Pilot Certification and Qualification Requirements for Air Carrier Operations (Proposal)

Group Proposal

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Abstract

The purpose of this paper is to research and analyze the proposed changes to certification requirements for pilots in air carrier operations. This paper will discuss how the regulations concerning pilots operating for Part 121 or 135 operators have changed and the crash of Colgan Air Flight 3407 that prompted the *Airline Safety and Pilot Training Improvement Act of 2009.* Through research via the Internet, this paper identifies aviation safety concerns in regards to the need for increased safety within the regional airlines and increased pilot training and experience in those airlines. Through research on the Internet and telephone interviews with Part 121 operators, the impending pilot retirement boom within Part 121 and 135 operations is analyzed in regards to the effects of pilot shortages, and the anticipated hiring problems that will arise due to the new certification requirements. Through research and telephone interviews, this paper develops proposed career paths for current and future commercial pilots who desire to work for Part 121 and 135 operators. The recommended career paths for future pilots proposed emphasizes the identified importance of receiving an aviation-based degree or joining the military to be a pilot; thus reducing the total flight-hours required to obtain Airline Transport Pilot certification and producing a safer, more qualified pilot flying for air carriers.

Certification Requirements for Pilots in Air Carrier Operations

Recent events in the aviation industry have prompted new, more restricting regulations affecting future pilots as well as the companies who hire them. These new regulations, which create higher flight hour minimums for pilots in regional and major airlines, were created to ensure safer air travel; however, with the upcoming pilot shortage they may cause more issues than expected. This paper will identify the changes between the current and new regulation affecting Airline Transport Pilot certification, expound on the Colgan Air Flight 3407 crash that prompted the new regulations, discuss the aviation safety concerns with regional airlines and pilot training and experience, and the impending retirement boom of pilots in the United States. This paper will analyze the anticipated hiring problems associated with the new regulations in regards to Part 121 air carriers, discuss pilot jobs available to commercial pilots to build flight hours, and recommend career paths for current and future pilots desiring to fly for Part 121 or 135 operators.

The New Proposed Regulation

On February 29, 2012, the Federal Aviation Administration (FAA) issued a Notice of Proposed Rule Making (NPRM) for the rules concerning pilots flying for Part 121 and Part 135 operations and Air Transport Pilot (ATP) license qualifications. The new regulation, if passed as proposed; will have a substantial effect on pilots and how they obtain an ATP license. More specifically, pilots wishing to work for a Part 121 air carrier.

The Current Regulation

Typically, a flight crew for most regional airlines and some majors airlines consists of two (2) flight crewmembers, the captain, or Pilot in Command (PIC) and a first officer or second in command (SIC). Under current regulations, a first officer (FO) only needs a Commercial Pilots License (CPL) and an instrument rating to serve as a second in command for air carrier operations. To be eligible for a CPL a person must be at least 18 years old and complete a knowledge and practical test.

To be eligible to act as captain or PIC of an aircraft used for Part 121 air carrier operations, a pilot must hold an ATP certificate and a type rating for the aircraft to be flown. To be eligible for an ATP certificate, a pilot must have at least 1,500 hours of total time and be 23 years old. The current ATP consists of a knowledge test and a practical test, and the pilot must already hold a CPL and instrument rating. (See Figure 1)

Changes to the Current Regulation

The changes announced in the NPRM are for pilots acting as a flight crew member of either a Part 121 air carrier or as a pilot of a Part 135 air taxi operation. A Part 121 air carrier is anyone who offers scheduled air carrier service (Airlines) in the United States (Federal Aviation Administration, 2012). A Part 135 air taxi operation is a company that conducts commuter or on demand operations such as charter flights (Federal Aviation Administration, 2012). The proposed regulations will be more stringent for the flight crews requiring that the SIC or first officer hold an ATP certificate and type rating for the aircraft flown for any operations under Part 121 or Part 135. Additionally, pilots acting as PIC must have a minimum of 1,000 flight hours in Part 121 or Part 135 operations before they are eligible to act as a PIC for these types of operations (Department of Transportation, 2012).

Changes to the ATP Certificate

Should the FAA's proposal become law, to be eligible for an ATP certificate under the new regulation, the pilot must be 23 years old, have at least 1,500 hours of total flight time and complete an ATP Certification training program before taking the ATP knowledge test? Also, for a multi-engine ATP the pilot must have 50 hours in the class of aircraft to be flown (Department of Transportation, 2012).

An ATP certificate with restricted privileges is also still available to pilots that wish to fly multi-engine aircraft and have either military pilot experience or are graduates of an aviation degree program (Department of Transportation, 2012). This restricted ATP certificate will be sufficient to act as a first officer or SIC for Part 121 and Part 135 operations. To be eligible for the ATP with restricted privileges a pilot must be 21 years old, have a CPL with an instrument rating, and have either 750 total flight time for military pilots, and 1,000 total hours flight time for those who graduated with an aviation degree. The pilot must also complete the ATP Certification training program prior to taking the knowledge test and pass a practical test (Department of Transportation, 2012). To serve as a captain or PIC in a Part 121 air carrier, the pilot must have 1,000 total flight hours in air carrier operations and already hold an ATP certificate and a type rating for the aircraft to be flown.

Most of these stipulations are for the ATP multi-engine land (MEL) rating. No modifications have been made to the single-engine land (SEL) ATP certificate, although many Part 121 operators do not use single-engine aircraft. The additional type rating and ATP requirement will only be for the operations in Part 121 and Part 135. All ATP certificates will require pilots to take the ATP certification training program course before taking the ATP

knowledge test. According to the NPRM, all Part 121 pilots must comply with these sections by August 2, 2013 (Department of Transportation, 2012).

ATP Certification Training Program

Any pilot under the new regulation will have to receive and log both ground and flight training to become eligible to take the ATP knowledge test. This training would be approved by the FAA and would consist of flight, simulator, and ground training. The training will consist of multi-crew operations, high altitude operations, and adverse weather conditions. Overall, this training will prepare the ATP candidate for air carrier operations and ensure the pilot can safety operate in the air carrier environment.

Colgan Air Flight 3407

The leading factor to the creation of the *Airline Safety and Pilot Training Improvement Act of 2009* was the devastating crash of Colgan Air Flight 3407. The National Transportation Safety Board (NTSB) determined the probable cause of the accident was due to pilot error with several contributing factors. This section will discuss the history of the flight, the pilots' errors and contributing issues, and the cultural impact of the crash.

History

Colgan Air is a regional contractor to Continental Airlines. Flight 3407 was departing Newark Liberty International Airport (EWR) for a short trip to Buffalo-Niagara International Airport (BUF). The aircraft flown was a Bombardier DHC-8-400, tail number N200WQ (Board, 2010). The aircraft, also known as a Q400, is a twin-engine turboprop that holds 74 passengers and has a T tail design (the horizontal stabilizer is lifted on the vertical stabilizer above the fuselage). According to the dispatch release, the total time en-route to BUF was 53 minutes

(Board, 2010). There were 45 passengers on board the aircraft with two crew members and two pilots (Board, 2010).

