U.S. DEPARTMENT OF TRANSPORTATION

OFFICE OF INSPECTOR GENERAL

Changes in Airline Service Differ Significantly for Smaller Communities, but Limited Data on Ancillary Fees Hinders Further Analysis

OST

Report No. EC2020036

May 27, 2020

U.S. DEPARTMENT OF TRANSPORTATION
OFFICE OF INSPECTOR GENERAL

Highlights

Changes in Airline Service Differ Significantly for Smaller Communities, but Limited Data on Ancillary Fees Hinders Further Analysis

Self-initiated

Office of the Secretary | EC2020036 | May 27, 2020

What We Looked At

In 2013 and 2014, reports from the Government Accountability Office (GAO) and the Massachusetts Institute of Technology (MIT) documented a disproportionate decline in commercial air service to smaller communities. Since that time, there have been concerns that small- and medium-sized communities continue to have limited access to the National Airspace System. The lack of a recent analysis, as well as major changes in the industry, prompted our office to update the GAO and MIT reports. Accordingly, our objective for this self-initiated audit was to detail recent trends in the aviation industry, particularly as they relate to small- and medium-sized communities.

What We Found

Compared to larger metropolitan areas, smaller communities have experienced disparate effects from several recent aviation industry trends. For example, departures declined in larger communities by roughly 12 percent and in smaller communities by about 34 percent. Connectivity—the ability to connect to and move throughout the national air system—declined by 16 percent in smaller communities, double the rate in larger communities; however, data limitations hindered our analysis of delays and cancellations. Similarly, competitive conditions improved in larger communities, but grew worse in smaller communities, where the cost to fly was also greater. Finally, we found that some airlines have dramatically increased their revenues from booking charges and other ancillary fees. However, the Department of Transportation (DOT) does not collect adequate data on ancillary fees, which reduces its ability to fully assess competition in the industry. Also, ancillary fees are not subject to the excise tax that funds the Airport and Airway Trust Fund (AATF). We conservatively estimate that certain carriers' use of booking fees as a revenue source reduced AATF revenues by $60.6 million in 2019 alone.

Our Recommendations

We made three recommendations to address DOT's data shortcomings and improve departmental clarity on the impact of ancillary fees on AATF receipts. The Department concurred with one of our three recommendations.

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Memorandum

Date: May 27, 2020

Subject: ACTION: Changes in Airline Service Differ Significantly for Smaller Communities, but Limited Data on Ancillary Fees Hinders Further Analysis | Report No. EC2020036

From: Charles A. Ward
Assistant Inspector General for Audit Operations and Special Reviews

To: Assistant Secretary for Aviation and International Affairs
Director of the Bureau of Transportation Statistics

A community's ability to develop economically is impacted by its connections with other communities and ability to transport people quickly and regularly. In 2013 and 2014, the Government Accountability Office (GAO) and the Massachusetts Institute of Technology's (MIT) International Center for Air Transportation (ICAT) released a series of reports documenting a disproportionate decline in commercial air service to smaller communities—relative to large communities—between 2007 and 2013.[1] When accounting for service changes affecting smaller communities, GAO and MIT researchers cited higher fuel costs, reduced demand, demographic changes, industry consolidation, and capacity discipline.[2]

The GAO and MIT reports predated a decline in jet fuel prices[3] in late 2014 and may not have included the full impact of recent airline mergers. For example, the final judgment in the merger between US Airways Group, Inc. and AMR Corporation was issued by the Department of Justice (DOJ) in April 2014, the firms did not integrate their reservation systems until October 2015. However, the GAO and MIT analyses only used data through 2013.

[1] For example, GAO, *Status of Air Service to Small Communities and the Federal Programs Involved* (GAO-14-454T), April 2014 and MIT ICAT, *Trends and Market Forces Shaping Small Community Air Service in the United States* (ICAT-2013-02), May 2013.
[2] The losses airlines incurred in the late 2000s—in part due to the economic recession and historically high jet fuel prices—contributed to changes in airlines' business models. In an effort to cut costs, airlines transitioned to a capacity-discipline strategy. This strategy reduced seating capacity by offering fewer flights, while reducing the share of unfilled seats on flights.
[3] The per-gallon price fell from $2.73 in September 2014 to $1.50 in January 2015.

Despite the airline industry's profitability since these reports were issued, there were concerns that many communities' ability to access the National Airspace System has not subsequently improved. In particular, these concerns have focused on airline service to small- and medium-sized communities. For example, the potential economic impact of this decline in air service received congressional attention, and the Federal Aviation Administration (FAA) Reauthorization of 2016 authorized the Secretary of the Department of Transportation (DOT) to establish a Working Group on Improving Air Service to Small Communities.

The lack of recent analysis, airlines' financial recovery during the past few years, and the completion of major airline mergers have prompted our office to update the earlier GAO and MIT analyses to better inform the ongoing policy debate regarding service to smaller communities. Accordingly, our objective for this self-initiated audit was to detail recent aviation industry trends, particularly as they relate to service to small- and medium-sized communities.[4] Specifically, we detail trends in airline service levels; numbers of passengers flown; airline service quality, including connectivity; airline competition; and prices paid by airline passengers for airfare and ancillary services—particularly as they relate to small- and medium-sized communities.

To meet the objective, we analyzed U.S. Census Bureau (Census) and DOT datasets that highlighted changes in activity, competition, prices, and service quality from 2005 through 2017.[5] Because we found that some fees—which are not included in the base ticket price—have grown considerably, we compiled information on certain fees through November 2019 in order to account for this trend. We reviewed airline industry research conducted by Government agencies, academic economists, and transportation researchers, with a focus on articles that analyzed competitive practices and service to smaller communities. To better understand the industry's considerations in serving smaller communities, we interviewed representatives from Airlines for America, the Regional Airline Association, and the Air Line Pilots Association. We also contacted GAO to discuss their previous research on ancillary fees. We conducted this performance audit in accordance with generally accepted Government auditing standards.

We appreciate the courtesies and cooperation of DOT representatives during this audit. If you have any questions concerning this report, please call me at (202) 366-1249 or Betty Krier, Chief Economist, at (202) 366-1422.

cc: The Secretary
DOT Audit Liaison, M-1
FAA Audit Liaison, AAE-100

[4] We included a second audit objective when we announced this review. In a subsequent review, we will provide a descriptive analysis of factors associated with changes in airline service to small- and medium-sized communities.
[5] We started with 2005 so that our baseline would be unaffected by the recession that began in 2008. Our analyses of ticket prices and competition used data beginning in 2006.

Results in Brief

In comparison to larger metropolitan areas, smaller communities have experienced disparate effects of several recent aviation industry trends.

- Departures decreased substantially system-wide[6] but smaller communities experienced the greatest percentage losses. While departures declined in larger communities by roughly 12 percent, departures dropped about 34 percent in smaller communities. Further, small communities without Essential Air Service (EAS)[7] saw an even larger decline.

- Passenger numbers have increased through growth in seats per flight and load factors. The number of seats per flight and passenger load factors had the largest percentage growth in smaller communities, by more than 35 percent and 12 percentage points, respectively. Still, the total number of seats fell significantly in smaller communities.

- Smaller communities lost the most connectivity to the National Airspace System, and data limitations hinder analysis of delays and cancellations. Connectivity—a measure of a passenger's ability to easily connect to and move throughout the national air system—declined among smaller communities by 16 percent, twice as much as the 8 percent decline in connectivity among larger communities. Differences in cancellations and delays by community size appear modest, but coverage of smaller community service quality was limited until 2018.

- Competitive conditions improved in larger communities, but worsened in smaller communities. While competition increased on routes originating from larger communities due primarily to non-legacy carriers entering these routes, it declined for smaller communities. Further, the price premium associated with flying from a smaller community—compared with taking similar flights from a large community—has risen in recent years.

- Ancillary fee revenue has grown significantly, which may degrade the quality of DOT's airline revenue and ticket price data and decrease Airport

[6] In this report, the term "system-wide" refers to passenger flights between airports in the contiguous United States.
[7] EAS is a DOT program that was put into place following the Airline Deregulation Act of 1978 to guarantee that small communities that were served prior to deregulation maintain a minimal level of scheduled air service.

and Airway Trust Fund (AATF)[8] receipts. Also, information we gathered while conducting our audit shows that some airlines' revenues from ancillary fees, such as booking fees, have grown dramatically. However, while DOT collects data on airline revenues and ticket prices, it does not collect adequate data on ancillary fees. Without this information, DOT and the traveling public may not know the impact of these fees on the costs to passengers and airline revenues for air service from smaller–or larger–communities. This may reduce DOT's ability to assess competitive conditions in the industry. Using available information, we determined that certain carriers' use of booking fees as a revenue source can be conservatively estimated to reduce AATF revenues by $60.6 million in 2019 alone.

