

Analysis of the Airline Pilot Shortage

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Abstract

The pilot shortage in the United States currently affects airlines and pilots drastically. The airlines have been forced to implement new solutions to recruit and retain pilots. These solutions include dramatic pay raises and cadet programs. One of the most significant causes of the pilot shortage is the aviation industry's rapid growth. Other factors include the aging pilot population and high flight training costs. In addition, regional airlines, a major source of pilots for major airlines, have a historically low pay rate, which deters pilots from wanting to work for them. This situation is compounded by a lack of hiring in the 2000s for various reasons. The effects of the pilot shortage include decreased flights, loss of revenue, and closing of some regional airlines. Airlines have implemented various solutions aimed at increasing the number of pilots. These include an increased pay rate, job pathway programs through universities, and guaranteed interviews or jobs. The solutions proposed will likely prove their effectiveness in minimizing the pilot shortage over the next decade.

Note: This research was correct prior to the onset of the Covid-19 pandemic, which has affected the airline industry.

A global pilot shortage currently affects not only pilots but also their employers. As a result, commercial airlines are forced to ground aircrafts because there are not enough pilots to fly them. Analysts project that the airlines will be short 8,000 pilots by 2023 and 14,139 pilots by 2026 (Klapper and Ruff-Stahl, 2019).

A shortage of 8,000 pilots translates to 835 grounded aircraft, and over 61 million passengers lost since 2016 (Klapper and Ruff-Stahl, 2019). As a result of these substantial numbers, the airlines have implemented several new incentives and programs, including dramatic pay raises and cadet programs designed to fast-track new pilots into commercial airline pilot positions.

The purpose of this report is to analyze the pilot shortage in the airline industry. Report topics include:

- causes of the pilot shortage
- effects of the shortage on the airlines and pilots
- proposed solutions

The report concludes that airlines must find ways to hire new pilots if they are to keep up with the projected industry growth. The significant need for new pilots in the airlines will result in better opportunities for airline pilots to begin their professional pilot careers sooner and to make more money.

Causes of the Pilot Shortage

Several factors contribute to the pilot shortage, including the aviation industry's rapid growth.

Aviation Industry Growth

Among the most significant causes of the pilot shortage is the aviation industry's rapid growth. The Federal Aviation Administration (FAA) reports that over 16 million flights are handled yearly in the United States alone, and this number is expected to grow (FAA, 2019).

From 2017 to 2018, the number of yearly passengers grew to over 1 billion, an increase of over 4.8% (FAA, 2019). The growth of the number of seats occupied in flight directly reflects the growth of the industry. In 2000, aircraft capacity reached an average of 66% per flight. In 2015, aircraft capacity rose to an average of 83% per flight (Nikle and Bjerke, 2018).

In 2016, 42% of domestic flights in the United States were flown by a regional airline, indicating a significant number of pilots are continuously needed for the regional airlines (Nikle and Bjerke, 2018). If this growth continues throughout the airlines, more aircraft and pilots will be needed.

Lower Fuel Prices

Contributions to the growth of the aviation industry include low oil prices (Nikle and Bjerke, 2018). From 2014 to 2015, average jet fuel prices dropped from \$2.92 per gallon to \$1.53 per gallon. This decrease in fuel prices increased net profits by \$18.1 billion in only one year (Schipper, 2017). Figure 1 shows the relationship between greater operating revenue to lower fuel costs.

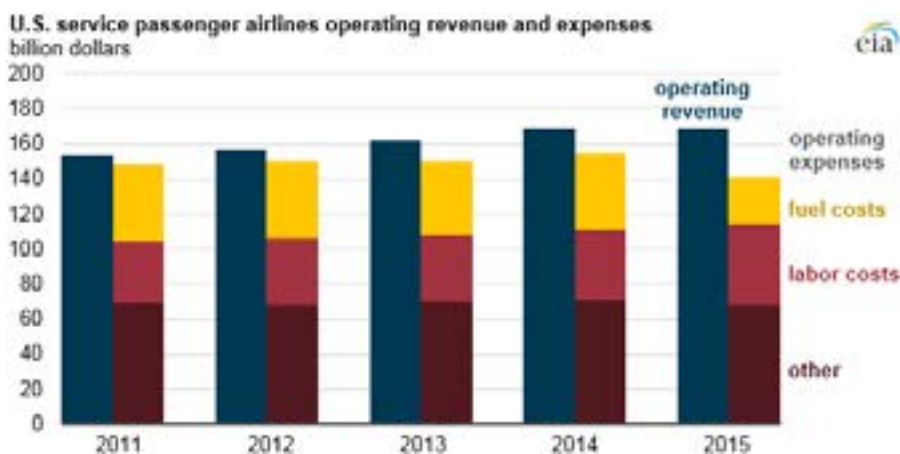


Figure 1: Graph of U.S. Service Passenger Airlines Operating Revenue and Expenses 2011-2015

Source: U.S. Energy Information Administration, based on Bureau of Transportation Statistics. *Note.* Graph 1 above shows the decrease of jet fuel costs over time, as well as the increase in labor costs and operating revenue at U.S. airlines.

