

Appendix B – Sources of Forecast Risk and Uncertainty

OVERVIEW

The forecasts are based on information available at the time of the study, measurable factors that drive air traffic, and assumptions about their future trends. Actual results could differ materially from the forecasts if any assumptions do not hold or unexpected events cause traffic to decrease or increase significantly. The Airport operates in a dynamic business environment where a variety of factors are at play. Many of these factors, often intertwined, are subject to volatility and uncertainty, introducing risk—both downside and upside—to forecast activity levels.

DISEASE OUTBREAKS

Passenger air travel demand is sensitive to disease outbreaks. Disease outbreaks pose an unpredictable danger in various ways, such as customer confidence, health and safety, international travel policies, and the well-being and availability of sufficient staffing and labor. In 2020, the COVID-19 pandemic became a significant threat to the entire aviation industry and could remain a concern for some time. Widespread vaccination is key to containing the spread of the disease, restoring people’s confidence in the public health and safety of air travel, and increasing people’s comfort level with crowded spaces. The distribution of COVID-19 vaccines has aided the recovery of air travel and the overall U.S. economy. However, new variants of the disease, such as Delta and Omicron, and new waves of infection slowed the recovery process. Current COVID-19 infection levels sit among its lowest numbers throughout the pandemic, and the U.S. Department of Health and Human Services ended the COVID-19 Public Health Emergency as of May 11, 2023.¹ That said, continuous monitoring of COVID-19 continues to be essential to minimize serious illness, hospitalizations, and fatalities while maintaining public confidence.

ECONOMIC CONDITIONS

The aviation industry is pro-cyclical: aviation traffic grows during periods of economic expansion as consumer and business incomes grow, increasing overall demand, including for air travel. Conversely, aviation traffic declines during periods of economic recession, as consumer and business incomes fall, causing overall demand and the demand for air travel to fall.

¹ Centers for Disease Control and Prevention, “Evolution of Pandemic Efforts,” *COVID Data Tracker Weekly Review*, February 24, 2023, <https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covidview/index.html>.

Various factors can trigger an economic recession. In 2020, the COVID-19 pandemic and the extreme mitigation measures triggered a global economic recession. The U.S. economy recovered to its pre-COVID output level in the second quarter of 2021 and has continued to grow, though at a slower pace. While the pandemic has eased, the U.S. economy faces other economic risks. In the short-term, inflationary pressures and supply constraints remain the most pressing concerns. International trade tensions, continuing geo-political tensions, weakness in portions of the global economy, financial market volatility, and the high level of U.S. government and private debt present economic risks for the U.S. economy. COVID-19 policies internationally have the potential to strain global supply chains, disrupt international trade, and hinder economic growth.

The growth of the U.S. economy faces several headwinds resulting from unfavorable, long-term demographic shifts, including population aging and declining population growth. An aging population will raise government expenditures on social programs and exert upward budgetary pressure on the U.S. government. This pressure will add to high U.S. government debt levels, which increased during the pandemic with federal programs aimed at alleviating the impacts of the pandemic on individuals and businesses. In addition, a dwindling population base could gradually reduce the overall demand for consumer goods, including the demand for air travel.

U.S. AIRLINE INDUSTRY VOLATILITY

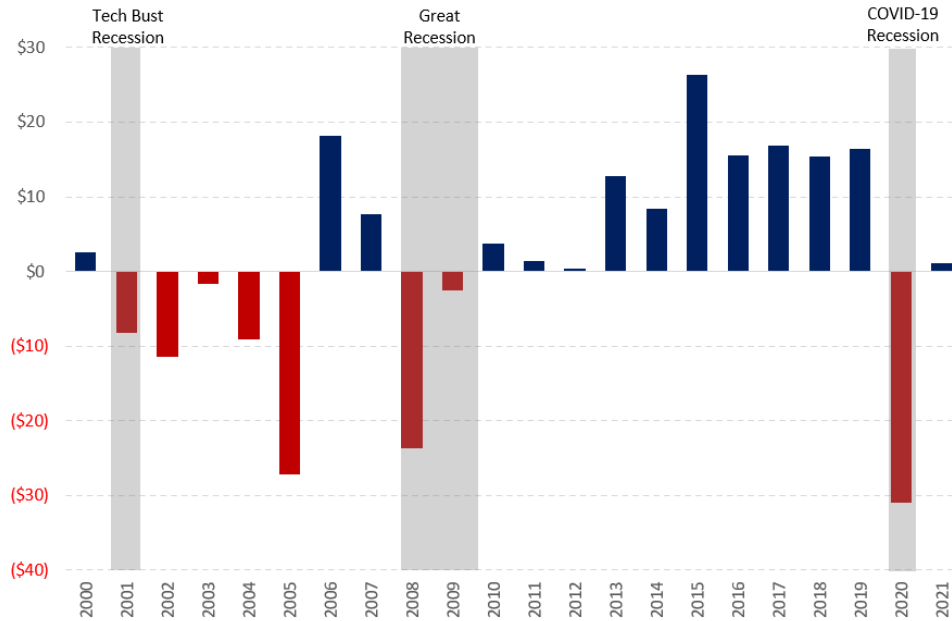
The U.S. airline industry is extremely volatile. It is vulnerable to many exogenous factors, such as economic downturns, sharp increases in oil prices, adverse weather, disease outbreaks, travel restrictions, terrorism threats, and geopolitical tensions. The volatility is reflected in the U.S. airline industry's balance sheet.