We are making recommendations to address DOT's data shortcomings and improve departmental clarity on the impact of ancillary fees on AATF receipts.

Background

DOT's Office of Aviation Analysis initiates and supports the development of DOT's public policies regarding economic oversight of the airline industry. The Office of Aviation Analysis analyzes and supports DOT's decision makers on major airline issues, including mergers and acquisitions, joint venture agreements and immunized international alliances between U.S. and foreign carriers, and airline distribution practices. Additionally, the Office of Aviation Analysis administers the EAS program and its Competition and Policy Analysis division monitors changes in the industry, analyzes industry trends – including assessments of airline fares, and evaluates policy options on a wide range of issues. DOT's Bureau of Transportation Statistics (BTS) publishes data and statistics on commercial aviation, which includes data on airfares, air carrier traffic, and airlines' financial data. This data is used by analysts within and outside DOT, and in our report we rely heavily on data published by BTS.

In our analysis, we defined communities using Census criteria and DOT information on EAS subsidies. We also categorized airlines into two primary groups—mainline and regional—as well as divided mainline and regional carriers into subgroups. All of our analysis focused exclusively on airline service between communities in the contiguous United States.[9] The following describes our

[8] The AATF was created under the Airport and Airway Revenue Act of 1970 to provide a dedicated source of funding for the U.S. aviation system, independent of the General Fund.

[9] We also restricted our analysis to airports which had at least 2,500 enplanements on scheduled passenger flights in at least one year between 2005 and 2017. Throughout this report, airport refers to an airport which met this enplanement threshold.

criteria for identifying communities and community size categories, EAS communities, and airline categories.

Defining Communities and Community Size Groups

We determined community boundaries using Census statistical area definitions. Communities were defined as either a county or set of counties. A set of counties was considered a single community when Census determined that they were significantly economically and socially integrated, see exhibit A for further details on our community definitions. This resulted in a number of communities that contain multiple airports, see exhibit F.

We categorized communities into five size groups—large (L), medium-large (ML), medium (M), medium-small (MS), small (S)—such that the combined population of all communities within a size group was approximately 20 percent of the population of the contiguous United States in 2010. Throughout the report, when we use the term "smaller" to describe communities, we are referring to both small and medium-small communities. Also, we use the term "larger" to refer to both medium-large and large communities. Table 1 below provides information on our community size categories and their population statistics.

Table 1. Community Size Groups

Category[a]	Number of Communities	Total Population	Percent of Total U.S. Population[b]	Median Size Community and Its Population[c]	Population Range
Large	5	68.0 million	22.4	Chicago-Naperville, IL-IN-WI; 9.84 million	8.15 million to 23.1 million
Medium-Large	10	57.5 million	19.0	Houston-The Woodlands, TX; 6.11 million	3.68 million to 7.89 million
Medium	26	59.5 million	19.6	Salt Lake City-Provo-Orem, UT; 2.27 million	1.46 million to 3.52 million
Medium-Small	83	60.5 million	20.0	Jackson-Vicksburg-Brookhaven, MS; 660,368	374,536 to 1.41 million
Small with commercial service & no EAS service	134	20.4 million	6.7	Mesa County, CO; 146,723	5,172 to 373,802
Small with EAS-subsidized commercial service	102	7.8 million	2.6	Franklin County, NY; 51,599	7,369 to 279,771
Small, without commercial service	1,215	29.6 million	9.7	Winn Parish, LA; 15,313	614 to 331,298

[a] Community statistics including EAS community information are for 2010.

[b] Total U.S. population is for the contiguous U.S.

[c] The median is the middle value and is less sensitive to outliers than an average. There are as many communities larger than the median size community as there are communities smaller than it. The median population column reports the higher of the central two communities when there is an even number of communities.

Source: OIG analysis of Census and DOT data

Essential Air Service

The Airline Deregulation Act of 1978 granted airlines the freedom to determine which routes they serve. This included granting carriers the ability to terminate airline service to any community without Government approval—raising concerns

that communities with relatively low traffic could lose service entirely. To address these concerns, the EAS program was established to ensure that small communities retain a link to the National Air Space System. Service at EAS communities is typically maintained by giving an air carrier a direct subsidy to provide flights between the EAS community and a medium or large hub airport, where passengers can connect to the national network.

Throughout this report, we define an EAS community as a small community with service subsidized under the EAS program in at least one quarter of a given year. That is, if a small community received an EAS subsidy in at least one quarter of a particular year, then we consider it to be an EAS community in that year. As of May 2018, there were 108 active EAS contracts.[10] In 2018, the yearly cost of the subsidies was $285.8 million, for an average of $2.65 million per EAS contract.

Categorization of Air Carriers

To understand air carriers' roles in serving smaller communities, we categorized them into broad groups based on a few components of their operations. At the highest level, provision of air services is divided between mainline carriers and regional carriers. A mainline carrier—such as Delta Air Lines or Frontier Airlines—is often the carrier that sells the ticket for an air travel itinerary, also known as the marketing carrier.[11] Also, mainline carriers often operate the associated flights, particularly on long-distance flights and flights using larger aircraft. In other cases, the mainline carrier markets a flight, while a regional carrier—such as SkyWest Airlines or Air Wisconsin Airlines—operates the flight under contract with the mainline carrier.

We further categorized mainline carriers as either legacy or non-legacy carriers. Legacy carriers operated routes prior to passage of the Airline Deregulation Act of 1978. Six of these airlines remained in operation in 2005—American Airlines, Continental Airlines, Delta Air Lines, Northwest Airlines, United Airlines, and US Airways.[12] Airlines that began operation after deregulation are considered non-legacy carriers.

[10] This figure includes some contracts which were awarded to airports which were not in a small community. EAS contracts which lie outside a small community are included in the cost figures presented in this paragraph, but otherwise are not defined as EAS communities in the report.

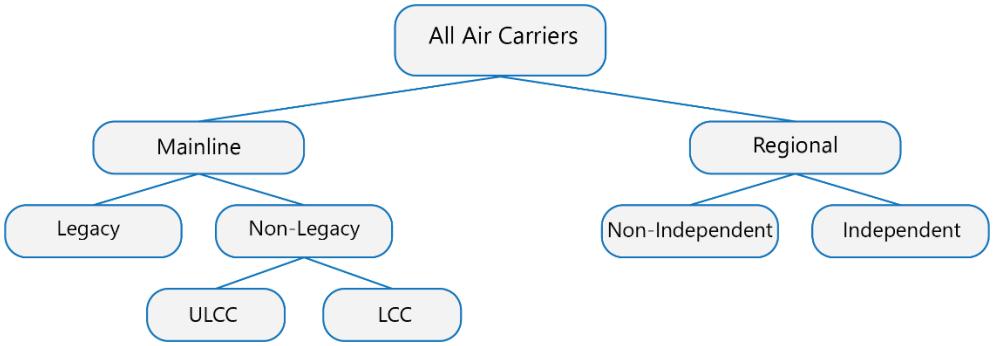
[11] Marketing carriers may sell tickets through direct channels such as the carrier's webpage, or through third party distributors, such as online travel agents.

[12] Alaska Airlines and Southwest Airlines operated prior to deregulation, but neither had a significant network in the contiguous United States at that time. Because our analysis focuses on service within the contiguous United States, we do not define them as legacy carriers for the purposes of this report.

We then divided non-legacy carriers into two categories. Low-cost carriers (LCCs)—such as Southwest and JetBlue—typically achieve lower costs than legacy carriers. Ultra-low-cost carriers (ULCCs)—such as Allegiant Air and Spirit Airlines—achieve even lower costs than LCCs. ULCCs are also distinct from LCCs and legacy carriers in their reliance on ancillary fees for a significantly greater share of their revenue than the other mainline carriers.

Lastly, we categorized regional carriers based on their ownership status, as some regional carriers are held by a mainline carrier's holding company while others are independently-owned. The latter are referred to in this report as independent regional carriers. Regional carriers that are held by a mainline carrier's holding company are referred to as "non-independent." Exhibit E lists carriers by category. Figure 1 below depicts the categorization of airlines used throughout this report.

