were greater than ±0.4, the highest number being ±0.42. The important negative indicators were GDP current price lagged two years, general government total expenditure lagged one year, household final consumption expenditure lagged two years, and real GDP growth lagged two years. The important positive indicators were unemployment rate lagged one

year, and youth unemployment lagged one year. Airlines or airports might be interested in obtaining aircraft maintenance personnel, so some data collection from them might be helpful in obtaining a better idea of outside influences to the retention of aircraft maintenance officers. Munitions and missile maintenance do not have a counterpart within the civilian sector, but they usually have a TS clearance which is marketable to certain corporations. Logistics readiness officers are usually sought after by larger companies with complex supply chains, such as Amazon, Target and UPS. Additional data which could be used to gain a deeper understanding of this AFSC's retention rates could come from growth and employment numbers of some of these larger companies, the logistics segment of the economy, and the airline industry.

AFSC31 - Security Forces.

The security forces correlation table contained 13 important economic indicators above ± 0.5, the highest of which was ± 0.8. The real GDP growth economic indicator had two significant correlation values, so only the highest value was listed under important indicators. The important negative indicators were employment lagged one year, GDP current price lagged two years, general government revenue lagged two years, general government total expenditure lagged one year, gross national savings lagged two years, household final consumption expenditure lagged two years, industrial production lagged two years, real interest rate, real GDP constant price lagged two years, and real GDP growth. The important positive indicators were unemployment rate lagged one year and youth unemployment lagged one year. Some possible places to obtain additional data to help determine security forces retention are private security firm employment and growth numbers, or law enforcement data. The correlations table indicates that these economic indicators are important to the retention rates of security forces officers within the Air Force. Data related to police

and security firm hiring practices might be useful in future examinations.

AFSC32 - Civil Engineer.

This correlation table had 8 significant indicators which were greater than ±0.5, the highest number being ±0.59. The important negative indicators were employment lagged one year, general government revenue lagged two years, general government total expenditure lagged one year, gross national savings lagged two years, industrial production lagged two years, real interest rate, real GDP constant price lagged two years and real GDP growth. There were no important positive indicators on this correlation table. Civil engineers do a lot of work for the government in terms of road and bridge construction, or for construction companies. Some additional data sources to use to help predict civil engineer retention rates would be state budgets for construction, housing market trends, or even the growth or hiring associated with construction companies.

AFSC35 - Public Affairs.

The public affairs officer correlation table contained 17 important economic indicators above ±0.5, the highest of which was ±0.75. Both the real GDP growth and services economic indicators had more than one high correlation value, so only the highest value listed under important indicators. The important negative indicators were employment lagged one year, GDP current price lagged two years, general government revenue lagged two years, general government total expenditure lagged one year, gross national savings lagged two years, household final consumption expenditure lagged two years, industrial production lagged two years, industry lagged one year, real interest rate, real GDP constant price lagged two years, and real GDP growth. The important positive indicators were services lagged two years, unemploy-

ment rate lagged one year and youth unemployment lagged one year. This career field is general and since most major companies have public affairs professionals on their PR staff, additional data sets could focus on major corporation hiring, particularly the Fortune 500 companies.

AFSC38 - Force Support Officer.

The correlation table for force support officers involved correlations greater than ± 0.5, with the highest correlation value being ± 0.65. This table contained 29 significant indicators, with at least one or more values originating from the same economic indicator group. Only the year with the highest correlation was listed as a significant economic indicator. The important negative indicators were employment, GDP current price lagged two years, general government revenue lagged one year, general government total expenditure, gross national savings, household final consumption expenditure lagged two years, industrial production, population, real GDP constant price and real GDP growth lagged two years. The important positive indicators were industry lagged two years, real interest rate lagged one year, services lagged one year, unemployment rate lagged one year and youth unemployment lagged one year. The correlations table indicates that these economic indicators are important to the retention rates of force support officers within the Air Force.

AFSC41 - Health Services Administrator.

This AFSC also had one of the lowest correlation values out of all the AFSCs examined. The health services administrator's correlation table contained 25 important economic indicators above ± 0.2, the highest of which was ± 0.2. Similar to previous correlation tables, only the year with the highest correlation was listed as a significant economic indicator. The important negative indicators were employment

lagged two years, industry lagged one year, real interest rate lagged two years, and services. The important positive indicators were GDP current price lagged one year, general government revenue, general government total expenditure lagged two years, gross national savings lagged one year, household final consumption expenditure, industrial production lagged one year, population lagged two years, real GDP constant price lagged one year, real GDP growth lagged one year, unemployment rate lagged two years, and youth unemployment lagged two years. Since the correlation values are so low, it indicates that this AFSC's retention rates are not greatly impacted by the economy. An interesting thing to look at to better understand health services administrator would be to equate military health services to civilian employment. Oftentimes, there are benefits for officers in this profession which helps to retain them for the Air Force.

AFSC42 - Clinical Social Worker.

The correlations table for this AFSC involved correlations greater than ±0.4, with the highest value being ±0.48. This resulted in 11 important economic indicators. The real GDP growth economic indicator had two high correlation values, so only the highest value was listed under important indicators. The important negative indicators were unemployment rate lagged one year and youth unemployment lagged one year. The important positive indicators were employment lagged one year, GDP current price lagged two years, general government revenue lagged two years, general government total expenditure lagged one year, gross national savings lagged two years, household final consumption expenditure lagged two years, real GDP constant price lagged two years and real GDP growth lagged two years. A possible reason for a clinical social worker's retention rate not being too dependent on the economy would be the pay difference between the Air Force and the civilian sector. On average, a

civilian clinical social worker makes around $50,000, while a Captain with over 4 years makes at least $10,000 more, not including benefits and bonuses. To get additional data comparing the military clinical social workers to civilian social workers would help to bring a better understanding to these retention rates.

AFSC43 - Bioenvironmental Engineer, Pharmacist.

The bioenvironmental engineer and pharmacist AFSC was also among the lowest correlation values out of all the AFSCs examined. The correlation table contained only 9 important economic indicators above ± 0.14, the highest of which was ± 0.14. The industry economic indicator had two significant correlation values, so only the highest value was listed under important indicators. The important negative indicators were industry lagged two years, real interest rate lagged one year, services lagged one year and unemployment rate. The important positive indicators were employment, gross national savings, household final consumption expenditure lagged one year and real GDP constant price. These results show that the economy has a very low impact on the retention rates of bioenvironmental engineers and pharmacists, meaning that there is probably data that aligns with this area but has not been collected and included in this analysis. It can also indicate that they have different motivations for staying besides the state of the economy. Some possible areas to look for additional data would be hospitals, retail and long-term-care facilities hiring rates and economical success.

AFSC44 - Emergency Services/Family Physician, Pediatrician, Radiologist.

The correlation table for emergency services physicians, family physicians, pediatricians and radiologist officers looked at numbers greater than ± 0.25, with the highest

correlation number being ±0.26. This table contained 24 important indicators, with at least one or more value coming from the same economic indicator group. Only the year with the highest correlation was listed as a significant economic indicator. The important negative indicators were employment, GDP current price lagged one year, general government revenue lagged one year, general government total expenditure, gross national savings lagged one year, household final consumption expenditure lagged one year, industrial production, industry, population and real GDP constant price. The important positive indicators were real interest rate lagged two years, services lagged one year, unemployment rate and youth unemployment. These results show that the economy has a very low impact on the retention rates of emergency services physicians, family physicians, pediatricians and radiologist officers, meaning that there is probably data that aligns with this area but has not been collected and included in this analysis. That data could be gathered by looking at the differences between these and the civilian equivalent, and at hospital hiring data.

AFSC45 - Orthopedic Surgeon, OB/GYN, Surgeon.

The orthopedic surgeon, OB/GYN, and surgeon's correlation table contained 11 important economic indicators above ±0.4, the highest of which was ±0.42. The industry economic indicator had two high correlation values, so only the highest value was listed under important indicators. The important negative indicators were employment, GDP current price, gross national savings, household final consumption expenditure lagged one year, industrial production and real GDP constant price. The important positive indicators were industry lagged two years, real interest rate lagged one year, services lagged one year and unemployment rate. Similar to the previous AFSCs relating to the healthcare fields, civilian hospital data and a comparison between military surgeons and civilian employment would be beneficial to

understanding the retention rates of this AFSC.

AFSC46 - Clinical/Privileged Advanced Practice Nurse.