Over the two decades before the pandemic, the U.S. scheduled passenger airline industry incurred annual net losses in 7 years, netting a profit of \$61.2 billion over the 20 years from 2000 through 2019, as shown in **Figure B-1**. After persistent losses during most of the 2000s, the U.S. scheduled passenger airline industry realized net profits almost yearly during the 2010s. The industry thrived amid the long economic expansion during the 2010s and the sharp decrease in fuel prices. The industry also reaped benefits from several business improvements made during the 2008-2009 Great Recession, including cost-cutting and productivity-enhancement measures. The improved financial performance enabled U.S. airlines to renew their fleets, increase scheduled flights and seats, and reduce capacity constraints.

In 2020, the U.S. scheduled passenger airline industry outlook took a dramatic downturn with the spread of COVID-19. **Figure B-2** shows the net income quarterly during the COVID-19 economic downturn. As air travel slowed dramatically in the first half of 2020, U.S. scheduled passenger airlines incurred an annual net loss of more than \$35 billion, the largest annual loss since 1977. However, in 2021, as air travel resumed, the industry began to recuperate some losses incurred in the previous year, operating a \$1.2 billion profit. To alleviate the negative financial impact of the COVID-19 pandemic on U.S. airlines' finances, the U.S. federal government provided financial relief to the U.S. airlines in three federal aid

packages: the Coronavirus Aid, Relief, and Economic Security Act (CARES Act); the Coronavirus Response and Relief Supplemental Appropriations Act (CRRSA); and the American Rescue Plan Act of 2021 (ARPA).

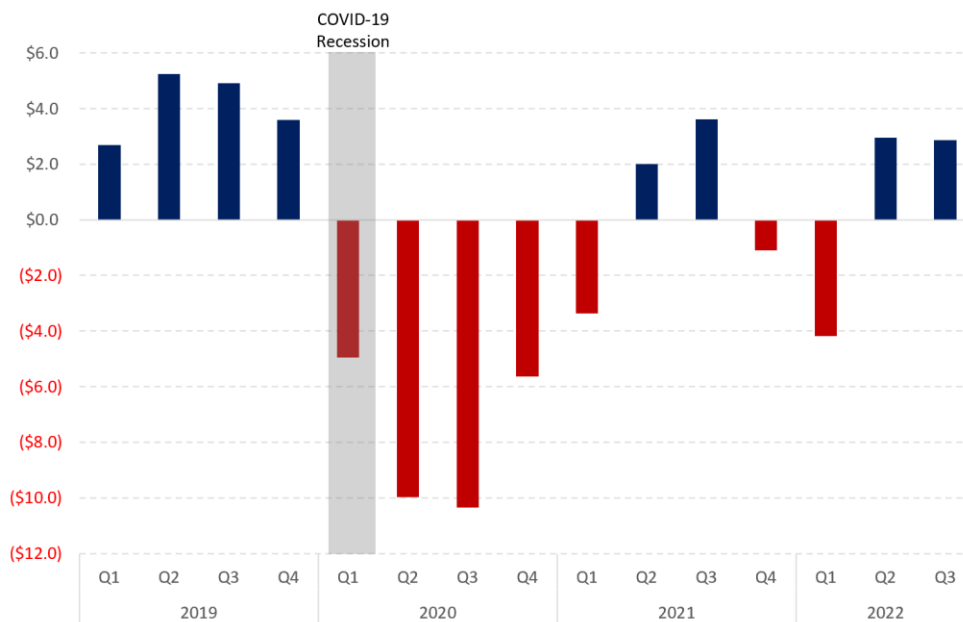
Figure B-1 Annual Net Income (\$ Billions), U.S. Scheduled Airlines, 2000-2021



Source: U.S. Bureau of Transportation Statistics (Form 41 Schedule P-1.2); Unison Consulting, Inc.