Figure 1. Categorization of Air Carriers



Source: OIG generated

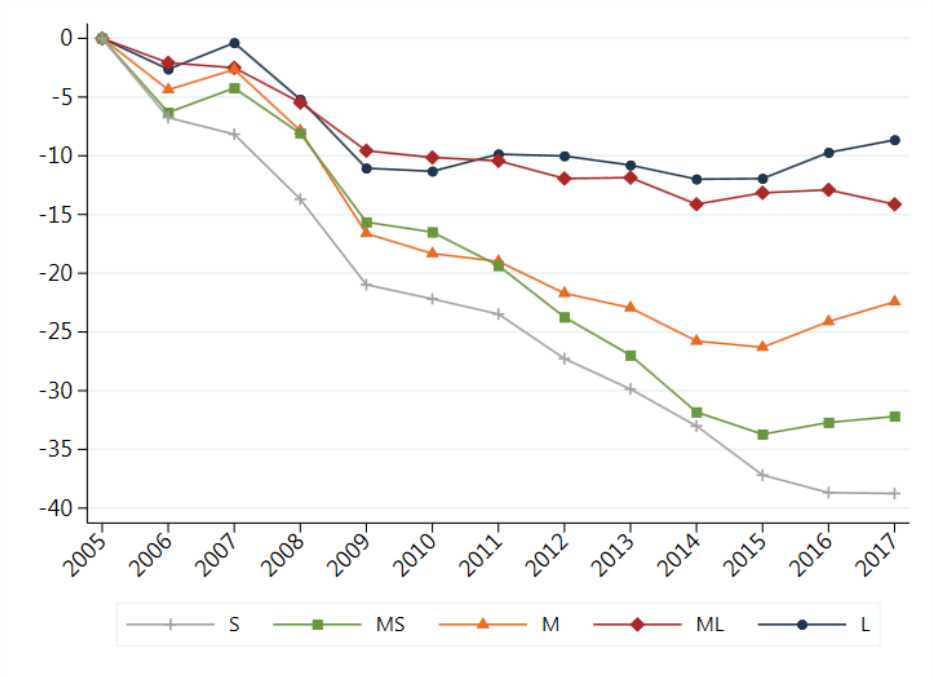
Departures Decreased Substantially System-Wide but Smaller Communities Experienced the Greatest Percent Losses

Departures have fallen in every community size group since 2005 but smaller communities experienced the greatest percent declines. Reductions in flight frequencies accounted for most of the system-wide decline but reductions in nonstop destinations served also contributed substantially. Small non-EAS communities experienced much larger reductions in both departures and nonstop destinations than small EAS communities.

Smaller Communities on Average Had the Greatest Percent Reductions in Departures

From 2005 through 2017, the number of system-wide passenger flights fell by 19.2 percent. However, the percent change in departures varied considerably across different community size groups. On average, larger communities lost roughly one-tenth of their departures, medium-sized communities slightly less than one quarter, and smaller communities approximately one-third. Notably, excluding EAS communities, the decline in departures from small communities was even larger, about 40 percent on average. Figure 2 below is a line chart that depicts the percent changes in departures by community size.

Figure 2. Percent Change in Departures by Community Size



Note: Excludes EAS communities. Baseline is 2005.

Source: OIG analysis of DOT data

In addition to large average declines across different community size groups, certain communities experienced significant reductions in departures during this period. For example, five medium-sized communities—Cincinnati, OH, which saw a 77.1 percent decline; Pittsburgh, PA; Greensboro, NC; Cleveland, OH; and Milwaukee, WI—lost over half of their departures, often resulting from an airline shifting the focus of its network away from an airport after a merger. Despite such dramatic changes, the median percent decline in departures—a measure

that is not sensitive to outliers—for each community size group was similar to its total percent decline. Table 2 below shows the median percent change in departures that occurred for the different community size groups.

Table 2. Median Percent Declines in Departures

Community Size Group	Median Percent Decline in Departures
Large	5.9
Medium-Large	18.0
Medium	21.8
Medium-Small	31.3
Small	32.3

Source: OIG analysis

Flight Frequency Reductions Accounted for Most Departure Declines but Destination Losses Were Also Sizeable

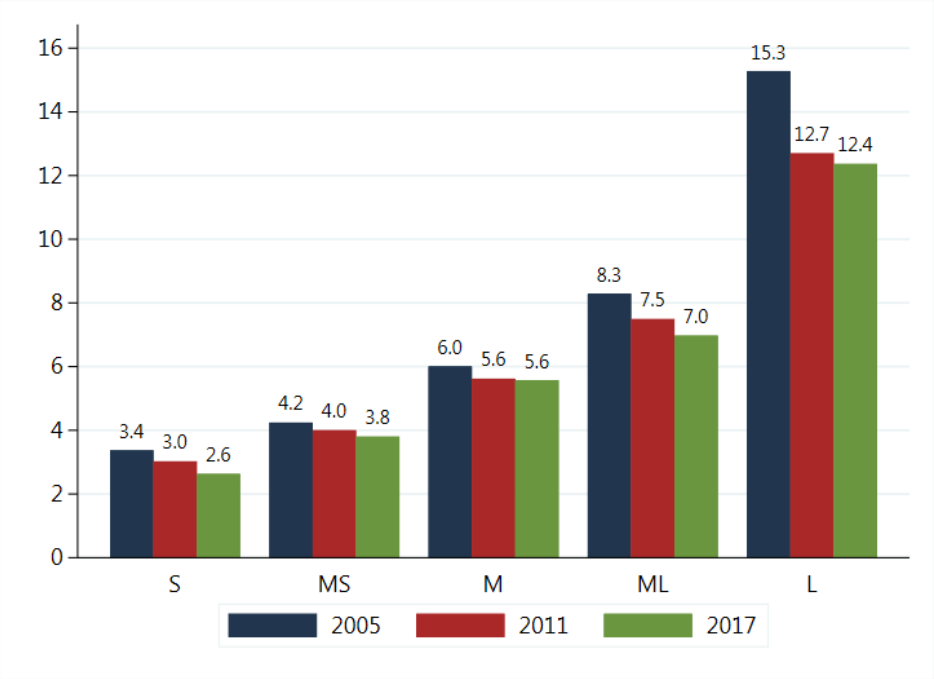
Reductions in flight frequencies to a destination accounted for 69.7 percent of declines in departures while reductions in the number of nonstop destinations[13] served accounted for 30.3 percent. Although all community size groups experienced a decline in flight frequencies, only medium and smaller communities lost nonstop destinations. Nevertheless, while large communities saw substantial growth in the number of nonstop destinations served, their total departures still fell because of substantial losses in flight frequency.

Reductions in flight frequencies accounted for the majority of departure declines in all except the medium and medium-small communities. Average flight

[13] In this section, we focused exclusively on daily nonstop destinations, which we consider to be particularly important for non-leisure travel. On average, daily destinations accounted for 95.5 percent of departures from small communities and 99.6 percent of departures from large communities in 2017. We define "daily" destinations as those that have over 250 flights per year and connect an origin and a destination community. This requires an average of at least one flight per weekday, while allowing for a small number of cancellations. Note that this definition does not differentiate between carriers. If Delta offered once-daily service on a route from January to June before exiting the market, then United entered the market and offered once-daily service on this route from July to December, the route is coded as a daily route. In addition, this definition includes seasonal routes as long as they accumulate over 250 flights in the year.

frequency[14] fell 19.0 percent in large communities, as shown by the decline from 15.3 to 12.4 in the figure below. It fell by 23.5 percent in small communities, including EAS communities, and by 23.7 percent when EAS communities are excluded. The comparable figure for medium-large communities showed a 15.7 percent drop. Figure 3 is a bar chart that depicts flight frequencies over time by community size.

Figure 3. Average Daily Flights on Daily Routes



Note: Daily routes offer at least 250 flights in a given year.

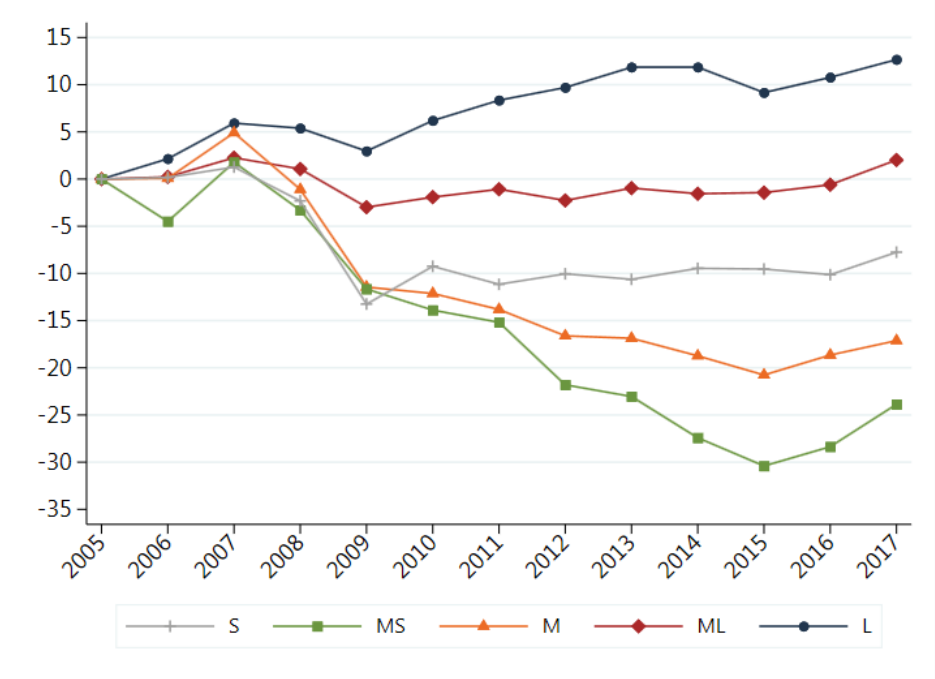
Source: OIG analysis of DOT data

In contrast to reductions in flight frequencies as shown above, larger communities experienced increases in total daily destinations served while smaller and medium-sized communities saw significant declines between 2005 and 2017. Specifically, large communities saw a 12.5 percent average increase in daily destinations and medium-large communities saw a 3.7 percent average increase. Medium and medium-small communities had declines in daily destinations of 17.1 and 21.0 percent on average respectively. Small communities' daily destinations fell by only 5.7 percent when EAS communities were included, which is not surprising given that 118 of the 236 small communities were EAS communities at some point from 2005 through 2017. Figure 4 below is a line

[14] Average flight frequency is the unweighted average of flight frequencies across all daily routes within each community size group.

chart that depicts the percent change in daily nonstop destinations by community size.