AFSC 46 had lower correlation values in the table, with values greater than ±0.2, and the highest correlation number being ±0.23. This resulted in 11 important economic indicators. The real GDP growth economic indicator had two high correlation values, so only the highest value was listed under important indicators. The important negative indicators were unemployment rate lagged one year and youth unemployment lagged one year. The important positive indicators were employment, GDP current price lagged two years, general government revenue lagged two years, general government total expenditure lagged one year, gross national savings lagged two years, household final consumption expenditure lagged two years, real GDP constant price lagged two years and real GDP growth. These results show that the economy has a very low impact on the retention rates of clinical nurses and advanced practice nurses, meaning that there is probably data that aligns with this area but has not been collected and included in this analysis. Additional data to determine retention rates could be collected from hospital hiring and financial data.

AFSC47 - Dentist.

This correlation table had 8 important indicators which were greater than ±0.5, the highest number being ±0.58. The important negative indicators were employment lagged one year, general government revenue lagged two years, general government total expenditure lagged one year, gross national savings lagged two years, industrial production lagged two years, real GDP constant price lagged two years and real GDP growth. The important positive indicator was youth unemployment lagged one year. The correlations table indicates that these economic indicators are important to the

retention rates of dentists within the Air Force. It is harder to obtain additional data for dentists in the civilian sector since most dentists set up their own practice, do not work for large companies or corporations, and we therefore may not have access to the required data.

AFSC51 - Judge Advocate.

The correlation table for judge advocates involved correlations greater than ± 0.5, with the highest correlation value being ± 0.5. This table contained 21 important indicators, with at least one or more of the values coming from the same economic indicator group. Only the year with the highest correlation was listed as an important economic indicator. The important negative indicators were GDP current price, general government revenue lagged one year, general government total expenditure, gross national savings lagged one year, household final consumption expenditure lagged one year, industrial production, industry, population and real GDP constant price. The important positive indicators were real interest rate lagged one year, services lagged one year, unemployment and youth unemployment. The correlations table indicates that these economic indicators are somewhat important to the retention rates of judge advocates within the Air Force. Law firm hiring and growth data could help determine retention rates.

AFSC52 - Chaplain.

The correlation table for chaplain officers involved correlations greater than ± 0.5, with the highest correlation number being ± 0.8. This table contained 19 significant indicators, with at least one or more values originating from the same economic indicator group. Only the year with the highest correlation was listed as an important economic indicator. The important negative indicators were services lagged two years,

unemployment rate lagged two years and youth unemployment lagged one year. The important positive indicators were employment lagged one year, GDP current price lagged two years, general government revenue lagged two years, general government total expenditure lagged one year, gross national savings lagged two years, industrial production lagged two years, industry lagged one year, real interest rate, real GDP constant price lagged two years and real GDP growth. The correlations table indicates that these economic indicators are important to the retention rates of chaplain officers within the Air Force.

AFSC61 - Operations Research Analyst, Physicist, Nuclear Engineer.

The correlation table for operations research analyst, physicist and nuclear engineer officers involved correlations greater than ±0.5, with the highest correlation number being ±0.64. The real GDP growth economic indicator had two larger correlation values, so only the highest value was listed under important indicators. The important negative indicators were employment lagged one year, GDP current price lagged two years, general government revenue lagged two years, general government total expenditure lagged one year, gross national savings lagged two years, household final consumption expenditure lagged two years, industrial production lagged two years, real interest rate, real GDP constant price lagged two years and real GDP growth. The important positive indicators were unemployment lagged one year and youth unemployment lagged one year. The correlations table indicates that these economic indicators are important to the retention rates of operations research analyst, physicist and nuclear engineer officers within the Air Force. Additional data could be gathered from Fortune 500 companies or other large corporations that target this career field area when hiring.

AFSC62 - Developmental Engineer.

The developmental engineer's correlation table contained 11 important economic indicators above ±0.4, the highest of which was ±0.45. The real GDP growth and services economic indicators both contained two larger correlation values, so only the highest value was listed under important indicators. The important negative indicators were general government revenue lagged two years, gross national savings lagged two years, industrial production lagged two years, industry lagged one year, real interest rate, real GDP constant price lagged two years and real GDP growth. The important positive indicators were general government total expenditure lagged two years and services lagged two years. These results show that the economy has a low impact on the retention rates of developmental engineers, meaning that there is probably data that aligns with this area that has not been collected and included in this analysis.

AFSC63 - Acquisitions Manager.

The acquisitions manager AFSC correlation table contains 19 important economic indicators above ±0.2, the highest of which was ±0.22. Similar to previous correlation tables, only the year with the highest correlation was listed as an important economic indicator. The important negative indicators were employment, GDP current price, general government revenue lagged one year, gross national savings, household final consumption expenditure lagged one year, industrial production, population, real GDP constant price and real GDP growth lagged two years. The important positive indicators were industry lagged two years, real interest rate lagged one year, services lagged one year and unemployment rate. These results show that the economy has a very low impact on the retention rates of acquisitions manager, meaning that there is probably data that aligns with this area but has not been collected and included

in this analysis.

AFSC64 - Contracting.

The correlation table for contracting officers involved correlations greater than ±0.4, with the highest correlation number being ±0.47. This table contained 23 indicators, with at least one or more values originating from the same economic indicator group. Only the year with the highest correlation was listed as an important economic indicator. The important negative indicators were employment, GDP current price, general government revenue lagged one year, general government total expenditure, gross national savings, household final consumption expenditure lagged one year, industrial production, population and real GDP constant price. The important positive indicators were industry lagged two years, real interest rate lagged one year, services lagged one year and unemployment. Additional data could be gathered from Fortune 500 companies or other large corporations that might target this career field when hiring.

AFSC65 - Financial Management.

This correlation table had 13 higher indicators which were greater than ±0.5, the highest number being ±0.68. The real GDP growth economic indicator had two larger correlation values, so only the highest value was listed under important indicators. The important negative indicators were employment lagged one year, GDP current price lagged two years, general government revenue lagged two years, general government total expenditure lagged one year, gross national savings lagged two years, household final consumption expenditure lagged two years, industrial production lagged two years, real interest rate, real GDP constant price lagged two years and real GDP growth. The important positive indicators were unemployment rate

lagged one year and youth unemployment lagged one year. The correlations table indicates that these economic indicators are important to the retention rates of financial management officers within the Air Force.

AFSC71 - Special Investigations.

The special investigations officer's correlation table contained 2 important economic indicators above ± 0.5, the highest of which was ± 0.5. This table only contained important negative indicators, which were employment and gross national savings. While the important indicators show that they have some relevance to the retention rates of special investigations officers, additional outside data would be helpful. Data could be pulled from law enforcement hiring, and also from government agencies such as the FBI, CIA or DEA.

Correlation Values.

To determine how the economy impacts retention rates within AFSCs, it suffices to inspect the correlations between the different AFSCs and economic indicators. Tables 1-3 indicate the correlation value signs with the strongest relationships for each AFSC. This means that correlation values as low as 0.14 are included in the table since some AFSCs correlations did not show any strong significance. They are included for the purpose of displaying the economic indicators that have the highest correlation which could suggest a possible indicator. Tables 4-6 display the correlation value signs that are above the absolute value of 0.5. Values greater than $|0.5|$ imply a moderate to strong relationship between an economic indicator and AFSC. Within each table, some signs are circled and others are not. The circled correlation value signs are there to emphasize the highest absolute value for an economic indicator that has more than one sign for a given AFSC.

The majority of the economic indicators for the first three tables, to include their lagged components, have a negative correlation to the AFSCs. An interesting aspect of the table is that AFSCs 14 and 15 have all the same signs, only their signs are the opposite. A takeaway of the tables is that only real interest rate, services, unemployment rate, and youth unemployment have a majority positive correlation with AFSC retention rates, while the rest have a negative majority.