The crew received their taxi clearance from EWR ground at approximately 8:30 p.m. (Board, 2010). While taxiing, the first officer began a conversation with the captain that was not pertinent to taxiing operations (Board, 2010). 14 CFR (Code of Federal Regulations) Part 121.542(b) states that no flight crewmember can engage in nonessential conversation during a critical phase of flight (taxi, takeoff, landing, and operations conducted below 10,000 feet except in cruise flight) (Transportation, 1981). The aircraft was cleared for takeoff at 9:18 pm.

At approximately 10:03 pm, the crew contacted Buffalo approach control. BUF approach control told flight 3407 to plan an instrument landing system (ILS) approach to runway 23 into BUF (Board, 2010). During the descent from 5000 feet to 4000 feet, the first officer asked the captain about the ice building up on the aircraft, to which the captain replied it was more than he has seen in a "long time" (Board, 2010). The Q400 is certified for flight into known icing conditions, and the NTSB did not mention icing as an issue to the flight. The first officer continued in conversation about training and other experiences she had with the captain, again, violating the "Sterile Cockpit Rule" (Board, 2010). The crew was given the final vector to intercept the ILS approach course at an altitude of 2,300 feet (Board, 2010, p. 92). The captain began slowing the aircraft down to its final approach speed prior to reaching the Outer Marker, which is also considered the final approach fix and where the Glideslope Intercept is located (Board, 2010).

Shortly thereafter, an "ice detected" message was annunciated on the engine display unit in the cockpit (Board, 2010). This coincided with the captain calling for flaps to be moved to the 15° position (Board, 2010). The flight data recorder (FDR) indicated that the flap handle was

moved to the 10° position, and the airspeed was about 135 knots (Board, 2010). Earlier in the flight when the first officer was filling out the landing data cards, she briefed that the landing speed was 118 knots; however, she did not use the appropriate speeds for when the ice protection system was on (Board, 2010). The appropriate landing speed for the situation was 138 knots; the captain did not notice the error (Board, 2010). Due to the incorrect airspeeds placed in the Flight Management Computer, the aircraft was becoming too slow. Right after the captain called for the flaps to the 15° position, the stick shaker (a system built within the aircraft control column to provide warning to a pilot of an impending aerodynamic stall) was activated, and the autopilot disconnected with an airspeed of approximately 131 knots (Board, 2010).

The flight data recorder indicated that after the stick shaker activated and the autopilot disconnected, the captain pulled back on the control yoke, which in turn slowed the airplane to 125 knots (Board, 2010). The captain added power, not full power, the aircraft rolled to 45° bank towards the left, and then back through wings level. Following the previous oscillations, the stick pusher (a system built within the control column to assist in aiding the pilot in the direction in which to pitch to recover from an aerodynamic stall situation) activated (Board, 2010). Through the oscillations in bank, rolling right and left, the first officer placed the flaps to the 0 position, or fully retracted position; at this point, the airspeed was 100 knots. The aircraft entered extreme roll angles and the first officer asked if she should select gear up, to which the captain replied to the affirmative, and shortly after the aircraft impacted a single-family home killing one person on the ground and all on board the aircraft.

Contributing Issues

Even though the *Airline Safety and Pilot Training Improvement Act of 2009* calls for increased experience for prospective airline pilots, experience was not an issue with Colgan

Flight 3407. According the NTSB report, the captain had an Airline Transport Pilot certificate, accumulated 3,379 hours of total flying time, 1,030 hours as a pilot-in-command, and 111 hours in the Q400 (Board, 2010). The NTSB discovered that the captain had failed five check rides (flights to attain a specific rating or certificate) (Board, 2010). The first officer held a commercial pilot certificate with second-in-command privileges only in the Q400 (Board, 2010). She had a total of 2,244 hours of total flying time and had "774 hours in turbine airplanes and on the Q400" (Board, 2010, p. 11). According to the NTSB report, she only had failed one check ride in the past (Board, 2010).

Experience was not an issue, but fundamental flying skills and procedures were. The captain failed to properly recover from an aerodynamic stall that was encountered. Had he performed the right recovery procedures, which all pilots are tested on, the captain could have regained control. Normal recovery procedures for a stall are fairly standard throughout the aviation industry for any aircraft: add full power, pitch down to increase airspeed and regain airflow over the wings, then pitch back to level flight and climb. The NTSB could not discern why the captain pulled back on the yoke instead of pushing forward, nor could they discern why the first officer retracted the flaps. When the aircraft is approaching an aerodynamic stall, the flaps lower the speed at which a stall will occur; however, if they are retracted, there is an extreme loss of lift to the wings, and the stall speed increases. Many speculate that the pilots believed there was tail plane icing (icing on the horizontal stabilizer) due to their reactions to the stall. In a tail plane icing situation, the first indication is that the control column, or yoke, will buffet, or shake. To recover from such a situation, it is opposite of what the pilot should do for a wing stall: leave the power as is, retract the flaps, pitch up, and regain control. Because the

captain added power, it is unclear whether this could have been the situation or not, even though T-tail designed aircraft are much less susceptible to tail plane icing.

Skills aside, there were human factor problems to be noted. The NTSB addressed an issue with commuting (having to fly from one, two, or three airports to the base) between the captain and the first officer. Colgan's policy on commuting is such that the pilots must be at their base of operation ready for duty and rested, no matter how long the commute (Board, 2010). The captain commuted from his home in Florida to his Newark base (Board, 2010). The first officer commuted from her home in Seattle, Washington (Board, 2010). The NTSB conducted research and found that of the 137 pilots based out of Newark, 93 pilots commuted; this number, they found out, was due to the high cost of living in the Newark area and the low pay for the pilots (Board, 2010). Many regional pilots commute because the pay is very low. If pilots commute, it is their responsibility to receive the legal amount of rest prior to their duty day; the minimum rest between flight duty days is eight hours. This is a concern because of the low pay, especially for first officers; who cannot afford hotel rooms each night between duty days. Many pilots use "crash pads," shared apartments, near their domicile. The first officer on the Colgan flight 3407 commuted from her Seattle home (Board, 2010). When asked by the captain on the last commuting flight what she would do until her report time, she responded that there was a couch in the crew room "that had her name on it" (Board, 2010, p. 13).

Commuting is a major concern because it generally leads to fatigue. The longer the commute, the less rest allotted prior to starting the duty day, the more fatigued the pilot may be, which leads to mistakes being made. In the NTSB findings, they concluded that the performance of the pilots was degraded due to fatigue; however, they could not discern the extent of degradation (Board, 2010). In the transcript of the PBS documentary *Flying Cheap,* a study on

the Colgan Crash, Correspondent Miles O'Brien is talking with a former Colgan first officer (Young, 2010). The former first officer stated that when he requested to use the Fatigue policy (a non-punitive policy, for pilots who feel fatigued and unable to perform their duties, allowing pilots to not fly and not get in trouble), the Vice President of the company told him that they could "shorten" his duty day, illegally changing the paperwork, so that he could get back home and rest there (Young, 2010). Regional airlines, most subcontracted by major airlines, receive their money for the completion of each flight. If a plane does not take off, no one gets paid, so there is a general push by the upper management to get the aircraft off the ground.