Figure 4. Percent Change in Daily Non-Stop Destinations by Community Size

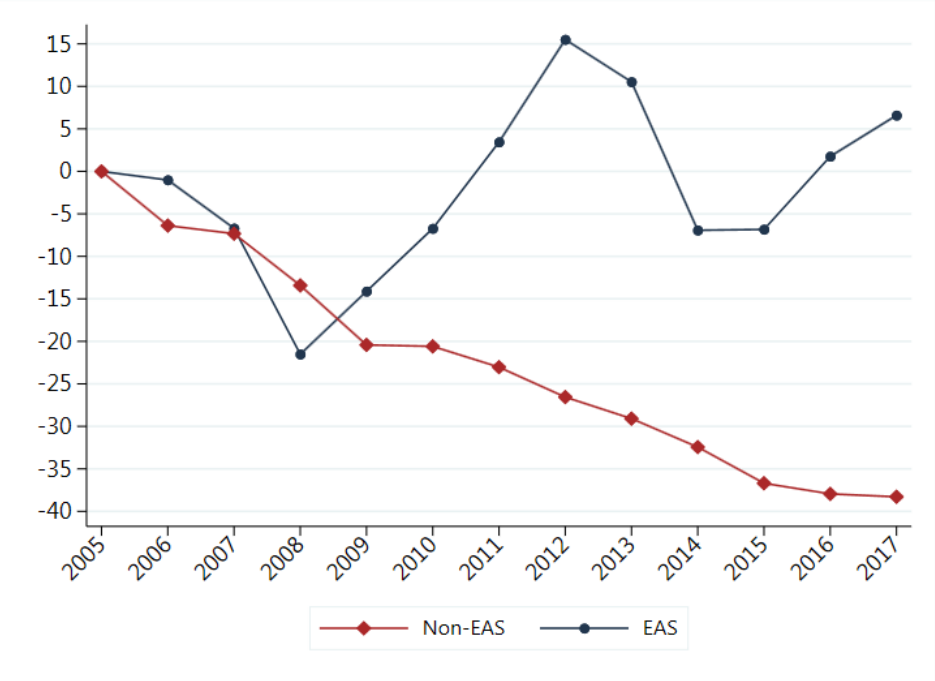


Note: Excludes EAS communities. Baseline is 2005.

Source: OIG analysis of DOT data

However, when the sample is restricted to non-EAS communities, small communities lost service to 20.8 percent of their daily destinations on average. Concurrently, the proportion of small community service accounted for by EAS flights has grown from 12.7 to 20.1 percent. Figure 5 is a line chart that depicts the percent changes in small community flights by whether or not they are subsidized by the EAS program.

Figure 5. Percent Change in Small Community Departures: EAS-Subsidized vs. Unsubsidized



Note: Baseline is 2005.

Source: OIG analysis of DOT data

In summary, large and medium-large communities saw an increase in the number of nonstop daily destinations on average, but a decrease in flight frequency on average to those destinations. Medium and medium-small communities saw a large decline in nonstop destinations, but those destinations that remained saw a modest decline in frequency. Among small communities, the median community neither gained nor lost destinations when EAS communities are included, but the median small non-EAS community experienced a significant decline in daily destinations. Small communities also saw a considerable decline in flight frequency.

Passenger Numbers Have Grown Through Increases in Seats and Load Factors, Despite Departure Declines

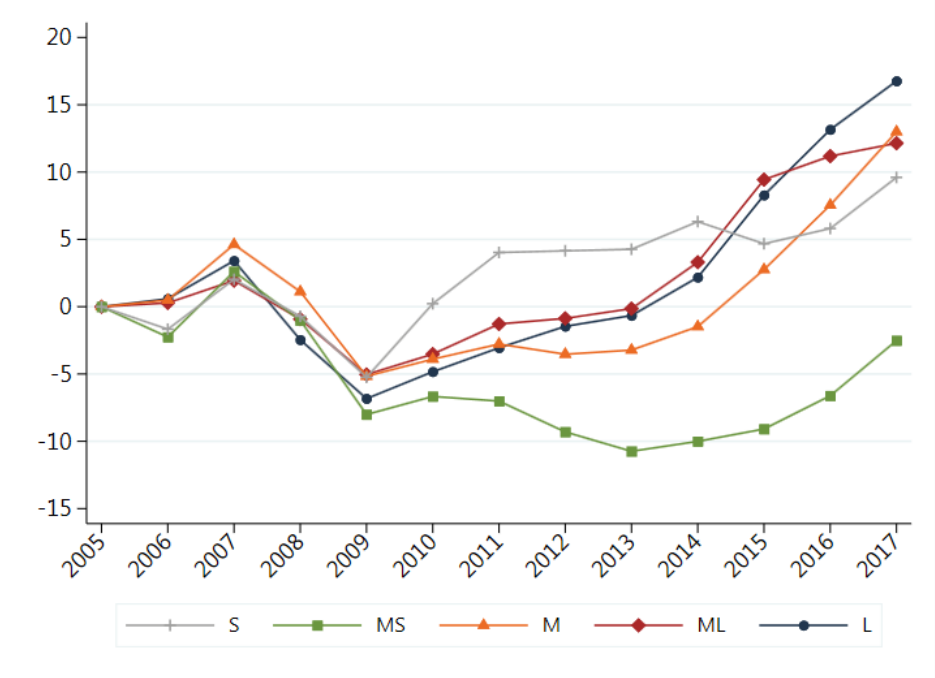
Despite departure declines, system-wide passenger numbers grew between 2005 and 2017. Only medium-small communities experienced a decline in passenger

numbers. In other community size groups, increases in seats per flight and load factors were sufficiently large to offset departure declines. Both of these increases were largest in percent terms in small communities. Still, the total number of seats fell significantly only in smaller communities.

Passenger Numbers in 2017 Exceeded 2005 Levels for Most Community Size Groups

From 2005 through 2017, the number of passengers flown by air carriers grew from 636 million to 711 million—an 11.8 percent increase. Small communities saw an increase of 9.6 percent in the number of passengers flown, while medium-small communities were the only community size group with a decline in passengers between 2005 and 2017. However, even in medium-small communities, the number of passengers was down by only 2.5 percent overall and has risen every year since 2013. Figure 6 is a line chart that depicts the percent change in passengers by community size.

Figure 6. Percent Change in Passengers by Community Size



Note: Baseline is 2005.

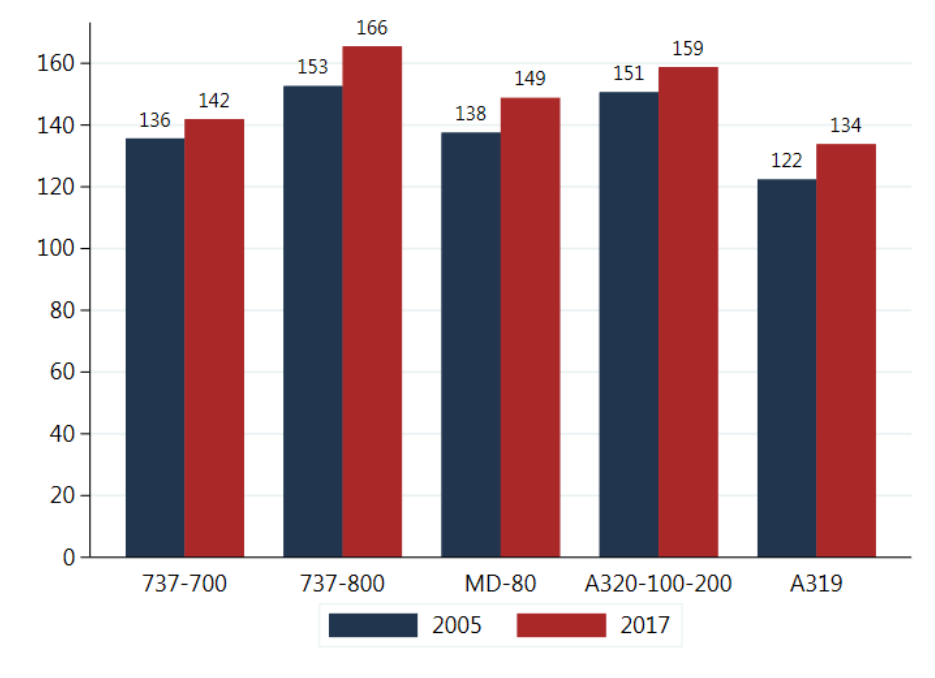
Source: OIG analysis of DOT data

The data shows that airlines were able to increase the number of passengers carried, despite the decline in departures, through increasing the number of passengers per flight. The greatest growth in the average number of passengers per flight—62.4 percent—occurred on flights originating in small communities, which carried an average of 26.6 passengers in 2005 and 43.2 in 2017.

