

FAA Aerospace Forecasts Fiscal Years 2025-2045

Economic Environment

In 2024, global real GDP expanded but continued its gradual deceleration from the spike in the second year of the pandemic. GDP surged by 6.4 percent in 2021 but slowed to 2.7 percent in 2024, a few tenths slower than the average over the decade prior to the pandemic. During the pandemic, inflation spiked, and government deficits swelled, conditions that monetary and fiscal authorities have worked to combat with higher interest rates and reduced spending – efforts that have restrained economic growth. Global GDP is expected to ease further in 2025 to 2.5 percent due to still-elevated interest rates, before edging up a couple of tenths to approach its long-term trend rate.

In the U.S., real GDP growth slows from 2.9 percent in FY2024 to 2.1 percent in FY2025 and 1.7 percent in FY2026. This “soft landing” scenario projected by S&P Global results from a combination of still-high interest rates, fading impacts from COVID relief measures, and slowing growth of household wealth. Accompanying slowing growth, unemployment begins to rise, with rates increasing from 3.9 percent in FY2024 to 4.4 percent, 4.7 percent and then 4.8 percent in the three subsequent years. This restrains demand but also inflation which allows the Federal Reserve to lower interest rates steadily through the end of the decade. Dampened demand, however, shows up in restrained consumer spending which grows 2.7 percent in FY2024, 2.6 percent in FY2025 and 1.7 percent in FY2026 before returning to trend at over 2 percent. After FY 2026 through the end of the forecast, GDP growth averages 1.7 percent per year and the unemployment rate stabilizes at 4.2 percent. As with other advanced economies, U.S. GDP growth is hindered by an aging

population that slows labor force growth and contributes to the decline in the participation rate.

Compared to the U.S., real GDP growth in the European Union plus U.K. is considerably weaker in 2024 at 0.9 percent and again at 1.1 percent in 2025. From there, growth bumps up to 1.5 percent before settling to its trend rate of about 1.3 percent. Aggressive deficit reduction efforts, high interest rates and population growth that turns negative in 2025 all dampen GDP growth.

In Japan, owing to sluggish consumption and exports, GDP declined by a slight 0.1 percent in 2024. Growth strengthens to 1.0 percent in 2025 with increased consumption from elevated wage growth and moderating inflation, although exports remain under pressure. Trend growth rates of 0.8 percent resume in the second half of the decade as the country’s longstanding problems of a shrinking labor force and aging population persist, though partially offset by some productivity increases.

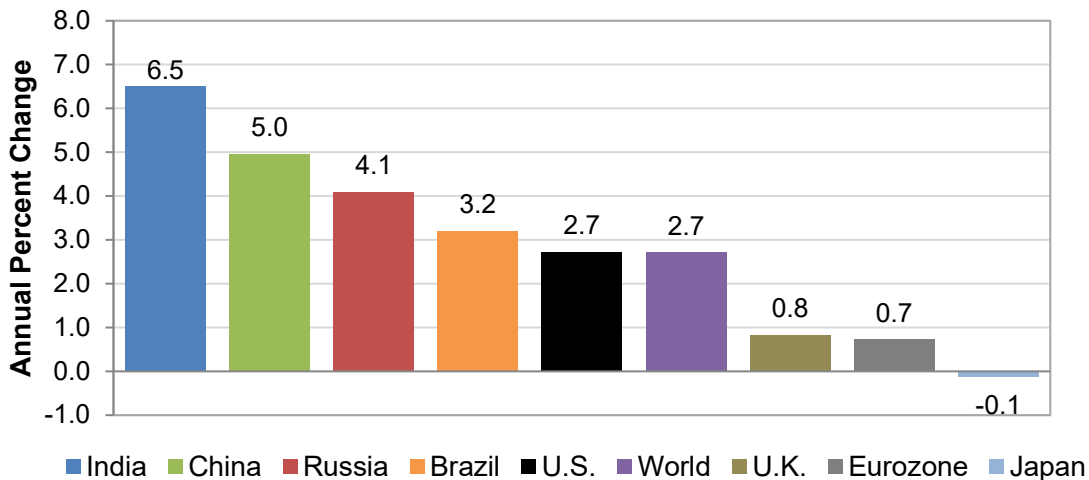
Although China’s GDP growth remains relatively strong, its long-term slowing continued in 2024 with growth of 5.0 percent that followed a rate of 5.2 percent the previous year. The slowdown is expected to extend through the forecast horizon with a rate of 3.9 percent in 2035 and 3.1 percent in 2045. Contributing factors include a shrinking population, declining returns on infrastructure investments, excess supply in the housing market and sluggish domestic demand.

Among large emerging markets, Brazil’s economy sees growth slow in 2025 to 2.3

percent due to restrictive monetary policy and a contraction in the labor market. Longer term, Brazil's economy benefits from its large domestic market and abundant natural resources but is restrained by high interest rates and large fiscal deficits. Russian growth rose in 2024 to 4.1 percent from wartime government spending but easing consumption and a cooling labor market are expected to slow growth in 2025 to 2.6 percent. Growth eases steadily to end the decade at 2.0 percent as the emigration of skilled professionals and military age people adds to downward demographic trends.

Productivity losses from the withdrawal of foreign companies and investment also contribute to the slowdown. Finally, India's strong expansion in both the manufacturing and services sectors was tempered in 2024 to 6.5 percent due to reduced government investment and the central bank's policy tightening. In the medium-term, declining contributions from the public sector will be offset by favorable demographics including strong consumer spending from growing middle-income households, increasing contributions from the service sectors, and undeveloped natural resources.

World Economic Growth in 2024

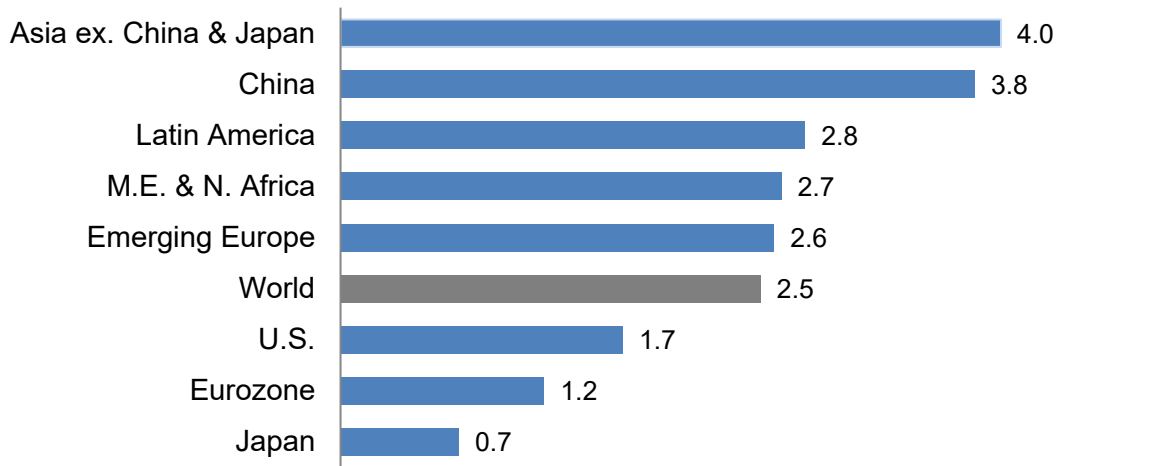


Source: S&P Global

S&P Global forecasts world real GDP to grow at 2.5 percent a year between 2025 and 2045. Emerging markets, at 3.7 percent a year, are forecast to grow faster than the global average but at lower rates than in the early 2000's. Asia (excluding Japan), led by India and China, is projected to have the fastest growth followed by Latin America,

Eastern Europe, Africa and the Middle East. Growth in the more mature economies (1.5 percent a year) will be lower than the global trend with the fastest rates in the U.S. followed by Europe. Growth in Japan is forecast to be very slow at 0.7 percent a year reflecting deep structural issues associated with a shrinking and aging population.

Asia Leads Global Economic Growth (annual GDP percent growth 2025-2045)

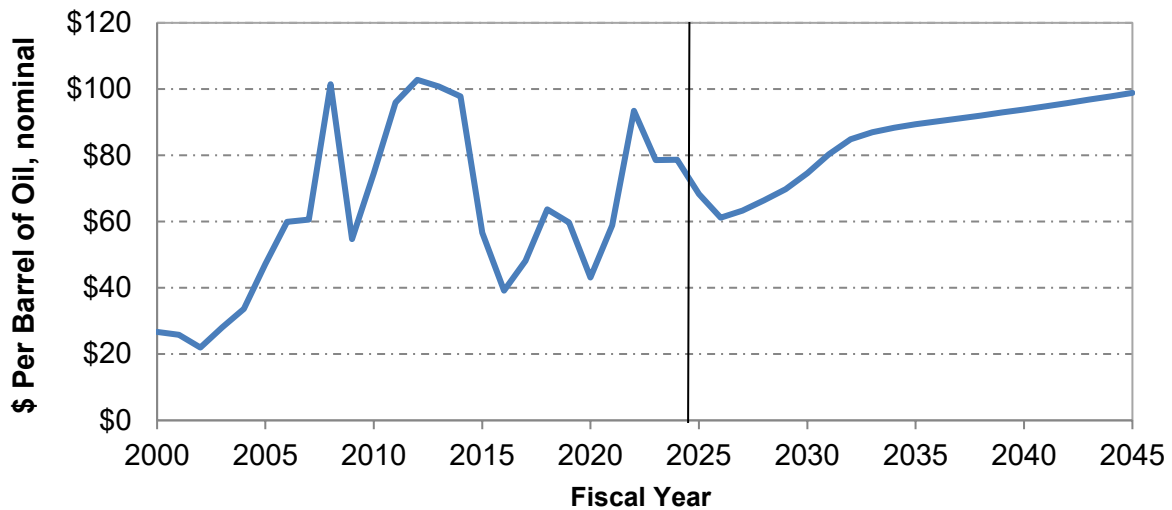


Source: S&P Global, Dec 2024 Comparative World Overview; APO-100 calculations

Oil held steady at about \$79 per barrel in 2023 and 2024 but is expected to decline in 2025 and 2026 as sluggish global demand combines with increasing supply. Over the long-run, S&P Global expects the price of oil

to increase due to growing global demand and higher costs of extraction. S&P Global forecasts U.S. refiner's acquisition cost of crude to rise to \$99 per barrel at the end of the forecast horizon.

U.S. Refiners' Acquisition Cost



Source: S&P Global

U.S. Airlines

Domestic Market

Mainline and regional carriers¹ offer domestic and international passenger service between the U.S. and foreign destinations, although regional carrier international service is confined to the border markets in Canada, Mexico, and the Caribbean.

Although the public health emergency caused by the pandemic officially ended in 2023 and most measures of aviation activity had returned to 2019's levels by last year, impacts were still being felt by carriers and are expected to continue through the end of the decade.

On the supply side, materials shortages, lower worker productivity and manufacturing missteps have slowed aircraft production, hindering carriers' ability to add more, and more efficient, aircraft. As airframers are holding sizable order books, the delivery delays will cascade out through the end of the decade. Besides constraining expansion plans, these delays will impact profitability as carriers hold on to older, less efficient aircraft and aircraft that are poorly sized for current market needs. Pilot shortages were another constraint to expansion that emerged during the pandemic, but these have largely been resolved.