Pilot fatigue while flying has been on the NTSB's "Most Wanted List" (corrective issues to reduce aircraft incidents/accidents) for quite some time. Performance degradation due to fatigue leads to mistakes made in critical phases of flight. Critical phases of flight, as discussed above according to the FARs, is when the pilot's must be in total control due to the general low altitude of flight and increased workload. Fatigue leads to the pilot's getting "behind the aircraft," or being one step behind instead of one step ahead; often resulting in an accident or incident.

Cultural Impact

The crash of Colgan Flight 3407 prompted the public to view the regional airlines in a different way. Regional airlines, such as Colgan Air, fly with the contractors paint scheme on their tail (livery). This gives a false sense of security to travelers. In the PBS transcript of *Flying Cheap,* it is brought to the attention of the viewer that the major airlines that contract the regionals have no connection to their safety measures and practices (Young, 2010). Until the Colgan crash, very few in the travelling public knew that this was the issue (Young, 2010). Even though Continental was painted on the tail of the Q400, they were not at fault, nor could be at

fault, for the events that transpired (Young, 2010). In an online Buffalo News article it states, "Two-thirds of corporate travel managers surveyed said business travelers had expressed concerns about the safety differences between major airlines and their regional partners" (Zremski, 2010). The article further states that those surveyed would pay higher prices for airfare "in return for higher safety standards at the regional airlines" (Zremski, 2010). Many of those surveyed are confused about "who's really flying their airplane" (Zremski, 2010).

A blog on the Internet titled *Regional Airline Revolution: Should you be scared?,* states, "The fundamentals of regional airlines (and the source of their ills) are this: Small aircraft mean poor economics and pilot pay, but are a necessary evil to fill larger planes at hubs" (Evan, 2010). Evan further explains that regionals have the same FAA standards as major carriers, but the fact is that they are less experienced, which leads to greater chances for mistakes (Evan, 2010). *The Airlines Safety and Pilot Training Improvement Act of 2009* is attempting to change this. By forcing first officers to have a type rating in the aircraft being flown and acquiring the ATP certificate, the FAA deems this as being more experienced. The bill was brought in place to reduce the amount of accidents/incidents in the regional carriers and to reduce safety concerns for the travelling public. The Colgan crash brought to light the safety hazards associated with regional airlines even though the issues were there well in the past.

Aviation Safety Concerns

The public's concern for aviation safety in recent years has increased due to the media highlighting errors within the aviation industry. Pilot training and experience has been in the limelight, especially for regional airlines. The media has emphasized the National Transportation Safety Board's (NTSB) probable cause, *pilot error,* as the major cause in the latest fatal regional airline accidents (United States Government Accountability Office, 2012).

The Regional Airlines

Regional airlines are where many pilots begin their careers in the aviation industry. Until recently many people did not understand how the regional airlines worked (PBS, 2012). Many of the regional airlines in the United States use the livery of their major flag carriers, as discussed above. Airlines such as *United* and their regional partners like *United Express* were believed by many to be the same companies, when in actuality, they are separate companies. Within the aviation industry, this is what is referred to as "code sharing."

Concern in the media has brought to light the airline consumer's troubles with this practice. Many of the consumers think they are flying with a major airline when in reality they are flying with a regional airline (PBS, 2012). Many concerns about pilot experience and maintenance issues within the regional airlines make many people wary of traveling with the lower cost regionals (NPR, 2012). Although many regional airline pilots are low time pilots with less experience than pilots at the major air carriers, all of them must have CPL and many have ATP certificates that require extensive training before obtaining (United States Government Accountability Office, 2012).

Pilot Training and Experience

According to the GAO's report on United States pilot training, "The FAA's pilot training requirements for certification of commercial pilots are not aligned with airline operations or emphasize skills that airlines consider important for greater aviation safety" (United States Government Accountability Office, 2012). This report stated many of the requirements, training, and the overall experience of the pilots after training do not prepare the pilot for the airline environment.

Today, with many of the United States pool of pilots retiring and air travel increasing, many people fear the regional airline will lower their standards to fill these empty seats. John Allen the FAA's Director of Flight Services states, "If the industry is stretched pretty thin… that can result in someone getting into the system that maybe isn't really the right person to be a pilot. Not everybody is supposed to be a pilot" (NPR, 2012). Should this happen, this would further decrease the safety of the traveling public and worry consumers even more.

This also presents a problem for the many pilots training to become airline pilots. In the aviation industry, the hours needed to be considered an experienced pilot, and how a pilot should accumulate these hours is widely debated. According to the NTSB, from their report on Accident Pilot Characteristics, "Pilots of the narrow body and wide body jet aircraft were, on average, a decade older than the pilots of small jets and turboprop aircraft. The pilots of the two groups of larger jet-powered aircraft also had more than twice as much total flying experience than the small jet and turboprop pilots. Interestingly, the difference among the groups in relation to the time spent in the type of aircraft is not substantial" (National Transportation Safety Board, 2011, p. 13). (Refer to figure 2)

Based on this information, it will be difficult for anyone to claim that any amount of "total flight time" constitutes an "experienced" pilot. During the years 2007-2009, there were a total of 80 accidents involving air carriers, including the major airlines. Two (2) of these accidents were fatal (National Transportation Safety Board, 2011). One of these accidents is the Colgan Air crash in Buffalo, New York on February 12, 2009. The last five (5) fatal accidents are regional air carrier crashes. Pilot error was the contributing factor in these accidents.

It is human nature for people to make mistakes. Many of these accidents were preventable. The flight crew had an opportunity to mitigate the risks before they became a factor

in these accidents. Many of the media's issues with pilot certification and experience have to do with these safety issues in the last decade. For the reasons stated above, some of these issues are based on fact. The new pilot qualifications are based on this information and in the end, is being put forward to ensure the traveling public's safety while using air travel in the United States.