Note: Gray areas indicate economic recession periods.

Figure B-2 Quarterly Net Income (\$ Billions), U.S. Scheduled Airlines, Q1 2019-Q3 2022



Source: U.S. Bureau of Transportation Statistics (Form 41 Schedule P-1.2); Unison Consulting, Inc.

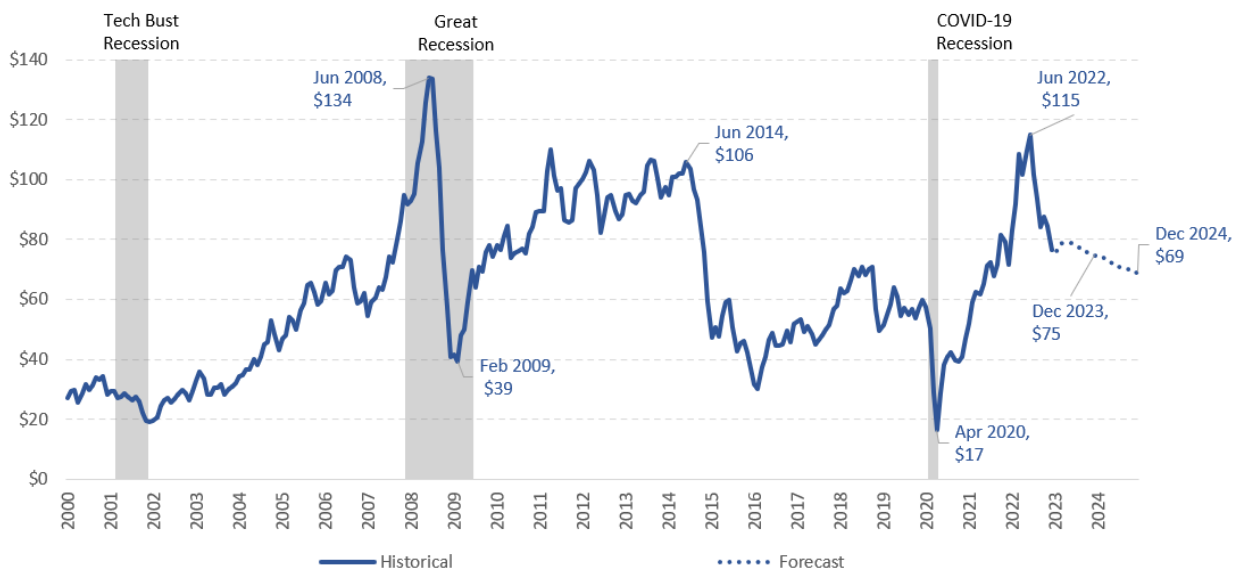
Note: Gray areas indicate economic recession periods.

VOLATILITY OF OIL PRICES AND IMPLICATIONS FOR AVIATION FUEL COST

Volatility in oil prices directly affects aviation fuel costs, a significant component of airlines’ operating costs (the correlation between prices is 0.95).² Increases in the price of oil, therefore, translate directly into higher airline fuel costs. Crude oil prices are presented in **Figure B-3**, and the price of aviation fuel in **Figure B-4**. In the 2000s, record oil price increases raised fuel costs, pressured airlines’ finances, and contributed to extensive net losses industry-wide. However, oil prices fell steeply by 2015, contributing to sustained profitability in the U.S. airline industry in the 2010s.

In 2020, the global economic recession and the oil supply glut kept oil prices low. As a result, airlines enjoyed low fuel prices, providing some cost relief during the pandemic. In 2021, the global economic recovery began to push oil prices up. Oil prices rose to a high of \$115 per barrel in June 2022, exacerbated by the Russia-Ukraine conflict. By December, prices had fallen to \$75 per barrel and are currently forecast to decline to under \$70 per barrel through 2024. Nevertheless, oil prices will continue to be affected by changing global economic conditions, geopolitical factors, and the unpredictability of actions taken by the Organization of the Petroleum Exporting Countries (OPEC).