Also constraining supply, under-staffing at some Air Traffic Control (ATC) facilities may, under certain circumstances, limit the number of aircraft that can be handled in those places. This will be slow to correct although FAA is accelerating efforts. In 2023, 1,512

controllers were hired, in 2024 that number rose to 1,811 and in 2025, the plan is for 2,000, the most in over a decade. All these issues will be slow to reverse and weigh on the forecast of capacity production for the next three to five years, or possibly longer.

The pandemic altered the demand side as well, with many of those impacts still evolving. Leisure traveler demand surged after the pandemic and is expected to continue as the main driver, although travelers have shown a clear preference for premium offerings and carriers are adapting cabins to claim more of these higher-yielding passengers. Whether this trend continues in coming years is something carriers will monitor closely. And while the pandemic caused a wave of blended leisure and business trips that altered peak day-of-week and seasonal patterns, they have started to return to pre-pandemic norms. Unlike leisure trips, business trips have grown slowly, a factor that is likely to continue in the near term especially since in-office work remains below pre-pandemic levels and is also increasing.

Higher airfares have already resulted from increased labor expenses necessary to attract and retain workers and this elevated spending is expected to be permanent. Labor unions representing pilots and flight attendants have found considerable leverage in the post-pandemic environment, making cost increases, and therefore fare increases, an industry-wide phenomenon. Passengers have been largely undeterred,

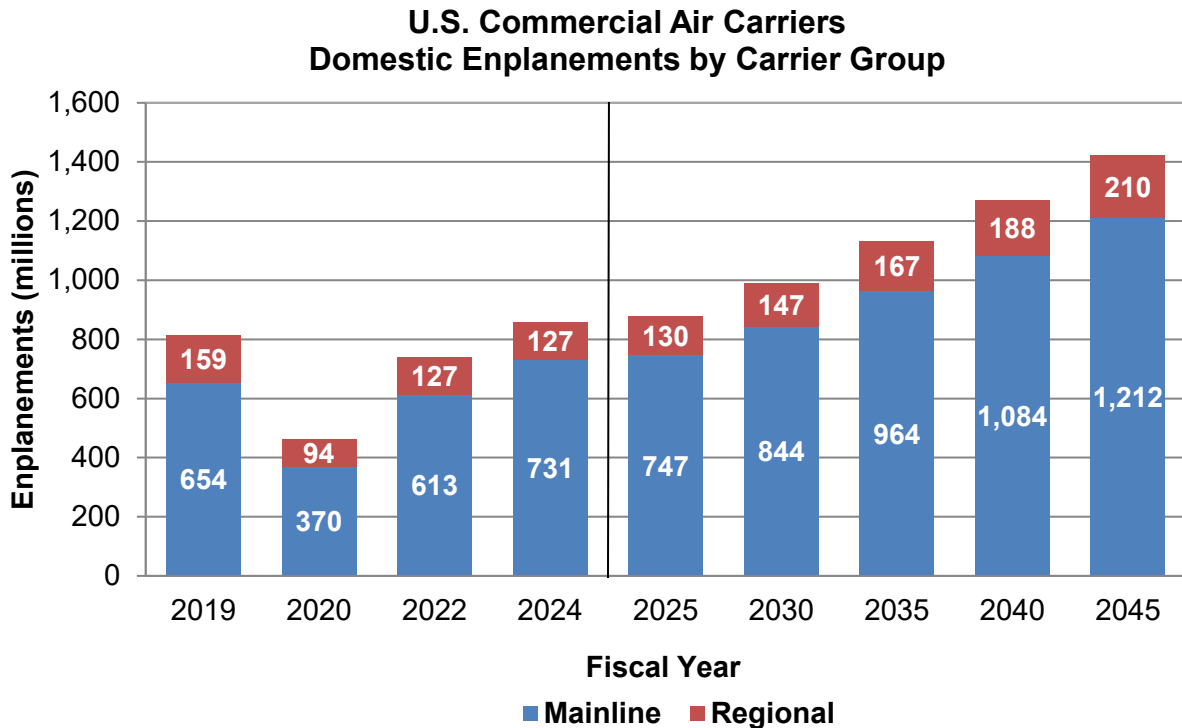
¹ Mainline carriers are defined as those providing service primarily via aircraft with 90 or more seats. Regionals are defined as those providing

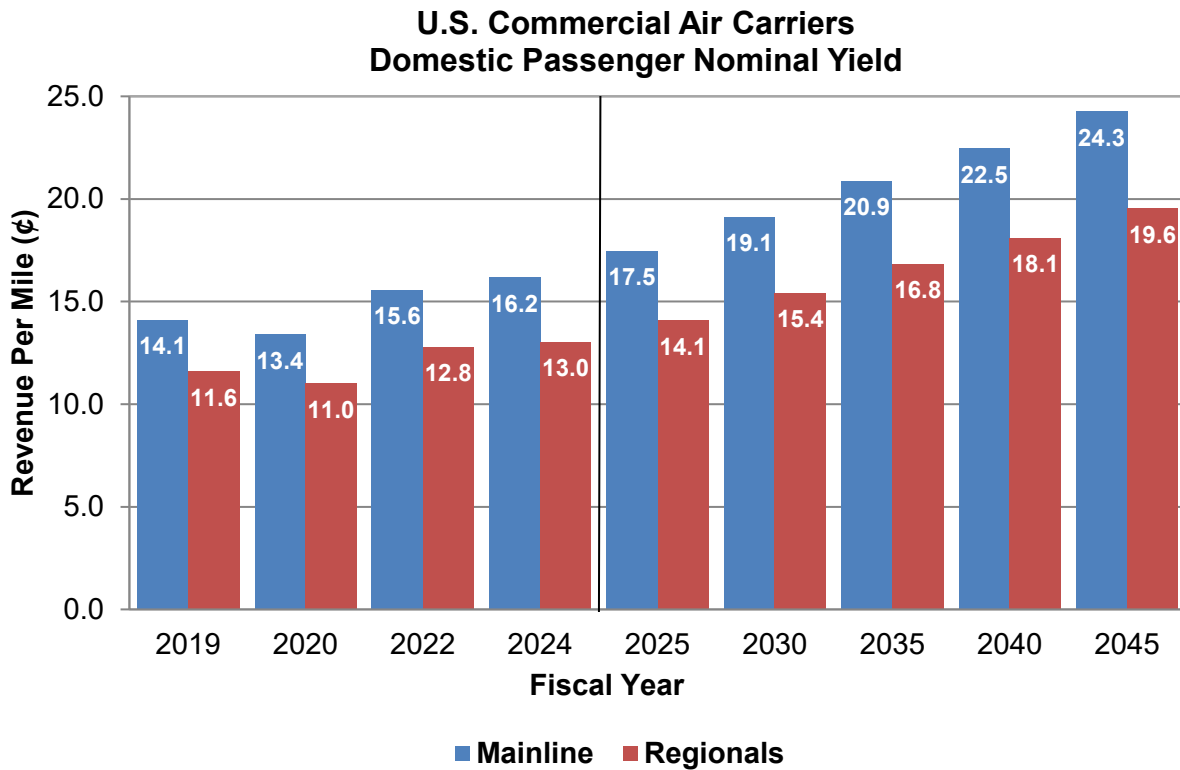
service primarily via aircraft with 89 or fewer seats and whose routes serve mainly as feeders to the mainline carriers.

allowing some carriers to add additional fare or fee increases that are helping to pay down debt incurred during the pandemic. Until debt returns to more typical levels, it will act as an additional restraint on investment and expansion.

During the first years of the pandemic, regional carriers suffered similar consequences of COVID-19 as mainline carriers. However, the impacts in recent years have differed. In 2024, regionals provided just 7.4

percent of domestic capacity, down from 11.1 percent in 2019, a result of both the shift in demand and difficulty supplying capacity as flight crews moved up to higher paying mainline jobs. In terms of traffic, regionals saw similar declines, dropping to 7.2 percent of RPM in 2024 compared to 10.4 percent in 2019. The deviations in 2024 have improved slightly from 2023 and are expected to revert over time as travel patterns and airline operations continue the slow recovery to more normal conditions.





Regional carriers have less leverage with the mainline carriers than they have had in the past as the mainline carriers have negotiated contracts that are more favorable for their operational and financial bottom lines. As mainline carriers have cut service to smaller cities since the pandemic, regional partners have been most affected. Furthermore, mainline carriers successfully reduced costs by offering voluntary retirements to flight crews but as activity rebounded, they drew replacements from the ranks of the regional carriers, exacerbating their pre-pandemic pilot shortages. Shortages of senior regional captains are likely to persist through next year due to the time required for training and experience.

A trend for regionals that was largely unaffected by the pandemic is the longstanding increase in the number of seats per aircraft. This measure rose by more than 55 percent

over the decade from 1997 to 2007 and although it slowed more recently to an increase of 17 percent in the ten years ending in 2019, it is a trend that is expected to continue. A consequence of this drive to replace 50-seat regional jets with more fuel-efficient 70-seat jets is that capital costs have increased. The move to the larger aircraft will prove beneficial in coming years, however, since their unit costs are lower.

Mainline carriers have also been increasing seats per aircraft flown although, unlike that for the regionals, the trend had been accelerating up until 2019. From 2009-2019, the measure grew by an average of 0.9 percent per year. Then during the pandemic, seats per aircraft jumped around, ranging from an increase of 3.0 percent in 2021 to a 0.4 percent decrease in 2022 as carriers first flew some of their idle long-haul international aircraft on domestic routes and then

reallocated them to more typical markets. That aircraft positioning seemed to normalize in 2024 when seats per aircraft grew 0.3 percent, about their 30-year average.

Besides the operational adjustments that carriers use to drive profitability, there are many less visible strategies that mainly revolve around passenger segmentation: categorizing passengers according to their willingness to pay differing amounts to travel between the same points. The primary tools to accomplish this are the revenue management systems that enable carriers to price fares optimally for each seat on each flight. Because they rely on historical data to make price and schedule predictions, the unprecedented nature of the collapse in 2020 meant they could provide little guidance in market, time-of-day or day-of-week pricing decisions. As demand stabilized, revenue management systems became relevant again. Going forward, the application of artificial intelligence will make these systems more adaptive and pricing more dynamic, leading to even more nuanced segmentation of passengers.