The Retirement Boom

The wave of pilot retirement has started as early as 2007 but was temporarily headed off when the Federal Aviation Administration (FAA) issued a regulatory change in December 2007, which extended the mandatory retirement age for commercial pilots from 60 to 65 years of age. The looming wave of pilot retirements that threatened to paralyze the industry with pilot shortages was effectively held off for five years to December 2011. In the year 2012, the industry has begun to experience a significant exodus of retiring pilots, increasing the demand for new pilots. This demand is tempered; however, by the FAA's proposed new regulations that will increase the rest requirements for all commercial pilots. American Airlines has stated that they will have to increase their pilot workforce by 22%, adding 2,325 new pilots just to comply with the new proposed regulations. Similarly, all US airlines large and small will be affected by the new regulations, resulting in significant new hiring (Transpac Aviation Academy, 2012). According to Captain Norm Gustitis, Flight Operations Duty Manager of United Airlines, the new "Age 65 Rule" will affect the New United beginning in 2013 by an average of 250-350 pilot retirements per year over the next 11 years. This translates to a retirement rate of 50% of their 12,000 pilots over the next 11 years, thus dramatically increasing United's pilot hiring and training demands (Gustitis, 2012). The new "Age 65 Rule" was passed by Congress and signed into law by the President on December 13, 2007. The *Fair Treatment for Experienced Pilots Act* allows both pilots on domestic flights to be up to age 65, while for international flights, it allows

one pilot to be up to age 65 as long as the other pilot is under age 60 to bring it up to the November 2006 International Civil Aviation Organization (ICAO) standard. This Act finally supplanted the "Age 60 Rule" that had been in effect since 1959 (Federal Aviation Administration, 2007). Even though the law is not retroactive and rehiring of pilots is not mandatory, airlines have the option to rehire pilots who retired at 60 years of age but are still under the age 65.

According to, airline consultant Kit Darby, an average of 3000 airline pilots per year retired over the last six years not due to the age limit but either for medical reasons, furloughed, or for a variety of other reasons. According to Figure 3, the backlogged number of pilots who have to retire because they have reached the age of 65 will begin to increase the number of those retiring for other reasons beginning in 2012 (ATP Flight School, 2012).

To meet the demand that will be generated by the forecasted airline pilots retirement, 19,000 pilots will need to be trained each year until 2026. Currently flight schools train approximately 12,000 pilots annually in the United States. An average of 9,130 new Commercial Certificates were issued over the last six years, a significant portion of which have been earned by foreign students who have no intention of working for an airline in the United States after finishing their training. Comparing the 9,130 new Commercial Certificates to the average number 4,775 ATP Certificates issued over the same time frame, one can conclude that only half of Commercial Pilots advance to be captains for various airlines in the airline industry. Figure 4 demonstrates the current and future demand for airline pilots (ATP Flight School, 2012).

The new NPRM issued by the FAA is consistent if not similar to the new law, the Airline Safety and Federal Aviation Administration Extension Act of 2010 (Public Law 111-216), signed by President Obama on August 1, 2010. The "Act" calls for a minimum of 1,500 total

flight hours to obtain ATP certification. In addition to the 1,500 hours requirement, aircrews must have sufficient flight hours in difficult operational conditions that may be encountered by an air carrier, as called for by Section 217 of the new law (Transportation Research Board of the National Academies, 2011). As stated in the report by Ms. Elizabeth Bjerke and Mr. Daniel Malott, both from the University of North Dakota, the number of flight instructors aspiring to work for air carriers is on the decline due to the requirement that all Part 121 airline pilots hold an ATP certificate. Obtaining the ATP certificate is very stringent as called for by Public Law 111-216. Therefore, the decision of well qualified pilots seeking employment as a flight instructor is negatively impacted by the new regulation, hence, there will be a continuing dearth of pilots to fill the slots being vacated by retiring pilots.

Bankruptcy of many airline companies have also impacted air carrier pilots' decisions in retiring early, contributing to the boom in pilot retirements forecasted in the previous years. There were 22 U.S. airlines that have filed for bankruptcy protection from the courts since 2007. There were a total of 170 filings for bankruptcy because airline deregulation in 1978. One pilot who decided to retire early from American Airlines (AA) after working with the company for 32 years is Bill Collins. He retired at age 60 in September, 2011, two months before the company filed for bankruptcy. Even as the retirement age has been extended to 65, he knew the time to retire was right when he heard rumblings of a bankruptcy filing by AA looming on the horizon. He took the plunge and was glad he did at the right time but is saddened at the fate others still flying for American Airlines, knowing that their future pensions have now been reduced and frozen, and with no more lump-sum payouts possible. He was one of the lucky 129 pilots who were able to receive lump-sum pension payouts of between $1.5 million and $2 million from American before the company filed for bankruptcy (Cokely, 2012).

American Airlines has the most potential among all the major airlines to offer early retirement to its senior captains but even without an early retirement incentive, American has 5,888 pilots reaching the mandatory age of 65 in the next 15 years. There are more than 1,900 American Airlines pilots furloughed, but many of these furloughees are now permanently employed elsewhere and will most likely not rejoin the company unless offered great incentives like restoring their seniority and pay to previous levels if they are larger than what they have currently (Airline Pilot Central, 2005-2012).

Not everything is doom and gloom in the airline industry. The impending pilot retirement boom is news of a forecasted demand for airline pilots. USA Today reported that "After nearly a four-year drought of job openings, the airline industry is on the brink of what's predicted to be the biggest surge in pilot hiring in history. Aircraft maker Boeing has forecast a need for 466,650 more commercial pilots by 2029 — an average of 23,300 new pilots a year. Nearly 40% of the openings will be to meet the soaring travel market in the Asia-Pacific region, Boeing predicts, but more than 97,000 will be in North America" (Jones, Demand for airline pilots set to soar, 2011). Also, according to Boeing's Current Market Outlook, the single most accurate projection of what the airline industry will be doing for the next 20 years and is based on current firm orders for its aircraft, air travel has grown by an average of 4.8% each year over the past 20 years. Consequently, passenger travel will grow at 5.0% and cargo at 5.8% over the next 20 years with the fastest growing economies leading the transformation into a more geographically balanced market. During 40 years of producing the Current Market Outlook, Boeing has learned that the importance of the livelihood of people around the world is where the resilience of air transport growth comes from. Boeing also stated that "… a record 31 percent of our forecast for airplanes with more than 100 seats is already on firm order (7,900 aircraft), so we have

unprecedented visibility of future airplane requirements, giving more certainty to the shape of our forecast" (ATP Flight School, 2012).

Anticipated Hiring Problems with New Certifications for the Regional Airlines

Many regional air carriers will be affected by the new pilot qualifications and certifications be put forth with the new bill. With many airline pilots expected to retire in the next decade, many of the more experienced pilot at the regionals are leaving to go to the major airlines. As the more experienced pilots leave the regional airlines, the pressure for the regional airlines to fill these seats will become more of a problem with less qualified pool of pilot candidates not meeting the requirements to work for Part 121 air carriers. The Regional Airline Association (RAA) represents North American regional airlines. Their mission is to "...support the regional airline industry, before the congress, DOT, FAA and other federal agencies" (Regional Airline Association, 2012). The RAA submitted comments to the FAA about the NPRM for New Pilot Certification Requirements for Air Carrier Operations in April 9, 2010. The following is their concerns with the new legislation.

RAA Comments to the ANPRM

The FAA asks (2010) "Should the FAA require all pilot crewmembers engaged in Part 121 air carrier operations to hold an ATP certificate? Why or why not" (p. 4)?

