



Timeline of Economic Changes

Introduction

Tennessee's aviation system has been affected by major events that have occurred both nationally as well as within the state. These include economic recessions, changes in fuel prices and airfares, and events that attract tourists and business travelers. These also include major weather events as well as investments at the state's largest airports. It is important to understand the timing of these events and how aviation activity was influenced.

This chapter provides an overview of major events, activities, and investments that have occurred since 1995 and have likely had some influence on the demand for Tennessee's aviation services and facilities. Multiple components of aviation activity – commercial air service, general aviation, and air cargo – are reviewed in light of these events, activities, and investments.

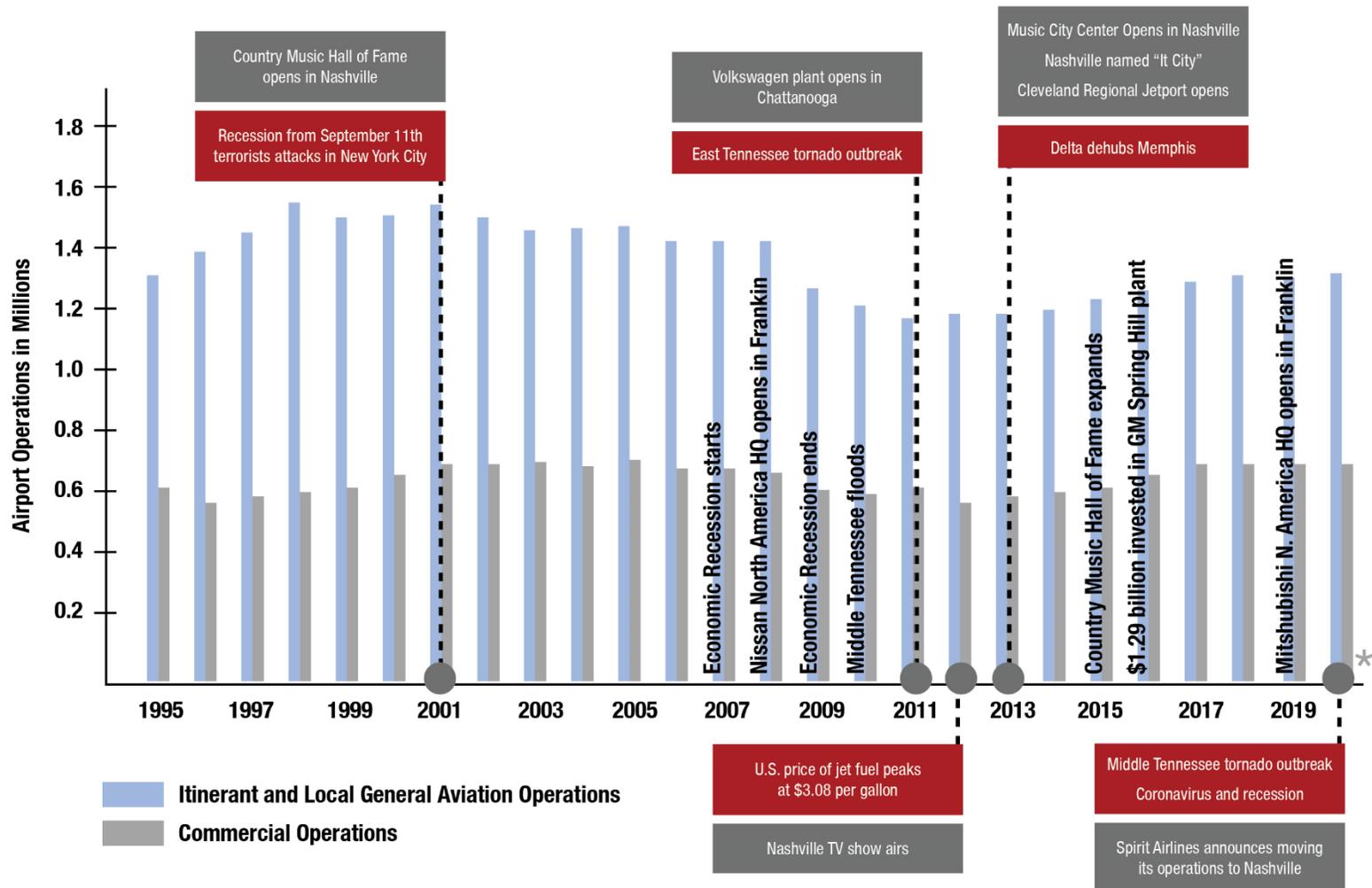
While many significant events have taken place in Tennessee during the last 25 years, this chapter focuses on those that were influential enough to have had an impact on the aviation system. **Figure 1** illustrates these major events in the context of total airport operations at Tennessee's commercial and general aviation airports. To highlight these changes, this document includes the following primary sections.

National Events: addresses changes in aviation in the national context, including recessions, changes in fuel prices and airfares, as well as early indications of the effects from COVID-19.

Statewide & Regional Events: addresses statewide, regional, and major airport-specific events and changes, including tourism growth, the Southeast's growing automobile sector, weather events, airport investments, and the de-hubbing by Delta in Memphis.

Airport Investments: addresses airport investments made in Tennessee's five primary commercial service airports: Nashville International Airport (BNA), Memphis International Airport (MEM), McGhee Tyson Airport (TYS), Lovell Field (CHA), and Tri-Cities Airport (TRI).

Figure 1. Timeline of Significant Events and Airport Operations in Tennessee, 1995-2020¹



* Airport operations for Calendar Year 2020 are based on forecasts made before the COVID-19 pandemic. Results are not reflective of the effects the pandemic has had on airport operations.

National Events

Aviation activity in Tennessee is affected by swings in the national economy and in prices of commercial airfare. This section discusses national economic events that affected Tennessee, including recessions in 2001 and 2007, as well as fluctuations in fuel prices and airfares.

Economic Recessions

Air travel and economic activity are closely related. Typically, as the economy grows, aviation activity also grows. This happens for three primary reasons:

- ◆ Corporate passenger travel increases as companies grow and employment increases
- ◆ Leisure-related travel increases as household incomes and discretionary spending grow
- ◆ Air freight shipments increase as domestic and international trade increases

Economic recessions are major events that affect economic activity in Tennessee, the U.S., and the world. The U.S. has endured three economic recessions since 1995, each of which impacted Tennessee's economy and aviation sector:²

- ◆ **9/11 Recession (March 2001 – November 2001):** The 9/11 Recession was caused by several activities starting with the collapse of a technology-led stock market bubble, and accounting scandals at major U.S. corporations, and ending with the terrorist attacks of September 11. Although the recession was relatively short in length, it had a severe impact on the aviation sector as a result of the 9/11-related plane groundings and subsequent industry regulations that added costs for airlines. The demand for air travel in the U.S. declined by 30 percent immediately following the terrorist attacks, causing major reductions in capacity and the loss of over 62,000 airline jobs at the time.³
- ◆ **Great Recession (December 2007 – June 2009):** The Great Recession was caused by the collapse of the housing market, a wave of foreclosures, and subsequent failure of financial firms that held mortgage-backed securities. The recession was severe and long-lasting, with the U.S. gross domestic product (GDP) declining by 4.3 percent over the span of 18 months. Consumer and business spending fell significantly, which suppressed demand for air travel.
- ◆ **COVID-19 Recession (February 2020 – Present):** The COVID-19 Recession began in February 2020 as a result of widespread business closures meant to protect the health of customers and employees during the pandemic. Since then, it has led to dramatic declines in economic activity and also passenger air travel due to concerns related to exposure to the virus aboard commercial airplanes. Tennessee's busiest airport,

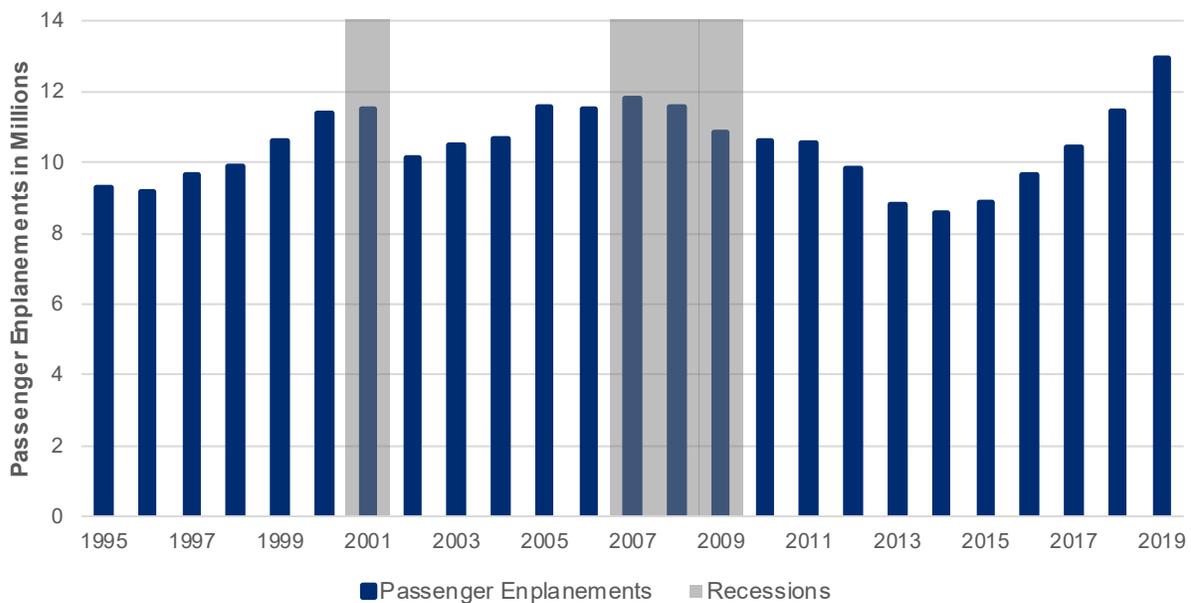
² The National Bureau of Economic Research (NBER) Business Cycle Dating Committee is the official arbiter of economic recessions. NBER defines a recession as "a significant decline in economic activity that is spread across the economy and that lasts more than a few months." It measures economic activity in multiple ways, most notably using real gross domestic product (GDP).

³ Sehl, Katie. "How the Airline Industry Survived SARS, 9/11, the Global Recession, and More." Apex, June 2020. <https://apex.aero/articles/aftershocks-coronavirus-impact/>

Nashville International Airport (BNA), served 71.4 percent fewer passengers in June 2020 compared with a year earlier.⁴

Figure 2 shows the two recessions and their impact on Tennessee enplanements through 2019.⁵ U.S. enplanements fell from 11.5 million in 2001 to 10.5 million in 2003, a drop of 9 percent.⁶ This decline was caused by a closure of the U.S. aviation system for two days and subsequent lack of consumer confidence in safety that resulted in reduced air travel and financial losses for the aviation industry. Enplanements recovered by 2007 when they reached 11.8 million. Enplanements then fell 27.7 percent between 2007 and 2014 due to the Great Recession and the economy’s slow recovery and did not surpass 2007 levels until 2019.

Figure 2. Tennessee Passenger Enplanements and U.S. Recessions, 1995-2019



Source: FAA 1995-2019 TAF Report, <https://taf.faa.gov/>

Note: Enplanement data are for fiscal years and recession data are for calendar years.

Delta Air Lines’ de-hubbing of Memphis International Airport (MEM) in 2013 was a significant event for Tennessee aviation. Although the de-hubbing officially happened during a period of statewide growth in enplanements, it is likely that enplanements would have grown even more if not for the de-hubbing (meaning it had a negative effect). More information about Delta’s de-hubbing can be found in the Statewide & Regional Events section of this report. Tennessee had

⁴ Aviation Statistical Summary, June 2020, Metropolitan Nashville Airport Authority, <https://flynashville.com/wp-content/uploads/2020/07/062020AviationStat.pdf>.

⁵ 2020 FAA data on enplanements is not yet known, so the impacts of COVID 19 are not included in this figure.

⁶ Enplanements are passenger boardings on scheduled commercial flights. Enplanements are provided for fiscal years that run from October 1 of the budget’s prior year through September 30 of the year being described (e.g., FY 2019 is between October 1, 2018 and September 30, 2019).

a much slower recovery from the 2007-2008 economic downturn than the 9/11 Recession, which speaks to the intensity and scale of the Great Recession.