The Number of Seats Per Flight Grew Substantially but Total Seats Still Fell Significantly in Smaller Communities

System-wide, seating capacity was 0.8 percent lower in 2017 than it was in 2005. This is a markedly smaller decline than the nearly 20 percent reduction in flights during this same period. This was largely a result of airlines' upgauging since 2005. Upgauging involves the airline changing the aircraft they use to models with higher seating capacities. Notably, airlines also increased the quantity of seats within aircraft models during this time. Figure 7 is a bar chart that shows the growth in seats on several airplane models.

Figure 7. Average Seating Capacity of Select Aircraft

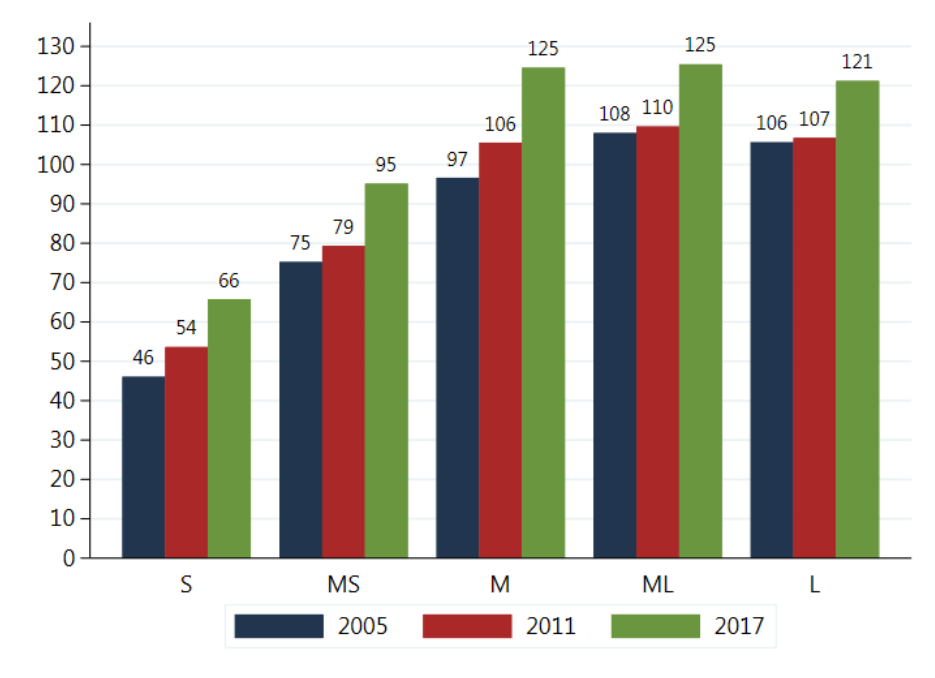


Note: MD-80 includes the MD-81, MD-82, MD-83, and MD-88.

Source: OIG analysis of DOT data

The average seating capacity per flight has increased in all community size groups. In absolute terms, medium-sized communities saw the greatest increase in average seating capacity, with the number of seats per flight rising from 96.6 in 2005 to 124.6 in 2017, a 29.0 percent gain. The other four community size groups all saw similar absolute increases in average seating capacity, but this represented the highest percent change—35.4 percent—for small communities. Notably, average seating capacity changes in small communities were even greater when only considering non-EAS communities—42.7 percent. In comparison, the percent increases in average seating capacity for large and medium-large communities were 14.8 percent and 16.2 percent, respectively. Figure 8 is a bar chart depicting average seats per flight by community size.

Figure 8. Average Seats per Flight by Community Size

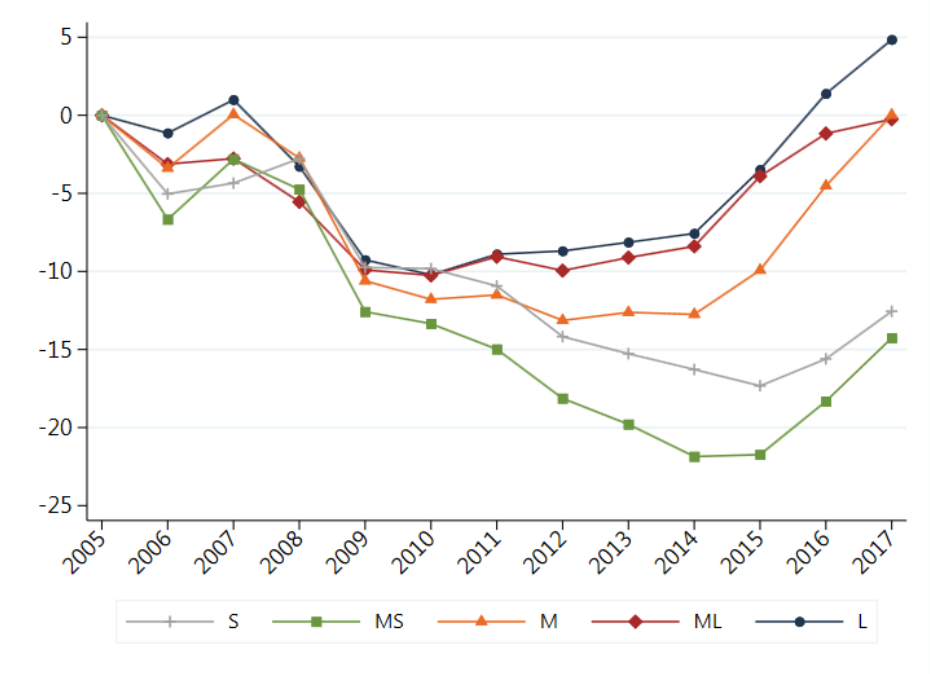


Note: Excludes EAS communities.

Source: OIG analysis of DOT data

However, the marked growth in seats per flight did not fully offset the impact of departure declines on airline seating capacity in smaller communities. The total number of seats fell 8.7 percent in small communities, and 14.2 percent in medium-small communities. In contrast, total seating capacity in large communities grew 4.8 percent, and fell by just 0.3 percent in medium-large communities. The minor decline in system-wide seating capacity was the net result of these different changes in larger and smaller communities. Figure 9 is a line chart showing changes in total seats by community size.

Figure 9. Percent Change in Total Seats by Community Size



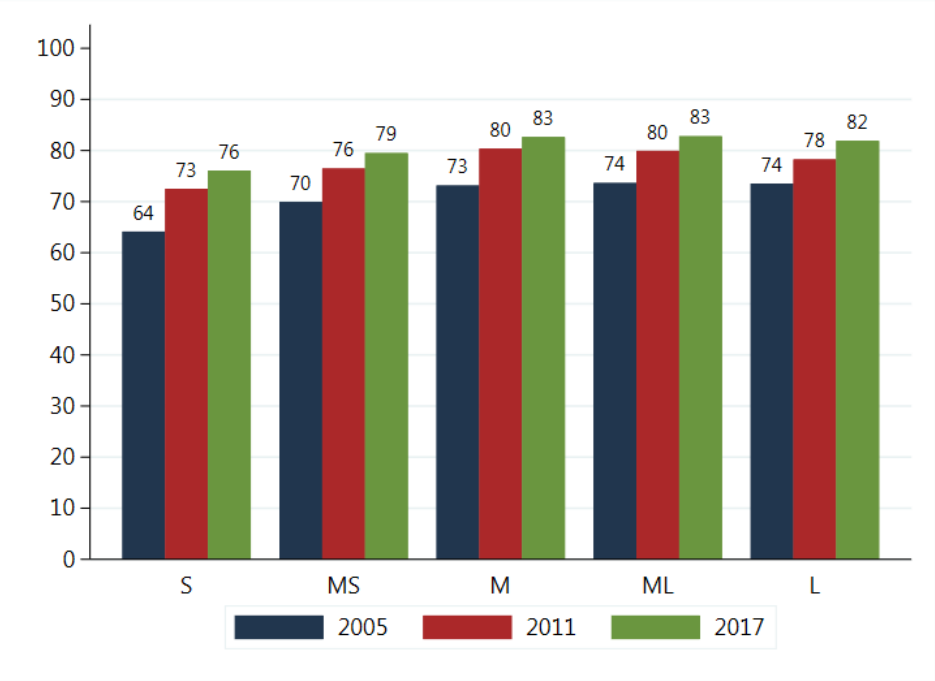
Note: Excludes EAS communities. Baseline is 2005.