The RAA takes a strong stance that obtaining 1,500 hours of total flight time is quite a hurdle for any pilot to accomplish (Regional Airline Association, 2012). The RAA states "If an applicant needs an ATP before an airline can hire him or her as a FO, a prospective pilot will likely reconsider attending a four-year aviation school as a path to a pilot career; or worse yet, he or she may choose an entirely different career because the upfront costs of acquiring 1,500 hours

of flight time is enormous" (Regional Airline Association, 2012, p. 4). The RAA goes on to say that many other countries have used "*ab-initio*[1]" training to train their pilots and have been quite successful with very low hour pilots (Regional Airline Association, 2012).

The FAA asks (2010) "Should the FAA consider crediting specific academic study in lieu of flight hour requirements? If so, what kind of academic study should the FAA accept, and to what extent should academic study (e.g., possession of an aviation degree from an accredited four-year aviation program) substitute for flight hours or types of operating experience" (p. 5)?

The RAA suggests this idea has "merit." The RAA explains that many aviation universities have "Bridge" programs with regional airlines and that many of the training is the same as that given by the regional airlines (Regional Airline Association, 2012). The RAA goes on to explain that "Air carriers should be provided the opportunity to select the best FO candidates from a variety of backgrounds and aviation experiences" (Regional Airline Association, 2012, p. 5).

The FAA asks (2010) "Should the FAA propose a new commercial pilot certificate endorsement that would be required for a pilot to serve as a required pilot in Part 121 air carrier operations? Why or why not" (p. 6)?

The RAA states that this would be unnecessary because all pilot new hires are required to go through a ground school with the air carrier after being hired (Regional Airline Association, 2012). The RAA recommends that if additional subject areas are needed, the FAA should regulate the training provided by the airlines to ensure the added subject areas are covered (Regional Airline Association, 2012).

[1] Ab-initio refers to a training program in which student pilots are trained as cadets for certain airlines, after which they are hired by that airline as a flight crew member

The FAA asks (2010) “If a Part 121 air carrier pilot does not hold an ATP certificate, should he or she nevertheless be required to meet the ATP certificate aeronautical knowledge and experience requirements of Sec. 61.159, even if he or she is serving as SIC? Why or why not” (p. 5)?

The RAA takes a strong stance to this, it states “If “experience” simply equates to 1,500 hours of flying time before a FO can sit in the right seat of a commercial flight, then our answer is ‘no.’” (Regional Airline Association, 2012, p. 5). The RAA says that most airlines already train all pilots to ATP knowledge standards and that the ATP certificate should be accomplished when the pilot fulfills the necessary “experience” requirements (Regional Airline Association, 2012).

The FAA asks (2010) “Are aviation/pilot graduates from accredited aviation university degree programs likely to have a more solid academic knowledge base than other pilots hired for air carrier operations? Why or why not” (p. 5)?

The RAA agrees that pilot candidates with aviation degrees are better prepared for the structured training environment of an air carrier (Regional Airline Association, 2012). The RAA also states that the regional airlines always consider candidates who do not take that route and are often excellent potential candidates for the regional airlines (Regional Airline Association, 2012).

The FAA asks (2009) “Should the FAA credit academic training (e.g., a university-awarded aviation degree) towards such an endorsement and if so, how might the credit be awarded against flight time or operating experience? We are especially interested in comments on how to balance credit for academic training against the need for practical operating experience in certain

meteorological conditions (e.g., icing), in high-altitude operations, and in the multi-crew environment" (p. 7).

The RAA states, "There is no data suggesting that the current balance of credit for academic training versus actual operating experience is not effective. The value of practical operating experience provided in a pilot school environment should not be diminished." (Regional Airline Association, 2012, p. 7.).

The FAA asks (2009) "Would a carrier-specific additional authorization on an existing pilot certificate improve the safety of Part 121 operations? Why or why not" (p. 8)?

The RAA explains that they believe a process, such as this would allow the FAA to create a certificate that would be in between the CPL and ATP. They emphasize that all regional air carriers train their FO's to the same standards as the captains and such a certificate is not needed (Regional Airline Association, 2012).

Based on the comments to the NPRM by the Regional Airline Association to the FAA, the RAA clearly believes it is in the best interest for the regional airline industry and consumer travel that the FAA leaves the current regulation as is. Should the NPRM pass as written, the future of career airline pilots in the U.S. could be significantly affected as well as the regional airline industry itself. Without a pool of qualified regional airline pilots, regional airline flights would be seriously affected and the future of the regional airlines could be at risk. The total flight time required to become a FO in a regional jet would be excessive for most aspiring airline pilots and many of the pilot candidates could choose other career fields. However, the RAA does states should the new requirements be enacted; they believe pilots with aviation related degrees and flight training do have an advantage in the industry. The RAA stated that many of the changes

the FAA proposed could be implemented with certain changes already in place, such as the ATP Certification training program. Pilots are already required to attend a ground school after being hired. Implementing additional training in this phase would be cost effective and would make the most sense. Every airline has different standard operating procedures (SOP's) and these would be practiced in the ground school as they would be in the actual airline environment for that particular airline.

Career Paths for Pilots Wishing to Become Airline Pilots

Not for a long time has it been possible to receive a commercial pilot certificate and immediately begin flying with the airlines. Prior to *The Airline Safety and Pilot Training Improvement Act of 2009*, the chance that a pilot with 250 hours could be hired as a first officer was extremely low; mainly in part to the overage of pilots in the industry. Because the bill passed to require first officers to have their ATP certificates, it will be a necessity to build those flight hours required outside Part 121 and 135 operations. This section will discuss the pilot job options available for commercial pilots (not requiring an ATP certificate), the minimum hours and training required for those operations and the recommended career paths for pilots wishing to acquire their ATP certificate and fly for Part 121 and 135 operators.

Pilot Jobs

There are several commercial pilot jobs available to pilots who do not possess an Airline Transport Pilot certificate. This sub-section will discuss the nature of the jobs listed, special requirements (if any), and will conclude with a table listing the jobs, the average hours earned a month, and general flight hours required.

The first pilot job to be discussed is the most common to commercial pilots; becoming a flight instructor. There are many benefits to being a flight instructor. One benefit is that by being

able to teach a student to fly, the flight instructor must be very knowledgeable on the material. The learning associated with being a flight instructor is valuable and will promote success in new hire classes as the pilot progresses in aircraft size and complexity. The author of this section talked with a representative of Ameriflight LLC., a cargo-based Part 135 operator. When asked how being a flight instructor played a role in acquiring a job as a pilot, the representative stated that if presented with two resumes, the flight instructor with fewer hours would be hired over the commercial pilot with higher hours. The representative stated that flight instructors have a different mentality than pilots who have not instructed. That mentality translates to safer operations. By having a Flight instructor certificate, mainly the MEI (multi-engine instructor), there are more job opportunities prior to reaching airlines and in the airlines. Being a check airman for an airline or company has increased benefits such as pay and preferred schedules.