Tennessee enplanements were 8.5 million in 2014 but have since grown significantly. Between 2014 and 2019, enplanements grew by 51.4 percent. **This equates to a compound annual growth rate (CAGR) of 8.6 percent, which is 6.9 percent higher than the national growth rate during the same period.** Before COVID-19, enplanements were forecast to grow at a similar rate in 2020. However, as mentioned above and shown in **Table 1**, preliminary data from Tennessee’s two busiest commercial service airports show a significant drop-off in passengers due to disruptions in airline operations in 2020 as a result of the pandemic.

Table 1. Comparison of Monthly Passenger Enplanements for BNA and MEM in 2019 and 2020

| | Nashville International Airport | | | Memphis International Airport | | |
|-----------------|---------------------------------|---------|----------|-------------------------------|---------|----------|
| | 2019 | 2020 | % Change | 2019 | 2020 | % Change |
| January | 152,717 | 164,744 | 8% | 585,863 | 657,466 | 12% |
| February | 149,453 | 158,375 | 6% | 584,876 | 668,237 | 14% |
| March | 194,728 | 94,455 | -51% | 755,200 | 383,512 | -49% |
| April | 183,482 | 10,029 | -95% | 747,058 | 31,510 | -96% |
| May | 222,401 | 27,693 | -88% | 844,443 | 102,325 | -88% |
| June | 216,281 | 52,096 | -76% | 841,170 | 241,611 | -71% |
| July | 213,790 | 73,714 | -66% | 828,530 | 309,036 | -63% |

Sources: Flynashville.com, <https://flynashville.com/nashville-airport-authority/airport-data-and-reports>; Flymemphis.com, <https://flymemphis.com/statistics>

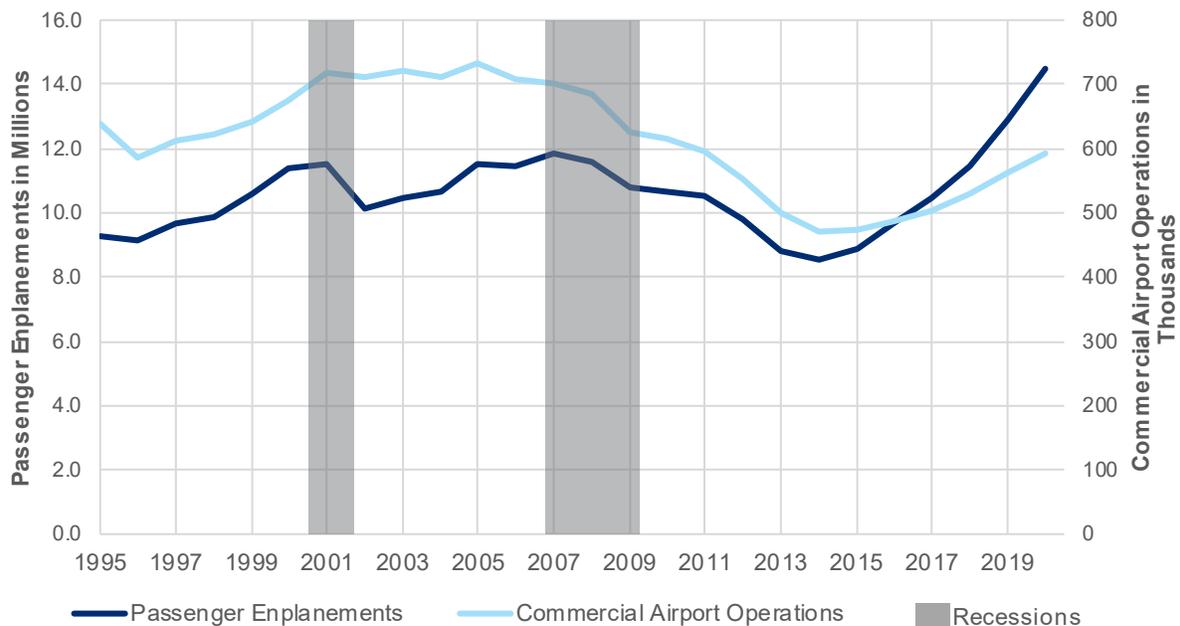
In April 2020, Tennessee Governor Bill Lee mandated a stay-at-home order in which residents were required to stay home and avoid large gatherings or locations to help decrease the spread of COVID-19. Similar to other states’ stay-at-home orders, Tennessee also banned all discretionary and nonessential travel.

These restrictions are taking a toll on the airline industry in which enplanements at Nashville International Airport (BNA) and Memphis International Airport (MEM) show a significant drop in numbers compared with 2019 levels. For instance, Nashville International Airport (BNA) enplanements went from 183,482 in April 2019 to 10,029 in April 2020; this is equivalent to a 95 percent reduction from the same month last year. Similarly, Memphis International Airport (MEM) experienced a 96 percent reduction in enplanements from 2019 to 2020 for the month of April. Although data shows passenger enplanements rising in more recent months for Nashville International Airport (BNA) and Memphis International Airport (MEM), both airports’ enplanements are still underperforming compared to 2019 figures.

COMMERCIAL AND GENERAL AVIATION OPERATIONS

Following the Great Recession, Tennessee’s commercial airport operations experienced a similar rate of decline as passenger enplanements. However, commercial airport operations have recovered more slowly (**Figure 3**). As shown, commercial airport operations have not rebounded to pre-recession levels as of 2019, whereas passenger enplanements in 2019 (12.9 million enplanements) exceeded the pre-recession peak of 2007 (11.8 million enplanements). The reduction in operations can be partly attributed to the upgauging or transition to larger airplanes, allowing for more enplanements per operation.

Figure 3. Tennessee Commercial Passenger Enplanements, Airport Operations and Recessions, 1995-2019



Source: FAA 1995-2019 TAF Report, <https://taf.faa.gov/>

Note: Operations data are for fiscal years and recession data are for calendar years.

General aviation (GA) operations have historically increased during periods of economic expansion and decreased during periods of economic contraction.^{7,8} One of several

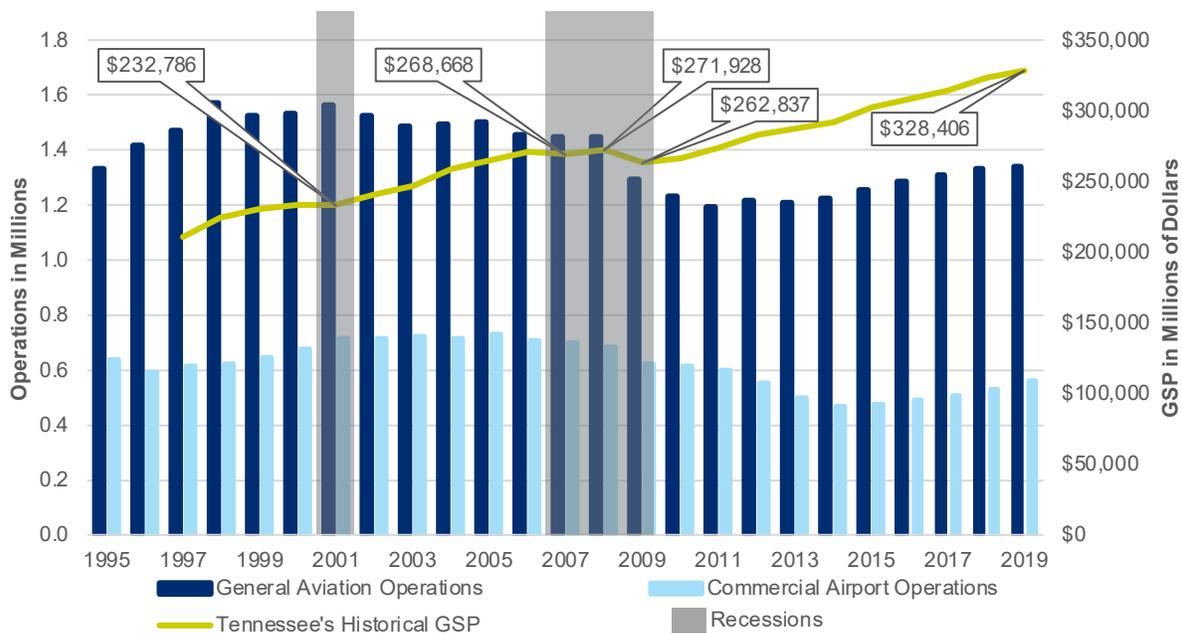
⁷ General aviation (GA) represents aircraft that are not flown by commercial airlines or the military. These flights are typically categorized as itinerant or local civil operations. Itinerant operations are those performed by aircraft with a specific origin or destination away from an airport. A local civil operation is a take-off or landing performed by an aircraft that operates within sight of an airport, or which executes simulated approaches or touch-and-go operations at an airport. Generally, local operations are characterized by training operations.

⁸ Airports included in FAA’s TAF data that do not have towers use estimated numbers for GA operations (and not actual counts). Moreover, FAA typically “straight-lines” the data over long periods, meaning non-towered airports will have the same numbers for several years until an airport conducts a forecast update for a specific project or an Airport Layout Plan (ALP) update, which can be used by the FAA to influence the future operations shown in the TAF for the airport.

considerations that could influence this relationship is the idea that GA pilots and passengers are relatively price sensitive since a large portion of GA operations is dependent on personal disposable income.

As shown in **Figure 4**, the growth pattern seen for GA operations between 1997 and 2019 similarly follows the annual growth of Tennessee's Gross State Product (GSP), particularly in the periods of 1997 to 1999, 2003 to 2005, 2006 to 2009, and 2011 to 2019. Although commercial airport operations can be interdependent on GDP (i.e., air transportation can enable economic activities, like tourism, which are dependent on the availability of air transportation services), this relationship is not as evident as the relationship between GA operations and Tennessee's GSP.

Figure 4. Tennessee's Commercial and GA Operations (1995-2019), Real GSP (1997-2019), and Recessions

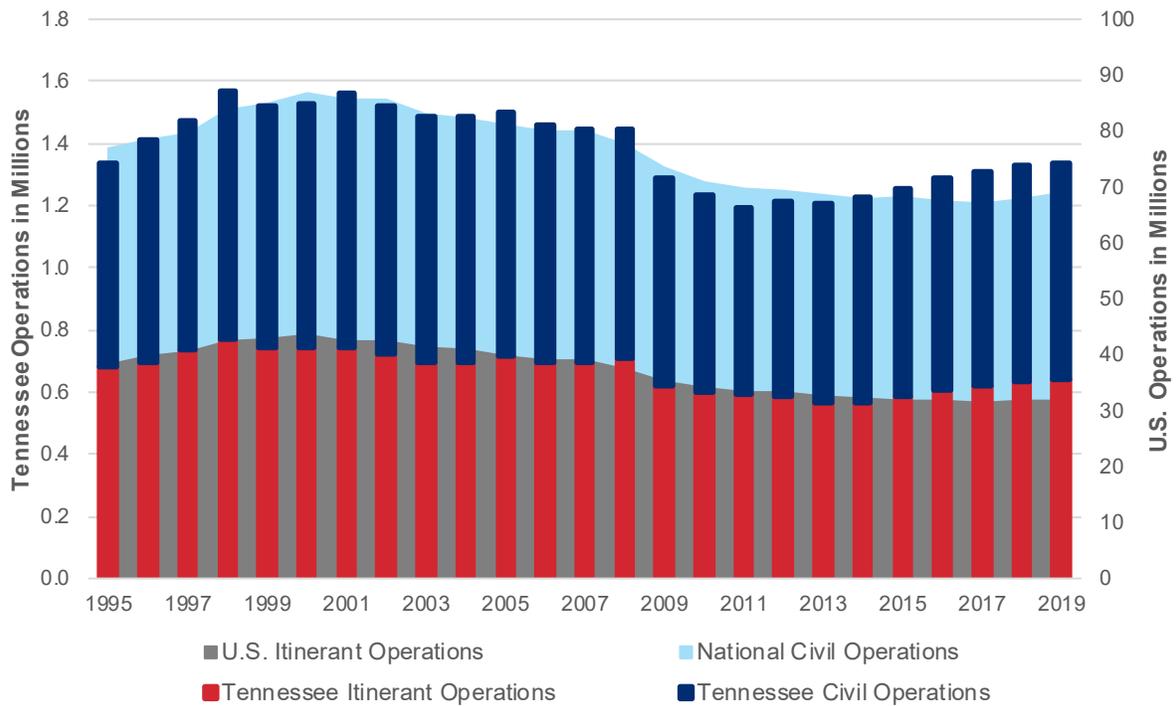


Sources: FAA 1995-2020 TAF Report, <https://taf.faa.gov/>; U.S. Bureau of Economic Analysis, <https://www.bea.gov/tools/>

Note: Real GSP is in millions of 2012 dollars. Industry detail is based on the 2012 North American Industry Classification System (NAICS). Calculations were performed on unrounded data. Chained (2012) dollar series are calculated as the product of the chain-type quantity index and the 2012 current-dollar value of the corresponding series, divided by 100.