Source: OIG analysis of DOT data

Load Factors Increased in All Community Size Groups

Higher load factors—defined as the ratio of passengers to seats on a plane—enabled the significant growth in passenger numbers despite the slight decline in system-wide seating capacity. Apart from small communities, the different community size groups' load factors in 2005 were between 69.9 and 73.6 percent, and grew 8.4 to 9.6 percentage points by 2017. In contrast, small communities had significantly lower load factors in 2005 than other community size groups, but experienced the highest load factor growth rate, particularly in non-EAS communities—12.0 percentage points. Figure 10 is a bar chart that shows that load factors increased significantly for all five community groups.

Figure 10. Load Factor Percent by Community Size



Note: Excludes EAS communities.

Source: OIG analysis of DOT data

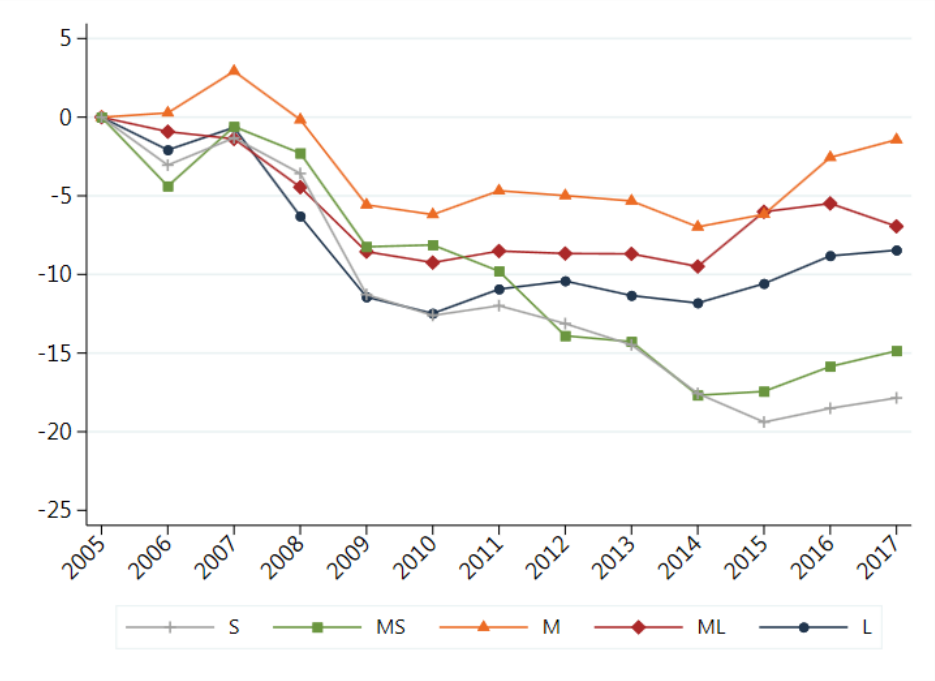
Smaller Communities Lost the Most Connectivity to the National Airspace System and Data Availability Limits Analysis of Delays and Cancellations

Connectivity—a measure of a passenger's ability to easily connect to and move throughout the National Airspace System—declined across all community size groups from 2005 to 2017. However, the average decline in connectivity among smaller communities was twice as big as in larger communities. Data on delays and cancellations were not reported for a large share of flights in smaller communities during this time, but the available data showed modest differences in delays and cancellations across community sizes.

Smaller Communities' Connectivity Has Declined Twice as Much as Larger Communities' Since 2005

Between 2005 and 2017, the average connectivity loss in smaller communities was about twice as high as in larger communities, 16.3 and 7.8 percent respectively. Further, every community size group lost connectivity between 2005 and 2017. However, the average decline for the medium-sized communities was only 1.4 percent. Figure 11 is a line chart that shows the percent change in average connectivity by community size.

Figure 11. Percent Change in Average Connectivity by Community Size



Note: Baseline is 2005.

Source: OIG analysis of DOT data

Our connectivity calculations were based on the Airport Connectivity Quality Index (ACQI), developed by researchers at MIT's International Center for Air Transportation. The ACQI accounts for: the number of nonstop and connecting destinations, with connecting destinations receiving less weight; the frequency of available scheduled flights to the nonstop destinations; and the quality of a destination, as a proxy for economic, social, cultural, and political importance. The ACQI captures the quality of an airport destination by assigning weights to

airports based on their FAA airport hub type designation.[15] This means that a flight to a large city or a major connecting hub is weighted more heavily than a flight to a smaller community with limited connecting options. Instead of calculating the connectivity by airport, we calculated it by community, community size group, and system-wide, see exhibit A for connectivity calculation details.

Our calculations show that the National Airspace System experienced a large decline in connectivity from 2007 to 2010. Subsequently, the average connectivity of smaller communities continued to decline, while the average connectivity from other communities stabilized or grew. For all but small communities, the average connectivity score bottomed out in 2014 and subsequently began to increase. Further, from 2005 through 2017, smaller individual communities were far more likely than larger individual communities to undergo a significant decline in connectivity. During this time, nearly half of smaller communities saw their connectivity decline by more than 20 percent, while fewer than one in seven larger communities saw their connectivity decline by more than 20 percent.

Differences in Cancellations and On-Time Performance Across Community Sizes are Modest, but Data Limitations Hinder Analysis

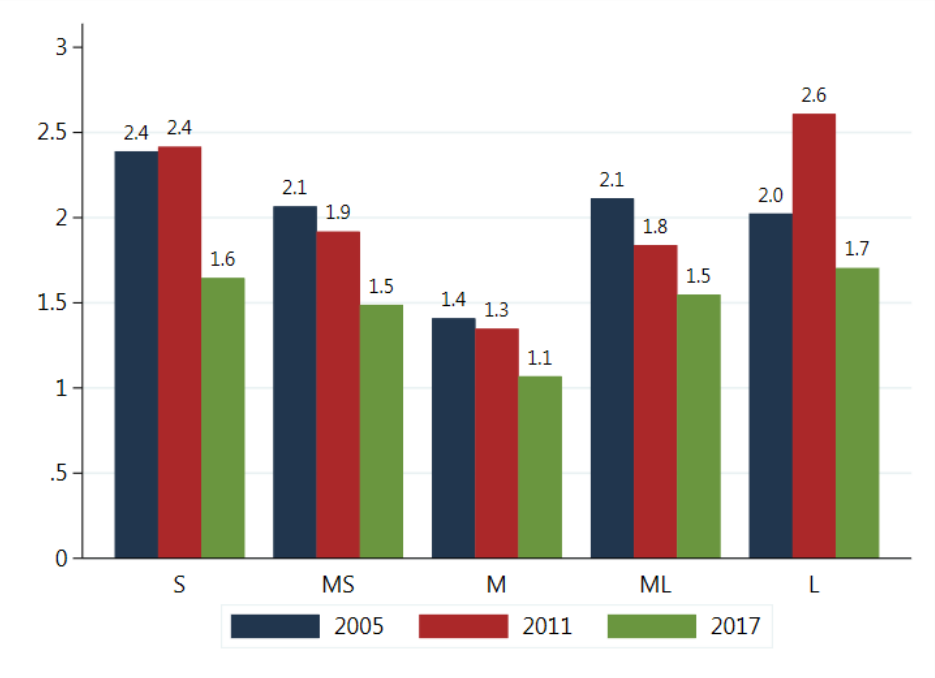
We found that passengers flying to smaller communities were just as likely to have their flights canceled, but less likely to be delayed, as those flying to larger communities. Also, the average delay of late arriving flights in smaller communities increased over time to nearly the same level as in the larger communities by 2017. However, lack of data coverage may limit the representativeness of these conclusions for smaller communities—as the services provided by carriers that fell below a revenue threshold were not reported (e.g., Allegiant Air and Air Wisconsin Airlines). Specifically, prior to 2018, FAA required carriers with more than 1.0 percent of total domestic scheduled passenger carrier revenues to report flight delays and cancellations. Consequently, over the period of our analysis, the average proportion of flights with service quality data[16] was only 60.0 percent for smaller communities in comparison to 81.6 percent for larger communities. Importantly, starting in 2018 FAA reduced this reporting threshold to 0.5 percent. This change brought the share of flights with service

[15] FAA classifies airports' hub type as Large, Medium, Small, or Nonhub, based on annual passenger enplanements.
[16] FAA's Airline Service Quality Performance database is the primary source for information on airline delays and cancellations.

quality data for 2018 to 92 percent in the smaller communities and to nearly 100 percent in the larger communities.