A consideration to be taken in before conducting flight instruction, is to know what Part of the Federal Aviation Regulations the school flies under. Part 61 flight schools are much less standardized and generally have fewer students. Andrew Hill, a former Part 61 flight instructor, stated in a phone interview that due to the diverse and low amount of students at the school, he did not acquire very many hours (Hill, 2012). Students range from high school age through people in their 50s and sometimes 60s. Generally, these are people who just want to get their private pilot rating to fly their own aircraft, or just to get it, so consistency in low. Part 141 flight schools have a higher volume of students and the student base is generally those that wish to fly for a living. Pilots will acquire far greater hours in a year, compared to those of most Part 61 flight schools. Part 142 flight schools are usually those associated with collegiate institutions and are much more standardized. These schools allow for greater hour gains per year than Part 61, but often times may be less than Part 141 operations.

The requirements to be a flight instructor are minimal. The pilot must have a commercial rating, followed by obtaining their certified flight instructor certificate. Although not required, the instrument instructor rating is preferred and gives more options to teach and acquire more hours. Obtaining the CMEI (certified multi-engine instructor) certificate is crucial for developing multi-engine time required for ATP minimums and for the opportunity to be a check-airman at an airline or company. Regulations pertaining to flight instruction and the minimum hours can be found in 14 CFR Part 61. The training is difficult and time consuming, but valuable in experience.

The second job to be discussed, and less common, is being a banner towing pilot. The majority of these jobs are in metropolitan areas (av8er, 2009). The aircraft most often used are common in flight training, so having to learn a new aircraft is generally not an issue. An article written by a banner towing pilot titled *Banner Towing: An Inside Look*, describes the job as "…not your average flying, the majority of the time you are flying around at very low airspeeds, and at very low altitudes…" (clearedirect, 2008). The author further states that the job does get boring at times but will make the pilot "a very good stick and rudder pilot," indicating it builds on the fundamental flight skills of flying by hand (clearedirect, 2008). In a phone interview conducted with the owner/operator of Aerial Messages in Orlando, Florida, Remoi Colin stated that he prefers to hirer pilots from Part 141 and Part 61 flight schools due to less standardized instruction (Colin, 2012). He described that the hours were not consistent, but more seasonal, and due to the current state of the industry, he has not been hiring due to the high retention rate for his company (Colin, 2012). Banner towing is a good option due to the lack of hours required; however, the pilot will only fly in visual flight rule conditions (VFR) and will not gain the required instrument flight rule conditions (IFR) that airlines operate day to day.

The following job to be discussed is aerial photography/survey. Dependent on the operation, the aircraft used may range from single engine Cessna 172s to high performance multi-engine aircraft. In an interview with a former C-172 survey pilot, Joshua Adams, he stated that he acquired the job in Maine with just his commercial pilot certificate and 200 hours of total flight time (Adams, 2012). Joshua stated that he gained valuable experience in cross-country operations, IMC (instrument meteorological conditions) flight, precision flight, and VFR flight. The flight hours acquired were vast; however, the pay was minimal. He would be on cross-country trips ranging from a couple of days to a month (Adams, 2012). This type of job is great, but if the pilot has a family to support, it can be rough.

In another phone interview with Vince Ammann, a survey pilot for Keystone Aerial Surveys, he stated that his company has higher required hours to be a pilot, due to higher performance aircraft being flown, but there are options for low time pilots (Ammann, 2012). Vince told the interviewer that a pilot can be a photographer on the flight, acting as a crewmember. The pilot can build time, especially cross country time, during the ferry flights in-between jobs, followed by upgrading to a pilot position once the flight hour requirements have been met (Ammann, 2012). There are aerial photography and survey companies all over the U.S., so the chances of acquiring a job as this type of pilot are available.

The next job discussed is being a pilot flying skydivers. Due to various aircraft used, many multi-engine, pilots must have their commercial licenses appropriate to the aircraft being flown. Some companies that have more frequent operations will use higher performance aircraft, which require type ratings. The job is local, so there is little to no cross country experience gained; however, pilots can acquire hundreds of hours in the peak skydiving seasons. Andrew Hill, a pilot for Mile High Skydiving based out of Longmont, Colorado, stated in a phone

interview that the company uses high-performance turbine King Air aircraft as well as a Twin Otter (Hill, 2012). Due to the requirement for type ratings to be the pilot-in-command of these aircraft, the minimum hours to fly for the company are high; however, during the peak season, the turbine flight hours acquired, necessary for major carriers, builds fast (Hill, 2012).Alex, an employee of Red Rock Skydiving based out of Cottonwood, Arizona, stated in a phone interview that the insurance generally requires more than the 250 flight hours achieved by a commercial pilot certificate, but with special training, or having a degree from a flight institution, pilots can be hired with less time (Alex, 2012).

The following pilot jobs listed are available without the requirement of an ATP certificate; however, many require "knowing" someone within the company or field. Agricultural pilots, or crop-dusters, generally require special training in the type of flying to be done as well as possible type ratings for certain aircraft. Traffic watch pilots, often contracted by local news and law enforcement are consistent, but only found in metropolitan areas (av8er, 2009). Glider tow pilots often have positions available but require specific training according to the Federal Aviation Regulations. This job is seasonal, and the pay is minimal (av8er, 2009). Aircraft ferry pilots are sometimes hired by companies, or by aircraft owners. Aircraft dealerships are a great way to get a ferry type job, but these jobs are competitive. Along with ferry pilots, aircraft sales is an option. Most of the time, the pilot would be conducting demonstration flights for perspective buyers but this also requires that the pilot have sales experience as well (av8er, 2009). There are other aviation jobs, but will not be listed in this paper due to the lack of job options available. (Refer to figure 5)

Recommended Career Paths

Many student pilots are unaware of the limited options for commercial pilot jobs. This research paper focuses on the recent changes in the aviation industry and how those changes will affect future airline pilots. Using the group's research on this project, this sub-section will give recommendations on career paths for commercial pilots wishing to fly for Part 121 or 135 operators. The recommendations will focus on the quickest and most efficient methods to reach the new Airline Transport Pilot certificate minimums. Three routes will be discussed: the collegiate route, the military route, and the Part 141 flight school route.

The first route to be discussed is the collegiate route. As discussed previously in this paper, an aviation-based degree will allow for pilots wishing to fly for Part 121 or 135 operators to receive a "restricted" ATP certificate at approximately 1000 total flight hours. The 500-hour reduction could make the difference of a year or more. Along with the reduction in hours, an aviation-based degree will set the pilot up for success throughout his or her aviation career. The overall knowledge gained through collegiate aviation schools will make the pilot more competitive. Delta Airlines requires a four-year degree, but does not state that it must be aviation based (Delta Airlines Inc., 2012). Southwest Airlines on the other hand does not require a degree, but states that it is preferred (Southwest Airlines Co., 2012). Whether or not a degree is required, the pilot will be more apt to receive the job, once he or she attains the required hours and has a four-year aviation based degree.