Compared to national trends, Tennessee's growth in GA operations was more significant between 2016 and 2019 (see **Figure 5**). This higher growth could be due to more localized events, such as the General Motors plant expansion in Spring Hill between 2016 and 2019 and Mitsubishi's North American headquarters establishment in Franklin in 2019.

Figure 5. U.S. and Tennessee General Aviation Operations (Itinerant and Local Civil), 1995-2019



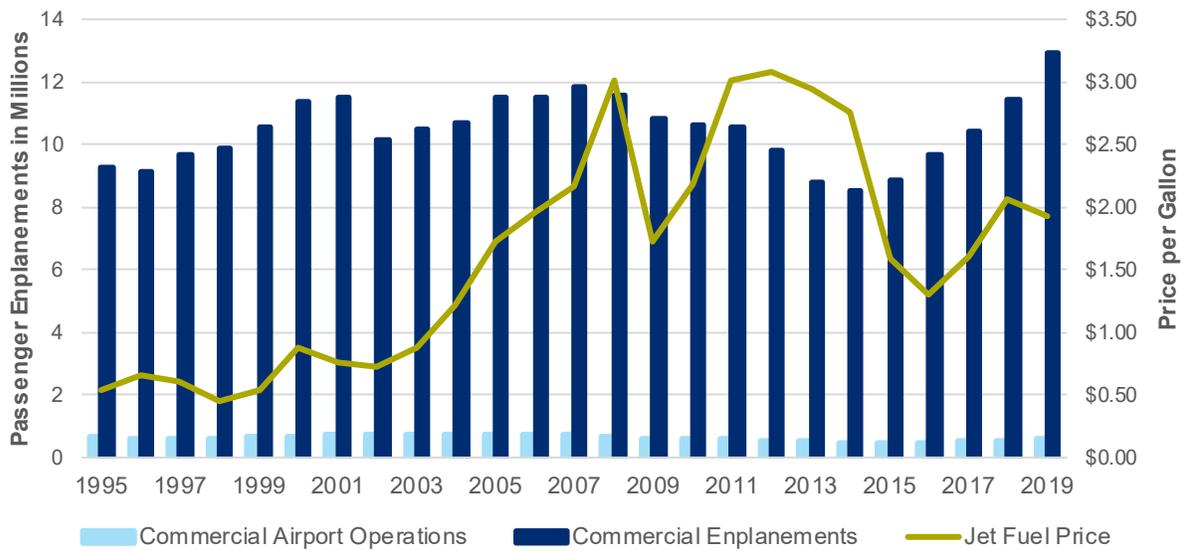
Source: FAA 1995-2019 TAF Report, <https://taf.faa.gov/>

Note: 1) Operations data are for fiscal years. 2) U.S. local civil and itinerant operations are represented as an area chart in light blue and gray (respectively). Tennessee local civil and itinerant operations are represented as a stacked bar chart in navy blue and red (respectively).

Fuel Prices

Changes in the price of jet fuel can have an effect on aviation activity, especially passenger enplanements since the impact is greatest on airlines. For instance, increases in fuel prices raise operating costs, which airlines may cover by increasing fares. **Figure 6** shows the history of real jet fuel prices per gallon from 1995 to 2019, joined with Tennessee’s commercial passenger enplanements from 1995 to 2019. The wholesale price of jet fuel peaked twice since 1995: once in 2008 at \$3.02 per gallon and again in 2012 at \$3.08 per gallon. While rising prices before the Great Recession do not appear to have negatively impacted operations, a 79.1 percent price spike between 2009 and 2012 appears to have slowed the recovery in passenger travel following the Great Recession.

Figure 6. Tennessee Passenger Enplanements and U.S. Wholesale Jet Fuel Price, 1995-2019

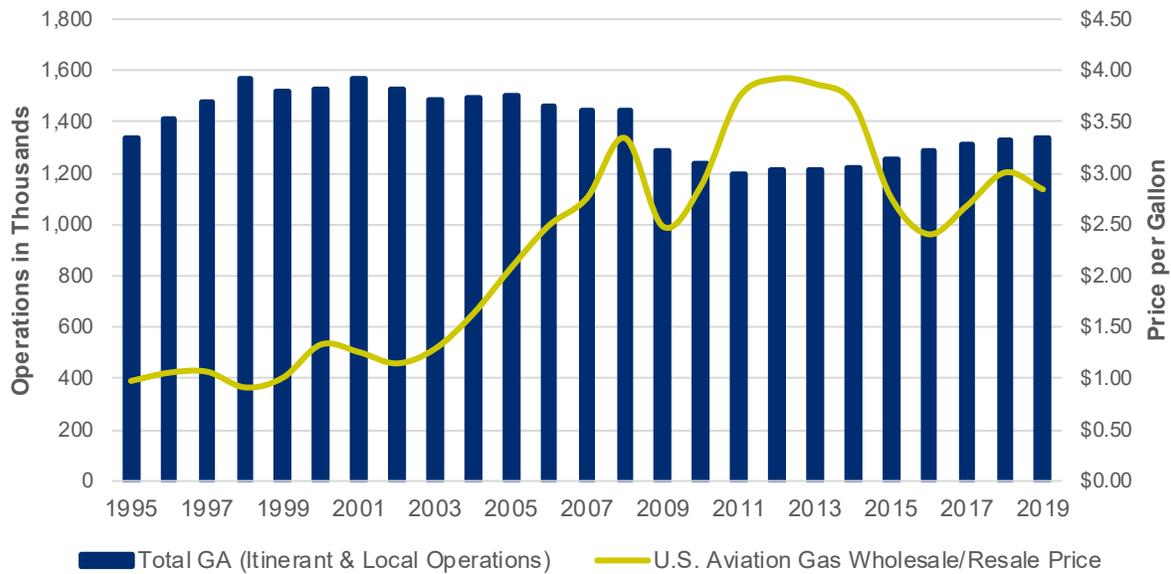


Sources: FAA 1995-2019 TAF Report, <https://taf.faa.gov/>; U.S. Energy Information Administration

Note: Operations data are for fiscal years.

Similar to the relationship between commercial airport operations and jet fuel prices, aviation gasoline (referred to as AvGas and used by many GA aircraft) prices also show a weak relationship with GA operations. **Figure 7** presents the history of AvGas fuel prices per gallon, joined with Tennessee’s total GA operations from 1995 to 2019.

Figure 7. Tennessee General Aviation Operations and U.S. Aviation Fuel Wholesale/Resale Price by Refiners



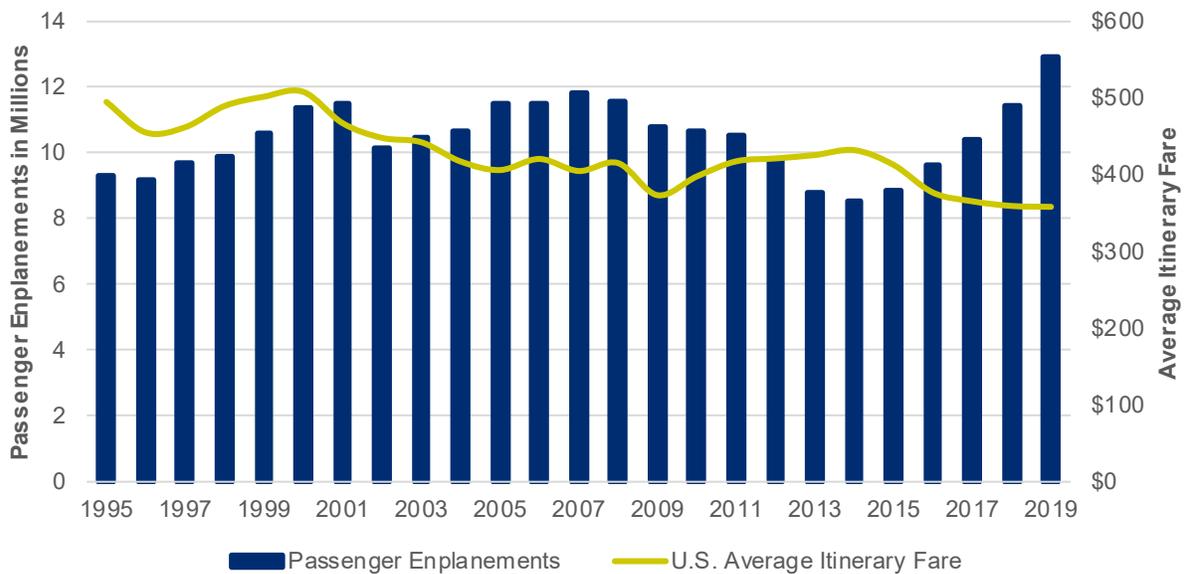
Sources: FAA 1995-2019 TAF Report, <https://taf.faa.gov/>; U.S. Energy Information Administration

Note: Operations data are for fiscal years.

Airfares

Using the Bureau of Transportation Statistics’s data on annual U.S. domestic average itinerary fare (in constant 2020 dollars), **Figure 8** demonstrates that there have been two periods of fare increases since 1995. The first was between 1996 and 2000, when airfares rose by 11.7 percent. The second was between 2009 and 2015, when airfares rose by 10.4 percent. While the first price increase appears to not have slowed airport operations, it is possible that the second airfare increase exacerbated the negative impact of the Great Recession. Despite the two periods of price increases, the average itinerary fare from 1995 to 2019 dropped from \$495 to \$358, which is equivalent to a 27.7 percent reduction in prices. When compared with 2020 prices (\$336), the price reduction is 32 percent, which is a significant drop that can be explained by impacts from the COVID pandemic.⁹

Figure 8. Tennessee Passenger Enplanements and Average Airfare (2020 dollars), 1995-2019



Sources: FAA 1995-2019 TAF Report, <https://taf.faa.gov/>; U.S. Bureau of Transportation Statistics

Note: Enplanement data are for fiscal years and airfare data are for calendar years.

Statewide & Regional Events

Several major events have occurred in Tennessee and in neighboring states that likely influenced statewide air travel in recent years, both positively and negatively. This section discusses a selection of these events in the context of aviation trends.

Tourism

Nashville is Tennessee’s largest city and is a domestic and international tourist destination. In 2019, 16.1 million people visited Nashville, representing a 22.9 percent increase over the level

⁹ The U.S. average itinerary fare for 2020 is based on averages during the first quarter – January to March – of the calendar year.

in 2010. Of these visitors, 4.8 million (30 percent) arrived through Nashville International Airport (BNA). The following events are often credited with contributing to increased visitation to Nashville and Middle Tennessee in recent years:¹⁰

- ◆ Hosting of Bonnaroo Music and Arts Festival in Manchester (2002-2019)
- ◆ Airing of the Nashville TV series on ABC and CMT (2012-2018)
- ◆ Expansion of the Country Music Hall of Fame (2014)
- ◆ Opening of Music City Center, Nashville’s convention center (2013)
- ◆ Opening of Opry Mills, a super-regional shopping mall in Nashville (2000)
- ◆ Prior events that laid the foundation for recent tourism growth include the re-opening of the Ryman Auditorium (1994) and the opening of Opryland (1972)¹¹

Major events in other parts of the state have also contributed to Tennessee’s status as a tourist destination, including the opening of Dollywood in 1986, the opening of Graceland in Memphis in 1982, and the Memphis blues revival throughout the 1980s.¹² While Tennessee’s attractions are a major draw for domestic travelers, between 2017-2018, the number of international visitors to the state increased by 11 percent, which was the highest growth rate in the nation.¹³

As discussed previously, since 2014, statewide passenger enplanements have increased at an average annual rate of 8.6 percent (see **Figure 9**). This trend follows an increase in the number of visitors to Nashville. Between 2014 and 2019, statewide enplanements increased by 51.4 percent while the number of visitors to Nashville increased by 22.9 percent. This relationship is significant because enplanements at Nashville International Airport (BNA) in 2019 comprised 67.1 percent of statewide enplanements. In addition to tourism travel, the continued growth of Nashville’s entertainment industry has likely contributed to increased enplanements. Between 2014-2019, the number of jobs in the film industry increased by 59.9 percent.¹⁴ During the same period, the number of jobs in sound recording increased by 11.8 percent. Many workers in these industries likely travel regularly by air to New York, Los Angeles, and other centers of the entertainment industry.