The last three tables only display 14 of the 26 AFSCs since they were the only ones to make the |0.5| cutoff. The same economic indicators from tables 1-3 that had a majority positive correlation are also present in these tables, with the addition of industry.

x1-x3 = Employment
x4-x6 = GDP Current Price
x7-x9 = General Government Revenue
x10-x12 = General Government Total Expenditure
x13-x15 = Gross National Savings
x16-x18 = Household Final Consumption Expenditure
x19-x21 = Industrial Production
x22-x24 = Industry
x25-x27 = Population
x28-x30 = Real Interest Rate
x31-x33 = Real GDP Constant Price
x34-x36 = Real GDP Growth
x37-x39 = Services
x40-x42 = Unemployment Rate
x43-x45 = Youth Unemployment

Figure 6. Economic Indicators Key

AFSC11 = Bomber/Fighter/Mobility/Reconnaissance Pilot
AFSC12 = Bomber/Fighter/Mobility/ Reconnaissance /Special Operations Combat Systems Officer
AFSC13 = Air Battle Manager, Space and Missile
AFSC14 = Intelligence
AFSC15 = Weather
AFSC17 = Cyberspace Operations
AFSC21 = Aircraft Maintenance, Munitions and Missile Maintenance, Logistics Readiness
AFSC31 = Security Forces
AFSC32 = Civil Engineer
AFSC35 = Public Affairs
AFSC38 = Force Support Officer
AFSC41 = Health Services Administrator
AFSC42 = Clinical Social Worker
AFSC43 = Bioenvironmental Engineer, Pharmacist
AFSC44 = Emergency Services/Family Physician, Pediatrician, Internist, Diagnostic Radiologist
AFSC45 = Orthopedic Surgeon, OB/GYN, Surgeon
AFSC46 = Clinical/Privileged Advanced Practice Nurse
AFSC47 = Dentist
AFSC51 = Judge Advocate
AFSC52 = Chaplain
AFSC61 = Operations Research Analyst, Physicist/Nuclear Engineer
AFSC62 = Developmental Engineer
AFSC63 = Acquisition Manager
AFSC64 = Contracting
AFSC65 = Financial Management
AFSC71 = Special Investigations

Figure 7. AFSCs Key

Table 1. Notable Corr. Value Signs: Economic Indicators x1-x15

AFSCs	Economic Indicators														
	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14	x15
11		−				−					−				
12						−					−				
13	−					−					−		−		
14		−	(−)	+	(+)		+	+	(−)	+		(+)		+	(−)
15		+	(+)	−	(−)		−	−	(+)	−		(−)		−	(+)
17	−		(+)	−	(−)		(−)	−		(−)		−	−	(−)	
21						−					−				
31		−				−			−		−				−
32		−							−		−				−
35		−				−			−		−				−
38	−			−	−	(−)	−	(−)		−			(−)	−	
41			−	+	(+)		(+)	+		+		(+)		+	
42		+				+			+		+				+
43	+												+		
44	−			−	(−)		−	(−)		−			−	(−)	
45	−			−									−		
46		+				+			+		+				+
47		−							−		−				−
51				(−)	−		−	(−)		−				−	
52		(+)	+			+			+		(+)	−			+
61		−				−			−		−				−
62									−			−			−
63	−			(−)	−		−	(−)					−		
64	−			(−)	−	−	−	(−)		−			(−)	−	
65		−				−			−		−				−
71	−												−		

Table 2. Notable Corr. Value Signs: Economic Indicators x16-x30

		Economic Indicators														
		x16	x17	x18	x19	x20	x21	x22	x23	x24	x25	x26	x27	x28	x29	x30
AFSCs	11			−												
	12			−												
	13			−						+					+	
	14	(+)	+		+	+	(−)	+	(−)		+	+	(+)	(−)	−	−
	15	(−)	−		−	−	(+)	−	(+)		−	−	(−)	(+)	+	+
	17	(−)	−		−	(−)	+	(−)	+	+	−	−	(−)	+	+	(+)
	21			−												
	31			−			−							−		
	32						−							−		
	35			−			−		−					−		
	38	−	−	(−)	(−)	−		−		(+)	(−)	−	−		(+)	+
	41	+			+	(+)		+	(−)		+	+	(+)			−
	42			+												
	43		+					+		(−)					−	
	44	−	(−)		(−)	−		(−)		+	(−)	−	−		+	(+)
	45		−		−			−		(+)					+	
	46			+												
	47						−									
	51	−	(−)		(−)	−		−			(−)	−	−		(+)	+
	52						+		+					+		
	61			−			−							−		
	62						−		−					−		
	63		(−)	−	−			−		(+)	(−)	−			+	
	64	−	(−)	−	−			−		(+)	(−)	−	−		+	
	65			−			−							−		
	71															

Table 3. Notable Corr. Value Signs: Economic Indicators x31-x45

		Economic Indicators														
		x31	x32	x33	x34	x35	x36	x37	x38	x39	x40	x41	x42	x43	x44	x45
AFSCs	11						−					+			+	
	12						−					+			+	
	13						−					+			+	
	14	+	(+)	−	−	(+)		(−)	−	+	−		(+)	−		(+)
	15	−	(−)	+	+	(−)		+	+	(−)	+		(−)	(+)		(−)
	17	−	(−)			(−)		+	(+)	−	+		(−)			−
	21						−					+			+	
	31			−	(−)		−					+			+	
	32			−												
	35			−	(−)	+	−	−		(+)		+			+	
	38	(−)	−				−		+		+	(+)		+	(+)	
	41		+			+		(−)		+	−		(+)	−		(+)
	42			+	+		(+)					−			−	
	43	+							−		−					
	44	(−)	−						+		+			+		
	45	−							+		+					
	46			+	(+)		+					−			−	
	47			−	−										+	
	51	(−)	−						+		+			+		
	52			+	(+)	−		+		(−)		−	(−)		(−)	−
	61			−	(−)		−					+			+	
	62			−	(−)	+		−		(+)						
	63	−					−		+		(+)	+				
	64	−							+		+	+				
	65			−	(−)		−					+			+	
	71															

Table 4. Correlation Value Signs over $|0.5|$: Economic Indicators x1-x15

		Economic Indicators														
		x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14	x15
AFSCs	11															
	12															
	13															
	14		−	(−)	+	(+)		+	+	(−)	+		(+)		+	(−)
	15		+	(+)	−	(−)		−	−	(+)	−		(−)		−	(+)
	17	−		(+)	−	(−)		(−)	−		(−)		−	−	(−)	
	21															
	31		−				−			−		−				−
	32		−							−		−				−
	35		−				−			−		−				−
	38	−			−	−	(−)	−	(−)		−			(−)	−	
	41															
	42															
	43															
	44															
	45															
	46															
	47		−							−		−				−
	51				(−)	−		−	(−)		−				−		
	52		(+)	+			+			+		(+)	−			+
	61		−				−			−		−				−
	62															
	63															
	64															
	65		−				−			−		−				−
	71	−												−		

Table 5. Correlation Values Signs over $|0.5|$: Economic Indicators x16-x30

AFSCs	Economic Indicators														
	x16	x17	x18	x19	x20	x21	x22	x23	x24	x25	x26	x27	x28	x29	x30
11															
12															
13			−												
14	(+)	+		+	+	(−)	+	(−)		+	+	(+)	(−)	−	−
15	(−)	−		−	−	(+)	−	(+)		−	−	(−)	(+)	+	+
17	(−)	−		−	(−)	+	(−)	+	+	−	−	(−)	+	+	(+)
21															
31			−			−							−		
32						−							−		
35			−			−		−					−		
38	−	−	(−)	(−)	−		−		(+)	(−)	−	−		(+)	+
41															
42															
43															
44															
45															
46															
47						−									
51	−	(−)		(−)	−		−			(−)	−	−		(+)	+
52						+		+					+		
61			−			−							−		
62															
63															
64															
65			−			−							−		
71															

Table 6. Correlation Values Signs over $|0.5|$: Economic Indicators x31-x45

AFSCs	Economic Indicators														
	x31	x32	x33	x34	x35	x36	x37	x38	x39	x40	x41	x42	x43	x44	x45
11															
12															
13						−					+				
14	+	(+)	−	−	(+)		(−)	−	+	−		(+)	−		(+)
15	−	(−)	+	+	−		+	+	(−)	+		(−)	+		(−)
17	−	(−)			(−)		+	(+)	−	+		(−)	(+)		−
21															
31			−	(−)		−					+			+	
32			−	−											
35			−	(−)	+	−	−		(+)		+			+	
38	(−)	−				−		+		+	(+)		+	(+)	
41															
42															
43															
44															
45															
46															
47			−	−										+	
51	(−)	−						+		+			+		
52			+	(+)	−		+		(−)		−	(−)		(−)	−
61			−	(−)		−					+			+	
62															
63															
64															
65			−	(−)		−					+			+	
71															

4.3 Regression Model

After analysis of the correlation tables, the significant economic indicators for each AFSC were identified. From there, a regression model for each AFSC was constructed to be able to predict the retention rate using the important indicators. In the process of creating a regression model the correlation matrix demonstrated multicollinearity, thereby zeroing out any attempted regression model. A Principal Component Analysis (PCA) was infeasible to rid the model of its multicollinearity due to the lack of economic indicator data points.