The standard career path, as recommended by the authors of this paper begins with receiving an aviation-based degree from an accredited college. While attending college, the student pilot will obtain the standard ratings (private, instrument, commercial, commercial multi-engine, certified flight instructor, instrument instructor, and multi-engine instructor). Upon completion of at least the certified flight instructor with instrument instructor (CFI/II), the

student will obtain a position as a flight instructor with the institution. All Part 141 and 142 schools prefer to hire their instructor pilots from within. Due to the various nature of operations conducted in flight instruction, this path will allow for a more timely transition to meet all the minimums of ATP certification. This path will also build the pilot's knowledge and skills, making him/her a more valuable asset to a Part 121 or 135 operator.

Major airlines require a certain amount of turbine flight time; about 1000 hours at average. This requirement means that the pilot, once he reaches the ATP minimums must move to a higher performance aircraft. Commonly, this is done by flying for the regional airlines. Flying for the regionals allows the pilot to gain experience in the commuter operations and ensures a smoother transition into the major airlines. Dependent on the operation the pilot desires to fly in (charter, commuter or cargo); the pilot should transition into that field as soon as possible. For example, if the pilot wishes to fly for UPS or FEDEX, a recommended path, after flight instruction is to fly for a smaller cargo company that utilizes turbine aircraft, build time, and once the requirements are met, make the move to UPS or FEDEX. Conversely, if the pilot wishes to fly for a major airline, after flight instruction fly for the regionals such as Express Jet, Skywest, Horizon, etc., to build up time and experience, followed by applying to one of the majors. There is no good, solid evidence as the amount of time it will take to be hired by the major airlines; however, with the impending pilot shortage, one can estimate that the time from beginning college to flying for a major airline is in the vicinity of 10-15 years.

The main downside to the collegiate route is money. The price to earn a four-year degree with the appropriate flight ratings is high. For example, at Embry-Riddle Aeronautical University in Prescott, Arizona, average student costs for a degree plus the essential flight training as listed above, is approximately $282,800 (Cyber Compass Corporation, 2012). Embry-Riddle is a

private college so costs tend to be higher. A public institution would be slightly cheaper. For example, Kansas State University, well-known for their aviation program, estimates the total cost for a four year degree plus flight costs as approximately $148,198 for out-of-state students (Cyber Compass Corporation, 2012). The future pilot must keep in mind that there are grants and scholarships available for flight students, but there will be debt left-over.

The next route to be discussed is the military route. To be a pilot in the military, the applicant must be an officer (there are other option besides officer, but they are not common unless the applicant has prior service). To be an officer, the applicant must attain a bachelor's degree. The nature of the degree is not as vital, but it is recommended that if desiring to be a pilot, the degree should be based on aviation. The military route offers extensive flight hours and an easy conversion to the major airlines; however, the officer is generally required to commit anywhere from 8-11 years after flight training. The major airlines, for quite some time, have preferred to hire former military pilots due to their experience and extensive flight training. For fixed wing pilots, specifically those wishing to fly for the major airlines after military service, the U.S. Navy, Air Force, Marines and Coast Guard are the best options. The U.S. Army has mostly helicopter pilots, with a very small fixed wing group.

The Reserve Officer Training Corps (ROTC) program for the specific branch chosen is the best option for acceptance into the military as well as reduced tuition costs. ROTC offers exceptional scholarships at the majority of U.S. universities and allows for a smooth transition into military life. After completion of the required service for the specific branch, the pilot can obtain a restricted ATP certificate with only 750 hours of total time. Military service is highly valued in the aviation industry, but military life may not be the right choice for some. If the

military route is chosen, the future pilot must research all branches to determine the best option for him or her, and realize the commitment he or she will be required to give.

The cheapest way to acquire the ATP certificate minimums would be to attend an accelerated pilot program at a Part 141 flight school, followed by obtaining an instructor pilot job with the school. These schools are based on obtaining the pilot ratings as fast and as cheap as possible. Some schools do offer degree programs along with the pilot's flight training. There are several flight schools that offer accelerated training, and some, guaranteed instructor jobs upon completion; however, this route is not recommended by the authors of this paper due to the importance of attaining a four-year degree.

The recommended career paths addressed are strictly the opinion of the authors of this paper. There are countless ways to obtain the minimum hours required for ATP certification; however, the authors believe the best options for the future pilot's success in the aviation industry is the collegiate path or military path. Each path has its' benefits and downsides, but either will ensure the future Part 121 or 135 pilot has the best chance for success.

Conclusion

The new pilot certifications standards for Part 121 and 135 will make it harder for pilots wishing to fly in the right seat of any commercial airliner. These new certification standards were proposed because the FAA believed these new standards would ensure safety. Safety is paramount in all aviation operations. Professional pilots the world over can attest to this. In the end, all pilots should be striving to be just that, professional pilots. The history of the new bill and the crash that sparked the debate of pilot qualifications in the flight deck, is discussed in this paper. Many of the sections of this paper were mentioned so the reader would know the reason why the pilot qualifications for air carriers was changed. Although, these qualifications have

been changed, and it will be a challenge to complete, it is not impossible to become an airline pilot. It will take dedication and perseverance to become an airline pilot and only those willing to rise to the challenge will be successful. In the end, only those pilots that love the job will make it to the flight deck of an airliner. The recommended career path section discussed three viable options for the student pilot to take to achieve this goal. An aviation degree can and will be a plus for any student pilot wishing to become an airline pilot. Various jobs were discussed to help the student pilot build flight time. With the retirement boom, the jobs will be available. In the end, it is up to the prospective pilot to choose the correct course of action that suit him or her.

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Figures

Figure 1

Scenario	Current Regulations	Proposed Regulations
Receive an ATP certificate with airplane category and multiengine class rating.	Be at least 23 years old, hold a commercial pilot certificate with instrument rating, pass a knowledge test and practical test, and have at least 1,500 hours total time as a pilot.	Meet all of the requirements in the current regulations, successfully complete a new ATP Certification Training Program before taking the ATP knowledge test, and have a minimum of 50 hours in class of airplane.
Receive an ATP certificate with restricted privileges (multiengine class rating only)	None	Be at least 21 years old, hold a commercial pilot certificate with instrument rating, successfully complete a new ATP Certification Training Program, pass ATP knowledge and practical tests, and for military pilots, have a minimum of 750 hours total time as a pilot, or for a graduate of an aviation degree program, have a minimum of 1,000 hours total time as a pilot.
Serve as a second in command (first officer) in part 121 air carrier operations.	Hold a commercial pilot certificate with appropriate category and class ratings and an instrument rating.	Hold an ATP certificate with appropriate aircraft type rating OR Hold an ATP certificate with restricted privileges and an appropriate aircraft type rating.
Serve as pilot in command (captain) in part 121 air carrier operations.	Hold an ATP certificate with appropriate aircraft type rating and have at least 1,500 hours of total time as a pilot.	Meet all of the requirements in the current regulations and have a minimum of 1,000 flight hours in air carrier operations (as an SIC in part 121 operations, a PIC in operations under either § 135.243(a)(1) or § 91.1053(a)(2)(i), or any combination thereof).