¹⁰ Nashville Convention & Visitors Corp. Research & Hospitality Stats (<https://www.visitmusiccity.com/research>). Nashville International Airport Economic Impact Fact Sheet (<https://flynashville.com/wp-content/uploads/2020/06/BNA-2019-Economic-Impact-Fact-Sheet.pdf>).

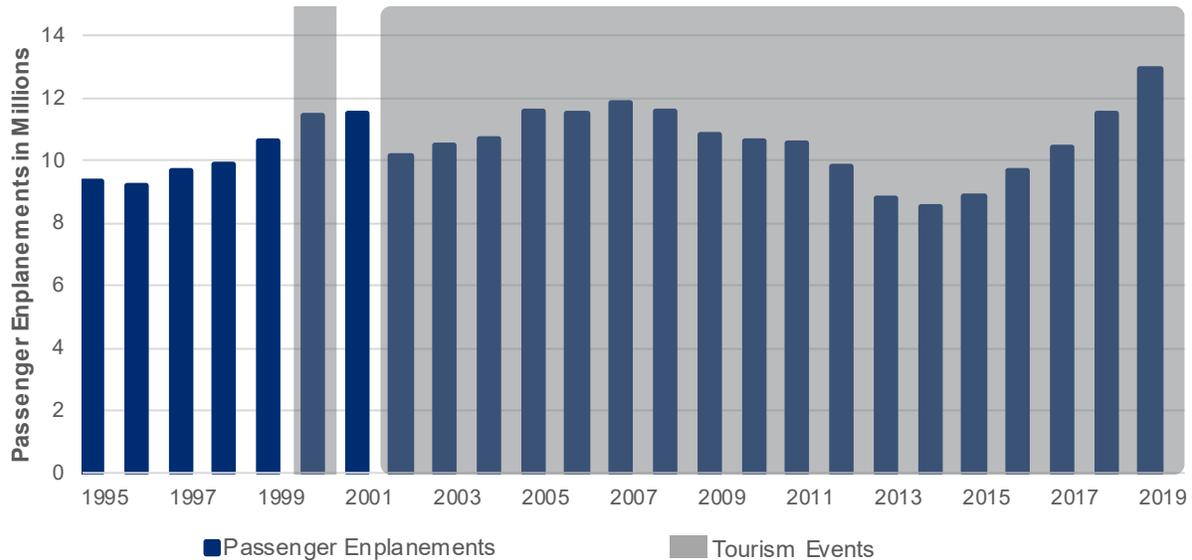
¹¹ Opryland closed in December 1997.

¹² Dolly Parton bought part of the company and renamed it Dollywood. Before 1986, it was called Silver Dollar City. Since the renaming, there have been multiple expansions each decade. (Wikipedia)

¹³ Jamie McGee, “Tennessee ranks No. 1 for international travel growth in U.S.,” *The Tennessean*, May 24, 2018, <https://www.tennessean.com/story/money/2018/05/24/tennessee-ranks-no-1-international-travel-growth-united-states/642420002/>.

¹⁴ Moody’s Analytics

Figure 9. Tennessee Historical Passenger Enplanements and Tourism Events, 1995-2019



Source: FAA 1995-2019 TAF Report, <https://taf.faa.gov/>

Note: Enplanement data are for fiscal years and tourism events are for calendar years.

Sporting Events

Sporting events play an important role in the U.S. economy, especially in regions where professional sports teams exist. Major sporting events are seen as catalysts for attracting visitors from all over the country. Since 2001, there have been several events related to professional sports in Tennessee:

- ◆ Hosting of the NFL Draft in Nashville (2019)
- ◆ Nashville hosted the men's NCAA tournament opening rounds at Bridgestone Arena (2000, 2003, 2005, 2012, 2018)
 - Regionals were held in Memphis at FedEx Forum (2009, 2014, 2017) and in Knoxville at Thompson-Boiling Arena (1994, 1999)
- ◆ The Nashville Soccer Club (MLS Team) was formed (2017)
- ◆ The Memphis Grizzlies, a professional basketball team that was established in 1995 as the Vancouver Grizzlies, relocated to Memphis where they play at the FedEx Forum (2001)
- ◆ The Nashville Predators, a professional hockey team, began playing in Bridgestone Arena (1998)
- ◆ The Tennessee Titans, a professional football team that was established in 1960 as the Houston Oilers, relocated to Memphis in 1997 and then to Nashville in 1998, where they currently play at Nissan Stadium (1997-1998)

Passenger enplanements were on a growth path while each of the events listed above occurred. However, it is unlikely that the establishment of professional sports teams in Tennessee had a noticeable impact on statewide air travel. While sporting events do attract people from outside Tennessee, some of whom travel by air, and may increase GA traffic, it is unlikely to be enough to influence overall trends in enplanements or annual GA operations. Similarly, while the NFL

Draft attracted travelers from out-of-state, it was for a period of just several days and likely had little effect on overall trends.

Business Expansion and Stagnation

Tennessee has attracted a significant amount of private investment since 1995, especially in the automotive industry. The state is located in “auto alley,” a multi-state region home to multiple auto manufacturing plants and headquarters. These auto facilities contribute to air travel through an increase in air freight shipments.¹⁵ Auto industry openings and expansions since 1995 in Tennessee and neighboring states include the following:

- ◆ General Motors electric vehicle plant in Spring Hill (2020-2022)¹⁶
- ◆ Mitsubishi North America headquarters in Franklin (2019)
- ◆ General Motors plant expansion in Spring Hill (2016-2019); the company also announced a \$2 billion investment in October 2020 that will enable the plant to manufacture electric vehicles¹⁷
- ◆ Toyota plant in Mississippi (2011)
- ◆ Volkswagen plant in Chattanooga (2011)
- ◆ Kia plant in Georgia (2009)
- ◆ Nissan North America headquarters in Franklin (2008)
- ◆ Mazda, Honda, and Toyota plants in Alabama (1997, 2001, 2003, respectively)

When viewed in the context of Tennessee enplanement and operations trends, the timing of these auto industry expansions likely contributed to aviation sector growth, as shown in **Figure 10**. This is especially true for activities that took place within the last five years and during the early- to mid-2000s. As the section on airport investments also shows, auto industry expansions potentially contributed to increased air cargo activity, especially at Memphis International Airport (MEM) and Nashville International Airport (BNA).¹⁸

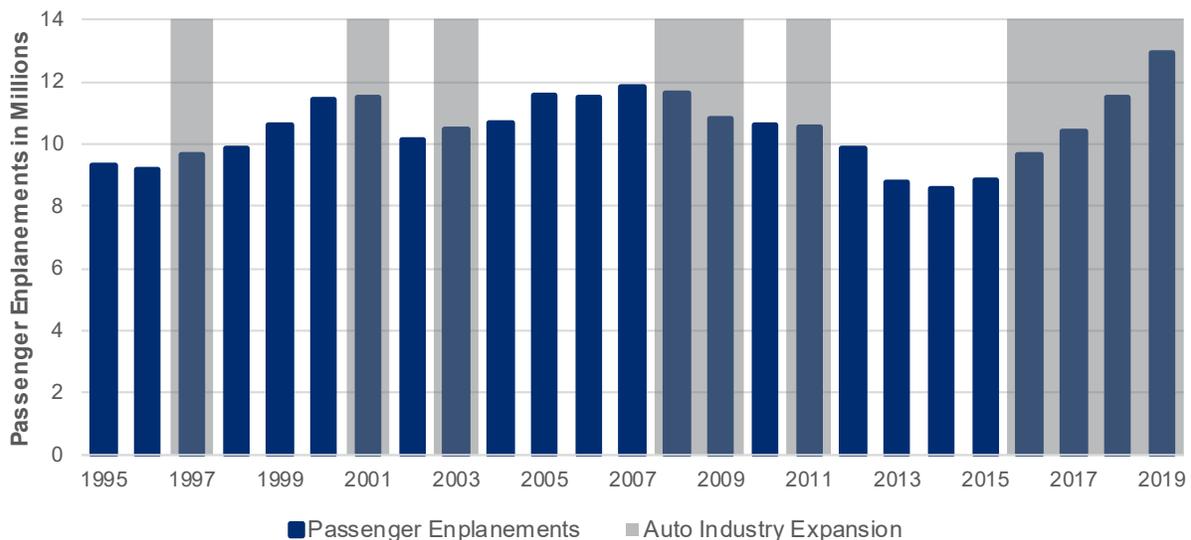
¹⁵ Although corporate passenger travel by automotive industry executives can be a contributing factor to increased air travel, that was not necessarily the case for the automotive industry expansion in Tennessee. The two airports that were adjacent to Tennessee’s auto expansion were Nashville International Airport (Mitsubishi and Nissan headquarters) and Maury County Airport (General Motors plant). The Federal Aviation Administration’s Terminal Area Forecast reported no change in Maury County Airport’s GA and local civil operations during the years – prior to and succeeding – of the GM Motors expansion in Spring Hill. Similarly, the GA and local civil operations for Nashville International Airport showed no significant change in operations prior to and succeeding the establishment of the Mitsubishi and Nissan headquarters in Franklin (there was only a 1 percent increase in operations from 2018 to 2019).

¹⁶ <https://abcnews.go.com/Business/wireStory/tennessee-factory-gms-3rd-electric-vehicle-plant-73715178>

¹⁷ “GM investing \$2 billion in Spring Hill plant to build electric vehicles, including Cadillac Lyriq,” *The Tennessean*, October 20, 2020, <https://www.tennessean.com/story/money/cars/2020/10/20/general-motors-spring-hill-tn-cadillac-lyriq/5989438002/>.

¹⁸ Section 4. Airport Investments

Figure 10. Historical Passenger Enplanements and Auto Industry Expansion, 1995-2019



Source: FAA 1995-2019 TAF Report, <https://taf.faa.gov/>

Note: Enplanement data are for fiscal years and auto industry expansion are for calendar years.

In addition to the auto industry, Tennessee has recently attracted companies in finance, healthcare, and software, all of which have likely contributed to increased aviation activity.¹⁹ In 2018, Amazon announced it would locate a new Operations Center of Excellence in downtown Nashville. The total investment that Amazon is committing for this expansion is \$230 million, which could create up to 5,000 high-paying jobs.²⁰ The Operations Center of Excellence facility is set to open during the first half of 2021.²¹ Once fully staffed, Amazon’s new facility will likely place additional demand on Nashville International Airport (BNA).