Source: Adapted from “*Lower airline fuel costs reduce U.S. airlines’ operating expenses, increase net profits,*” by Mark Schipper, February 17, 2017, p. 1. Retrieved from <https://www.eia.gov/todayinenergy/detail.php?id=30012>

Economic and Population Growth

Economic and population growth in the United States over the past several years have also contributed to industry growth in terms of increasing demand for commercial airline travel (Nikle and Bjerke, 2018). In the United States, the real gross domestic product (GDP), or the market value of goods and services, increased by 2.9% in 2018 (Duffin, 2019). During the economic recession in 2009, the real GDP decreased by -2.5% (Duffin, 2019). Since 2009, the real GDP has an overall increasing trend. This increasing GDP indicates more money is available for air travel (Duffin, 2019).

Aging Pilot Population

Another factor contributing to the pilot shortage is the aging pilot population. This situation is because of several factors.

Retirement Age Limit

For one thing, commercial airlines in the United States mandate the pilot retirement age at sixty-five (Klapper and Ruff-Stahl, 2019). Thus, a pilot's flying life in the airlines is limited. Between 2017 and 2028, an average of 500 pilots per year is expected to retire because of the mandatory retirement age (Thompson, 2018).

Retirement and Medical Losses

Other factors contributing to the loss of pilots include retirement and medical grounding as pilots retire within the next fifteen years or are grounded due to losing medical certification, the need for pilots increases (Lutte and Mills, 2019). The average age of US airline pilots is 50.6 years old, and almost half of airline pilots are over 50 (Lutte and Mills, 2019).

There is no estimated number of pilots losing medical certifications. However, the mandatory retirement age and the current average age of pilots translates to half of the current airline pilots retiring in the next fifteen years.

High Training Requirements

An additional problem contributing to the pilot shortage involves the costs in time and money to train new pilots. In 2014, the FAA issued 7400 airline transport pilot (ATP) certificates versus only 5300 ATP certificates in 2018, a decrease associated in part with the time and money required to obtain certification (Lutte and Mills, 2019).

Flight Training and College Degree Costs

Many certificates and ratings are required by the airlines, including private pilot, instrument, commercial, multi-engine, flight instructor, flight instructor-instrument, and airline transport pilot (ATP) (Thompson, 2018). The flight training cost for all these ratings can be \$50,000 to \$100,000, in addition to the possible costs of a higher education degree (Lutte and Mills, 2019). This historically high flight training cost is exacerbated by federal caps on undergraduate student loans of \$58,000, requiring student pilots to find private sources of funding for the remainder (Lutte and Mills, 2019).

In addition to the required ratings, a college degree is preferred, although not required. Furthermore, a college degree increases the already high cost to become an airline pilot. A four-year degree at Embry-Riddle Aeronautical University costs \$256,000. This cost can be offset by pilots instructing other pilots for money; however, the overall high cost incurs a large amount of debt for student pilots (Thompson, 2018). These high training and college costs can discourage people from pursuing a pilot career.

Required Flight Hours

Along with spending large amounts of money on training, pilots must build flight hours before they can legally fly for the airlines. In 2013, the Federal Aviation Ad-

ministration cited a new flight hour regulation. The United States requires a minimum of 1500 flight hours for an airline transport pilot certificate (ATP), although there is an hour reduction for a restricted ATP (R-ATP) (Klapper and Ruff-Stahl, 2019).

The R-ATP is awarded through military flight time or higher education. In 2013, 17% of regional airline pilots had an R-ATP. This translates to 83% of regional airline pilots required to gain a full 1500 hours before being certified to fly for the airlines (Klapper and Ruff-Stahl, 2019).

These extra required hours take more time to gain, and sometimes more money, directly delaying pilots' careers in the airlines and the airlines' ability to hire new pilots when they are needed.