Figure 2

Pilot Age/ Flight Experience	Aircraft Type			
	Wide Body	Narrow Body	Small Jet	Turboprop
Pilot Age	51.5 (40–60)	49 (39–59)	37 (26–56)	36 (26–47)
Total Flying Time (hours)	11,196 (5,004–15,000)	11,178 (4,000–22,500)	5,965 (3,749–22,812)	3,481 (2,250–7,800)
Time in Aircraft Class (hours)	2,394 (193–7,591)	4,246 (303–19,300)	2,751 (101–4,772)	2,000 (110–3,789)

Figure 2- Average (median) and range of accident pilot age and flight experience by aircraft type, 2007–2009.

**Review of U.S. Civil Aviation Accidents, 2007–2009*

Figure 3

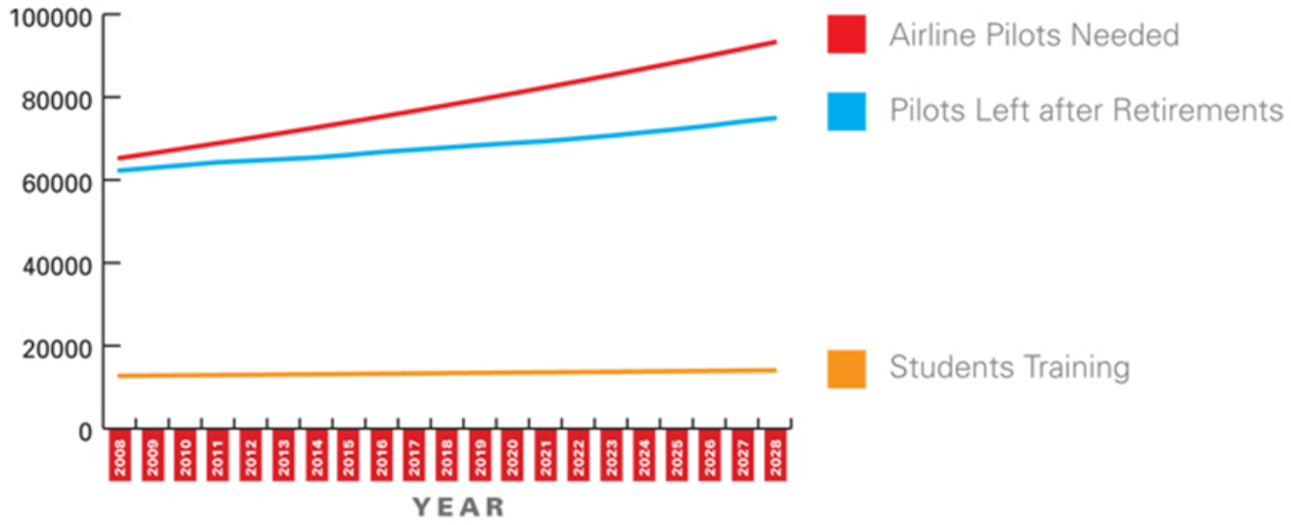

Figure 4

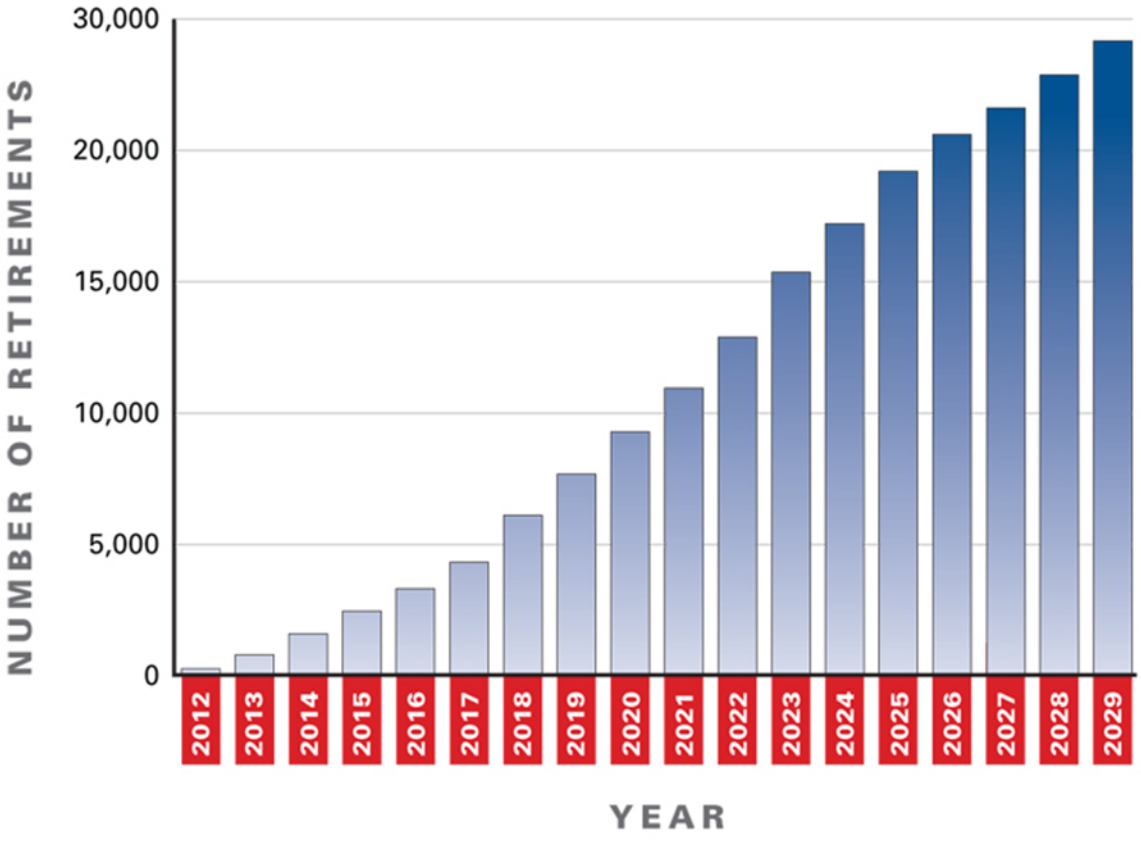

Figure 5

Pilot Job	Minimum flight hours required	Average flight hours acquired/month	Average annual income
Part 61 Flight Instructor	250	66-125	$10,000-$30,000
Part 141/142 Flight Instructor	250	66-125	$25,000-$50,000
Banner Tow Pilot	250	10-100	$15,000-$25,000
Skydiving Pilot	250-1000	40-100	Unknown
Aerial photography/survey pilot	250-1000 and/or 100 multi-engine	60	$46,000

*Values received from aviationcareerguide.com, http://www.simplyhired.com/a/salary/search/q-Aerial+Photography+Pilot & interviews conducted with above mentioned pilots.