The available data show that, from 2005–2017, flight cancellation percentages generally declined and were lowest for passengers flying to medium-sized communities. While the cancellation percentages for both small and large communities declined by 2017, both experienced increased cancellation percentages in 2011. Figure 12 is a bar chart showing cancellation percentages by community size.

Figure 12. Cancellation Percentage by Community Size

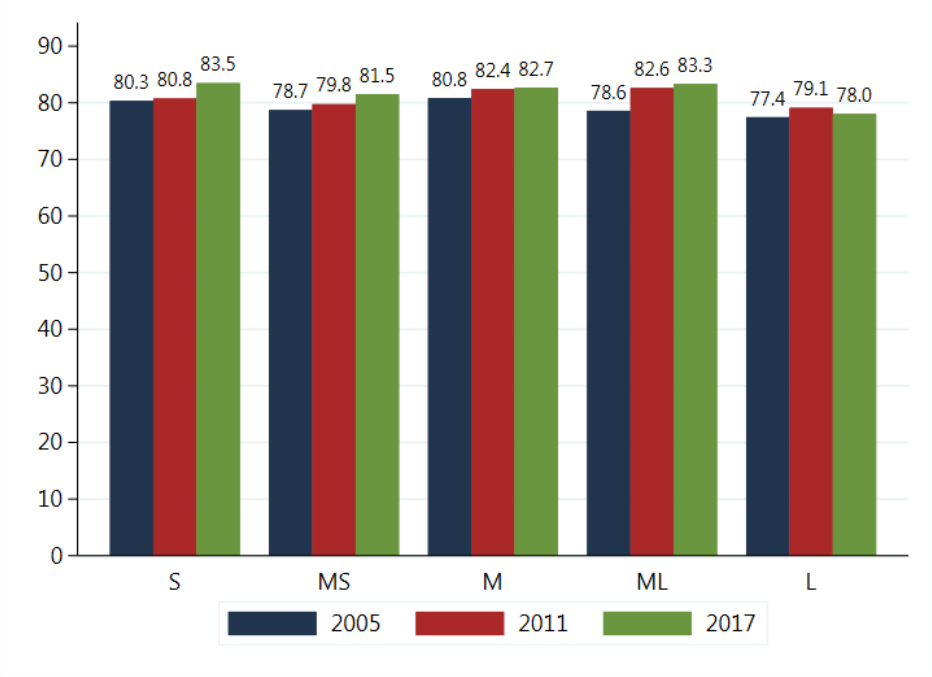


Source: OIG analysis of DOT data

On-time performance—the percentage of flights no more than 15 minutes late—to all communities generally improved by 2017, although large communities experienced deteriorating performance between 2011 and 2017.[17] Figure 13 is a bar chart showing on-time performance percentage by community size.

[17] Some of the improvement in on-time performance may have resulted from increased schedule padding by airlines. For more details, see Dennis Zhang, Yuval Salant, and Jan A. Van Mieghem, Where Did the Time Go? On the Increase in Airline Schedule Padding Over 21 Years (August 24, 2018).

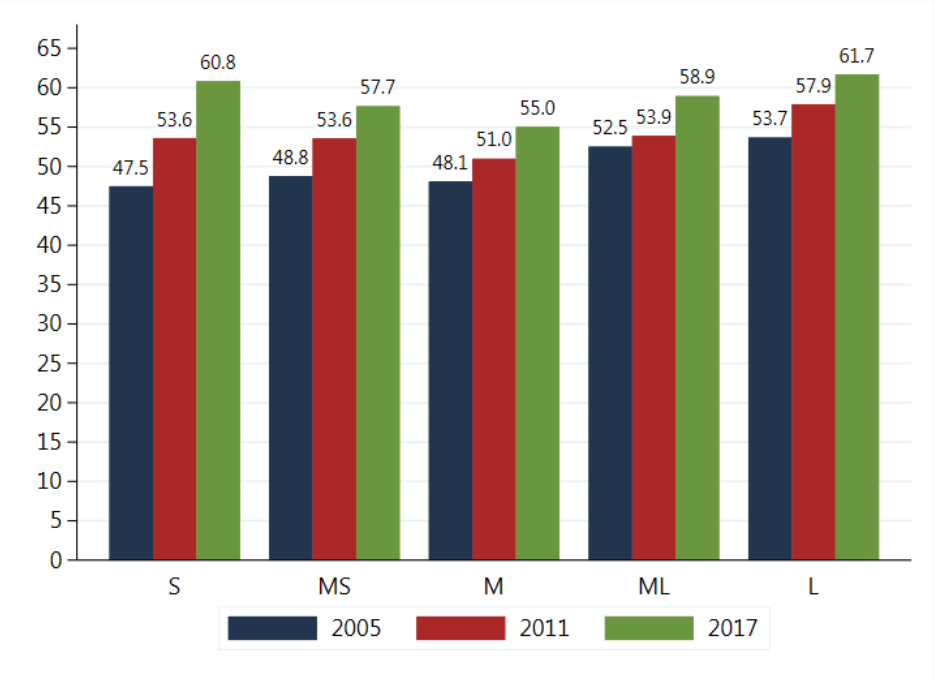
Figure 13. On-Time Performance Percentage by Community Size



Source: OIG analysis of DOT data

While passengers arriving late to smaller communities experienced shorter delays than those arriving late to larger communities, that difference narrowed by 2017, as the length of delays in smaller communities worsened. Lateness—the minutes of delay for flights that arrived later than 15 minutes after their scheduled arrival time—for passengers flying into smaller communities was 5 minutes lower than in larger communities in 2005; by 2017, the difference decreased to 1 minute. The downward trend was the result of increasing lateness at smaller communities, from approximately 48 minutes in 2005 to 59 minutes in 2017. Figure 14 below is a bar chart showing average minutes of delay for delayed flights by community size.

Figure 14. Average Minutes of Delay for Delayed Flights by Community Size



Source: OIG analysis of DOT data

Competitive Conditions Improved in Larger Communities but Worsened in Smaller Communities

Domestic airline services consolidated substantially from 2006 to 2017. This occurred within both the mainline and regional segments. However, since 2006, different community size groups have experienced diverging outcomes. Competition increased on routes from larger communities, but declined on routes from smaller communities. Accounting for part of this difference is that non-legacy carrier service in larger communities expanded more than in smaller communities. Lastly, non-legacy carriers differ substantially in their strategies for serving smaller communities.

Both the Mainline and Regional Airline Industry Segments Underwent Substantial Consolidation

Mainline carriers and regional carriers divide the provision of commercial airline services between them, and both industry segments have become substantially more consolidated.[18] The share of passengers purchasing tickets from the four largest mainline carriers has risen considerably—from 58 percent in 2006 to 79 percent in 2017. Similar changes occurred in the regional segment during this time. The four largest regional airline holding companies combined to carry 55 percent of all passengers flying on a regional carrier in 2006. By 2017, this figure rose to 76 percent. Even greater consolidation occurred among the subset of regional holding companies that are independent. Specifically, the four largest independent regional airline holding companies combined to carry 66 percent of all passengers flying on an independent regional carrier in 2006, and this figure rose to 94 percent by 2017.

While the passenger share of the four largest firms in each segment illustrates the scale of consolidation among larger firms, it offers a limited image of how each segment evolved. The industry has restructured considerably since 2000. Legacy airlines struggled financially for much of 2000 through 2010, and underwent a series of major mergers from 2005 through 2013. Of the six legacy airlines operating in 2005, only three remained in 2017. Also during this period, LCCs expanded and ULCCs grew dramatically. For example, LCC JetBlue's passenger share rose from 3.8 percent in 2006 to 5.4 percent in 2017. The combined passenger share of ULCCs Allegiant Air, Frontier Airlines, and Spirit Airlines rose from 3.0 percent in 2006 to 9.5 percent in 2017.

Additionally, non-legacy carriers' passenger share rose from 35.4 percent in 2006 to 45.9 percent in 2017. The entry of non-legacy carriers into new routes has been cited by regulatory agencies and researchers as a means to promote competition—in light of legacy carriers' consolidation. For example, the DOJ ruled that US Airways Group and AMR Corporation could merge under the subsequently formed American Airlines Group. However, they were also required to offer 26 slots[19] to non-legacy carriers—16 at Reagan National Airport to JetBlue Airways, Inc. and 10 slots at LaGuardia Airport to Southwest Airlines, Inc.