In 2013, Delta Air Lines announced that it planned to end its hub operations at Memphis International Airport (MEM). Although the de-hubbing was important for Memphis International Airport (MEM), it did not lead to a noticeable drop in statewide enplanements from 2007 through 2014. Declines in statewide enplanements are more closely correlated with economic recessions, with enplanements increasing in the early to mid-2000s even as Delta flights were being reduced at Memphis International Airport (MEM). Statewide enplanements still grew significantly even after the airport was officially de-hubbed in 2013. It is likely that the de-

¹⁹ Steve Kaelble, “Tennessee Keeps Attracting Headquarters Operations,” 2019, *Area Development*, <https://www.areadevelopment.com/ContributedContent/Q3-2019/tennessee-keeps-attracting-headquarters-operations.shtml>

²⁰ “Amazon’s new headquarters isn’t coming to Nashville, but they are investing in the city anyway.” *Tennessean*. November 2018. (<https://www.tennessean.com/story/news/local/2018/11/13/amazon-hq-2-headquarters-announcement-nashville/1987258002/>)

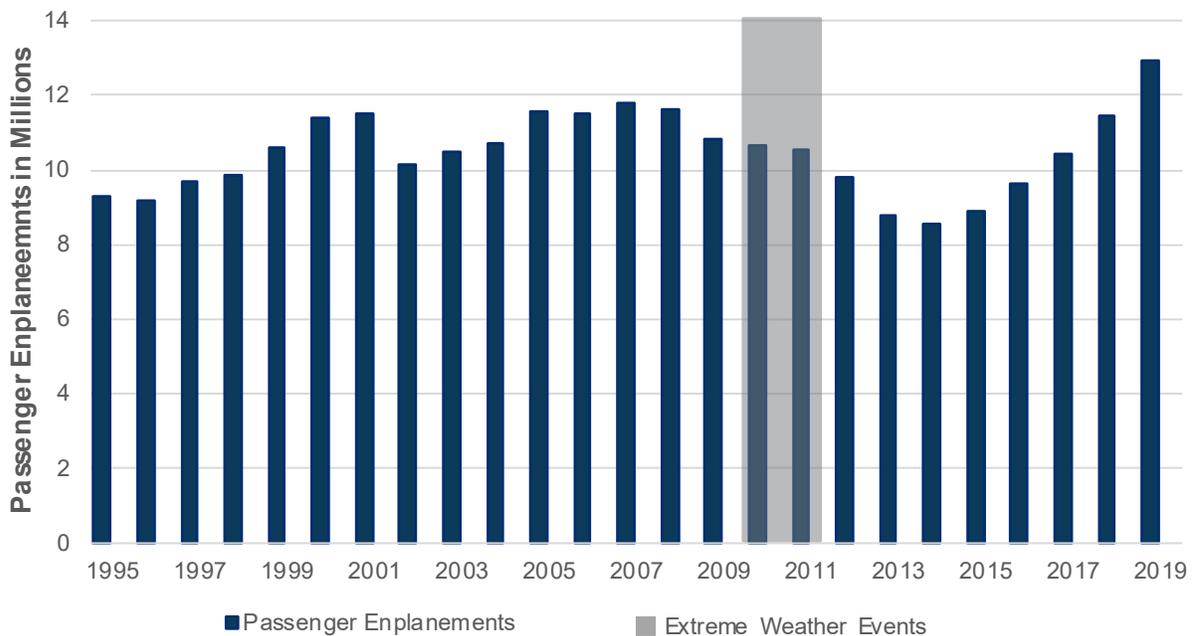
²¹ Layden, Melanie. “Amazon already expanding in Nashville ahead of official move.” *News4Nashville*. July 2019 (https://www.wsmv.com/news/amazon-already-expanding-in-nashville-ahead-of-official-move/article_4cb626a2-afd5-11e9-b409-c3896b23b38c.html)

hubbing at Memphis International Airport (MEM) slowed the increase in statewide enplanements—meaning growth would have been greater otherwise—but it is difficult to discern the precise impact. Enplanements at Memphis International Airport (MEM) are discussed in more detail in the Airport Investments section.

Extreme Weather Events

As discussed previously, enplanements in Tennessee fell 27.7 percent between 2007 and 2014 due to the Great Recession and the economy’s slow recovery. This decline in enplanements was possibly exacerbated or extended by a series of floods in Middle Tennessee in 2010 and Southwest Tennessee in 2011, as well as a tornado outbreak in East Tennessee in 2011 (see **Figure 11**).

Figure 11. Tennessee Historical Commercial Enplanements and Extreme Weather Events, 1995-2019



Source: FAA 1995-2019 TAF Report, <https://taf.faa.gov/>

Note: Enplanement data are for fiscal years and extreme weather events are for calendar years.

The effects of the 2011 flood in Memphis put General Dewitt Spain Airport (M01) under as much as 12 feet of water and was forced to close as a result.²² A more recent extreme weather event includes a tornado in March 2020 that caused significant damage at John C. Tune Airport (JWN) in Nashville.²³ The damages to John C. Tune Airport (JWN) from the tornado amounted

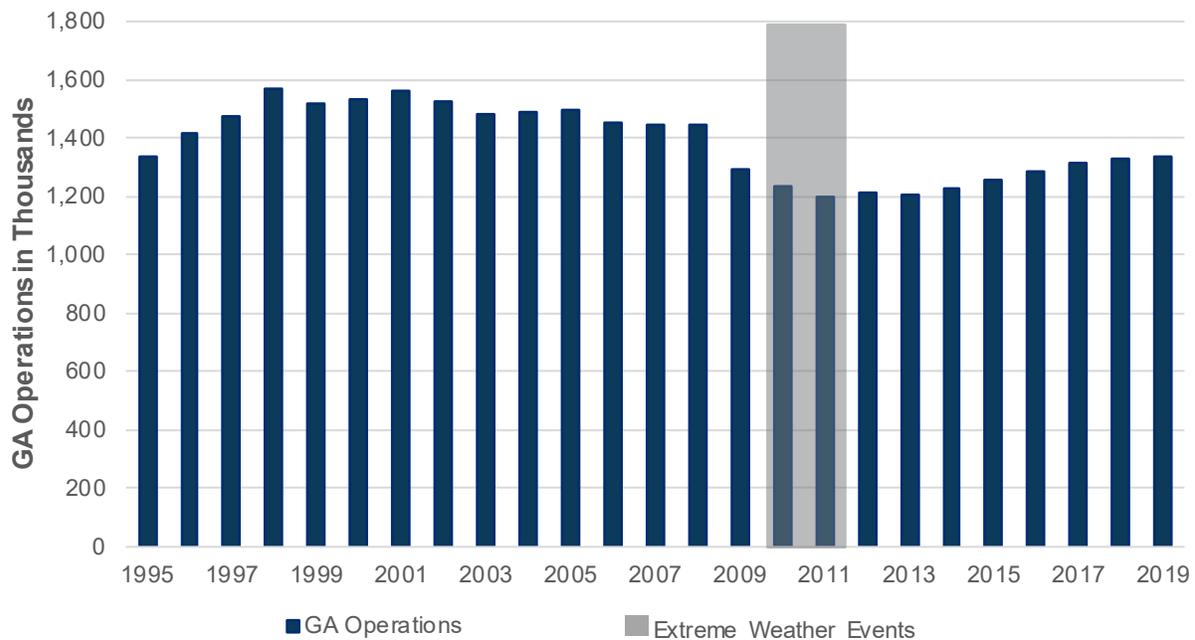
²² Curt Epstein, “Memphis GA Airport Ravaged by Flood,” May 26, 2011, <https://www.ainonline.com/aviation-news/aviation-international-news/2011-05-26/memphis-ga-airport-ravaged-flood>

²³ “John C. Tune Airport reopening after tornado damage,” *News Channel 5 Nashville*, <https://www.newschannel5.com/news/john-c-tune-airport-reopening-after-tornado-damage>

to \$93 million and included 90 destroyed aircraft and personal property items (e.g., vehicles), as well as damages to the terminal, 17 hangars, pavement, navigation aids, signage, lighting, fencing, and utilities.²⁴

The effects that the 2020 tornado would have had on GA operations is not shown in **Figure 12** since the data ends at Year 2019. The 2011 flooding at General Dewitt Spain Airport (M01) showed to not have had a negative impact on GA operations since operations saw a slight increase in 2012.

Figure 12. Tennessee Historical GA Operations and Extreme Weather Events, 1995-2019



Source: FAA 1995-2019 TAF Report, <https://taf.faa.gov/>

Note: Operations data are for fiscal years and extreme weather events are for calendar years.

These weather events can have both negative and positive impacts on aviation activity. The events typically bring more people in terms of weather reporters and then emergency and recovery personnel but can also reduce demand during the period of the event.

²⁴ "Tune Airport Suffers \$93M in damages." Nashville Post, March 2020, <https://www.nashvillepost.com/business/transportation/aviation/article/21120008/tune-airport-suffers-93m-in-damages>

Airport Investments

Tennessee’s busiest commercial service airports have seen significant capital and airline service investment in recent years that have had an impact on aviation activity, especially investments made during the 2001 and 2007-2009 recessions that helped lay the groundwork for increased capacity in subsequent years. A significant portion of these investments were made possible by the Airport Improvement Program (AIP), a program of the Federal Aviation Administration (FAA). This section discusses aviation trends and capital investments at the state’s five largest commercial service airports:²⁵

- ◆ Nashville International Airport (BNA)
- ◆ Memphis International Airport (MEM)
- ◆ McGhee Tyson Airport (TYS)
- ◆ Lovell Field (CHA)
- ◆ Tri-Cities Airport (TRI)

The discussion also includes air cargo activity at Nashville International Airport (BNA), Memphis International Airport (MEM), and McGhee Tyson Airport (TYS). Cargo shipped through these airports is important for growing Tennessee’s economy, especially in industries that produce and consume goods with high value-to-weight ratios, including electronics and pharmaceuticals.

Nashville International Airport (BNA)

Nashville International Airport (BNA) enplanement volumes have grown consistently since 1995, with only six years of decline over the 26-year period, most occurring after recessions. As discussed previously, this is partly attributable to Nashville’s growth as a tourism destination.

BNA AIP GRANT HISTORY

Fiscal Years: 2005-2019

Federal Funds Received: \$143 million

Work Completed:

- Acquired aircraft rescue and firefighting vehicle
- Acquired snow removal equipment
- Constructed deicing containment facility
- Energy efficiency equipment/infrastructure
- Environmental mitigation
- Expanded aircraft rescue and firefighting building
- Extended runway safety area
- Identified the airport’s environmental footprint
- Rehabilitated runway lighting
- Rehabilitated taxiway and apron
- Security enhancements
- Updated airport master plan
- Wildlife Hazard Assessments

²⁵ Tennessee has 78 public use airports, five of which are commercial service airports that serve the state’s largest metropolitan areas. “Economic Impacts of Aviation Activity in Tennessee.” Tennessee Department of Transportation. 2014. <https://www.tasp2040.com/wp-content/uploads/2019/11/TDOT-Aviation-Economic-Impact-Study-2014.pdf>.

Although international travel accounted for less than two percent of total enplanements at Nashville International Airport (BNA) in 2019 (153,000 out of 8.9 million enplanements), total international enplanements have increased more than seven-fold since 2012.²⁶

Nashville International Airport (BNA) has also benefitted from state and federal aviation grants, including through the federal AIP program.²⁷ Most recently, grants have supported BNA Vision, which is an airport growth and expansion plan that includes upgrades to terminal garages; a new hotel, international arrivals facility, and central utility plant; lobby, baggage claim, taxi lane, and terminal apron expansions; and access roadway improvements.²⁸ The anticipated completion date for these improvements is 2023, however, some improvements have likely impacted enplanements already.

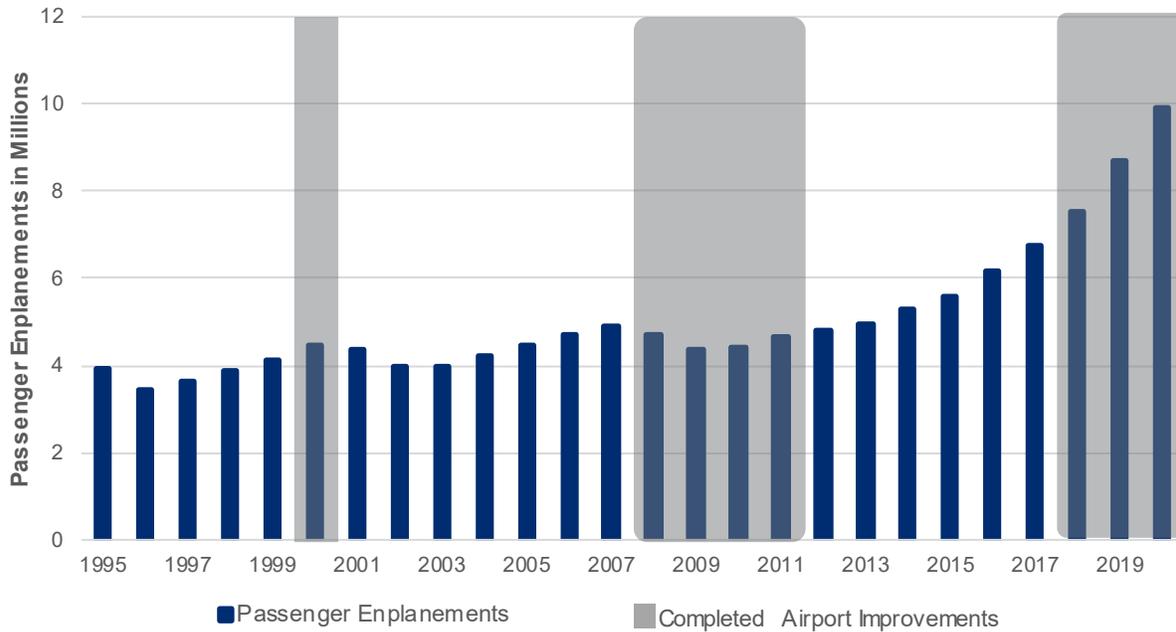
Figure 13 compares the years in which these improvements occurred to passenger enplanements for Nashville International Airport (BNA).