4.4 Summary

The overall analysis on Air Force retention rates found that the economic metrics used had a strong influence only on certain AFSCs. Only around half of the AFSCs showed a strong correlation between certain economic indicators, and the majority of the indicators had a negative correlation. An interesting take-away from the strongly correlated AFSCs was that only AFSC 14 (Intelligence) and AFSC 52 (Chaplains) had a predominately positive correlation to the economic indicators, while the rest of the AFSCs were predominately negative. To gain a more comprehensive picture of Air Force retention, outside data sources specific to each AFSC are needed. Possible data sources to look for would be airline hirings, Fortune 500 company hirings, private securityfirm hirings, and their overall growth.

V. Conclusion

5.1 Limitations of Work

The intent of this thesis was to use external economic data to build a regression model to predict retention rates. While this thesis was able to draw conclusions on the economic indicators through the use of correlation tables, a regression model was found to be impossible with the current data. Multicollinearity was found in the economic data, limiting this study to only identifying significant economic indicators. The findings of this study establish a groundwork for building a robust model to predict retention rates.

5.2 Follow-On Research

This study created a baseline for predicting retention rates in relation to a specific AFSC. While the overall goal for constructing a regression model proved to be unsuccessful, a deep dive into an individual AFSC may result in a regression model. By collecting additional outside data specific to a certain AFSC, the multicollinearity of the original data could be overcome through the use of a Principal Component Analysis (PCA) or a Partial Least Squares Regression (PLS).

Since the retention data was provided in an annual format, the economic indicator data needed to be annual as well. With yearly data, only a small number of data points were able to be collected and used. The lack of data points could have contributed to the multicollinearity of the model. Going forward, breaking the data up into quarters or monthly averages might be beneficial to reducing the multicollinearity. Retrieving economic data from different sources may also help since the data used in this thesis all originated from one source.

5.3 Conclusion

In summary, this thesis explored the possible relationships between Air Force retention rates and economic indicators. Through the use of correlation tables, it found that the majority of the economic indicators had a negative correlation to the AFSCs. If an economic indicator increases, a positive correlation means that the retention rate increases, while a negative correlation would result in the retention rate decreasing. The economic data contained indicators which correspond to both a growing economy and a declining economy. The majority of the economic indicators had a negative correlation with retention rates, and as such in a growing economy the retention rates will be expected to decrease. As the economy grows, more jobs become available which gives Air Force officers more incentive to leave, while in a declining economy officers are more likely to remain in the Air Force. In particular, all but two AFSCs (namely AFSC 14 - Intelligence and AFSC 52 - Chaplains) express a negative correlation with the economic indicators. In a flourishing economy, these two AFSCs are more likely to remain with the Air Force.

This thesis revealed which economic metrics were important to specific AFSCs and the relationship between them. It gives a general picture for how economic indicators influence Air Force retention rates, and could be utilized by HAF/A1PF when predicting future retention.

Appendix A. AFSC Correlation Plots

Key:
x1-x3 = Employment
x4-x6 = GDP Current Price
x7-x9 = General Government Revenue
x10-x12 = General Government Total Expenditure
x13-x15 = Gross National Savings
x16-x18 = Household Final Consumption Expenditure
x19-x21 = Industrial Production
x22-x24 = Industry
x25-x27 = Population
x28-x30 = Real Interest Rate
x31-x33 = Real GDP Constant Price
x34-x36 = Real GDP Growth
x37-x39 = Services
x40-x42 = Unemployment Rate
x43-x45 = Youth Unemployment

AFSC11 = Bomber/Fighter/Mobility/Reconnaissance Pilot
AFSC12 = Bomber/Fighter/Mobility/ Reconnaissance /Special Operations Combat Systems Officer
AFSC13 = Air Battle Manager, Space and Missile
AFSC14 = Intelligence
AFSC15 = Weather
AFSC17 = Cyberspace Operations
AFSC21 = Aircraft Maintenance, Munitions and Missile Maintenance, Logistics Readiness
AFSC31 = Security Forces
AFSC32 = Civil Engineer
AFSC35 = Public Affairs
AFSC38 = Force Support Officer
AFSC41 = Health Services Administrator
AFSC42 = Clinical Social Worker
AFSC43 = Bioenvironmental Engineer, Pharmacist
AFSC44 = Emergency Services/Family Physician, Pediatrician, Internist, Diagnostic Radiologist
AFSC45 = Orthopedic Surgeon, OB/GYN, Surgeon
AFSC46 = Clinical/Privileged Advanced Practice Nurse
AFSC47 = Dentist
AFSC51 = Judge Advocate
AFSC52 = Chaplain
AFSC61 = Operations Research Analyst, Physicist/Nuclear Engineer
AFSC62 = Developmental Engineer
AFSC63 = Acquisition Manager
AFSC64 = Contracting
AFSC65 = Financial Management
AFSC71 = Special Investigations

AFSC11:

Correlations

	Change in CR (AFSC=11)
Change in CR (AFSC=11)	1.0000
x1: year	-0.3100
x2: year-1	-0.4127
x3: year-2	0.0188
x4: year	-0.2161
x5: year-1	-0.1997
x6: year-2	-0.4600
x7: year	-0.1966
x8: year-1	-0.1976
x9: year-2	-0.3037
x10: year	-0.1748
x11: year-1	-0.4427
x12: year-2	0.0729
x13: year	-0.3023
x14: year-1	-0.1843
x15: year-2	-0.3213
x16: year	-0.1723
x17: year-1	-0.2346
x18: year-2	-0.4571
x19: year	-0.2167
x20: year-1	-0.1410
x21: year-2	-0.2362
x22: year	-0.2260
x23: year-1	-0.0865
x24: year-2	0.2977
x25: year	-0.1987
x26: year-1	-0.1943
x27: year-2	-0.1851
x28: year	-0.1751
x29: year-1	0.2676
x30: year-2	0.1507
x31: year	-0.2423
x32: year-1	-0.1458
x33: year-2	-0.3926
x34: year	-0.3626
x35: year-1	0.1109
x36: year-2	-0.4570
x37: year	-0.1018
x38: year-1	0.2383
x39: year-2	0.1174
x40: year	0.2298
x41: year-1	0.4581
x42: year-2	0.0008
x43: year	0.1536
x44: year-1	0.4594
x45: year-2	-0.0259

AFSC12:

Correlations	
	Change in CR (AFSC=12)
Change in CR (AFSC=12)	1.0000
x1: year	-0.1195
x2: year-1	-0.1376
x3: year-2	0.0217
x4: year	-0.0889
x5: year-1	-0.0834
x6: year-2	-0.1611
x7: year	-0.0824
x8: year-1	-0.0827
x9: year-2	-0.0948
x10: year	-0.0751
x11: year-1	-0.1506
x12: year-2	0.0106
x13: year	-0.1170
x14: year-1	-0.0783
x15: year-2	-0.1015
x16: year	-0.0742
x17: year-1	-0.0950
x18: year-2	-0.1615
x19: year	-0.0891
x20: year-1	-0.0637
x21: year-2	-0.0696
x22: year	-0.0922
x23: year-1	-0.0154
x24: year-2	0.1156
x25: year	-0.0831
x26: year-1	-0.0816
x27: year-2	-0.0785
x28: year	-0.0472
x29: year-1	0.1058
x30: year-2	0.0669
x31: year	-0.0976
x32: year-1	-0.0653
x33: year-2	-0.1294
x34: year	-0.1174
x35: year-1	0.0241
x36: year-2	-0.1615
x37: year	-0.0208
x38: year-1	0.0962
x39: year-2	0.0264
x40: year	0.0934
x41: year-1	0.1615
x42: year-2	-0.0149
x43: year	0.0679
x44: year-1	0.1598
x45: year-2	-0.0241

AFSC13:

Correlations	
	Change in CR (AFSC=13)
Change in CR (AFSC=13)	1.0000
x1: year	-0.4534
x2: year-1	-0.3668
x3: year-2	0.1861
x4: year	-0.3772
x5: year-1	-0.3627
x6: year-2	-0.4942
x7: year	-0.3599
x8: year-1	-0.3608
x9: year-2	-0.1992
x10: year	-0.3401
x11: year-1	-0.4269
x12: year-2	-0.0863
x13: year	-0.4476
x14: year-1	-0.3488
x15: year-2	-0.2238
x16: year	-0.3378
x17: year-1	-0.3931
x18: year-2	-0.5065
x19: year	-0.3777
x20: year-1	-0.3085
x21: year-2	-0.1094
x22: year	-0.3858
x23: year-1	0.0709
x24: year-2	0.4442
x25: year	-0.3618
x26: year-1	-0.3578
x27: year-2	-0.3496
x28: year	-0.0332
x29: year-1	0.4206
x30: year-2	0.3177
x31: year	-0.3997
x32: year-1	-0.3131
x33: year-2	-0.3322
x34: year	-0.2845
x35: year-1	-0.0429
x36: year-2	-0.5066
x37: year	0.0534
x38: year-1	0.3963
x39: year-2	-0.0354
x40: year	0.3891
x41: year-1	0.5040
x42: year-2	-0.1653
x43: year	0.3204
x44: year-1	0.4811
x45: year-2	-0.1935