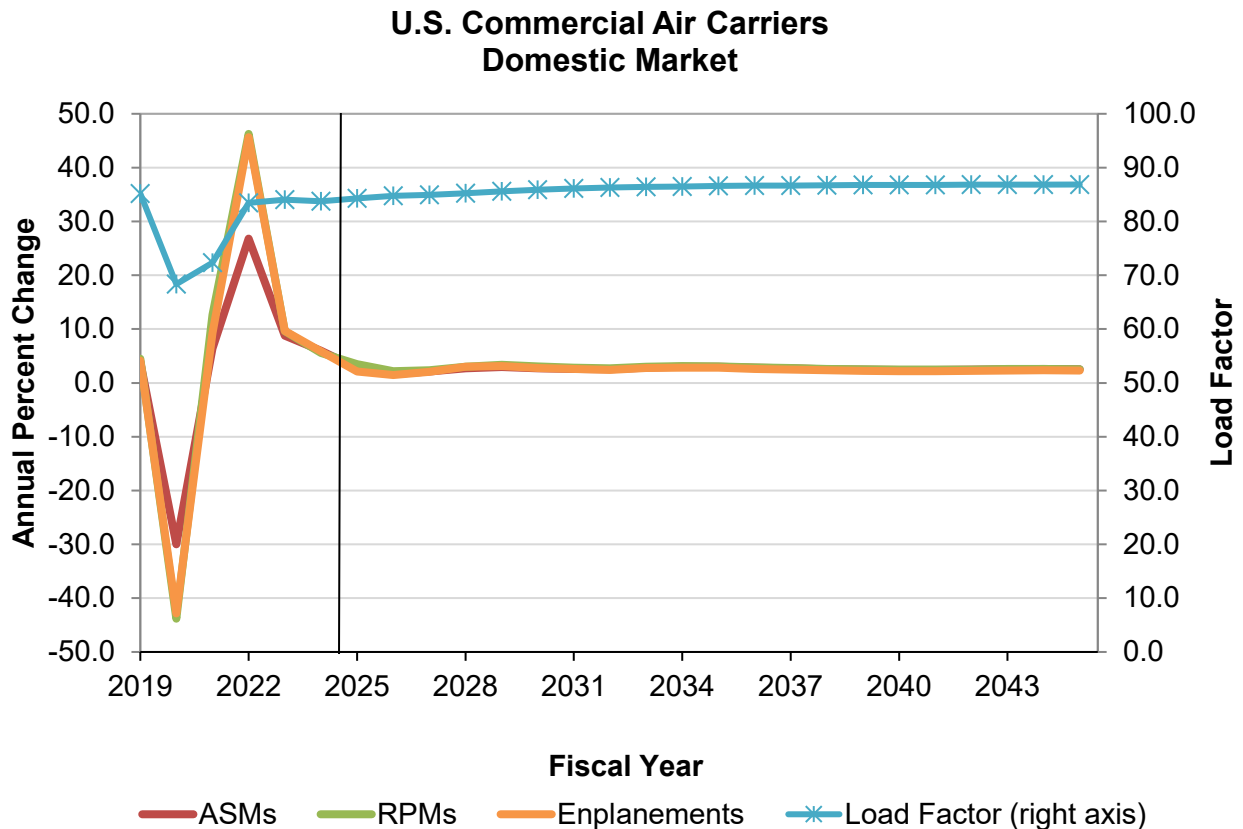
Yet another continuing trend and method of passenger segmentation is product differentiation through ancillary sales. Carriers generate ancillary revenues by selling products and services beyond that of an airplane ticket to customers. This includes the un-bundling of services previously included in the ticket price such as checked bags, on-board meals, and seat selection, and adding new services such as boarding priority and internet access. After posting record net profits in 2015, U.S. passenger carrier profits declined subsequently on rising fuel and labor costs, and flat yields, but were supported by ancillary revenues. Even in 2020 when profits turned to staggering losses, this remained a meaningful source of revenue for carriers.

One source of ancillary revenue, change fees, was broadly scrapped in 2020. As traveler plans were forced to change due to COVID-19-related restrictions, airlines began dropping fees for itinerary changes in many ticket classes. As a share of total passenger revenue, cancellation fees dropped from about 2 percent in 2019 and prior years to under 0.6 percent in 2024. Most airlines have made the elimination of change fees a permanent move, although it applies only to tickets for the main cabin and above. Baggage fees remain a solid source of revenue at 4.0 percent of passenger revenue in 2024, the same as in 2019.

Other methods of segmenting passengers into more discrete cost categories based on comfort amenities like seat pitch, leg room, and power outlets were unaffected by the pandemic. The offering of Basic Economy fares has been part of an effort by network carriers to protect market share in response to the rapid growth LCCs have achieved in recent years. Between 2007 and 2019, network carrier domestic enplanements increased almost 19 percent, but low-cost carrier enplanements grew by 39 percent. RPMs over the same period showed a similar pattern with network carrier domestic RPMs up almost 23 percent and LCC RPMs fully 48 percent higher. These longer-term trends were interrupted in 2020 with enplanements and RPM dropping across both mainline and LCC carriers to just over half of 2019 levels. By 2023, the strength of LCCs became apparent again as their enplanements and RPMs had recovered to about 9 percent above 2019 levels. In 2024, however, the combination of mainline competition and excess capacity in domestic markets forced LCCs and Ultra Low-Cost Carriers (ULCC) to adapt their marketing strategies. Just as mainline carriers had used Basic Economy

fares to capture LCC customers, LCCs and ULCCs began to use premium offerings to capture network carrier customers. These carriers introduced or announced seats with more legroom, blocked middle seats, re-bundled of fares to include some ancillaries, and added more attractive loyalty programs. Given the overall shift in consumer

preferences to experiences over goods, and towards premium travel, LCCs and ULCCs will continue battling directly for network carrier customers in the medium-term at least.



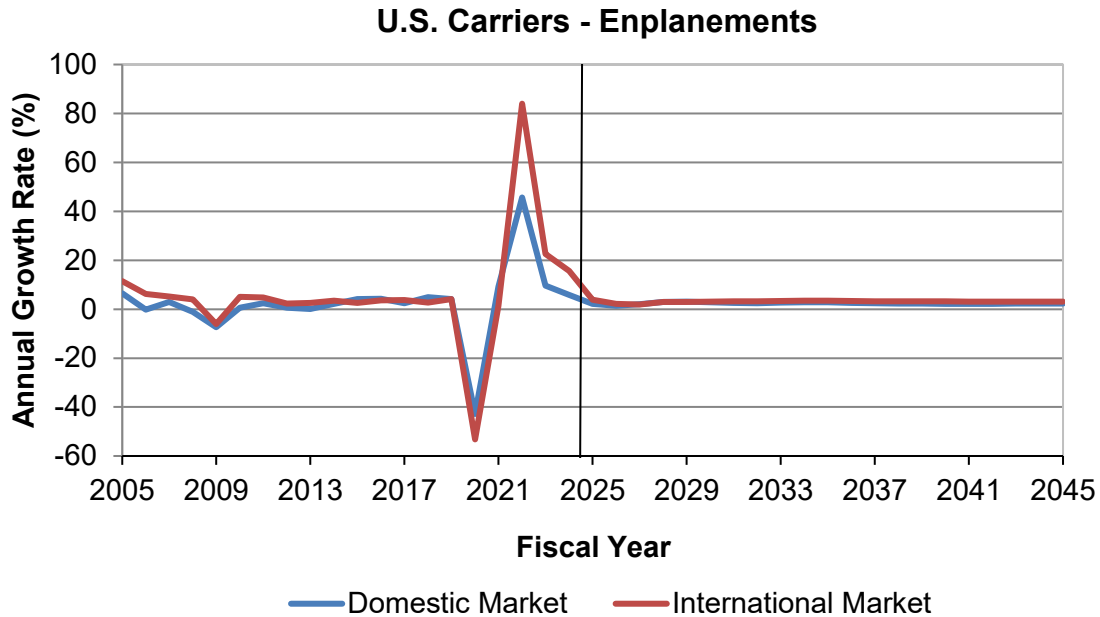
International Market

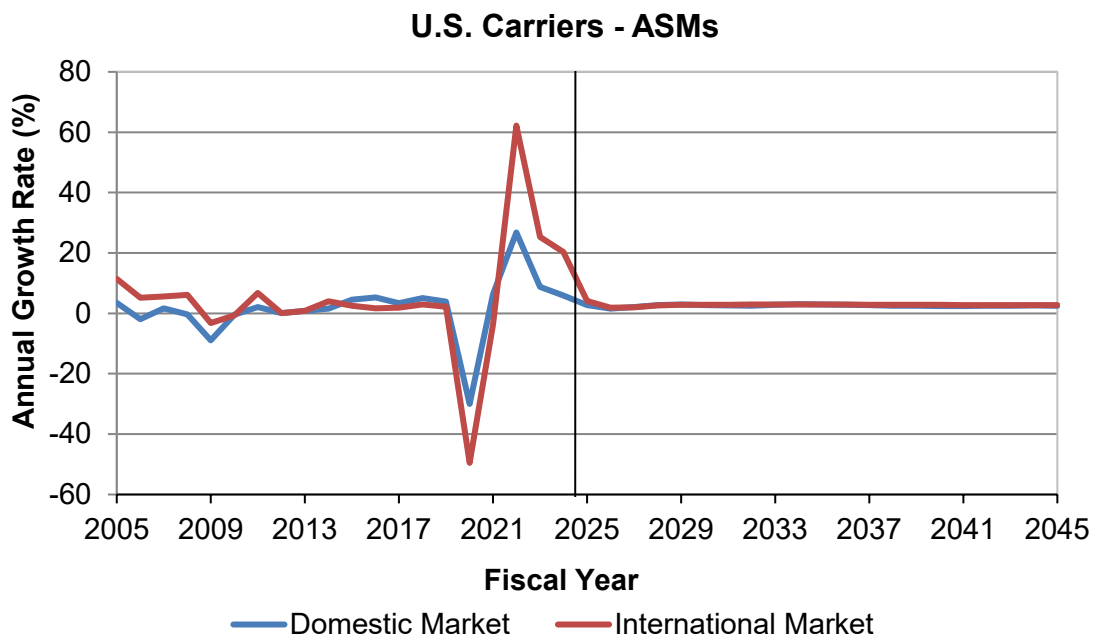
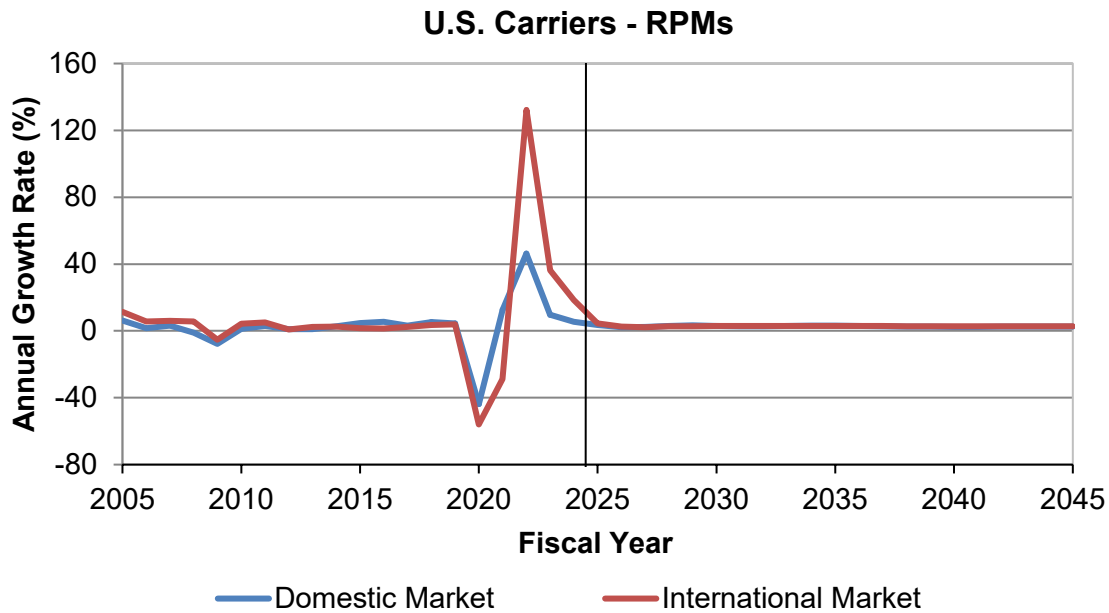
Over most of the past decade, the international market has been the growth segment for U.S. carriers when compared to the mature and much larger U.S. domestic market. For the ten years ending in 2024, international enplanements grew by 31 percent while domestic enplanements grew 24 percent. However, during the downturn in 2020

and the first years of the recovery, domestic activity fell less and recovered faster. But by 2024, domestic enplanements had grown only 6 percent above 2019's level, while international enplanements showed much stronger improvement, exceeding 2019 levels by 24 percent. International travel had

been particularly impacted by border closings, quarantine requirements and other travel restrictions, as well as the uncertainty of when requirements might change. However, as restrictions lifted, activity rebounded sharply. On the domestic side, the fall in business travel contributed to the decline and

slower recovery, even as leisure travel surged. International travel is expected to show further gains in 2025, supported by the strong dollar and increased preferences for overseas trips.