Figure B-3 Crude Oil Price, West Texas Intermediate, \$/Barrel, January 2000-December 2022 (Forecast to December 2024)

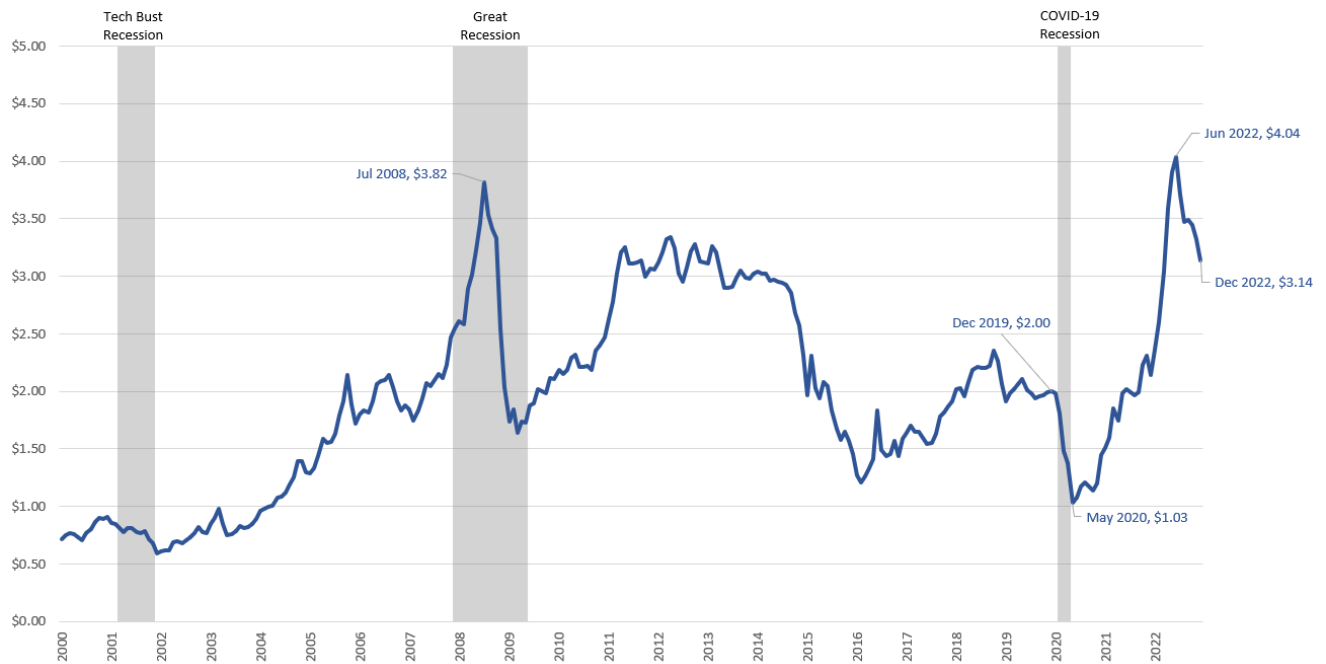


Source: U.S. Energy Administration; Unison Consulting, Inc.

Note: Gray areas indicate economic recession periods.

² Based on data from the U.S. Energy Administration and U.S. Bureau of Transportation Statistics and calculations by Unison Consulting, Inc.

Figure B-4 Aviation Fuel, Price per Gallon, Monthly, 2000-2022



Source: U.S. Bureau of Transportation Statistics; Unison Consulting, Inc.

Note: Gray areas indicate economic recession periods.

AIRLINE MARKET CONCENTRATION

Airline market concentration raises concerns if it could lead to the abuse of market power or excessive price increases. Monopoly market power is less of a concern at PSP given the relatively even distribution of market shares among airlines. Alaska Airlines, the largest carrier in terms of market share, made up about 22 percent of the Airport’s total enplanements in 2022, declining from a high share of 27 percent in 2020. Alaska’s share decline was partly due to Southwest’s entry in 2020, whose market share increased from 1 percent in 2020 to 18 percent in 2021 and 2022—just slightly behind American Airlines’ second largest market share of a little over 18 percent in 2022. No other airlines had more than 18 percent market share in 2022.