AFSC14:

Correlations

	Change in CR (AFSC=14)
Change in CR (AFSC=14)	1.0000
x1: year	0.4465
x2: year-1	-0.5000
x3: year-2	-0.7597
x4: year	0.5934
x5: year-1	0.6137
x6: year-2	-0.1627
x7: year	0.6175
x8: year-1	0.6163
x9: year-2	-0.6950
x10: year	0.6419
x11: year-1	-0.3817
x12: year-2	0.7863
x13: year	0.4610
x14: year-1	0.6315
x15: year-2	-0.6747
x16: year	0.6446
x17: year-1	0.5689
x18: year-2	-0.0906
x19: year	0.5927
x20: year-1	0.6758
x21: year-2	-0.7508
x22: year	0.5806
x23: year-1	-0.7877
x24: year-2	-0.4694
x25: year	0.6150
x26: year-1	0.6201
x27: year-2	0.6306
x28: year	-0.7781
x29: year-1	-0.5201
x30: year-2	-0.6666
x31: year	0.5581
x32: year-1	0.6713
x33: year-2	-0.5532
x34: year	-0.6138
x35: year-1	0.7882
x36: year-2	-0.0895
x37: year	-0.7883
x38: year-1	-0.5638
x39: year-2	0.7880
x40: year	-0.5755
x41: year-1	0.1076
x42: year-2	0.7679
x43: year	-0.6638
x44: year-1	0.2203
x45: year-2	0.7563

AFSC15:

Correlations

	Change in CR (AFSC=15)
Change in CR (AFSC=15)	1.0000
x1: year	-0.4550
x2: year-1	0.5837
x3: year-2	0.8238
x4: year	-0.6239
x5: year-1	-0.6476
x6: year-2	0.2216
x7: year	-0.6519
x8: year-1	-0.6506
x9: year-2	0.7849
x10: year	-0.6807
x11: year-1	0.4580
x12: year-2	-0.8618
x13: year	-0.4716
x14: year-1	-0.6684
x15: year-2	0.7646
x16: year	-0.6838
x17: year-1	-0.5955
x18: year-2	0.1431
x19: year	-0.6231
x20: year-1	-0.7207
x21: year-2	0.8390
x22: year	-0.6090
x23: year-1	0.8645
x24: year-2	0.4811
x25: year	-0.6490
x26: year-1	-0.6551
x27: year-2	-0.6673
x28: year	0.8628
x29: year-1	0.5392
x30: year-2	0.7098
x31: year	-0.5829
x32: year-1	-0.7154
x33: year-2	0.6395
x34: year	0.7024
x35: year-1	-0.8675
x36: year-2	0.1418
x37: year	0.8667
x38: year-1	0.5895
x39: year-2	-0.8679
x40: year	0.6030
x41: year-1	-0.1616
x42: year-2	-0.8347
x43: year	0.7065
x44: year-1	-0.2842
x45: year-2	-0.8195

AFSC17:

Correlations

	Change in CR (AFSC=17)
Change in CR (AFSC=17)	1.0000
x1: year	-0.6789
x2: year-1	0.1692
x3: year-2	0.7595
x4: year	-0.7500
x5: year-1	-0.7571
x6: year-2	-0.1983
x7: year	-0.7583
x8: year-1	-0.7579
x9: year-2	0.4451
x10: year	-0.7654
x11: year-1	0.0299
x12: year-2	-0.7143
x13: year	-0.6871
x14: year-1	-0.7626
x15: year-2	0.4116
x16: year	-0.7661
x17: year-1	-0.7403
x18: year-2	-0.2667
x19: year	-0.7497
x20: year-1	-0.7723
x21: year-2	0.5524
x22: year	-0.7450
x23: year-1	0.7050
x24: year-2	0.6918
x25: year	-0.7575
x26: year-1	-0.7592
x27: year-2	-0.7623
x28: year	0.6267
x29: year-1	0.7182
x30: year-2	0.7708
x31: year	-0.7357
x32: year-1	-0.7716
x33: year-2	0.2370
x34: year	0.3197
x35: year-1	-0.6866
x36: year-2	-0.2678
x37: year	0.6937
x38: year-1	0.7382
x39: year-2	-0.6813
x40: year	0.7430
x41: year-1	0.2509
x42: year-2	-0.7524
x43: year	0.7703
x44: year-1	0.1414
x45: year-2	-0.7617

AFSC21:

Correlations

	Change in CR (AFSC=21)
Change in CR (AFSC=21)	1.0000
x1: year	-0.2742
x2: year-1	-0.3831
x3: year-2	0.0046
x4: year	-0.1865
x5: year-1	-0.1713
x6: year-2	-0.4204
x7: year	-0.1683
x8: year-1	-0.1693
x9: year-2	-0.2873
x10: year	-0.1482
x11: year-1	-0.4083
x12: year-2	0.0792
x13: year	-0.2669
x14: year-1	-0.1570
x15: year-2	-0.3029
x16: year	-0.1459
x17: year-1	-0.2037
x18: year-2	-0.4166
x19: year	-0.1870
x20: year-1	-0.1169
x21: year-2	-0.2269
x22: year	-0.1957
x23: year-1	-0.0915
x24: year-2	0.2626
x25: year	-0.1703
x26: year-1	-0.1662
x27: year-2	-0.1578
x28: year	-0.1719
x29: year-1	0.2345
x30: year-2	0.1258
x31: year	-0.2109
x32: year-1	-0.1214
x33: year-2	-0.3657
x34: year	-0.3395
x35: year-1	0.1137
x36: year-2	-0.4165
x37: year	-0.1055
x38: year-1	0.2071
x39: year-2	0.1196
x40: year	0.1993
x41: year-1	0.4179
x42: year-2	0.0133
x43: year	0.1285
x44: year-1	0.4209
x45: year-2	-0.0111

AFSC31:

Correlations

	Change in CR (AFSC=31)
Change in CR (AFSC=31)	1.0000
x1: year	-0.2917
x2: year-1	-0.8028
x3: year-2	-0.2597
x4: year	-0.0966
x5: year-1	-0.0645
x6: year-2	-0.7453
x7: year	-0.0584
x8: year-1	-0.0603
x9: year-2	-0.7146
x10: year	-0.0168
x11: year-1	-0.8025
x12: year-2	0.4061
x13: year	-0.2747
x14: year-1	-0.0348
x15: year-2	-0.7330
x16: year	-0.0120
x17: year-1	-0.1333
x18: year-2	-0.7137
x19: year	-0.0977
x20: year-1	0.0463
x21: year-2	-0.6354
x22: year	-0.1161
x23: year-1	-0.4268
x24: year-2	0.2647
x25: year	-0.0625
x26: year-1	-0.0540
x27: year-2	-0.0364
x28: year	-0.5549
x29: year-1	0.2009
x30: year-2	-0.0285
x31: year	-0.1489
x32: year-1	0.0374
x33: year-2	-0.7930
x34: year	-0.7714
x35: year-1	0.4633
x36: year-2	-0.7132
x37: year	-0.4498
x38: year-1	0.1407
x39: year-2	0.4729
x40: year	0.1237
x41: year-1	0.7217
x42: year-2	0.2919
x43: year	-0.0231
x44: year-1	0.7663
x45: year-2	0.2479

AFSC32:

Correlations

	Change in CR (AFSC=32)
Change in CR (AFSC=32)	1.0000
x1: year	-0.0425
x2: year-1	-0.5837
x3: year-2	-0.3502
x4: year	0.1063
x5: year-1	0.1297
x6: year-2	-0.4604
x7: year	0.1341
x8: year-1	0.1327
x9: year-2	-0.5870
x10: year	0.1640
x11: year-1	-0.5516
x12: year-2	0.4393
x13: year	-0.0290
x14: year-1	0.1511
x15: year-2	-0.5918
x16: year	0.1673
x17: year-1	0.0792
x18: year-2	-0.4233
x19: year	0.1055
x20: year-1	0.2083
x21: year-2	-0.5578
x22: year	0.0919
x23: year-1	-0.4512
x24: year-2	0.0212
x25: year	0.1311
x26: year-1	0.1373
x27: year-2	0.1499
x28: year	-0.5202
x29: year-1	-0.0282
x30: year-2	-0.1959
x31: year	0.0675
x32: year-1	0.2022
x33: year-2	-0.5926
x34: year	-0.5968
x35: year-1	0.4718
x36: year-2	-0.4227
x37: year	-0.4642
x38: year-1	-0.0736
x39: year-2	0.4771
x40: year	-0.0862
x41: year-1	0.4324
x42: year-2	0.3705
x43: year	-0.1921
x44: year-1	0.4877
x45: year-2	0.3428