²⁶ Bureau of Transportation Statistics T-100 Market data.

²⁷ “Nashville International Airport: Master Plan Update: Chapter 8 Financial Plan,” pages 6-8, FlyNashville, <https://flynashville.com/wp-content/uploads/2020/02/BNA-MPU-FINANCIAL-PLAN.pdf>. “Press Release – U.S. Department of Transportation Announces \$586 Million in Airport Infrastructure Grants,” Federal Aviation Administration, September 2018, https://www.faa.gov/news/press_releases/news_story.cfm?newsId=23114. “Press Release – U.S. Transportation Secretary Elaine L. Chao Announces \$49.3 Million in Infrastructure Grants to Four Airports in Tennessee,” Federal Aviation Administration, July 2019, https://www.faa.gov/news/press_releases/news_story.cfm?newsId=23928.

²⁸ “Eyes on the Horizon,” Nashville International Airport, <https://bnavisionnashville.com/plans/>.

Figure 13. Nashville International Airport (BNA) Commercial Passenger Enplanements and Years in Which Airport Improvements Were Completed, 1995-2020



Source: FAA 1995-2019 TAF Report, <https://taf.faa.gov/>

Note: Enplanement data are for fiscal years and airport improvements are for calendar years.

Previous Nashville International Airport (BNA) investments that likely contributed to growth in enplanements include the following:²⁹

- ◆ Nashville International Airport (BNA)'s Terminal Garage 2 that includes over 2,000 parking spaces and dedicated ground transportation center for commercial vehicle pickups (2018)³⁰
- ◆ Terminal renovations and expansions in 2009 and 2011
- ◆ Runway improvements completed in 2009 and 2010
- ◆ Runway expansions between 1998 and 2000 and in 2008
- ◆ Improvements to the short-term parking garage, roadway, and bridges in front of the airport terminal, and a pedestrian bridge that now provides access between the arrival and departure levels of the airport terminal and parking garage (2008)

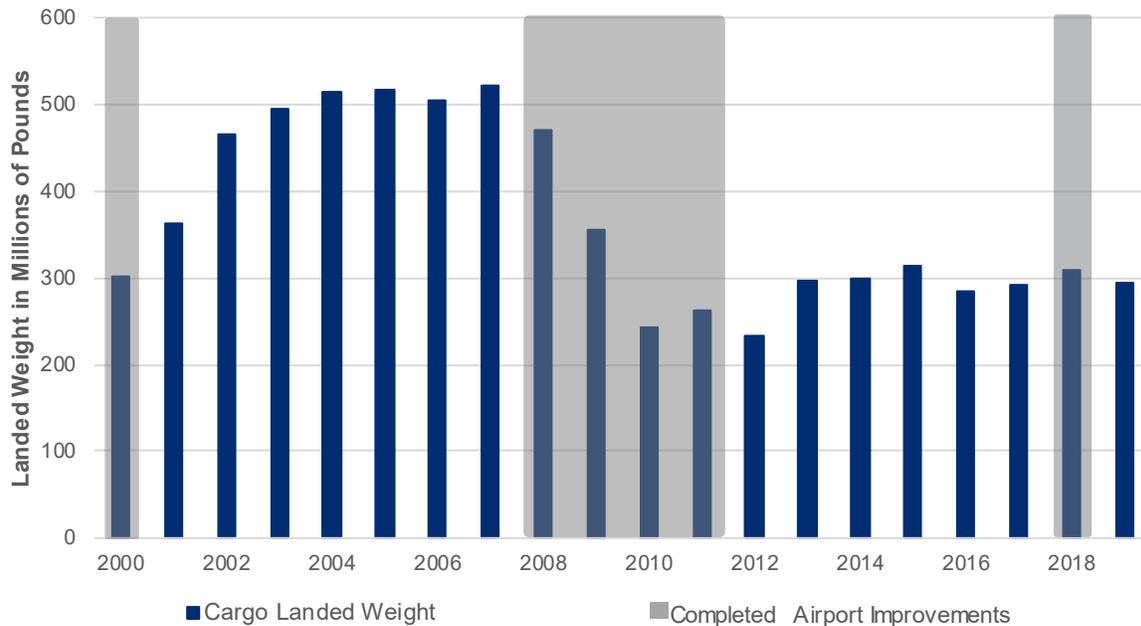
Nashville International Airport (BNA) is also home to the Nashville Air Cargo complex, which primarily serves the electronics industry. The airport experienced a significant decline in cargo landed weight following the Great Recession and has still not fully recovered (see **Figure 14**). In

²⁹ "Nashville International Airport Renovation Project, Nashville, Tennessee," Airport Technology, <https://www.airport-technology.com/projects/nashville/>, <https://www.bizjournals.com/nashville/stories/1998/08/24/story3.html>.

³⁰ "BNA Opens New Parking Facility," Airport News, <https://airportnews.com/bna-opens-new-parking-facility/>

response to a moderate increase in air cargo since the Great Recession, the airport is now rehabilitating and expanding its cargo facilities, which will involve expanding air freight services on 113 acres.³¹

Figure 14. Nashville International Airport (BNA) Landed Weight and Years in Which Airport Improvements Were Completed, 2000-2019



Source: Federal Aviation Administration's All-Cargo Data for U.S. Airports, https://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/

Note: Cargo data and airport improvements are for calendar years.

³¹ "Tennessee Statewide Multimodal Freight Plan," Tennessee Department of Transportation, https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/TDOT_FreightPlan_AMENDED_04022019.pdf

Memphis International Airport (MEM)

Unlike at Nashville International Airport (BNA), passenger enplanements at Memphis International Airport (MEM) fell significantly following the Great Recession and have still not recovered to pre-recession levels. As discussed earlier, one reason for this is Delta Air Lines' de-hubbing of the airport.³² The reduction in Delta flights began in 2000, when there were as many as 300 daily departures, and continued until there were around 90 departures in 2013 when the de-hubbing became official.³³ However, enplanements at Memphis International Airport (MEM) actually increased slightly after Delta started removing flights in 2000. Enplanements then began falling precipitously during the Great Recession, with the continued reduction in Delta flights likely compounding the decline.

Although passenger enplanements at Memphis International Airport (MEM) are well below their pre-recession peak, they have increased gradually since 2014. Several capital projects could be partly responsible for this turnaround, some of which were supported by the AIP.³⁴

Figure 15 compares the years in which these capital projects occurred to passenger enplanements for Memphis International Airport (MEM).

MEM AIP GRANT HISTORY

Fiscal Years: 2005-2019

Federal Funds Received: \$437 million

Work Completed:

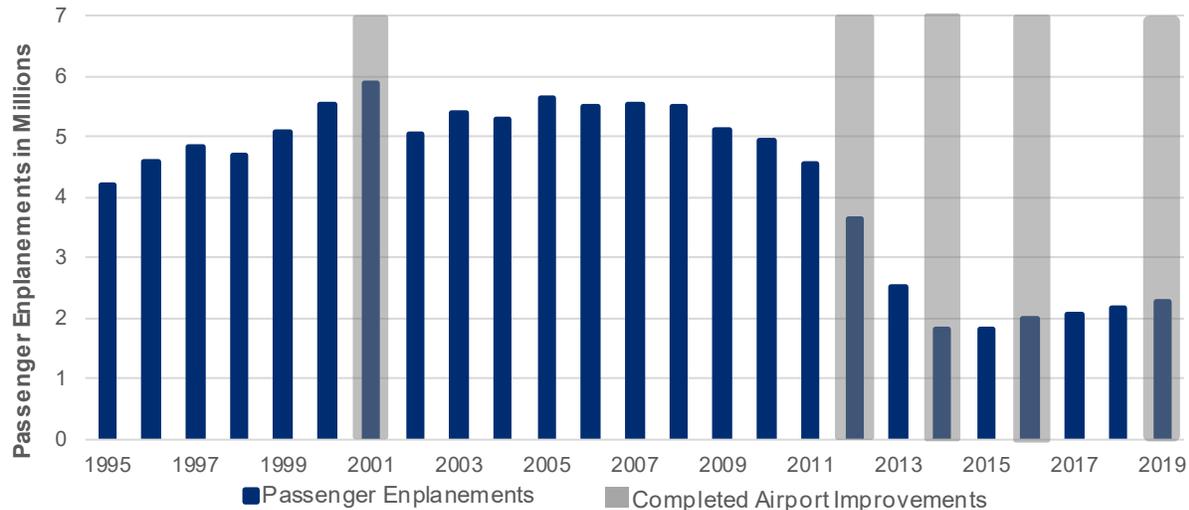
- Acquired aircraft rescue and firefighting vehicle
- Acquired snow removal equipment
- Collected airport data for airport's geographic information system
- Constructed aircraft rescue and firefighting building
- Constructed deicing containment facility
- Improved access and service roads
- Improved airport drainage
- Improved runway safety area
- Improved terminal building
- Installed airfield guidance signs
- Rehabilitated runway, apron, and taxiway and widened taxiway
- Security enhancements
- Updated airport master plan study
- VALE infrastructure

³² "Delta to pull plug on Memphis hub after Labor Day," USA Today, <https://www.usatoday.com/story/todayinthesky/2013/06/04/delta-air-lines-to-pull-plug-on-memphis-hub/2390515/>

³³ "Delta finally de-hubs Memphis after years of pruning unprofitable flights," Centre for Aviation, <https://centreforaviation.com/analysis/reports/delta-finally-dehubs-memphis-after-years-of-pruning-unprofitable-flights-112839>

³⁴ "Airport Improvement Program (AIP) Grant Histories," Federal Aviation Administration, https://www.faa.gov/airports/aip/grant_histories/

Figure 15. Commercial Passenger Enplanements at Memphis International Airport (MEM) and Years in Which Airport Improvements Were Completed, 1995-2019



Source: FAA 1995-2019 TAF Report, <https://taf.faa.gov/>

Note: Enplanement data are for fiscal years and airport improvements are for calendar years.