AIRLINE ECONOMICS, COMPETITION, AND AIRFARES

Airfares have an important effect on passenger demand, particularly for relatively short trips where the automobile (or occasional bus or train) is a viable alternative. Fare levels are also particularly impactful for price-sensitive “discretionary” travel, such as vacation travel. Airfares are influenced by airline operating costs and debt burden, passenger demand, capacity and yield management, market presence, and competition. The aviation activity forecasts for the Airport assume that, over the long term, annual increases in airfares will not exceed annual inflation. If they do, the increases in airfares would dampen forecast traffic growth.

AIRLINE MERGERS

Over the long run, the airline industry has been consolidating in response to competition, cost, and regulatory pressure. Airline mergers affect service and traffic at airports when they consolidate facilities, optimize route networks, and route connecting traffic through other hubs. The impact on affected airports usually happens within a few years—sometimes immediately—following a merger. The impact can be significant or trivial, depending on whether the merging airlines have a large market share at an airport and whether they carry significant connecting traffic through the airport.

STRUCTURAL CHANGES IN DEMAND AND SUPPLY

Historically, major crises have prompted lasting structural changes in the aviation industry’s demand and supply. For example, the 2001 terrorist attacks prompted more stringent airport security measures requiring passengers to arrive at the airport much earlier for departing flights. This reduced some of the time advantages of air travel over ground transportation for short-haul flights. The COVID-19 pandemic brought about significant effects on the aviation industry, some of which could be structural and permanent.

On the demand side, COVID-19 could usher in a “new normal” in consumer behavior, social interactions, and business methods that would permanently alter travel propensities and preferences. Public health and safety concerns may influence customers to consider ground transportation for longer distances previously traveled by air. For vacation travel, consumers are adapting to the COVID-19 environment by favoring destinations accessible by ground transportation. The accelerated adoption of technology for virtual meetings and conferences could result in a permanent downshift in business travel demand. These shifts in air travel demand can potentially delay the revitalization of the industry to pre-COVID traffic and growth levels.

On the supply side, U.S. airlines have taken steps to become smaller—accelerating the retirement of old aircraft, deferring new aircraft orders, and cutting workforces during the worst period of the COVID-19 pandemic. However, the streamlined fleet and workforce have constrained U.S. airlines in restoring adequate capacity to accommodate the strong rebound in air travel demand. Moreover, it could take years for U.S. airlines to resolve these capacity constraints amid supply chain problems in aircraft manufacturing, a pilot shortage, and an overall shortage in labor supply.

One favorable trend is the accelerated adoption of no-touch technologies by airlines, airports, and the TSA. These new technologies will help allay public health and safety concerns and speed up passenger processing. By saving passengers time and reducing uncertainty, these technologies could help restore the competitiveness of air travel against ground transportation and stimulate traffic recovery and growth.

LABOR SUPPLY CONSTRAINTS

The COVID-19 pandemic and resulting recession led to employee layoffs across many airlines, and companies went into 2021 with a significantly smaller workforce than they had before the pandemic. In addition, the demand for leisure travel accelerated in the first half of 2021, requiring airlines to adjust their workforce to meet demand. As a result, insufficient numbers of qualified employees could limit the airlines' ability to provide an adequate supply of flights and seats and, by extension, slow overall air traffic growth. Competition between companies to attract and retain skilled personnel has intensified and threatens to further impact industry growth.

Pilot shortages are a significant concern for U.S. airlines. Several factors contribute to the shortage of pilots. First, approximately 5,000 experienced pilots accepted early retirement in response to airlines' desire to cut staff during the pandemic. Second, many pilots historically gained their training via military service. However, the use of drones and reductions in military staff has limited that pathway. Third, the aviation industry is heavily gender-biased (women comprise only about 5 percent of the global pilot workforce). This failure to diversify severely reduces the size of the pilot labor force. Fourth, the working conditions and initial pay for new pilots are discouraging. The substantial investments in time, money, and experience required to become a pilot can be a disincentive to joining the industry.

GEOPOLITICAL CONFLICTS AND THE THREAT OF TERRORISM

Geopolitical conflicts and acts of terrorism disrupt air transportation. The terrorist attacks of September 11, 2001, serve as a constant reminder of the severe threat that such acts have on the aviation industry. Travel threats and warnings elevate airport security measures, resulting in more meticulous passenger screening, longer waits at security screening lines, and increased passenger anxiety—all discouraging air travel.

The Russian invasion of Ukraine is the latest example of a geopolitical conflict affecting air transportation. The United States, Canada, and the European Union have closed their airspace to Russian aircraft. In retaliation, Russia has limited the use of its airspace to the airlines of many countries. These constraints have significantly impacted flight routes and flight times for global travel.