Decreasing Number of Military Pilots Transitioning to Commercial Airlines

The commercial airlines have traditionally relied on military pilots to fill their numbers since they typically have earned required certificates and flight hours through military service. However, the number of military pilots transitioning into the airlines is dropping because of a pilot shortage in the military. This decrease of military pilots suggests the airlines need to hire more pilots with a degree and R-ATP to sooner meet the desired number of pilots (Klapper and Ruff-Stahl, 2019).

The Department of Defense expects the pilot shortage to get worse over the next ten years as fewer pilots join the military. As of 2018, the Marine Corps was short 238 fixed-wing pilots (Thompson, 2018), and the Army was short 731 helicopter pilots. As of 2016, the Air Force was short 1,544 total pilots (Thompson, 2018). These military pilot shortages are caused by several reasons, including low quality of life for military men and women, high military flight operations, and uncertain military budgets (Thompson, 2018).

Historically Low Pay

Another cause of the shortage includes historically low regional airline pay rates (Lutte and Mills, 2019). Pilots are given a guaranteed minimum number of flight hours per month, which is used to estimate a yearly salary (Bjerke and Nikle, 2018). According to Bjerke and Nikle (2018), in 2012, a first-year first officer at a regional airline received about \$22.00 per flight hour or \$19,800 a year, with 75 flight hours guaranteed. In 2007, the lowest pay rate for a first-year first officer was only \$16 per flight hour (Bjerke and Nikle, 2018), or only \$14,400 per year (Bjerke and Nikle, 2018).

In comparison to the pay rate at major airlines, a first-year first officer at a major airline in 2012 received an average of \$59 per hour or \$49,560 a year, with 70 flight hours guaranteed. The large pay gap between the regional airlines and major airlines grew when comparing contracts and pilot seniority (Bjerke and Nikle, 2018).

Lack of Hiring During the 2000s

Other causes of the pilot shortage include the 9/11 attack in 2001 and the economic recession in 2008. The terrorist attack on 9/11 created a general fear of flying, despite new federal safety regulations. Increased oil prices caused a rise in flight costs for passengers and operating costs for the airlines. Therefore, people were not flying enough for airlines to earn the revenue needed to hire more pilots.

As a result of the lack of revenue, regional airline pilots' careers stagnated because the major carriers were not hiring. This career stagnation proved its long-term effects when the major airlines finally hired the regional pilots, leaving the regionals short of pilots (Bjerke and Nikle, 2018).

Effects of the Pilot Shortage

The effects of the shortage are widespread, affecting the regional airlines the most since their revenues and operating margins are smaller than those of large commercial airlines (Klapper and Ruff-Stahl, 2019). Regional airlines are smaller airlines that fly to smaller airports that large air carriers do not service (Bjerke and Nikle, 2018).

Loss of Pilots at Regional Airlines

Regional airlines traditionally hire new pilots who need to earn more commercial flight hours before they are eligible to apply for large commercial airlines. Thus, the regional airlines supply a large number of pilots to major airlines.

As the major air carriers such as Delta Airlines or American Airlines take pilots away from the regional airlines, the pilot shortage can drastically affect the regional airlines. A study was done in 2019, analyzing how different pilot deficit numbers impact aircraft parked and passengers lost. The study, involving three different scenarios using various pilot deficit numbers, revealed that regional airline passenger and revenue losses increased when fewer pilots were flying, due to more flights being grounded (Klapper and Ruff-Stahl, 2019).

Loss of Revenue at Regional Airlines

The loss of pilots at the regional airlines contributes to the loss of revenue at the regional airlines. The regional airlines earn revenue by agreements and contracts with major airlines, so the regional airlines are legally required to meet a certain number of flights under a major carrier (Klapper and Ruff-Stahl, 2019).

In more extreme circumstances, this loss of revenue can lead to bankruptcy. In 2016, for example, Republic Airways filed bankruptcy because it was unable to meet the required flights because of a lack of pilots. Thus, the lack of pilots required Republic Airways to ground more aircraft. This was a difficult situation, but it was a situation that directly resulted from the pilot shortage. Furthermore, regional airlines that are unable

to make their required flights impact the major airlines, who received revenue from the regionals based on flight numbers (Klapper and Ruff-Stahl, 2019).

To recruit more pilots for the shortage, airlines have to spend more money. Airlines offering incentives like higher pay and sign-on bonuses can create a loss of revenue compared to the investments they are making. These large investments toward pilot hiring and retaining were a contributor to Republic Airways' bankruptcy in 2016 (Klapper and Ruff-Stahl, 2019).