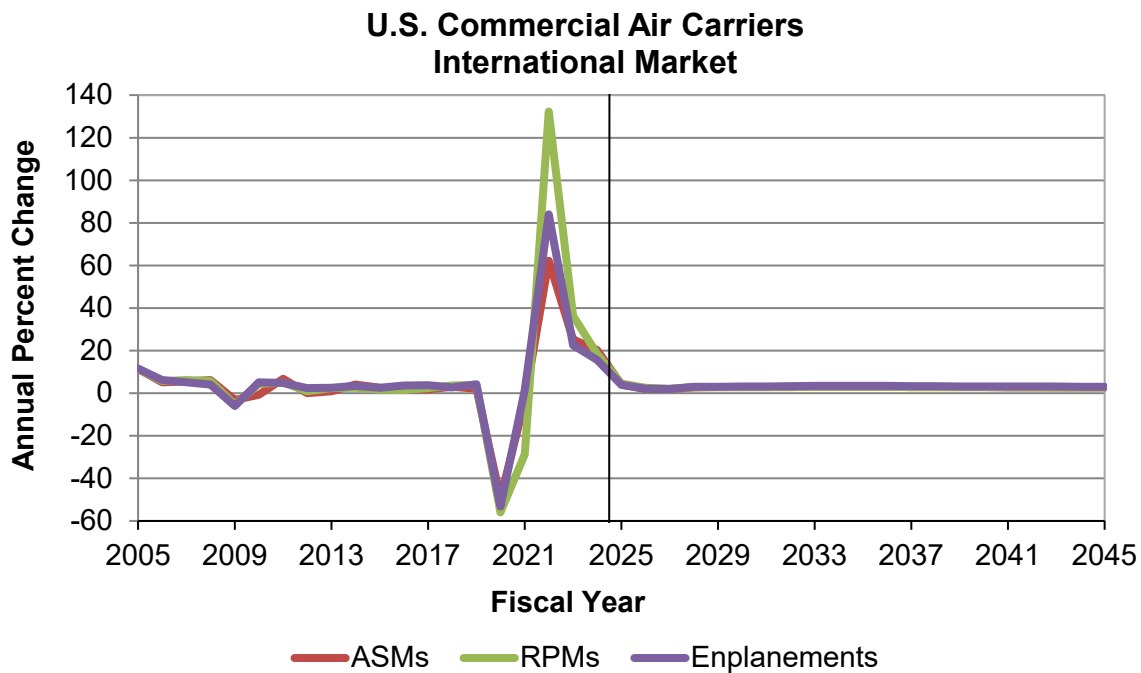
International capacity and demand will see another year of solid growth in 2025 as the recovery concludes and rates return to more typical values in 2026. For FY2025 the annual growth rates for international ASM and RPM are forecast at 4.1 percent and 4.5 percent, respectively, and enplanements at 3.9

percent as aggregate trip lengths grow due to increasing Atlantic and Pacific activity. From FY2026-2045, annual growth for ASMs and RPMs are forecast to grow at 2.7 percent and 2.8 percent, respectively, while enplanements will grow at a rate of 3.1 percent.

Load factors recovered sharply again in 2023, reaching 83 percent, more than 6 points above the previous year and similar to 2019's level. However, some overcapacity in 2024 suppressed a further increase and load factors dropped back to 82 percent. Load factors are believed to be close to their maximum and projected to rise only slightly throughout the remainder of the decade to reach 83 percent at the end of the forecast.

In the long-run, growth of major global economies will slow from the above-trend rates of recent, pre-pandemic years. Several

moderating factors are at work, including high inflation and interest rates, reduced global trade, and political stresses. The European and Japanese economies are generally seeing slow growth, in part due to weak trade with Asia, mainly China. Overall, global conditions appear set to return to a stable path once the economic environment improves with looser financial conditions, diminished risk of recession, and improved government fiscal positions. Rising oil prices, however, will create some drag on this otherwise supportive environment for air travel demand.



The impact of COVID-19 on travel by region has varied considerably, as have the recovery paths. Factors affecting the responses by market are similar to those affecting travel as a whole: COVID-19 case counts, governmental restrictions, predominant traveler segments, and macroeconomic conditions. As a result, enplanements to the Latin region had fully recovered in 2022, and to the Atlantic region in 2023. The Pacific region has

been the slowest and is forecast to be fully recovered in 2028.

For U.S. carriers, the Latin region remains the largest international destination with more than twice the enplanements of the Atlantic region in 2024, due to its proximity to the U.S., strong trade ties, and popular leisure destinations. In 2024, Latin region enplanements rose by 13 percent while RPMs rose 15 percent. Much of the strength was

again driven by leisure traffic heading to warm weather destinations and the appeal of nearby foreign locations. Enplanement and RPM growth are expected to slow substantially in 2025, decelerating to long-term trend rates. Over the twenty-year period of 2025-2045, Latin region enplanements are forecast to increase at an average rate of 3.6 percent a year while RPMs grow 3.8 percent a year.

The Pacific region is the smallest in terms of enplanements which do not yet reflect the region's emerging markets' economic growth and potential for air travel. Enplanements bottomed out at just 5.8 percent of 2019's level in 2021 as many countries enforced stringent travel restrictions, especially China, a very large market in the region. RPM also collapsed by a similar amount. In 2022, enplanements and RPMs came off the 2021 trough and by 2024, recovered to about 83 percent of 2019 levels. In 2025, those measures of activity are expected to continue expanding to above 92 percent. With comparatively slow trend growth, the region's enplanements take time to fully recover to 2019's level but are within 2 percent by 2027 while RPMs are fully recovered in that year. Growth of RPMs and enplanements in 2025 will slow to 11 percent, a deceleration from 47 percent in 2024. From FY2026 through the end of the forecast, Pacific enplanements and RPMs are forecast to grow at average rates of 2.6 percent and 2.7 percent, respectively. Although the region is forecast to have the strongest economic growth of any region

Total Passengers to/from the U.S. on American and Foreign Flag Carriers

Actual Results:

During CY2024, total passengers flown on U.S. and Foreign Flag carriers between the

over the next 20 years, led by China and India, enplanements and RPMs over the period are restrained in part because of generally low incomes and relatively small middle classes. Consequently, demand centers on smaller but wealthier countries such as Japan and Korea, rather than the large, faster growing economies.

The Atlantic region ranks in size between the Latin and Pacific regions, with pre-pandemic enplanements roughly twice those in the Pacific region and half those in the Latin region. After contracting in 2015 and 2016, Atlantic enplanement growth began rising to reach 7.0 percent in 2019. This growth was supported by U.S. demand as well as growth of Middle East and African markets, even as the European economies slowed in 2019. In 2020, like the other regions, Atlantic enplanements tumbled and bottomed out in 2021 at 21 percent of 2019's level. Subsequent percentage gains were large, returning enplanements to 130 percent of 2019 levels in 2024. Although Western Europe is a mature area with moderate economic growth, the economically smaller Middle East and Africa areas are expanding rapidly with GDP growth rates more than twice that of Europe. As a result, a growing share of the forecast aviation demand in the Atlantic region is linked to those two areas, particularly in the second half of the forecast period. Over the forecast horizon from 2025 to 2045, enplanements and RPMs in the Atlantic region are expected to grow at average annual rates of 1.8 percent and 2.0 percent, respectively.

United States and the Atlantic, Latin, Pacific, and Canada Transborder regions grew 9.3 percent to total 266.9 million passengers, marking the return to pre-COVID passenger

levels.² Passenger levels steadily improved after the 73.4 percent drop posted in CY2020, with growth of 47.4 percent in CY2021, 97.3 percent in CY2022, 25.0 percent in CY2023, and 9.3 percent in CY2024.

Although growth in total passengers has been strong, the path to recovery for the individual regions has been mixed. The Latin and Atlantic Regions led the recovery, with the Latin region returning to pre-COVID levels last year (CY2023), followed by the Atlantic region in CY2024.

Conversely, the recovery for the Canada Transborder and Pacific regions has not been as robust. Passenger levels for both regions endured two consecutive years of post-COVID decline.³ At the end of CY2024, Canada Transborder passenger levels were 99 percent of pre-COVID levels and are forecast to surpass that mark during 2025.

Recovery for the Pacific region remains elusive. Passenger levels for this region remain 30 percent below pre-COVID levels and remain below until CY2027.

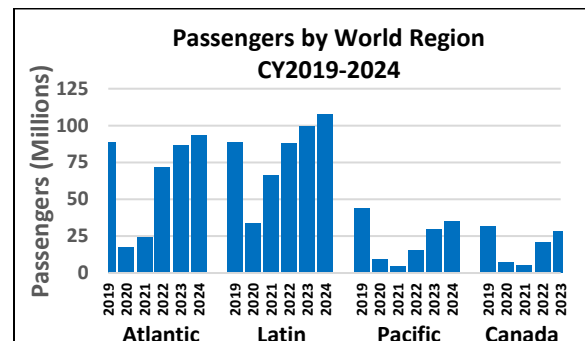
The chart below shows the tempo at which the individual world regions have recovered/are recovering to pre-COVID passenger levels.

<i>Recovery to Pre-COVID Passenger Levels Indexed to 2019 (by World Region)</i>						
Region	2019	2020	2021	2022	2023	2024
Atlantic	100	19.6	27.2	80.7	98.0	105.4
Latin	100	37.7	74.1	99.2	112.3	121.0
Pacific	100	21.6	10.0	34.8	67.2	79.2
Canada	100	21.9	15.1	65.3	89.1	99.0
Total	100	26.6	39.2	77.3	96.6	105.5

² The recovery of passengers to pre-COVID and pre-911 levels took five years, although the drop in passenger levels due to covid was far more severe than the drop in passengers resulting from

Comparing the share of total passengers by world region for CY2024 shows the Latin region with the largest share at 38.5 percent (107.3 million passengers). The Atlantic region is second in terms of passenger share. During CY2024, the Atlantic region held a 35.0 percent share of total passengers (93.3 million passengers). Ranking three and four were the Pacific region with a 12.7 percent share (34.7 million passengers), and Canada Transborder region with an 11.8 percent share (31.5 million passengers).

The percentage growth in passengers from CY2023 to CY2024, for the four regions ranked from highest to lowest, was Pacific (18.0 percent), Canada Transborder (11.0 percent), Latin (7.7 percent), and Atlantic (7.5 percent). Passenger levels for CY2019-24 are presented below by world region.



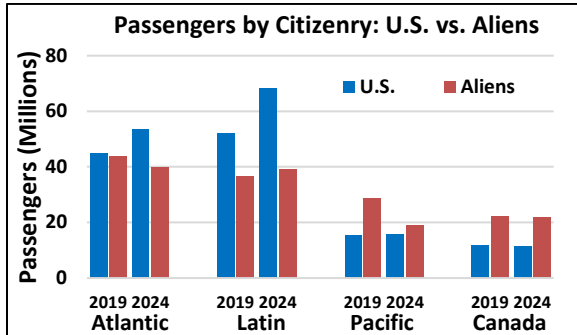
Notably, the U.S. citizen share of passengers travelling between the U.S. and three of the world regions has been increasing vis-a-vis foreign citizen passenger share. The increase in U.S. citizen passenger share may be indicative of a faster return to pre-COVID activity in the U.S., both in terms of economic

the terror attacks (down 73.4 percent vs. 14.0 percent, respectively).