Memphis International Airport (MEM) investments that have supported growth in enplanements include the following:

- ◆ Taxiway construction and terminal building improvements in 2019
- ◆ Access road and terminal building improvements and security enhancements in 2016
- ◆ Security enhancements, apron rehabilitation, and terminal building improvements in 2014
- ◆ Runway safety, pavement, and security improvements and aircraft-parking ramp reconstruction in 2012
- ◆ Runway and taxiway reconstruction and extension, access road improvements, and security equipment acquisition in 2001

Major capital improvements at Memphis International Airport (MEM) that are underway and expected to be completed between 2020-2021 include the following:³⁵

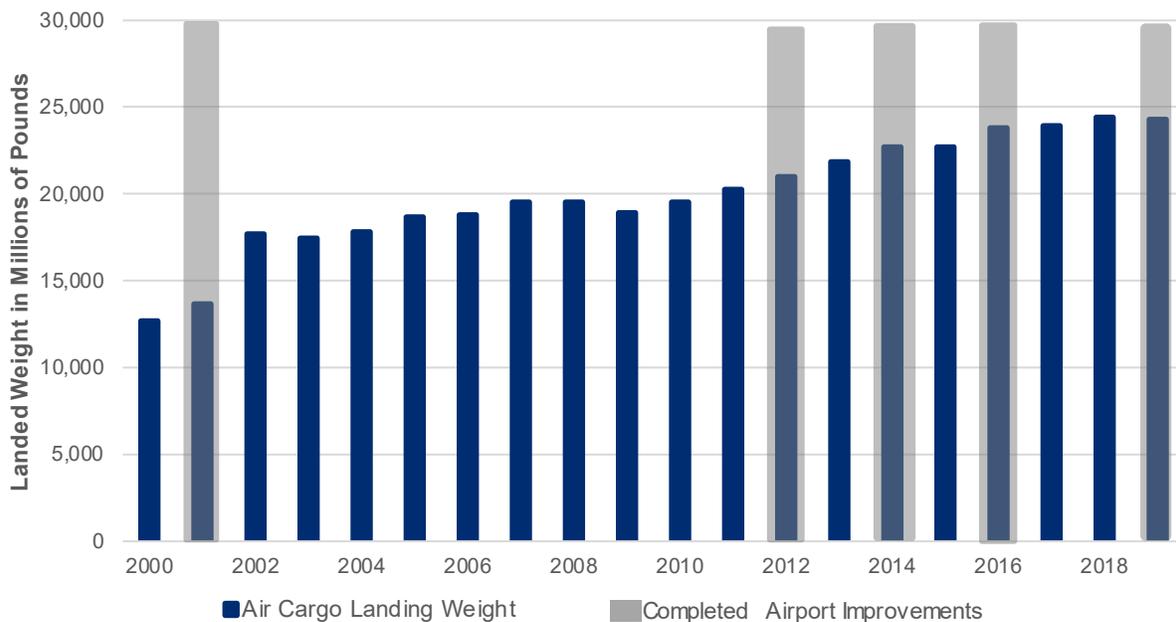
- ◆ Airfield maintenance and warehouse facility that will house the Airport Authority's airfield maintenance area, Memphis Airport Police, Communications Dispatch, Operations staff, Procurement staff, and emergency and snow operations
- ◆ Concourse modernization project that will result in wider corridors, larger boarding areas, moving walkways, consolidation of airline and retail operations, and seismic upgrades

Memphis International Airport (MEM) has become a major air cargo hub in recent decades even as commercial passenger activity has declined. Today, Memphis International Airport (MEM) is

³⁵ "Construction at MEM," Memphis International Airport, <https://www.flymemphis.com/construction>

the busiest cargo airport in the U.S. as measured by landed weight, as illustrated in **Figure 16**.³⁶ A primary reason for this is the FedEx World Hub, which has been located at Memphis International Airport (MEM) since 1979 and handles nearly 5 million tons of cargo annually.³⁷ United Parcel Service (UPS) also has a major presence at Memphis International Airport (MEM).³⁸ Both companies have contributed to the growth in landed weight that has occurred at Memphis International Airport (MEM) since 2000. In 2018, FedEx announced a modernization plan involving \$1.5 billion in new investment.³⁹ The plan will involve constructing new facilities to accommodate growth in e-commerce shipments.

Figure 16. Memphis International Airport (MEM) Landed Weight and Years in Which Airport Improvements Were Completed, 2000-2019



Source: Federal Aviation Administration's All-Cargo Data for U.S. Airports, https://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/

Note: Cargo data and airport improvements are for calendar years.

³⁶ "CY 2019 Preliminary All-Cargo Landed Weights, Rank Order, ACAIS FAA Airports, https://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/media/preliminary-cy19-cargo-airports.pdf

³⁷ "FedEx History," FedEx, <https://www.fedex.com/en-us/about/history.html>; EBP analysis of air freight data

³⁸ "Properties and Cargo." Memphis International Airport, <https://www.flymemphis.com/properties-and-cargo>

³⁹ "FedEx announces \$450 million investment in Memphis hub; total investment hits \$1.5 billion," Commercial Appeal, <https://www.commercialappeal.com/story/money/industries/logistics/2019/08/02/fedex-memphis-world-hub-investment-memphis-airport/1892669001/>

Of Tennessee's three commercial service airports that provide significant air cargo service, Memphis International Airport (MEM) is the only airport to show some resilience against the Great Recession. When Nashville International Airport (BNA) and McGhee Tyson Airport (TYS) experienced significant declines in landed weight between 2008 and 2009 (24 percent and 11 percent, respectively), Memphis International Airport (MEM)'s air cargo transport decreased by just three percent (19.5 billion pounds to 18.9 billion pounds).

McGhee Tyson Airport (TYS)

McGhee Tyson Airport (TYS) serves Knoxville and surrounding areas. Like Nashville International Airport (BNA), McGhee Tyson Airport (TYS) has experienced consistent growth in passenger enplanements except for recession-related dips. Two airlines likely supported this growth by launching the following service in 2011:⁴⁰

- ◆ Frontier Airlines introduced four weekly low-fare flights to Denver
- ◆ Vision Airlines introduced three weekly flights to Destin/Fort Walton Beach in Florida

Since new services like those listed above were added at McGhee Tyson Airport (TYS), spring and summer vacation travel has increased, which has likely contributed to continual growth in enplanements since 2015. Other improvements to McGhee Tyson Airport (TYS) that had very little to no effect on passenger enplanements were taxiway and apron construction and improvements to the airport's terminal building.

Figure 17 compares passenger enplanements for McGhee Tyson Airport (TYS) with years in which these capital projects occurred.

TYS AIP GRANT HISTORY

Fiscal Years: 2005-2012, 2014-2019

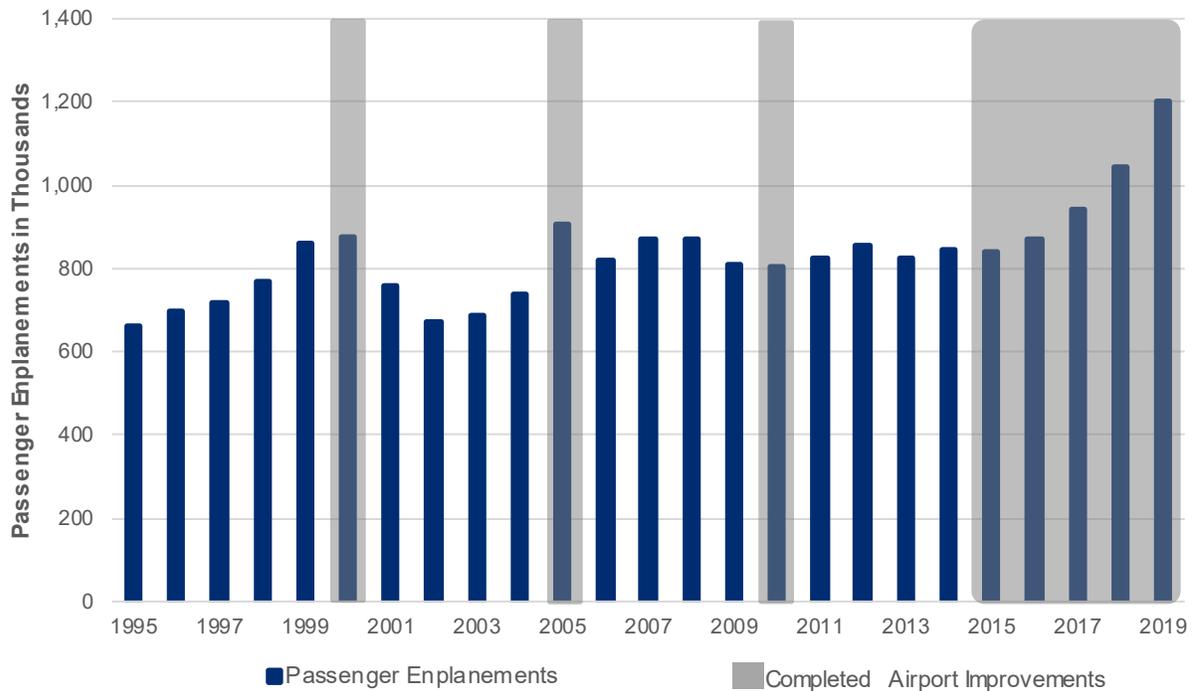
Federal Funds Received: \$153 million

Work Completed:

- Acquired emergency generator
- Acquired land for approaches
- Acquired snow removal equipment
- Constructed apron
- Constructed airport rescue and firefighting building
- Constructed taxiway
- Constructed snow removal equipment building
- Conducted environmental study
- Installed miscellaneous NAVAIDS
- Modified terminal building
- Rehabilitated runway and taxiway
- Wildlife Hazard Assessments

⁴⁰ "Comprehensive Annual Financial Report," Page 12, Metropolitan Knoxville Airport Authority, <https://flyknoxville.com/wp-content/uploads/2017/01/2011-CAFR.pdf>.

Figure 17. Commercial Passenger Enplanements at McGhee Tyson Airport (TYS) and Years in Which Airport Improvements Were Completed, 1995-2019



Source: FAA 1995-2019 TAF Report, <https://taf.faa.gov/>

Note: Enplanement data are for fiscal years and airport improvements are for calendar years.

The following capital projects at McGhee Tyson Airport (TYS) have likely supported growth in passenger enplanements, some of which have involved AIP funding:⁴¹

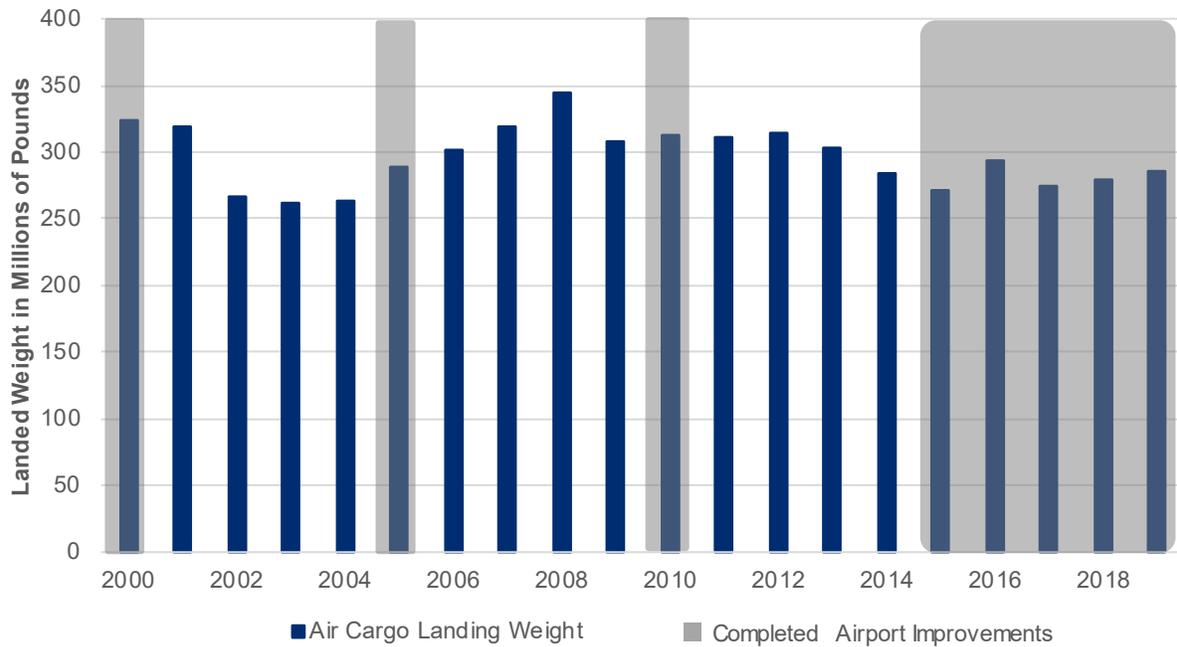
- ◆ Runway rehabilitation from 2015-2019
- ◆ Taxiway and apron construction in 2000, 2005, and 2010
- ◆ New concourse, passenger gates, loading bridges, restrooms, seating, ticket counters, elevators, escalators, flight information displays, and baggage belts (2000)

The presence of UPS and FedEx cargo airlines allows McGhee Tyson Airport (TYS) to link to three major air cargo hubs in the region (Memphis; Indianapolis, Indiana; and Louisville, Kentucky).⁴² McGhee Tyson Airport (TYS) handles a similar amount of cargo landed weight as Nashville International Airport (BNA) despite having far fewer passenger enplanements (see **Figure 18**). Unlike Nashville International Airport (BNA), however, McGhee Tyson Airport (TYS) saw only a modest decline in air cargo activity following the Great Recession.