AFSC35:

Correlations

	Change in CR (AFSC=35)
Change in CR (AFSC=35)	1.0000
x1: year	-0.1482
x2: year-1	-0.7517
x3: year-2	-0.3620
x4: year	0.0395
x5: year-1	0.0696
x6: year-2	-0.6379
x7: year	0.0753
x8: year-1	0.0736
x9: year-2	-0.7187
x10: year	0.1140
x11: year-1	-0.7279
x12: year-2	0.4863
x13: year	-0.1315
x14: year-1	0.0973
x15: year-2	-0.7297
x16: year	0.1184
x17: year-1	0.0048
x18: year-2	-0.5979
x19: year	0.0385
x20: year-1	0.1720
x21: year-2	-0.6655
x22: year	0.0211
x23: year-1	-0.5034
x24: year-2	0.1217
x25: year	0.0715
x26: year-1	0.0795
x27: year-2	0.0958
x28: year	-0.6056
x29: year-1	0.0598
x30: year-2	-0.1557
x31: year	-0.0100
x32: year-1	0.1639
x33: year-2	-0.7543
x34: year	-0.7487
x35: year-1	0.5331
x36: year-2	-0.5972
x37: year	-0.5222
x38: year-1	0.0022
x39: year-2	0.5409
x40: year	-0.0139
x41: year-1	0.6077
x42: year-2	0.3898
x43: year	-0.1507
x44: year-1	0.6664
x45: year-2	0.3518

AFSC38:

Correlations

	Change in CR (AFSC=38)
Change in CR (AFSC=38)	1.0000
x1: year	-0.6554
x2: year-1	-0.3829
x3: year-2	0.3675
x4: year	-0.5832
x5: year-1	-0.5681
x6: year-2	-0.6033
x7: year	-0.5651
x8: year-1	-0.5661
x9: year-2	-0.1355
x10: year	-0.5441
x11: year-1	-0.4799
x12: year-2	-0.2447
x13: year	-0.6505
x14: year-1	-0.5534
x15: year-2	-0.1704
x16: year	-0.5416
x17: year-1	-0.5993
x18: year-2	-0.6313
x19: year	-0.5837
x20: year-1	-0.5096
x21: year-2	-0.0113
x22: year	-0.5919
x23: year-1	0.2252
x24: year-2	0.6475
x25: year	-0.5671
x26: year-1	-0.5630
x27: year-2	-0.5542
x28: year	0.0907
x29: year-1	0.6260
x30: year-2	0.5197
x31: year	-0.6059
x32: year-1	-0.5146
x33: year-2	-0.3296
x34: year	-0.2584
x35: year-1	-0.1896
x36: year-2	-0.6317
x37: year	0.2030
x38: year-1	0.6025
x39: year-2	-0.1799
x40: year	0.5952
x41: year-1	0.6252
x42: year-2	-0.3424
x43: year	0.5227
x44: year-1	0.5767
x45: year-2	-0.3764

AFSC41:

Correlations

	Change in CR (AFSC=41)
Change in CR (AFSC=41)	1.0000
x1: year	0.1772
x2: year-1	-0.0743
x3: year-2	-0.2183
x4: year	0.2035
x5: year-1	0.2065
x6: year-2	0.0290
x7: year	0.2071
x8: year-1	0.2069
x9: year-2	-0.1473
x10: year	0.2105
x11: year-1	-0.0358
x12: year-2	0.2109
x13: year	0.1800
x14: year-1	0.2091
x15: year-2	-0.1387
x16: year	0.2108
x17: year-1	0.1995
x18: year-2	0.0490
x19: year	0.2034
x20: year-1	0.2145
x21: year-2	-0.1742
x22: year	0.2014
x23: year-1	-0.2091
x24: year-2	-0.1816
x25: year	0.2067
x26: year-1	0.2075
x27: year-2	0.2089
x28: year	-0.1919
x29: year-1	-0.1911
x30: year-2	-0.2135
x31: year	0.1977
x32: year-1	0.2140
x33: year-2	-0.0926
x34: year	-0.1147
x35: year-1	0.2052
x36: year-2	0.0493
x37: year	-0.2067
x38: year-1	-0.1987
x39: year-2	0.2041
x40: year	-0.2006
x41: year-1	-0.0444
x42: year-2	0.2175
x43: year	-0.2132
x44: year-1	-0.0126
x45: year-2	0.2185

AFSC42:

Correlations

	Change in CR (AFSC=42)
Change in CR (AFSC=42)	1.0000
x1: year	0.2304
x2: year-1	0.4867
x3: year-2	0.1064
x4: year	0.1143
x5: year-1	0.0949
x6: year-2	0.4776
x7: year	0.0912
x8: year-1	0.0923
x9: year-2	0.4119
x10: year	0.0658
x11: year-1	0.4966
x12: year-2	-0.2007
x13: year	0.2205
x14: year-1	0.0768
x15: year-2	0.4258
x16: year	0.0629
x17: year-1	0.1364
x18: year-2	0.4629
x19: year	0.1150
x20: year-1	0.0271
x21: year-2	0.3549
x22: year	0.1261
x23: year-1	0.2143
x24: year-2	-0.2146
x25: year	0.0936
x26: year-1	0.0885
x27: year-2	0.0778
x28: year	0.2996
x29: year-1	-0.1768
x30: year-2	-0.0381
x31: year	0.1458
x32: year-1	0.0326
x33: year-2	0.4758
x34: year	0.4563
x35: year-1	-0.2383
x36: year-2	0.4626
x37: year	0.2294
x38: year-1	-0.1409
x39: year-2	-0.2446
x40: year	-0.1307
x41: year-1	-0.4667
x42: year-2	-0.1270
x43: year	-0.0414
x44: year-1	-0.4865
x45: year-2	-0.0989

AFSC43:

Correlations

	Change in CR (AFSC=43)
Change in CR (AFSC=43)	1.0000
x1: year	0.1422
x2: year-1	0.0326
x3: year-2	-0.1135
x4: year	0.1396
x5: year-1	0.1383
x6: year-2	0.0928
x7: year	0.1381
x8: year-1	0.1381
x9: year-2	-0.0228
x10: year	0.1361
x11: year-1	0.0571
x12: year-2	0.0942
x13: year	0.1423
x14: year-1	0.1370
x15: year-2	-0.0155
x16: year	0.1358
x17: year-1	0.1407
x18: year-2	0.1024
x19: year	0.1396
x20: year-1	0.1324
x21: year-2	-0.0479
x22: year	0.1402
x23: year-1	-0.0910
x24: year-2	-0.1424
x25: year	0.1382
x26: year-1	0.1379
x27: year-2	0.1371
x28: year	-0.0672
x29: year-1	-0.1421
x30: year-2	-0.1335
x31: year	0.1411
x32: year-1	0.1329
x33: year-2	0.0199
x34: year	0.0037
x35: year-1	0.0849
x36: year-2	0.1026
x37: year	-0.0872
x38: year-1	-0.1409
x39: year-2	0.0832
x40: year	-0.1404
x41: year-1	-0.1003
x42: year-2	0.1098
x43: year	-0.1338
x44: year-1	-0.0844
x45: year-2	0.1149

AFSC44:

Correlations

	Change in CR (AFSC=44)
Change in CR (AFSC=44)	1.0000
x1: year	-0.2546
x2: year-1	-0.0023
x3: year-2	0.2408
x4: year	-0.2643
x5: year-1	-0.2643
x6: year-2	-0.1239
x7: year	-0.2643
x8: year-1	-0.2643
x9: year-2	0.0989
x10: year	-0.2636
x11: year-1	-0.0500
x12: year-2	-0.2143
x13: year	-0.2561
x14: year-1	-0.2640
x15: year-2	0.0860
x16: year	-0.2635
x17: year-1	-0.2637
x18: year-2	-0.1450
x19: year	-0.2643
x20: year-1	-0.2612
x21: year-2	0.1416
x22: year	-0.2641
x23: year-1	0.2096
x24: year-2	0.2570
x25: year	-0.2643
x26: year-1	-0.2642
x27: year-2	-0.2640
x28: year	0.1731
x29: year-1	0.2612
x30: year-2	0.2620
x31: year	-0.2633
x32: year-1	-0.2616
x33: year-2	0.0217
x34: year	0.0516
x35: year-1	-0.2005
x36: year-2	-0.1453
x37: year	0.2040
x38: year-1	0.2636
x39: year-2	-0.1980
x40: year	0.2639
x41: year-1	0.1402
x42: year-2	-0.2359
x43: year	0.2623
x44: year-1	0.1060
x45: year-2	-0.2424