³ Passenger levels for the Atlantic and Latin regions started to rebound in CY2021, one year after the covid downturn.

growth and the ending of the COVID era restrictions on mobility. Comparing CY2019 to CY2024, the Atlantic, Latin, and Pacific regions each showed an increase in U.S. citizens as a share of total passengers. To the contrary, U.S. citizen passenger shares in the Canada Transborder region decreased.

The U.S. citizen share of passengers in the Atlantic region increased 6.4 points (going from 50.8 percent in CY2019 to 57.2 percent in CY2024). In the Latin region, U.S. citizen share of passengers increased 4.9 points (going from 58.6 percent in CY2019 to 63.5 percent in CY2024). In the Pacific region, U.S. citizen passenger share increased 10.0 points (going from 34.8 percent to 44.8 percent). To the contrary, U.S. citizen passenger shares in the Canada Transborder region posted a slight decline of 0.2 points (going from 34.5 percent in CY2019 to 34.3 percent in CY2024).

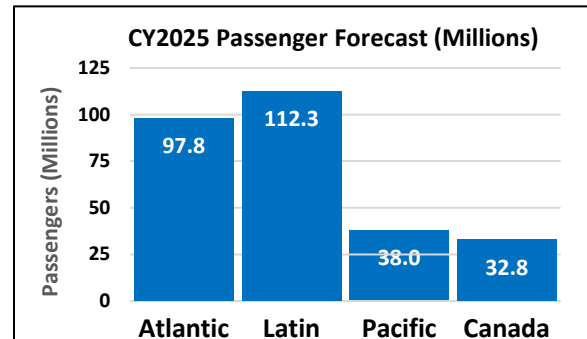


Forecast Results:

For CY2025, combined passengers for all four world regions are forecast to grow 5.2 percent over CY2024 levels to 280.8 million passengers.

Of the four regions, the Pacific is forecast to grow fastest with year-over-year growth of 9.3 percent for CY 2025. Growing at a slower pace are the Atlantic and Latin regions, with

growth of 4.8 percent and 4.6 percent, respectively. Canada is forecast to grow slowest with growth of 3.9 percent.



Over the 20-year forecast horizon, international passengers for the combined regions are forecast to grow an average of 3.1 percent annually, going from 266.9 million passengers in CY2024 to 502.3 million in CY2045. Growth during the first half of the forecast period is 3.4 percent versus 2.7 percent during the last half. Some of the factors that may impact future international air travel demand include demographics, travel costs, technological advancements, consumer behavior, and globalization.

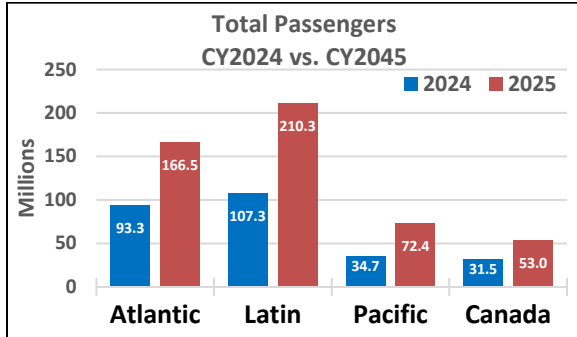
The Pacific region is forecast to grow fastest with average annual growth of 3.6 percent over the forecast period, totaling 72.4 million passengers by CY2045. The faster growth for this region partially reflects a drawn-out recovery from pre-COVID levels compared to the Atlantic, Latin, and Canada Transborder regions.

Growing at a slightly slower pace is the Latin region. This region is forecast to grow at an average annual rate of 3.3 percent, totaling 210.3 million passengers by the end of the forecast period.

The Atlantic and Canada Transborder regions are forecast to grow at more modest rates, with average annual growth rates of 2.8 percent and 2.5 percent, respectively,

over the 20-year forecast period. By CY2045, Atlantic region passengers are forecast to total 166.5 million and Canada Transborder passengers are forecast to total 53.0 million.

The chart below compares passenger totals posted for CY2024 to the CY2045 passenger forecast.

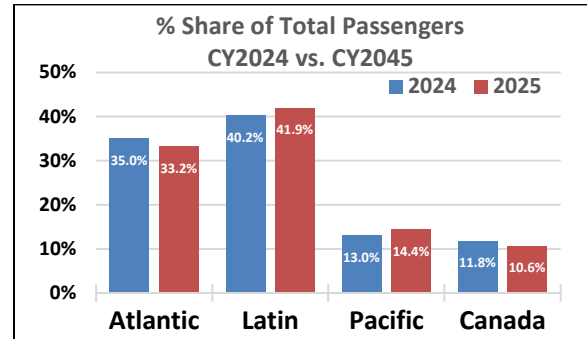


The ranking of regions by share of total passengers is forecast to remain stable – with the CY2024 rankings holding through CY2045. Going from largest passenger share to smallest share are the Latin, Atlantic, Pacific, and Canada Transborder regions.

While the overall rankings for passenger share remain steady over the forecast horizon, two regions are forecast to have an increase in passenger share (Latin and Pacific) while the other two regions (Atlantic and Transborder) show a decrease in passenger share. The Latin and Pacific regions gain 1.6 points and 1.4 points of passenger share, respectively, while the Atlantic and Canada Transborder regions lose 1.9 points and 1.2 points, respectively.

By the end of the 20-year forecast period, the Latin region is forecast to have a 41.8 percent share of total passengers (up from 40.2 percent in CY2024). The Atlantic region share of passengers is forecast to be 33.1 percent in CY2045 (down from 35.0 percent

in CY2024); Pacific region passenger share is forecast to be 14.4 percent (up from 13.0 percent in CY2024); and Canada Transborder region passenger share is forecast to be 10.6 percent in CY2045 (down from 11.8 percent in CY2024).

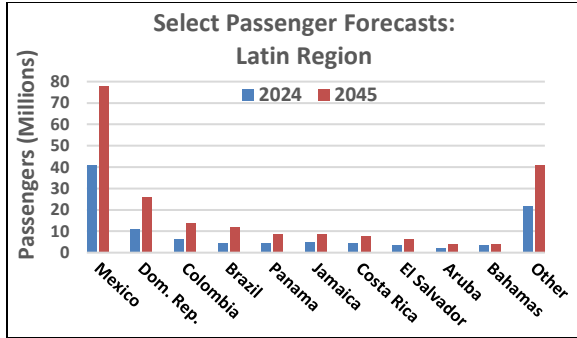


On an individual basis, the countries posting the top three passenger levels in CY2024 were Mexico, Canada and United Kingdom, with passenger totals of 40.8 million, 31.5 million, and 21.2 million passengers, respectively. These three countries retain their ranking at the end of the forecast period.

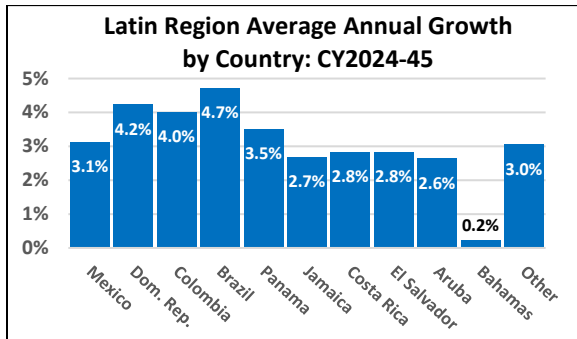
Ranking 4, 5, and 6 in CY2024 was Germany (11.0 million passengers), Dominican Republic (10.9 million passengers), and Japan (9.9 million passengers). By the end of the forecast period, Dominican Republic and Germany trade rankings, while France replaces Japan to be ranked number 6.

Of the countries within the Latin region, the top three as measured by CY2024 passenger totals remain as the top three at the end of the forecast period. These three countries are Mexico, Dominican Republic, and Colombia. At the end of the forecast period passenger levels are forecast to be 77.9 million for Mexico; 26.1 million for the Dominican Republic; and 14.0 million for Colombia.

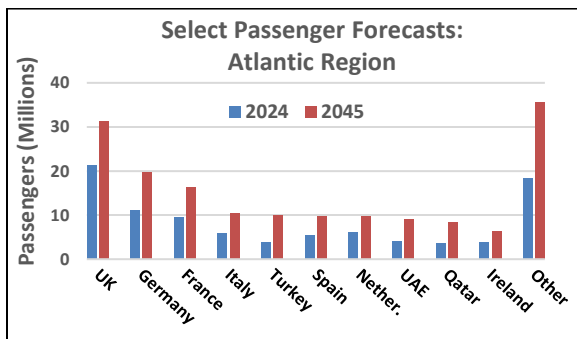
FAA Aerospace Forecast Fiscal Years 2025–2045



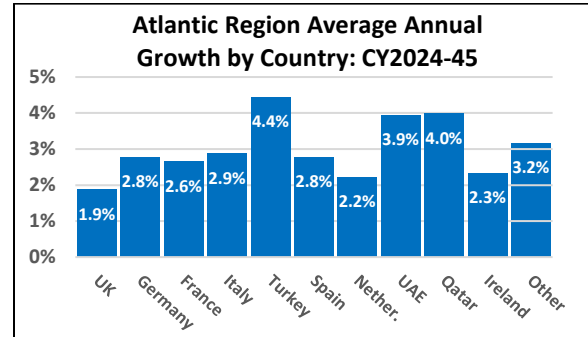
Correspondingly, those countries within the Latin region with the highest average annual percentage growth over the 20-year forecast period are Brazil (4.7 percent), the Dominican Republic (4.2 percent), and Colombia (4.0 percent).



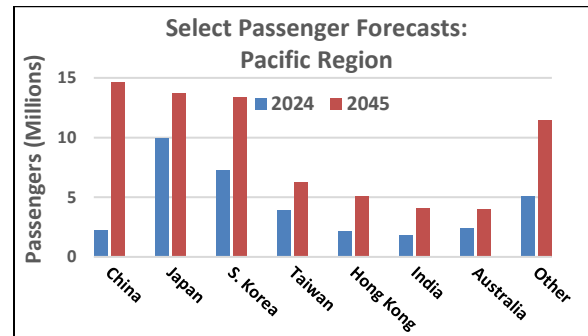
In the Atlantic region, the countries with the top three CY2024 passenger totals were the United Kingdom, Germany, and France. These three countries retain their rankings at the end of the forecast period with CY2045 passenger totals of 34.0 million for the United Kingdom, 21.7 million for Germany and 18.6 million for France.



The countries with the highest average annual growth rate in the Atlantic region over the forecast period are Turkey (4.4 percent), Qatar (4.0 percent), and United Arab Emirates (3.9 percent).

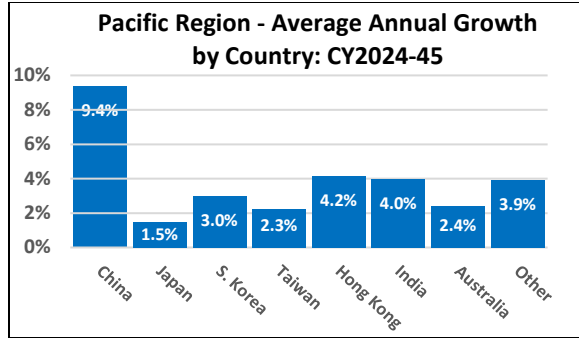


The top three countries in the Pacific region as measured by CY2024 passenger totals were Japan, South Korea, and Taiwan. At the end of the forecast period China ranks one (14.7 million passengers), Japan ranks two (13.7 million passengers), and South Korea ranks three (13.4 million passengers).