Proposed Solutions for the Pilot Shortage

In response to the pilot shortage, commercial airlines adopted several approaches, including increased pay rates and pathway programs.

Regional Airline Effective Wage	2007 (1)(2)	2011 (1)(2)	2014 (1)(2)	2016 (1)(2)(3)	2017 (1)(2)(3)	Effective Wage % Change (2007-2017)
Air Wisconsin	\$22,077	\$23,427	\$24,498	\$31,500	\$26,977	249%
Compass	\$20,862	\$22,032	\$22,698	\$32,634	\$54,400	161%
Commute Air	\$17,100	\$21,051	\$27,000	\$43,886	\$55,319	224%
Endeavor	\$18,657	\$23,328	\$22,527	\$57,000	\$55,144	196%
Envoy	\$21,519	\$22,905	\$23,256	\$56,210	\$56,210	161%
ExpressJet	\$20,835	\$20,745	\$20,907	\$34,650	\$48,400	132%
GoJet	\$19,320	\$20,504	\$20,815	\$44,160	\$44,546	131%
Horizon	\$29,535	\$30,364	\$31,192	\$32,135	\$63,924	116%
Great Lakes	\$14,400	\$14,616	\$14,616	\$28,582	\$29,082	102%
Mesa	\$17,526	\$20,183	\$20,183	\$30,183	\$57,759	230%
Piedmont	\$23,022	\$24,426	\$25,533	\$50,398	\$50,956	121%
PSA	\$20,196	\$21,357	\$21,618	\$53,517	\$53,868	167%
Republic	\$20,655	\$20,655	\$20,655	\$48,860	\$52,979	156%
SkyWest	\$17,408	\$19,895	\$19,895	\$36,757	\$37,418	115%
Trans States	\$20,061	\$21,447	\$22,428	\$40,215	\$55,201	175%
Average	\$20,212	\$21,796	\$22,521	\$41,379	\$52,812	161%

Table 1: US regional airline pay scale changes.

Note. Table 1 above demonstrates that the average effective wage for a first-year first officer at multiple regional airlines grew 161% from 2007 to 2017.

Source: Adapted from *US regional airline pay scale changes*, by Elizabeth Bjerke and Alex Nikle, 2018, p. 9. Retrieved from <https://commons.erau.edu/cgi/viewcontent.cgi?article=1233&context=ijaaa>

Increased Pay Rate

Increasing pilot salaries has been recognized as an essential solution to the pilot shortage. For one thing, regional airlines increased pay rates and bonuses starting in 2016. In December of 2017, a first-year First Officer at a regional earned an average of \$38.33 per hour, with the highest pay rate of \$50.16 per hour at Endeavor Airlines (Bjerke and Nikle, 2018). Other pay incentives include sign-on bonuses and the company paying for hotels when pilots have a layover overnight. If pilots are already certified to fly a specific regional jet aircraft, then they can receive a bonus (Bjerke and Nikle, 2018).

The average effective wage, which includes bonuses and incentives for the first

year at a regional airline in 2017, was \$52,812, in contrast to 2007, when the average effective wage was \$20,212. Because of the pilot shortage, the effective wage increased by 161% in only ten years. Table 1 shows the different wages among various regional airlines over the last ten years (Bjerke and Nikle, 2018). Since first-year officer pay at major airlines is around twice that of regional airlines (Klapper and Ruff-Stahl, 2019), these pay increases encourage people to spend the money to train and become pilots to fly for the airlines, as well as help pilots decide which airline they want to fly for.

New Pathway and Recruiting Programs

Another solution involves new recruiting programs that promote hiring through regional pathway programs as well as direct flow hiring by major carriers (Klapper and Ruff-Stahl, 2019).

Regional Airline Pathway Programs

Some major commercial airlines have partnered with regional airlines to make it easier to transition directly to the major airlines. For example, after a specified time at PSA (not to be confused with Pacific Southwest Airlines) and Envoy regional airlines, pilots can move directly to American Airlines mainline as a first officer.

Other regional airlines offer guaranteed interviews to a mainline air carrier (Klapper and Ruff-Stahl, 2019). Many regional airline pathway programs offer financial bonuses like tuition reimbursements for flight instructor training and retention bonuses for staying past their promotion time.

Major Airline Pathway Programs

Another innovative program pairs major airlines with universities and colleges that provide aerospace programs. The major airlines work with universities or higher education institutions through their pathway programs, such as Delta Propel, through Delta Airlines, and Southwest Airlines Destination 225 (Lutte and Mills, 2019). These programs at the regional airlines and major airlines, referred to as “cadet pathway programs” (Lutte and Mills, 2019), provide mentor pilots who guide new pilots through their training and give exposure to the airline experience.