⁴¹ "McGhee Tyson Airport (TYS/KTYS), Knoxville, TN," Airport Technology, <https://www.airport-technology.com/projects/knoxville/>, <https://flyknoxville.com/tys/assets/PDF/MasterPlanExec.pdf>.

⁴² Accounting and Finance Department of Metropolitan Knoxville Airport Authority. "Comprehensive Annual Financial Report (2019)." Metropolitan Knoxville Airport Authority, <https://flyknoxville.com/wp-content/uploads/2019/11/2019-Metropolitan-Knoxville-Airport-Authority-Financial-Statements.pdf>

Figure 18. McGhee Tyson Airport (TYS) Landed Weight and Years in Which Airport Improvements Were Completed, 2000-2019



Source: Federal Aviation Administration's All-Cargo Data for U.S. Airports, https://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/

Note: Cargo data and airport improvements are for calendar years.

Lovell Field (CHA)

Lovell Field (CHA) has experienced overall growth in passenger enplanements since 1995 with the exception of recession-related dips. Unlike Tennessee's other major airports, enplanements at Lovell Field (CHA) increased between 2008 and 2009. One reason for this could be the timing of key capital investments that could have supported increased enplanements, some of which were funded using AIP dollars. These investments include the following:⁴³

- ◆ Taxiway construction in 2000, 2010, and 2019
- ◆ Energy efficiency equipment and infrastructure installations in 2018
- ◆ Apron rehabilitation in 2015
- ◆ Runway and taxiway rehabilitation in 2005
- ◆ Construction of Aircraft and Rescue Firefighting Building in 2005

Additional improvements that are expected to be completed in the next one to two years include a terminal expansion that will add four to five gates for aircraft and enhance concourse space for passengers, as well as a new multi-level parking garage.⁴⁴

Figure 19 compares the years in which these capital investments occurred to passenger enplanements for Lovell Field (CHA).

CHA AIP GRANT HISTORY

Fiscal Years: 2005-2019

Federal Funds Received \$73 million

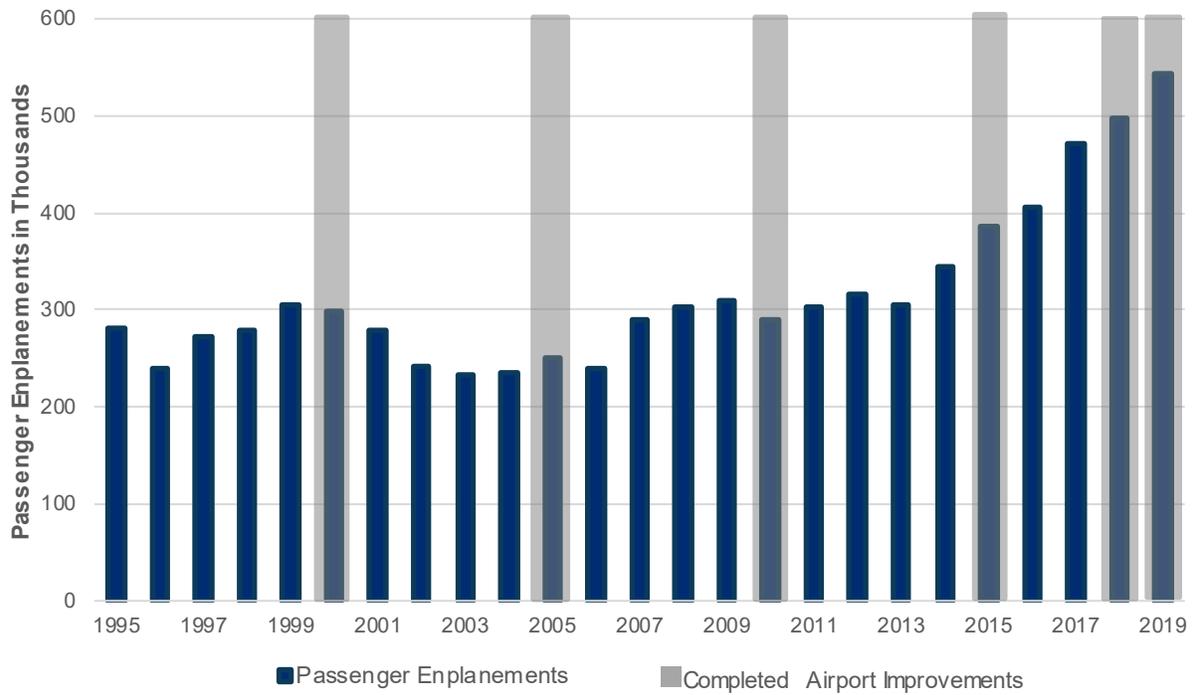
Work Completed:

- Acquired land for approaches
- Constructed aircraft rescue and firefighting building
- Constructed apron
- Energy efficiency equipment/infrastructure
- Installed runway vertical/visual guidance system
- Rehabilitated apron, runway, and taxiway
- Security enhancements
- Updated airport master plan study
- VALE infrastructure
- Wildlife Hazard Assessments

⁴³ "Airport Improvement Program (AIP) Grant Histories," Federal Aviation Administration, https://www.faa.gov/airports/aip/grant_histories/

⁴⁴ "Chattanooga Metropolitan Airport officials plan parking, terminal expansions," Chattanooga Times Free Press, <https://www.timesfreepress.com/news/business/aroundregion/story/2019/mar/18/chattanooga-airport-parking-expansion/490831/>.

Figure 19. Commercial Passenger Enplanements at Lovell Field (CHA) and Years in Which Airport Improvements Were Completed, 1995-2019



Source: FAA 1995-2020 TAF Report, <https://taf.faa.gov/>

Note: Enplanement data are for fiscal years and airport improvements are for calendar years.

Tri-Cities Airport (TRI)

Tri-Cities Airport (TRI) serves the Tennessee cities of Kingsport and Johnson City, as well as Bristol, Virginia. The airport offers a smaller level of commercial service compared to other Tennessee airports. Passenger enplanements at Tri-Cities Airport (TRI) have remained relatively flat since 1995 (see **Figure 20**). Notable exceptions include a 20.4 percent increase in enplanements from 2004 to 2005 and a 14.2 percent increase from 2019 to 2020. Airport capital investments (some AIP-funded) that could have contributed to these increases include the following:⁴⁵

- ◆ Apron, runway, and taxiway construction in 2018 and 2019
- ◆ Terminal expansion, improved baggage and ticketing processes, a new restaurant, children’s play area, and five new passenger gates (2014-2017)
- ◆ Apron and taxiway rehabilitation in 2010
- ◆ Fuel farm construction in 2005
- ◆ Taxiway construction in 2000

Figure 20 compares the years in which these capital investments occurred to passenger enplanements for Tri-Cities Airport (TRI).

TRI AIP GRANT HISTORY

Fiscal Years: 2005-2019

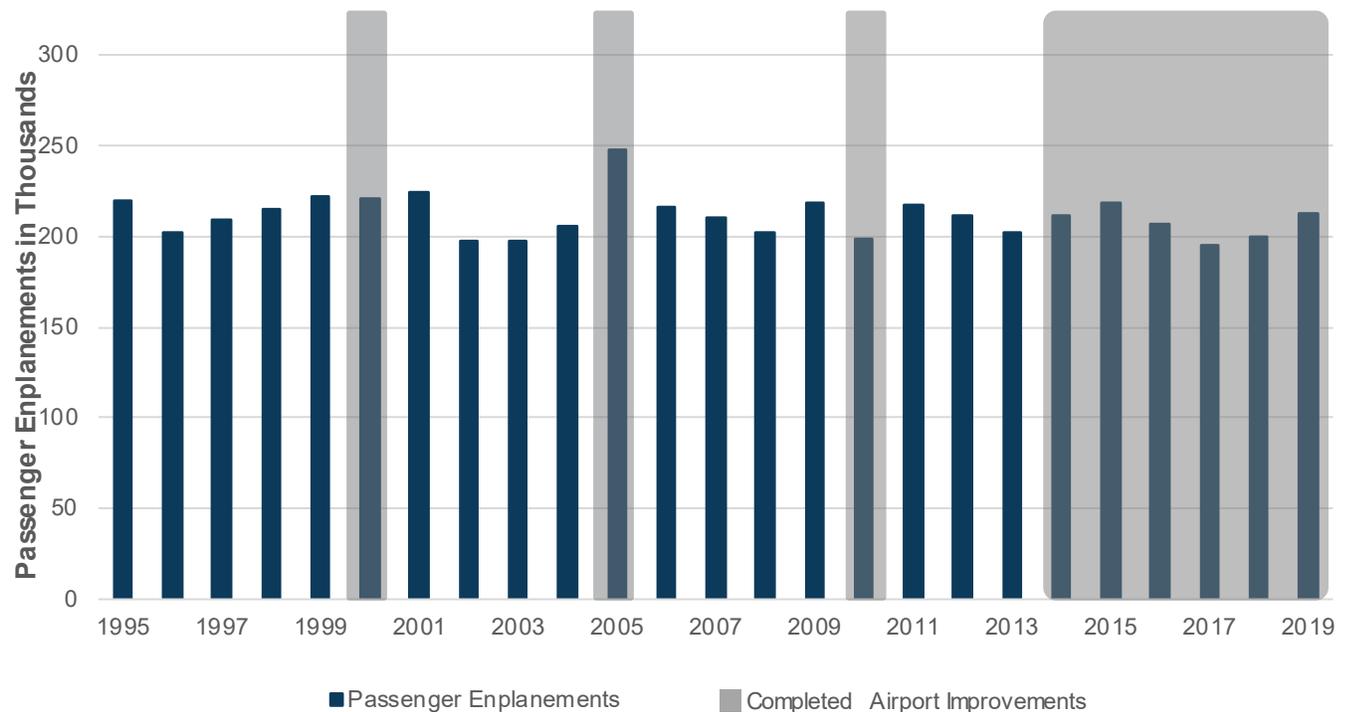
Federal Funds Received: \$57 million

Work Completed:

- Acquired safety equipment and/or security equipment
- Acquired friction measuring equipment
- Acquired land for approaches
- Acquired snow removal equipment
- Constructed taxiway and apron
- Expanded apron
- Improved airport erosion control
- Installed airfield guidance signs
- Improved runway
- Improved runway safety area
- Installed perimeter fencing required by 49 CFR 1542
- Improved access road
- Improved terminal building
- Installed miscellaneous NAVAIDS
- Modified terminal building
- Rehabilitated apron
- Security enhancements

⁴⁵ Bradley, Jennifer. “Tri-Cities Airport Updates & Expands Its Aging Terminal,” Airport Improvement, <https://airportimprovement.com/article/tri-cities-airport-updates-expands-its-aging-terminal/>; “Tri-Cities Airport completes expansion project,” Tri-Cities Area Journal of Business, <https://www.tricitiesbusinessnews.com/2017/02/tri-cities-airport/>; “Airport Improvement Program (AIP) Grant Histories,” Federal Aviation Administration, https://www.faa.gov/airports/aip/grant_histories/.

Figure 20. Commercial Passenger Enplanements at Tri-Cities Airport (TRI) and Years in Which Airport Improvements Were Completed, 1995-2019



Source: FAA 1995-2020 TAF Report, <https://taf.faa.gov/>

Note: Enplanement data are for fiscal years and airport improvements are for calendar years.

Conclusion

This chapter discussed major events that have impacted Tennessee’s aviation system. Economic recessions have had the largest influence on passenger enplanements, operations, and air cargo, especially the Great Recession of 2007-2009. This includes both the commercial service and GA sectors. Fuel prices and airfares have also likely had some effect. Within Tennessee, Nashville’s growth as an international tourist destination has contributed to more enplanements in recent years, especially at Nashville International Airport (BNA).

Although the COVID-19 pandemic has had detrimental effects on the airline industry in 2020 that could exceed the outcomes of the Great Recession, the pandemic is still ongoing so it is difficult to predict future repercussions on travel, the airline industry, and other industries that rely on air travel (e.g., tourism).

Expansions in the auto industry also impacted air travel in Tennessee, both positively and negatively. Finally, Tennessee’s major airports have made significant investments in recent years that likely attracted more passengers and air cargo carriers. These investments and other events described above have likely contributed to the overall growth of the state’s aviation sector.