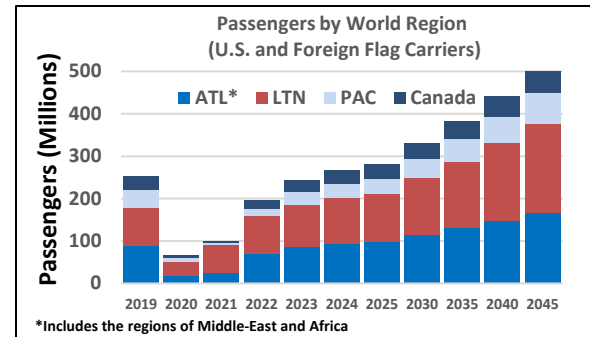
Countries forecast to have the highest average annual growth in the Pacific region are China (9.4 percent), Hong Kong (4.2 percent), and India (4.0 percent). China growth is coming off a depressed base, reflecting the slow recovery from the COVID downturn.

FAA Aerospace Forecast Fiscal Years 2025–2045



The chart below presents historical and forecast data for passengers travelling between

the U.S. and the four world regions on U.S. and foreign flag carriers.



Cargo

Air cargo traffic includes both domestic and international freight/express and mail. The demand for air cargo is a derived demand resulting from economic activity. Cargo moves in the bellies of passenger aircraft and in dedicated all-cargo aircraft on both scheduled and nonscheduled service. Cargo carriers face price competition from alternative shipping modes such as trucks, container ships, and rail cars, as well as from other air carriers.

Historically, air cargo activity tracks with GDP. Other factors that affect air cargo growth are fuel price volatility, movement of real yields, globalization, and trade. The forecasts of revenue ton miles (RTMs) rely on several assumptions specific to the cargo industry. First, security restrictions on air cargo transportation will remain in place. Second, most of the shift from air to ground transportation has occurred. Finally, long-term cargo activity depends heavily on economic growth.

The forecasts of RTMs derive from models that link cargo activity to GDP. Forecasts of domestic cargo RTMs use real U.S. GDP as the primary driver of activity. Projections of international cargo RTMs depend on growth in world and regional GDP, adjusted for inflation. FAA forecasts the distribution of RTMs between passenger and all-cargo carriers based on an analysis of historic trends in shares, changes in industry structure, and market assumptions.

U.S. carrier international air cargo traffic spans four regions consisting of Atlantic, Latin, Pacific, and 'Other International.'

U.S. air carriers flew 48.0 billion RTMs in 2024, a small increase from 47.3 billion in 2023. During the pandemic, households made huge changes in spending patterns, shifting out of services and into goods, goods that were often shipped by air. As a result, RTMs surged to 20 percent above 2019's level by 2022. Consumer spending then began to revert in 2023, bringing system RTMs down to 10 percent above 2019's level. Domestic cargo RTMs rose 3.1 percent to 18.1 billion in 2024 while international RTMs grew just 0.5 percent to 29.9 billion. Air cargo RTMs flown by all-cargo carriers averaged 78.7 percent of the total in the years leading up to 2020 but then spiked to 88.0 percent in 2020 and 2021, with passenger carriers flying the remainder. Since 2021, and the return of passenger flights and their belly-hold capacity, the share of air cargo RTMs flown by all-cargo carriers has dropped to 83.7 percent in 2024. Total RTMs flown by the all-cargo carriers fell 0.9 percent in 2024 while total RTMs flown by passenger carriers jumped by 15.7 percent.

After rising by 1.5 percent in 2024, total RTMs are expected to grow 4.2 percent in 2025 as the normalization of consumer demand for goods versus services concludes and air cargo is again governed by economic activity. Buoyed by steady U.S. and world economic growth in the long term, FAA projects total RTMs to increase at an average annual rate of 2.9 percent over the forecast period (from 2025 to 2045).

Domestic cargo RTMs from 2025 to 2045 are forecast to increase at an average annual rate of 2.0 percent. In 2024, all-cargo carriers carried 93.3 percent of domestic cargo

RTMs. The all-cargo share is forecast to remain roughly flat in the medium-term as passenger flights return to the system. In the long-term, the all-cargo share rises only slightly to 94.5 percent by 2045 based on increases in capacity for all-cargo carriers.

International cargo RTMs rose slightly in 2024 with the normalization of spending and as international passenger flights returned, RTMs shifted away from all-cargo carriers. With the post-pandemic return of passenger flights, international RTMs on passenger aircraft jumped 19.1 percent in 2024 and is expected to grow rapidly in 2025, increasing about 8 percent, but then slowing down to just over 3 percent in 2026. Over the same years, all-cargo RTMs will grow about 4.5 percent per year as some tonnage is lost to

passenger carriers. The share of international cargo RTMs flown by all-cargo carriers fell to 78.0 percent in 2024 and is forecast to decline in the near term before gradually increasing in line with historical trends and ending at 82.3 percent in 2045.

Following the period of recovery and readjustment, growth for both types of carriers returns to long-run trend rates. For the forecast period (2025-2045), international cargo RTMs are expected to increase an average of 3.3 percent a year based on projected growth in world GDP. The Other International region has the fastest annual RTM growth (4.0 percent), followed by Pacific (3.5 percent), Atlantic (2.6 percent), and Latin America region (1.7 percent).

General Aviation

The FAA uses estimates of fleet size, hours flown, and utilization rates⁴ from the General Aviation and Part 135 Activity Survey (GA Survey) as baseline figures to forecast the GA fleet and activity. Since the survey is conducted on a calendar year (CY) basis and the records are collected by CY, the GA forecast is done by CY. Forecasts of new aircraft deliveries, using data from General Aviation Manufacturers Association (GAMA), together with assumptions of retirement rates, generate growth rates of the fleet by aircraft categories, which are applied to the GA Survey fleet estimates. The forecasts are carried out for “active aircraft,”⁵ not total aircraft. The FAA’s general aviation forecasts also rely on discussions with industry experts conducted at industry meetings, including the Transportation Research Board (TRB) meetings of Business Aviation and Civil Helicopter Subcommittees conducted twice a year in January and May or June.

The results of the 2023 GA Survey, the latest available, were consistent with the results of surveys conducted since major improvements to the survey methodology were introduced in 2004. The active GA fleet was estimated to be 214,222 aircraft in 2023 (2.2 percent higher than 2022). Fleet increases were observed in all categories of piston and turbine aircraft with the exception of gliders and the lighter than air category (together forming the other aircraft). Single-engine and multi-engine pistons were up by 1.1 percent, turbine aircraft, including rotorcraft, were up by 2.3 percent, while

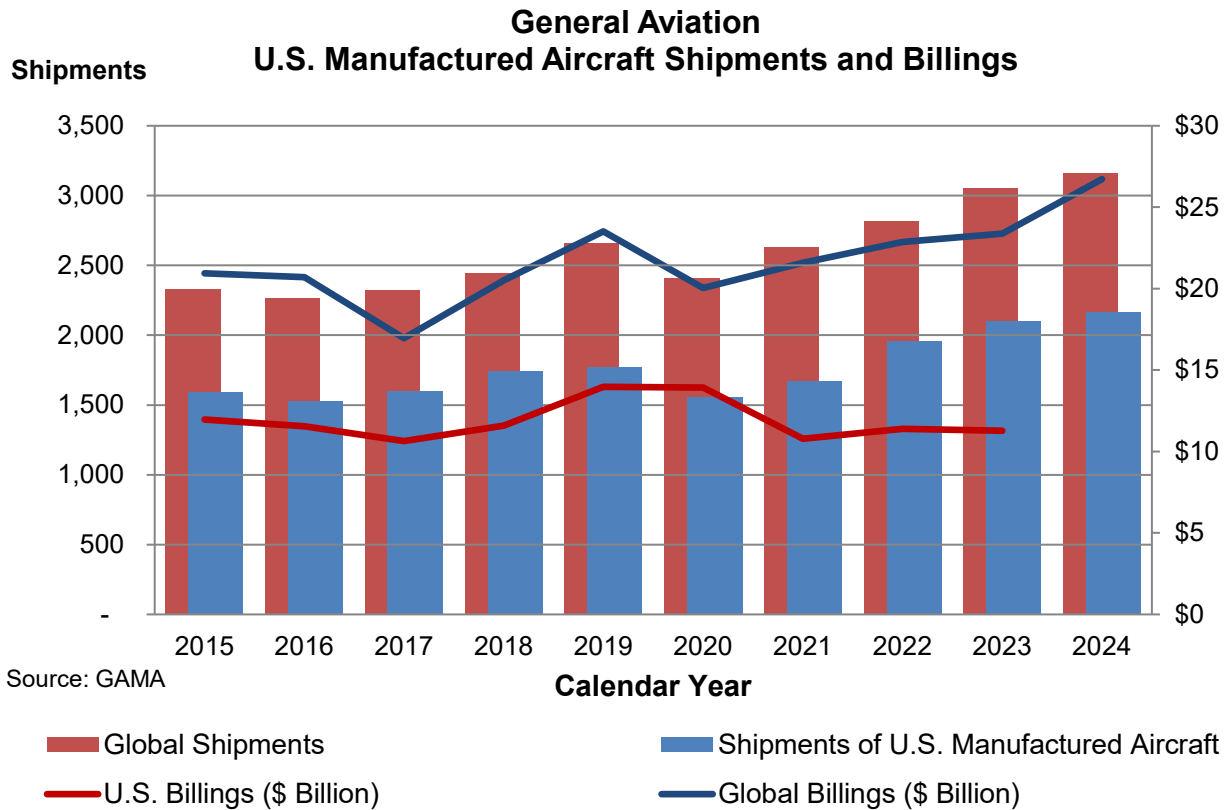
piston rotorcraft, light-sport aircraft (LSA), and experimental aircraft were up by 5.9, 12.8, and 7.3 percent, respectively. Total hours flown were estimated to be 28.6 million in 2023, up 6.0 percent from the previous year (11.7 percent above 2019 levels), and were at their highest level since 2000. Flight hours increased in the experimental, single-engine and multi-engine piston, rotorcraft, and light-sport aircraft (LSA) categories, up 24.7, 12.4, 4.2, 4.7, and 53.5 percent, respectively. Hours flown by turbojets fell 11.6 percent while hours flown by turboprops and other aircraft (gliders and lighter than air) were down 0.2 and 13.4 percent, respectively.

In 2024, deliveries of the general aviation aircraft manufactured in the U.S. increased to 2,169 – 3.1 percent above CY 2023 and 22.5 percent higher than their 2019 level. Deliveries of fixed-wing piston aircraft were up by 5.4 percent with single-engine piston aircraft up 5.0 percent, while the much smaller segment of multi-engine piston deliveries saw a 21.7 percent increase. Business jet deliveries increased by 4.1 percent, but a 3.4 percent decline in turboprop deliveries resulted in only a 0.4 percent increase in fixed wing turbine shipments. While the GAMA statistics for factory net billings in 2024 were not available for the U.S. manufactured GA aircraft yet (they were \$11.3 billion in 2023), global billings increased in 2024 by 14.3 percent to \$26.7 billion.

⁴ In this context, flight hours refer to the total hours flown by a certain type of aircraft (i.e., single-engine piston, turboprop, experimental) during the survey year as inferred by the responses to the survey for the total of active GA aircraft;

utilization rate is average hours flown by an aircraft of a certain type.

⁵ An active aircraft is one that flies at least one hour during the survey year.