Student pilots at these higher education institutions enroll in cadet programs in specific airlines, and these cadet programs are a large contributing factor to which airlines graduating pilots will pick for a job. In fact, some pilots pick schools based on the availability of partner programs at the university (Lutte and Mills, 2019).

Many student pilots can participate in more than one cadet pathway program, allowing them to interact with more airlines. These interactions can help pilots ultimately decide which airline they want to fly for (Lutte and Mills, 2019).

The Airline Owners and Pilots Association (AOPA) looked at some of the most

recent pathway programs implemented in colleges and universities across the United States. United Airlines partnered with the Metropolitan State University of Denver, which allows students to interview at United Airlines prior to meeting the minimum flight hour requirement. Students who are participating in this program will fly at one of United's regional airlines, and, within five to seven years after their initial employment, the pilots will flow into United without an intermediate interview (Tullis, 2019).

JetBlue partnered with Embry-Riddle Aeronautical University to invest students in an air charter company to build time. After four years, Embry-Riddle graduates will fly A320s, a large aircraft that major air carriers fly. This program allows students to gain experience and the required time without going through the regional airlines. This program could exclude any hesitancy towards flying for a regional airline (Tullis, 2019).

Major airlines are not the only major air carriers that are implementing pathway programs. Both UPS and FedEx started programs within the last few years. UPS Airlines started an internship program with a small cargo carrier called Ameriflight, where pilots can build time at Ameriflight and advance sooner to UPS. Fed Ex partnered with Delta State University, just one of many universities, for their program Purple Runway. Student pilots will fly for feeder cargo carriers to FedEx to build time (Tullis, 2019).

American Airlines partnered with several flight schools with their cadet program to accelerate students' flight training. Students at these flight schools interview at Piedmont, PSA, or Envoy, who all have direct-flow into American Airlines. This program does not guarantee a job, but it does provide resources to progress faster (Tullis, 2019). The only difference between this program and only the direct-flow program is the timeline.

One of the most significant cadet programs is the Delta Propel program through Delta Airlines. Delta is currently partnered with eight universities, including Middle Tennessee State University. In this program, students follow one of three pathways:

- Flying for a regional connection airline
- Job-share as a flight instructor for the student's university and Delta Private Jets
- Flying for the Air National Guard

After forty-two months at one of these three pathways, the student is given a qualified job offer to fly for Delta mainline, provided they meet federal hour minimums (Delta, 2019). This program accelerates the timeline between graduation at a higher education institution and the major air carriers at a rate no other pathway program advertises. Delta Propel even offers private student loans at the lowest rates available through Wells Fargo, another feature other pathway programs do not offer (Delta, 2019).

Bypassing Regional Airlines to Major Airlines

A question currently up for discussion in the airline industry is whether or not

the regional airlines are an adequate investment to make and if the major airlines should have their own aircraft to fly the smaller routes.

Instead of contracting a regional airline, Delta Airlines bought older, smaller aircraft with low operating costs to make those regional flights. With this solution, the initial investment is larger than that of a regional airline, but major airlines would not worry about regional airline reliability. This method of regional flying would likely increase the major airlines' ability to recruit more pilots (Klapper and Ruff-Stahl, 2019).

Conclusion

The pilot shortage has forced airlines to find solutions for recruiting and retaining pilots (Lutte and Mills, 2019). The causes of the shortage include the mandatory retirement age, the high flight-hour requirement, flight training costs, and the lack of pilot hiring in the 2000s. Furthermore, pilots moving from the regional airlines to the major airlines leave the regional airlines short of pilots. Thus, the shortage affects both the regional airlines and major airlines by causing grounded aircraft and passengers and revenue losses. As a response to the pilot shortages, the airlines have created solutions that include higher pay-rates and innovative recruitment and training programs.

Overall, these solutions, especially the cadet pathway and direct-flow hiring programs, are likely to prove their effectiveness in minimizing the pilot shortage over the next decade (Klapper and Ruff-Stahl, 2019). Over 95,000 pilots are expected to be hired within the next 20 years (Nikle and Bjerke, 2018), and, with these new incentives and programs, all airlines should have a fairly easy job recruiting qualified pilots.

Pilots aspiring to fly for the airlines will not have to worry about finding a job over the next several years. The airlines will find them.

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