AFSC45:

Correlations

	Change in CR (AFSC=45)
Change in CR (AFSC=45)	1.0000
x1: year	-0.4233
x2: year-1	-0.1491
x3: year-2	0.3031
x4: year	-0.4020
x5: year-1	-0.3962
x6: year-2	-0.3156
x7: year	-0.3950
x8: year-1	-0.3954
x9: year-2	0.0141
x10: year	-0.3864
x11: year-1	-0.2184
x12: year-2	-0.2380
x13: year	-0.4224
x14: year-1	-0.3903
x15: year-2	-0.0080
x16: year	-0.3854
x17: year-1	-0.4078
x18: year-2	-0.3405
x19: year	-0.4021
x20: year-1	-0.3715
x21: year-2	0.0906
x22: year	-0.4052
x23: year-1	0.2273
x24: year-2	0.4218
x25: year	-0.3958
x26: year-1	-0.3941
x27: year-2	-0.3906
x28: year	0.1510
x29: year-1	0.4164
x30: year-2	0.3760
x31: year	-0.4101
x32: year-1	-0.3738
x33: year-2	-0.1125
x34: year	-0.0649
x35: year-1	-0.2075
x36: year-2	-0.3409
x37: year	0.2150
x38: year-1	0.4089
x39: year-2	-0.2021
x40: year	0.4064
x41: year-1	0.3349
x42: year-2	-0.2902
x43: year	0.3773
x44: year-1	0.2933
x45: year-2	-0.3077

AFSC46:

Correlations

	Change in CR (AFSC=46)
Change in CR (AFSC=46)	1.0000
x1: year	0.0737
x2: year-1	0.2382
x3: year-2	0.0893
x4: year	0.0152
x5: year-1	0.0057
x6: year-2	0.2150
x7: year	0.0039
x8: year-1	0.0045
x9: year-2	0.2172
x10: year	-0.0084
x11: year-1	0.2357
x12: year-2	-0.1314
x13: year	0.0685
x14: year-1	-0.0031
x15: year-2	0.2220
x16: year	-0.0098
x17: year-1	0.0262
x18: year-2	0.2045
x19: year	0.0156
x20: year-1	-0.0270
x21: year-2	0.1958
x22: year	0.0211
x23: year-1	0.1374
x24: year-2	-0.0655
x25: year	0.0051
x26: year-1	0.0026
x27: year-2	-0.0026
x28: year	0.1735
x29: year-1	-0.0464
x30: year-2	0.0218
x31: year	0.0308
x32: year-1	-0.0244
x33: year-2	0.2365
x34: year	0.2316
x35: year-1	-0.1477
x36: year-2	0.2043
x37: year	0.1439
x38: year-1	-0.0284
x39: year-2	-0.1505
x40: year	-0.0233
x41: year-1	-0.2071
x42: year-2	-0.0986
x43: year	0.0202
x44: year-1	-0.2221
x45: year-2	-0.0859

AFSC47:

Correlations

	Change in CR (AFSC=47)
Change in CR (AFSC=47)	1.0000
x1: year	-0.1068
x2: year-1	-0.5870
x3: year-2	-0.2913
x4: year	0.0402
x5: year-1	0.0637
x6: year-2	-0.4938
x7: year	0.0682
x8: year-1	0.0668
x9: year-2	-0.5649
x10: year	0.0983
x11: year-1	-0.5668
x12: year-2	0.3874
x13: year	-0.0937
x14: year-1	0.0853
x15: year-2	-0.5730
x16: year	0.1018
x17: year-1	0.0131
x18: year-2	-0.4619
x19: year	0.0394
x20: year-1	0.1435
x21: year-2	-0.5248
x22: year	0.0258
x23: year-1	-0.4006
x24: year-2	0.0860
x25: year	0.0652
x26: year-1	0.0714
x27: year-2	0.0841
x28: year	-0.4791
x29: year-1	0.0375
x30: year-2	-0.1308
x31: year	0.0015
x32: year-1	0.1372
x33: year-2	-0.5899
x34: year	-0.5867
x35: year-1	0.4235
x36: year-2	-0.4614
x37: year	-0.4151
x38: year-1	-0.0076
x39: year-2	0.4295
x40: year	-0.0202
x41: year-1	0.4697
x42: year-2	0.3128
x43: year	-0.1270
x44: year-1	0.5167
x45: year-2	0.2833

AFSC51:

Correlations

	Change in CR (AFSC=51)
Change in CR (AFSC=51)	1.0000
x1: year	-0.4955
x2: year-1	-0.0238
x3: year-2	0.4558
x4: year	-0.5095
x5: year-1	-0.5087
x6: year-2	-0.2558
x7: year	-0.5085
x8: year-1	-0.5086
x9: year-2	0.1725
x10: year	-0.5062
x11: year-1	-0.1154
x12: year-2	-0.4014
x13: year	-0.4981
x14: year-1	-0.5074
x15: year-2	0.1474
x16: year	-0.5058
x17: year-1	-0.5093
x18: year-2	-0.2955
x19: year	-0.5095
x20: year-1	-0.5001
x21: year-2	0.2564
x22: year	-0.5095
x23: year-1	0.3918
x24: year-2	0.4994
x25: year	-0.5087
x26: year-1	-0.5083
x27: year-2	-0.5074
x28: year	0.3188
x29: year-1	0.5061
x30: year-2	0.5021
x31: year	-0.5089
x32: year-1	-0.5011
x33: year-2	0.0224
x34: year	0.0805
x35: year-1	-0.3736
x36: year-2	-0.2961
x37: year	0.3805
x38: year-1	0.5091
x39: year-2	-0.3684
x40: year	0.5094
x41: year-1	0.2864
x42: year-2	-0.4457
x43: year	0.5027
x44: year-1	0.2219
x45: year-2	-0.4592

AFSC52:

Correlations

	Change in CR (AFSC=52)
Change in CR (AFSC=52)	1.0000
x1: year	-0.0556
x2: year-1	0.7581
x3: year-2	0.5603
x4: year	-0.2532
x5: year-1	-0.2837
x6: year-2	0.5448
x7: year	-0.2894
x8: year-1	-0.2876
x9: year-2	0.8064
x10: year	-0.3280
x11: year-1	0.6955
x12: year-2	-0.6645
x13: year	-0.0737
x14: year-1	-0.3114
x15: year-2	0.8071
x16: year	-0.3323
x17: year-1	-0.2177
x18: year-2	0.4874
x19: year	-0.2522
x20: year-1	-0.3846
x21: year-2	0.7871
x22: year	-0.2344
x23: year-1	0.6780
x24: year-2	0.0843
x25: year	-0.2856
x26: year-1	-0.2936
x27: year-2	-0.3099
x28: year	0.7519
x29: year-1	0.1504
x30: year-2	0.3688
x31: year	-0.2024
x32: year-1	-0.3768
x33: year-2	0.7800
x34: year	0.7986
x35: year-1	-0.7008
x36: year-2	0.4865
x37: year	0.6925
x38: year-1	0.2104
x39: year-2	-0.7066
x40: year	0.2270
x41: year-1	-0.5012
x42: year-2	-0.5845
x43: year	0.3640
x44: year-1	-0.5881
x45: year-2	-0.5513

AFSC61:

Correlations

	Change in CR (AFSC=61)
Change in CR (AFSC=61)	1.0000
x1: year	-0.1149
x2: year-1	-0.6447
x3: year-2	-0.3222
x4: year	0.0467
x5: year-1	0.0725
x6: year-2	-0.5412
x7: year	0.0774
x8: year-1	0.0758
x9: year-2	-0.6214
x10: year	0.1105
x11: year-1	-0.6220
x12: year-2	0.4275
x13: year	-0.1005
x14: year-1	0.0962
x15: year-2	-0.6301
x16: year	0.1143
x17: year-1	0.0169
x18: year-2	-0.5059
x19: year	0.0458
x20: year-1	0.1601
x21: year-2	-0.5777
x22: year	0.0308
x23: year-1	-0.4419
x24: year-2	0.0920
x25: year	0.0741
x26: year-1	0.0809
x27: year-2	0.0949
x28: year	-0.5278
x29: year-1	0.0387
x30: year-2	-0.1462
x31: year	0.0041
x32: year-1	0.1532
x33: year-2	-0.6481
x34: year	-0.6448
x35: year-1	0.4670
x36: year-2	-0.5053
x37: year	-0.4578
x38: year-1	-0.0108
x39: year-2	0.4736
x40: year	-0.0246
x41: year-1	0.5146
x42: year-2	0.3458
x43: year	-0.1419
x44: year-1	0.5665
x45: year-2	0.3135