GAMA also reported that rotorcraft deliveries increased at a global level in 2024 in both piston and turbine segments by 0.5 percent and 9.6 percent, respectively, for an overall 7.6 percent increase.

These current conditions indicate continuing growth in the GA sector. The active fleet in 2023 was 1.5 percent above the 2019 level and at its highest since 2010, with the turbine aircraft, including rotorcraft, experimental, LSA and other aircraft (gliders and lighter than air vehicles) categories above their 2019 levels. The long-term outlook for general aviation, driven by turbine aircraft activity, remains stable. The active general aviation fleet, which showed an increase of 2.2 percent between 2022 and 2023, is forecast to increase from its 2023 level of 214,222 aircraft to 238,350 by 2045, as the declines in

the fixed-wing piston fleet are offset by increases in fixed-wing turbine, rotorcraft, experimental, and light sport aircraft fleets. The total active general aviation fleet grows at a rate of 0.5 percent annually.

The more expensive and sophisticated turbine-powered fleet (including rotorcraft) is projected to grow by 20,055 aircraft between 2023 and 2045 to total 54,685, displaying an average annual growth rate of 2.1 percent during this period, with the turbojet fleet increasing 2.7 percent a year. Cumulative growth for the turbine-powered fleet is 57.9 percent from 2023 to 2045. The growth in U.S. GDP and corporate profits are catalysts for the growth in the turbine fleet.

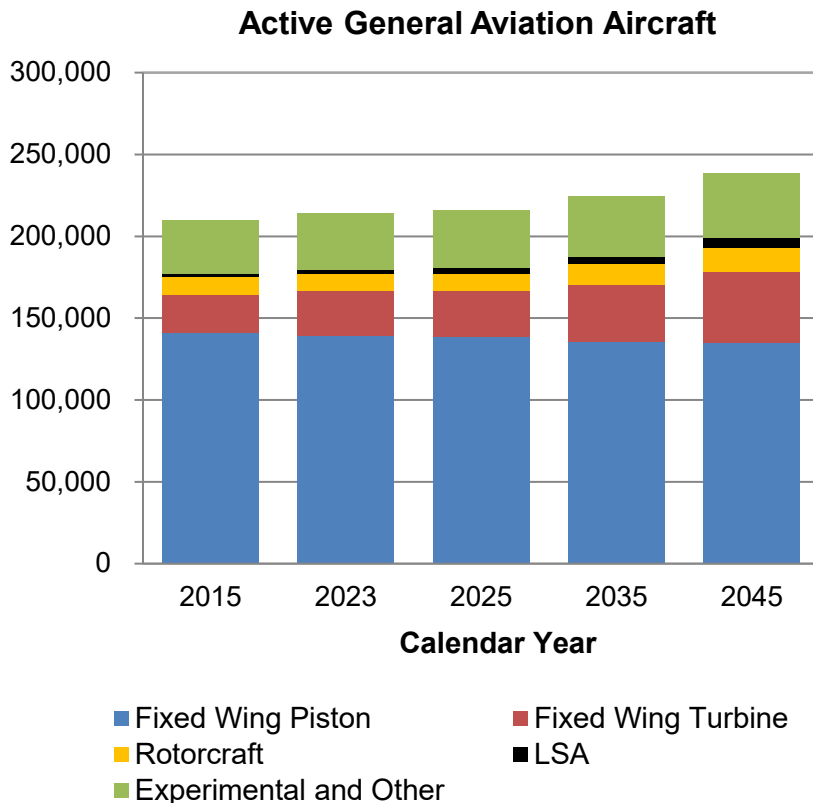
The largest segment of the fleet, fixed wing piston aircraft, is predicted to shrink by 4,450

FAA Aerospace Forecast Fiscal Years 2025–2045

aircraft between 2023 and 2045, with an average annual growth rate of -0.1 percent. Unfavorable pilot demographics, overall increasing cost of aircraft ownership, availability of much lower cost alternatives for recreational usage, combined with new aircraft deliveries not keeping pace with retirements

of the aging fleet are the drivers of the decline.

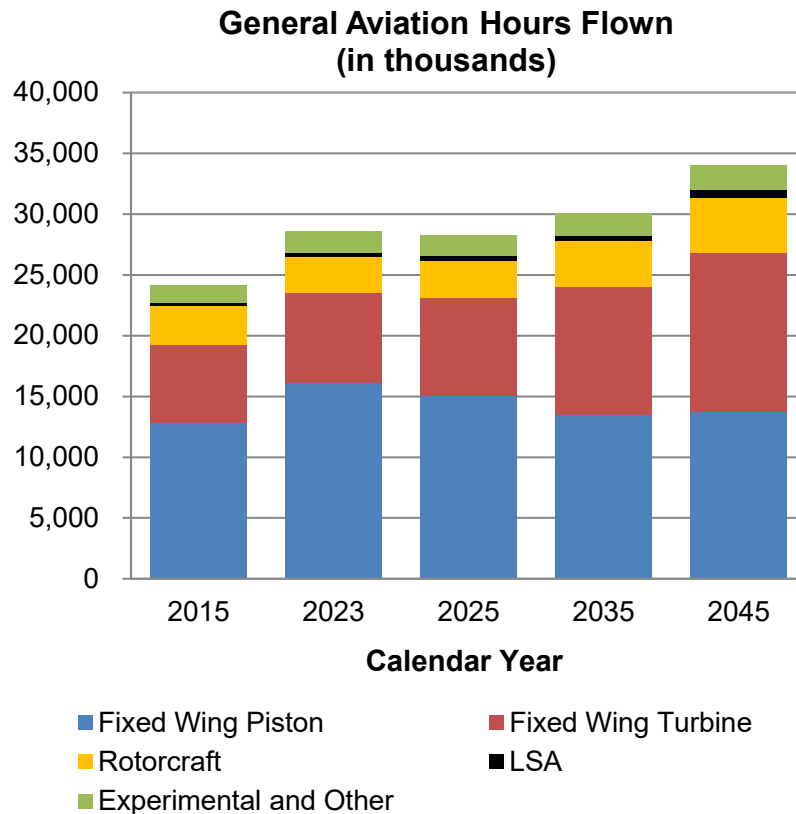
On the other hand, the smallest category, light-sport-aircraft (created in 2005), is forecast to grow by 3.1 percent annually, adding about 2,860 new aircraft by 2045 to nearly double its 2023 fleet size of 3,007.



The number of general aviation hours flown is forecast to grow faster than the active fleet, increasing an average of 0.8 percent per year through 2045, compared to a 0.5 percent annual increase in the active fleet. The growth in hours over the forecast period totals 19.0 percent, from 28.6 million in 2023 to 34.0 million by 2045, as the newer aircraft fly more hours each year. Fixed wing piston hours are forecast to decrease at a slightly faster rate than the fixed wing piston fleet, an

average of 0.7 percent a year, largely due to an aging fleet. In 2023, 24.2 percent of the fixed wing piston aircraft were 60 years old or older and FAA expects that figure to increase over the forecast period. Countering this trend, hours flown by turbine aircraft (including rotorcraft) are forecast to increase 2.5 percent yearly between 2023 and 2045. Jet aircraft account for most of the increase, with hours flown increasing at an average annual rate of 3.2 percent during

this period. The large increases in jet hours result mainly from the increasing size of the business jet fleet.



Rotorcraft activity, positively impacted by additional and replacement demand from Emergency Medical Services (EMS), firefighting (due to longer and regionally overlapping fire seasons) and Search and Rescue operations, contributed to higher rotorcraft deliveries in 2024. Potential effects of Advanced Air Mobility (AAM, including electric vertical take-off and landing--eVTOLs) in the later years of the forecast period are too uncertain to include in the forecast yet. Some industry experts suggest AAM would have a complementary impact to rotorcraft demand while others argue that the large size of some of the newly developed AAM vehicles will necessitate new

infrastructure before large scale use of AAM can occur. In addition, softening oil prices will negatively impact oil exploration activity, one of the leading uses of rotorcraft, resulting in a slowdown in rotorcraft demand. Taking these factors into account, the active fleet of rotorcraft is projected to grow at about the same rate compared to the previous year's forecast, 1.7 percent a year, going from a total (piston and turbine together) of 10,051 in 2023 to 14,715 in 2045. Rotorcraft hours are projected to grow by 2.0 percent annually during this period as the share of the higher utilization turbine rotorcraft fleet increases over the forecast period.

Lastly, the light sport aircraft category is forecasted to see an increase of 2.2 percent a year in hours flown, primarily driven by growth in the fleet.

The FAA also conducts a forecast of pilots by certification categories, using the data compiled by the Administration’s Mike Monroney Aeronautical Center. There were 848,770 active pilots certificated by FAA at the end of 2024. The number of certificates in all pilot categories continued to increase except for the recreational pilot certificates that only 59 pilots carry. The FAA suspended the student pilot forecast since 2018. The number of student pilot certificates has been affected by a regulatory change that went into effect in April 2016 and removed the expiration date on the new student pilot certificates. The number of student pilots jumped from 128,501 at the end of 2016 to 149,121 by the end of 2017, and to 345,495 at the end of 2024. The 2016 rule change generates a cumulative increase in the certificate numbers and breaks the link between student pilot and advanced certificate levels of private pilot or higher. There is not sufficient data to provide a reliable forecast for the student pilots.

Commercial and air transport pilot (ATP) certificates have been impacted by legislative changes as well. The Airline Safety and Federal Aviation Administration Extension Act of 2010 mandated that all Part 121 (scheduled airline) flight crew members would hold an ATP certificate by August 2013. Airline pilots holding a commercial pilot certificate and mostly serving at Second in Command positions at the regional airlines could no longer operate with only a commercial pilot certificate after that date, and the FAA data initially showed a faster decline in commercial pilot numbers, accompanied by a higher rate of increase in ATP certificates. The number of

commercial pilot certificates started to increase in 2017 and reached 109,727 in 2024, following a 2.8 percent increase from 2023. The number of ATP certificate holders increased every year from 2010 through 2019. There was a small decline in the number of certificate holders in both 2020 and 2021 due to the impact of the COVID-19 pandemic, but the decline was more than offset by an increase in 2022. The number of pilots holding an ATP certificate has continued to increase since 2022 and totaled 179,194 in 2024, a 2.9 percent increase from the previous year.

Private pilots continued their increase in 2024, up 2.6 percent from 167,711 in the previous year to 172,012. Sport pilot certificates, created in 2005, maintained their steady increase since their inception to reach 7,309 by December 31, 2024. Rotorcraft pilot certificates held steady at 13,429 in 2024, compared to 13,428 at the end of 2023.

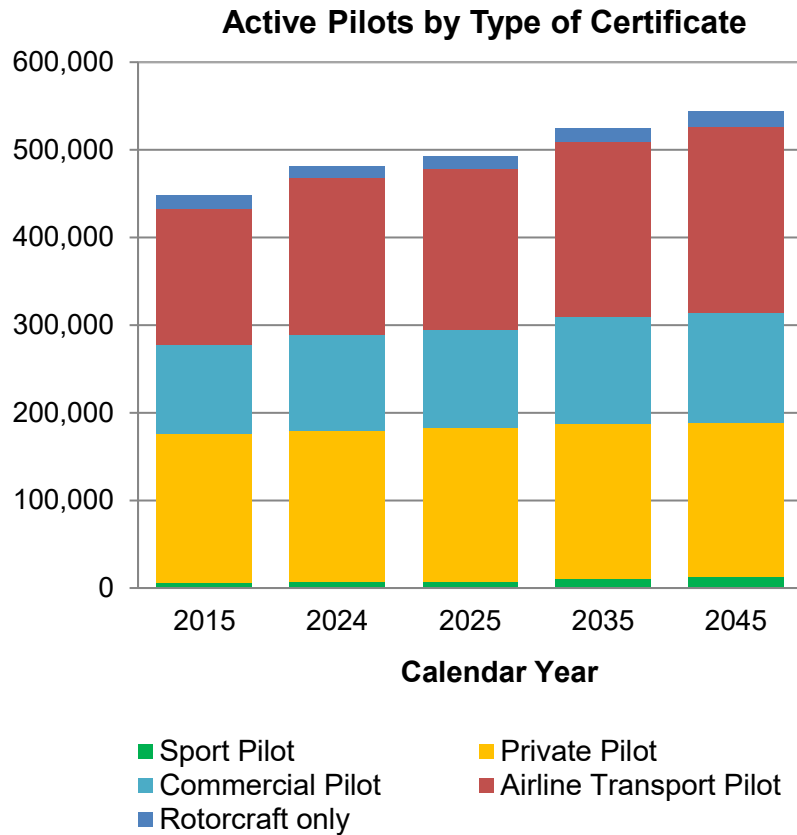
The number of active general aviation pilots (excluding students and ATPs) is projected to increase slightly between 2024 and 2045 from 324,081 to 355,180 (0.4 percent annually). The ATP category is forecast to increase by 34,200 (an average of 0.8 percent annually). The much smaller category of sport pilots is predicted to increase by 2.6 percent annually over the forecast period. Private pilot certificates are projected to have a marginal growth of 0.1 percent per year between 2024 and 2045, while commercial pilot certificates are projected to increase at an average annual rate of 0.6 percent over the forecast horizon.

The declining trend in private pilot certifications flattened after 2016 and started to increase in 2022. As other less costly recreational choices become more attractive and sport pilot certificates provide an alternative

FAA Aerospace Forecast Fiscal Years 2025–2045

for hobby use of flying, it is forecasted that the increase in the number of private pilots will level by 2030, while this certificate will continue to be a means to attain higher ratings, such as instrument, or to move up on

the path to become professional pilots by earning commercial and ATP certificates. Consequently, higher rates of increase are estimated for commercial pilots and ATPs.



FAA Operations

The traffic at FAA facilities underwent drastic changes during the period of 2019 and 2020 from the COVID-19 impact. There was a 16.7 percent decline in traffic from 53.3 million in 2019 to 44.4 million in 2020. After completing the recovery from the COVID-19 downturn in 2023, airport operations at FAA and contract towers continued their robust growth path, up 3.6 percent in 2024, totaling 56.5 million.

In the long run, economic growth in air travel demand and the business aviation fleet will drive long-term growth in operations at FAA facilities over the forecast period. Activity at FAA towers and contract towers is projected to increase at an average rate of 1.1 percent a year through 2045 from 58.2 million in 2025 to 72.8 million in 2045. The 1.1 percent annual growth forecast equals the 1.1 percent forecast for 2024-2044 last year. Commercial operations⁶ at these facilities are forecast to increase 1.9 percent a year, approximately four times faster than non-commercial operations. The growth in commercial operations is less than the growth in U.S. air-

line passengers (1.9 percent versus 2.5 percent) over the forecast period due primarily to larger aircraft (seats per aircraft mile) and higher load factors. Both trends allow U.S. airlines to accommodate more passengers without increasing the number of flights.

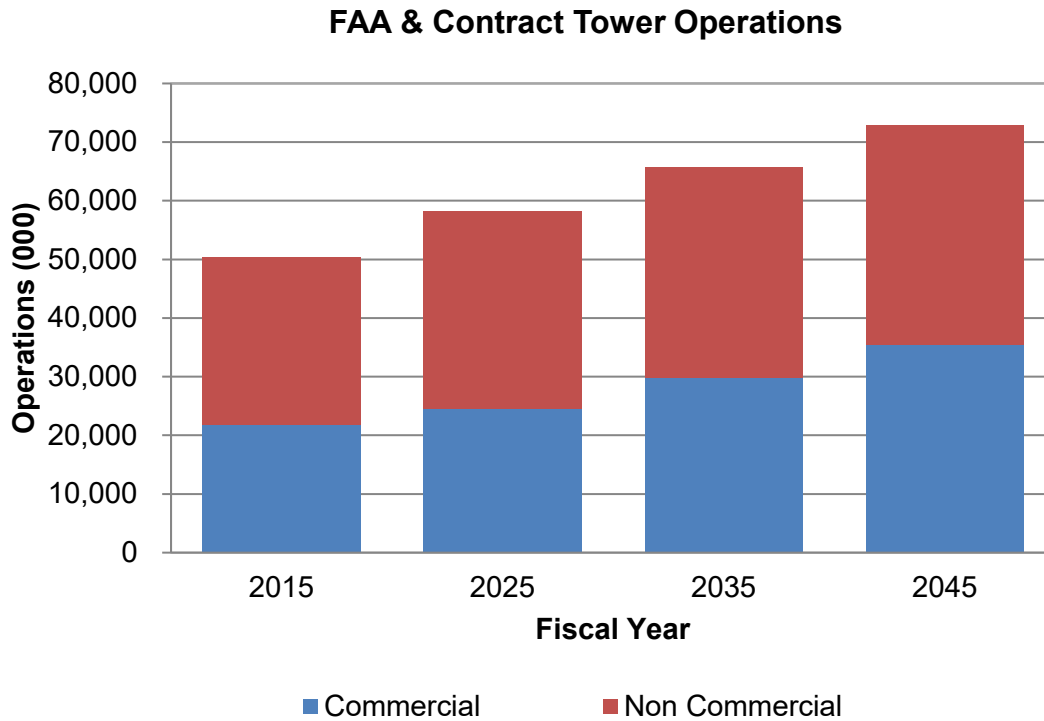
General aviation operations are forecast to increase an average of 0.5 percent a year as increases in turbine powered activity more than offset declines in piston activity. General aviation operations accounted for 54.7 percent of total operations in 2024. This is slightly higher than pre-COVID share of 51.7 percent in 2019. The decline of general aviation traffic was relatively mild during the early years of the pandemic where recovery speed was swift.

The growth in operations at towered airports is not uniform. Most of the activity at large and medium hubs⁷ is commercial in nature, as these are the airports where the vast majority (about 88 percent in 2023) of the passenger enplanements in the U.S. occur.

⁶ Commercial operations include air carrier and commuter/air taxi operations.

⁷ A large hub is defined to have 1 percent or more of total U.S. revenue passenger enplanements in FY 2023. A medium hub is defined to have at

least 0.25 percent but less than 1 percent of total U.S. revenue passenger enplanements. In the 2023 TAF there were 31 large hub airports and 33 medium hub airports.



Given the growth in airline demand that is forecast and with most of that demand is at large and medium hubs, activity at the large and medium hubs is expected to grow substantially faster than smaller airports including small hub and non-hub facilities. The forecasted annual growth in operations is 1.9 percent at large hubs, 1.6 percent at medium hubs, 0.8 percent at small hubs and non-hubs, respectively, between 2025 and 2045.

Among the 31 large hubs, the airports with the fastest long-term annual growth forecast are those located along the coastal sections of the country where most large cities are located. Large cities have historically generated robust economic activity, which in turn drives up passenger demand. In terms of COVID-19 recovery, the airports with mostly

domestic traffic and located at popular leisure destinations have had stronger recoveries.

FAA TRACON (Terminal Radar Approach Control) Operations⁸ are forecast to grow slightly faster than at towered facilities. This is in part a reflection of the different mix of activities at TRACONs. TRACON operations are forecast to increase an average of 1.4 percent a year between 2025 and 2045. Commercial operations accounted for approximately 58 percent of TRACON operations in 2024 and are projected to grow 1.8 percent a year over the forecast period. General aviation activity at these facilities is projected to grow only 0.5 percent a year over the forecast.

⁸ TRACON operations consist of itinerant Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) arrivals and departures at all airports in the

domain of the TRACON as well as IFR and VFR overflights.

FAA Aerospace Forecast Fiscal Years 2025–2045

The number of IFR aircraft handled is the measure of FAA En-Route Center activity. Growth in airline traffic is expected to lead to increases in activity at En-Route centers. Over the forecast period, aircraft handled at En-Route centers are forecast to increase at an average rate of 1.7 percent a year from 2025 to 2045, with commercial activity growing at the rate of 1.8 percent annually. Activity at En-Route centers is forecast to grow

faster than activity at towered airports and FAA TRACONs because more of the activity at En-Route centers is from the faster growing commercial sector and high-end (mainly turbine) general aviation flying.⁹ In 2024, the share of commercial IFR aircraft handled at FAA En-Route centers is about 82.5 percent, which is greater than the 58 percent share at TRACONs or the 42 percent share at FAA and Contract Towers.

⁹ Much of the general aviation activity at towered airports, which is growing more slowly, is local in nature, and does not impact the centers.

U.S. Commercial Aircraft Fleet

Restrained by retirements and maintenance work, the number of active aircraft in the U.S. commercial fleet contracted slightly in 2023-24 (a decrease of 185 aircraft). The total number of commercial aircraft is forecast to increase from 7,387 in 2024 to 10,607 in 2045, an average annual growth rate of 1.7 percent a year. Long-term increases in demand for air travel and growth in air cargo is expected to fuel increases in both the passenger and cargo fleets.

Between 2024 and 2045 the number of jets in the U.S. mainline passenger carrier fleet (including regional jets) is forecast to grow from 4,829 to 6,854, a net average of 96 aircraft a year as carriers continue to remove older, less fuel-efficient narrowbody aircraft. As the industry continues to feel the effects of the COVID-19 downturn, increasing utilization rates, production issues and continuing supply chain constraints are all hampering near term growth. These factors result in declines in the narrowbody fleet (including E-series aircraft as well as A220-series at Jet-Blue and A220-series at Delta) through 2027. After 2030, the narrowbody passenger fleet sees solid increases averaging 112 aircraft per year as carriers replace older technology 737 and A320 family aircraft with more efficient MAX and Neo families over the entire forecast period. Over the entire forecast period, the widebody passenger fleet grows by an average of 21 aircraft a year as carriers add 777-8/9, 787's, A350's to the

fleet while retiring 767-300/400, A330-200/300 and 777-200 aircraft. In total the U.S. passenger carrier widebody fleet increases by 2.7 percent a year over the forecast period.

The regional carrier fleet is forecast to increase from 1,697 aircraft in 2024 to 2,354 in 2045 as the fleet expands by 1.6 percent (31 aircraft) a year over that period. Carriers remove 50-seat regional jets and retire older small turboprop and piston aircraft, while adding 70-90 seat jets, especially the ERJ-175s. By 2045, the number of jets in the regional carrier fleet totals 2,114, up from 1,370 in 2024. The turboprop/piston fleet is forecast to shrink by 27% from 327 in 2024 to 240 by 2045. These aircraft account for 10 percent of the regional fleet in 2045, down from 19 percent in 2024.

The cargo carrier large jet aircraft fleet is forecast to increase from 861 aircraft in 2024 to 1,399 aircraft in 2045 driven by the growth in freight RTMs. The narrowbody cargo jet fleet is projected to increase on net by just 4 aircraft a year as 737-800/900MAX's are converted from passenger use to cargo service as older 757-200's are retired. The widebody cargo fleet is forecast to increase 22 aircraft a year as new 777-8 and converted 767-300 aircraft are added to the fleet, replacing older MD-11, A300, and 747-400 freighters as well as additional capacity for growing demand.