AFSC62:

Correlations

	Change in CR (AFSC=62)
Change in CR (AFSC=62)	1.0000
x1: year	0.1096
x2: year-1	-0.3909
x3: year-2	-0.3659
x4: year	0.2148
x5: year-1	0.2305
x6: year-2	-0.2421
x7: year	0.2335
x8: year-1	0.2325
x9: year-2	-0.4481
x10: year	0.2531
x11: year-1	-0.3435
x12: year-2	0.4114
x13: year	0.1194
x14: year-1	0.2447
x15: year-2	-0.4443
x16: year	0.2554
x17: year-1	0.1962
x18: year-2	-0.2058
x19: year	0.2142
x20: year-1	0.2817
x21: year-2	-0.4516
x22: year	0.2050
x23: year-1	-0.4169
x24: year-2	-0.1252
x25: year	0.2315
x26: year-1	0.2356
x27: year-2	0.2439
x28: year	-0.4434
x29: year-1	-0.1606
x30: year-2	-0.2738
x31: year	0.1882
x32: year-1	0.2778
x33: year-2	-0.4099
x34: year	-0.4290
x35: year-1	0.4257
x36: year-2	-0.2052
x37: year	-0.4226
x38: year-1	-0.1924
x39: year-2	0.4279
x40: year	-0.2011
x41: year-1	0.2145
x42: year-2	0.3769
x43: year	-0.2714
x44: year-1	0.2702
x45: year-2	0.3618

AFSC63:

Correlations

	Change in CR (AFSC=63)
Change in CR (AFSC=63)	1.0000
x1: year	-0.2265
x2: year-1	-0.1133
x3: year-2	0.1397
x4: year	-0.2064
x5: year-1	-0.2020
x6: year-2	-0.1941
x7: year	-0.2011
x8: year-1	-0.2014
x9: year-2	-0.0271
x10: year	-0.1948
x11: year-1	-0.1481
x12: year-2	-0.1000
x13: year	-0.2252
x14: year-1	-0.1976
x15: year-2	-0.0391
x16: year	-0.1941
x17: year-1	-0.2111
x18: year-2	-0.2051
x19: year	-0.2066
x20: year-1	-0.1843
x21: year-2	0.0151
x22: year	-0.2090
x23: year-1	0.0937
x24: year-2	0.2244
x25: year	-0.2017
x26: year-1	-0.2005
x27: year-2	-0.1978
x28: year	0.0493
x29: year-1	0.2187
x30: year-2	0.1874
x31: year	-0.2130
x32: year-1	-0.1858
x33: year-2	-0.0944
x34: year	-0.0695
x35: year-1	-0.0820
x36: year-2	-0.2053
x37: year	0.0864
x38: year-1	0.2120
x39: year-2	-0.0788
x40: year	0.2099
x41: year-1	0.2027
x42: year-2	-0.1317
x43: year	0.1883
x44: year-1	0.1840
x45: year-2	-0.1426

AFSC64:

Correlations

	Change in CR (AFSC=64)
Change in CR (AFSC=64)	1.0000
x1: year	-0.4765
x2: year-1	-0.2491
x3: year-2	0.2869
x4: year	-0.4316
x5: year-1	-0.4218
x6: year-2	-0.4166
x7: year	-0.4199
x8: year-1	-0.4205
x9: year-2	-0.0682
x10: year	-0.4061
x11: year-1	-0.3216
x12: year-2	-0.2018
x13: year	-0.4737
x14: year-1	-0.4122
x15: year-2	-0.0934
x16: year	-0.4045
x17: year-1	-0.4420
x18: year-2	-0.4389
x19: year	-0.4319
x20: year-1	-0.3832
x21: year-2	0.0210
x22: year	-0.4373
x23: year-1	0.1882
x24: year-2	0.4719
x25: year	-0.4212
x26: year-1	-0.4185
x27: year-2	-0.4128
x28: year	0.0936
x29: year-1	0.4588
x30: year-2	0.3899
x31: year	-0.4462
x32: year-1	-0.3866
x33: year-2	-0.2097
x34: year	-0.1574
x35: year-1	-0.1633
x36: year-2	-0.4393
x37: year	0.1727
x38: year-1	0.4440
x39: year-2	-0.1565
x40: year	0.4394
x41: year-1	0.4340
x42: year-2	-0.2696
x43: year	0.3919
x44: year-1	0.3957
x45: year-2	-0.2930

AFSC65:

Correlations

	Change in CR (AFSC=65)
Change in CR (AFSC=65)	1.0000
x1: year	-0.1506
x2: year-1	-0.6842
x3: year-2	-0.3145
x4: year	0.0196
x5: year-1	0.0470
x6: year-2	-0.5881
x7: year	0.0522
x8: year-1	0.0506
x9: year-2	-0.6480
x10: year	0.0874
x11: year-1	-0.6655
x12: year-2	0.4293
x13: year	-0.1355
x14: year-1	0.0722
x15: year-2	-0.6587
x16: year	0.0914
x17: year-1	-0.0119
x18: year-2	-0.5531
x19: year	0.0187
x20: year-1	0.1403
x21: year-2	-0.5969
x22: year	0.0028
x23: year-1	-0.4451
x24: year-2	0.1267
x25: year	0.0487
x26: year-1	0.0560
x27: year-2	0.0708
x28: year	-0.5404
x29: year-1	0.0705
x30: year-2	-0.1254
x31: year	-0.0254
x32: year-1	0.1329
x33: year-2	-0.6851
x34: year	-0.6782
x35: year-1	0.4728
x36: year-2	-0.5525
x37: year	-0.4626
x38: year-1	0.0183
x39: year-2	0.4800
x40: year	0.0037
x41: year-1	0.5617
x42: year-2	0.3402
x43: year	-0.1209
x44: year-1	0.6130
x45: year-2	0.3051

AFSC71:

Correlations

	Change in CR (AFSC=71)
Change in CR (AFSC=71)	1.0000
x1: year	-0.5033
x2: year-1	-0.2432
x3: year-2	0.3163
x4: year	-0.4610
x5: year-1	-0.4515
x6: year-2	-0.4250
x7: year	-0.4496
x8: year-1	-0.4502
x9: year-2	-0.0514
x10: year	-0.4361
x11: year-1	-0.3212
x12: year-2	-0.2294
x13: year	-0.5008
x14: year-1	-0.4421
x15: year-2	-0.0780
x16: year	-0.4345
x17: year-1	-0.4711
x18: year-2	-0.4500
x19: year	-0.4613
x20: year-1	-0.4134
x21: year-2	0.0421
x22: year	-0.4665
x23: year-1	0.2154
x24: year-2	0.4992
x25: year	-0.4509
x26: year-1	-0.4482
x27: year-2	-0.4426
x28: year	0.1176
x29: year-1	0.4871
x30: year-2	0.4200
x31: year	-0.4751
x32: year-1	-0.4167
x33: year-2	-0.2011
x34: year	-0.1456
x35: year-1	-0.1897
x36: year-2	-0.4504
x37: year	0.1994
x38: year-1	0.4730
x39: year-2	-0.1827
x40: year	0.4685
x41: year-1	0.4445
x42: year-2	-0.2988
x43: year	0.4220
x44: year-1	0.4019
x45: year-2	-0.3226

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14. ABSTRACT

Fluctuations in the economy can cause military recruitment and retention plans to go awry. By focusing on various economic metrics, it is possible to anticipate changes in retention rates for specific Air Force Specialty Codes (AFSCs). To address the challenge of maintaining a robust and mission capable Air Force, a correlation analysis is employed to determine the relationship between certain economic indicators and AFSC retention rates. As one might suspect, retention rates follow the trend of decreasing when the economy is strong. Of interest, we found two AFSCs which go against this trend. Namely, the retention rates for officers in the Intelligence and Chaplin AFSCs are higher during a flourishing economy. Ultimately, the correlation tables revealed which economic metrics were important to specific AFSCs and the relationship between them.

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