[18] We conducted our analysis of competition of mainline carriers throughout this section using marketing carriers. Because regional carriers primarily operate flights marketed by mainline carriers, we computed measures of regional market structure using operating carriers.

[19] A slot is an authorization to either take-off or land at a particular airport on a particular day during a specific time period. In addition to divestitures at Reagan National Airport and LaGuardia Airport, the ruling also required

The regional segment also underwent significant restructuring over this timeframe. We conducted our analysis of regional airlines using airline holding companies rather than individual airlines in scenarios where multiple airlines were held by the same company. Regional airline holding companies often own multiple regional airlines. Some of the increase in regional concentration can be traced to merging mainline carriers' subsidiaries falling under the same holding company after the mainline partners merged. For example, the regional subsidiaries of US Airways Group and AMR Corporation were each placed under the newly formed American Airlines Group, Inc. after the two companies merged.

However, changes in the structure of the regional airline industry did not result entirely from mergers of mainline carrier holding companies. For example, the independent regional holding company SkyWest, Inc. acquired two large independent regional airlines—Atlantic Southeast Airlines, Inc. in 2005 and ExpressJet Airlines, Inc. in 2010. In 2005, SkyWest, Inc. carried 18.2 percent of passengers flying on independent regional airlines, while ExpressJet carried 13.7 percent of passengers, and Atlantic Southeast carried 8.4 percent of passengers. By 2012, the SkyWest, Inc. holding company carried 46.8 percent of passengers flying on independent regional airlines.

To better measure the changes in airline industry concentration, we use the Hirschmann-Herfindahl Index (HHI). This is a standard measure of industry concentration used by DOJ and the Federal Trade Commission (FTC). The HHI is calculated as the sum of the squared value of the passenger share of each airline.[20] The HHI ranges from zero to 10,000, and a greater HHI corresponds to a more concentrated market. DOJ and FTC generally classify markets as unconcentrated if the HHI falls below 1,500; moderately concentrated if the HHI lies between 1,500 and 2,500; and highly concentrated if the HHI lies above 2,500. The maximum value of 10,000 indicates a monopoly.

The changes in the HHI from 2006 through 2017 shown in the figure below indicate that every industry segment underwent a sizeable degree of consolidation. The increase was greater among the regional segment (859 points) and the independent regional segment (1,714 points) than it was among the mainline segment (550 points). Based on the DOJ and FTC classification, both the mainline and regional markets were unconcentrated in 2006, but became moderately concentrated by 2017. The independent regional market was likewise

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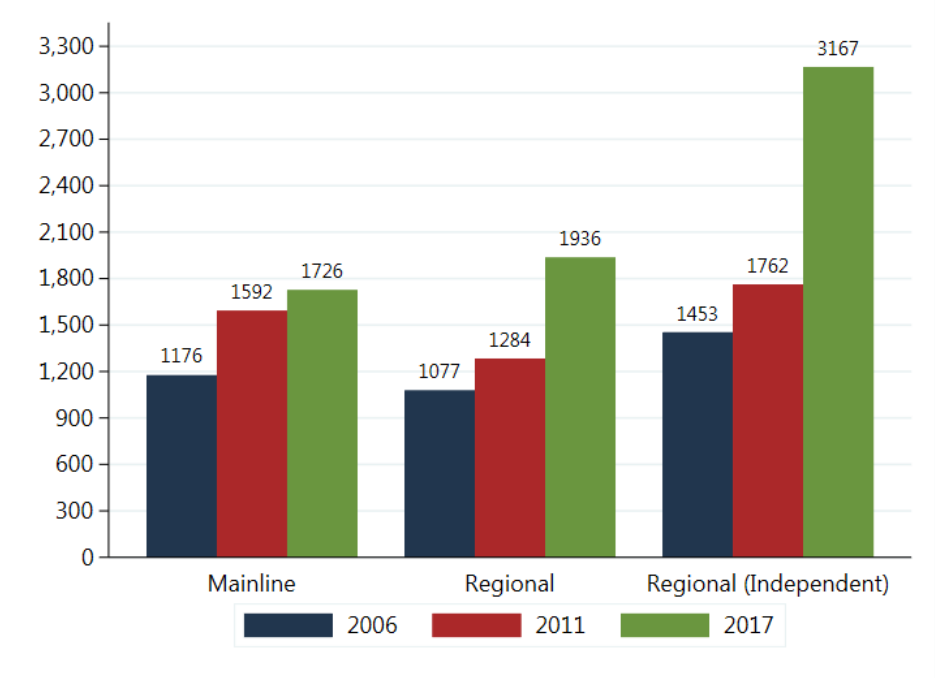
divestiture of gates at Boston Logan International Airport, Chicago O'Hare International Airport, Dallas Love Field, Los Angeles International Airport, and Miami International Airport. Research has shown that these divestitures improved gate access of non-legacy carriers and resulted in lower airfares on routes with forced divestitures. For more details, see: Zhou Zhang, Federico Ciliberto, and Jonathan Williams, "Effects of Mergers and Divestitures on Airline Fares," *Transportation Research Record: Journal of the Transportation Research Board*, vol. 2603, no. 1 (2017), pp. 98-104.

[20] Letting s_j represent firm j's share of all passenger enplanements in a given year, $HHI = 10{,}000 * \sum_{j=1}^{J} s_j^2$. The index can alternatively be computed using revenue rather than numbers of passengers.

unconcentrated in 2006 and became highly concentrated by 2017. Figure 15 is a bar chart with the HHI by market segment for 2006, 2011, and 2017.

Figure 15. HHI by Market Segment



Source: OIG analysis of DOT data

Regional carriers play a critical role in service to smaller communities, as passengers in these communities are more likely to be served by the regional carriers than passengers in larger communities. From 2005 through 2017, regional carriers flew 75 percent of passengers in small communities and over 40 percent of passengers in medium-small communities, as compared to around 20 percent of passengers in larger communities.

Economists and other researchers have studied the relationship between mainline competition and outcomes such as prices and service quality, but we are unaware of any study that examines the possible impacts of regional consolidation. For example, whether regional consolidation can impact ticket prices by impacting contract negotiations with their mainline partners is unknown.[21]

[21] For example, Millou and Petrakis study mergers in the upstream sectors of vertically related industries, focusing on the relationship between contract types and market structure. Economists have referred to the mainline and regional airlines as vertically related, with the mainline carriers representing downstream firms and regional carriers representing upstream firms. For more, see Chrysovalantou Millou and Emmanuel Petrakis, "Upstream horizontal mergers, vertical contracts, and bargaining," *International Journal of Industrial Organization*, vol. 25, no. 5 (2007), pp. 963–987.

Route-Level Competition Increased in Larger Communities and Declined in Smaller Communities

Passengers flying from smaller communities had fewer carriers to choose from when purchasing tickets in 2017 than in 2006. During this time, the average number of effective competitors[22]—which are holding companies that sold at least 5 percent of tickets between an origin and destination in the year—for a passenger flying from a small community fell from 2.66 to 2.51. The average number of effective competitors for a passenger flying from a medium-small community fell from 3.73 to 3.33. In contrast, passengers flying from larger communities had more carriers to choose between in 2017 than in 2006. During this time, the average number of effective competitors for a passenger flying from a medium-large community rose from 3.73 to 4.03, while the average number of effective competitors for a passenger flying from a large community grew from 4.26 to 4.56.

While useful, the measure of effective competitors does not account for the relative size of the competitors. The HHI provides more information than the average number of effective competitors, as it depends on both the number of competitors and the difference in competitors' size. Given two markets with the same number of competitors, the HHI will be lower—indicating stronger competition—in the market with more similarly-sized competitors. For example, consider a route that initially has one competitor and consequently, $100^2 = 10{,}000$. If a second competitor begins serving this route and captures 10 percent of the market, the HHI would fall to $90^2 + 10^2 = 8{,}200$. If a second competitor begins serving this route and captures 40 percent of the market, the HHI would fall to $60^2 + 40^2 = 5{,}200$. Each scenario brings one additional competitor, but the lower HHI indicates the latter has a greater effect on competition.

We find that the divergence in competitive conditions between smaller and larger communities is also present when the HHI—rather than effective competitors—is used to measure competition. The HHI in small and medium-small communities rose between 2006 and 2017, indicating a decline in competition. In contrast, the HHI in large and medium-large communities fell during the same period,

[22] Effective competitors and the HHI are defined based on the marketing carrier, and weighted by the number of passengers on the route. We included both direct and indirect itineraries between an origin and destination because airlines which offer direct flights also compete with airlines offering indirect flights. In 2017, 74.5 percent of passengers flew direct, 24.5 percent of passengers made one stop, 0.9 percent of passengers made two stops, and 0.1 percent of passengers made at least three stops.

indicating an increase in competition. Figure 16 is a bar chart showing route-level HHI by community size for 2006, 2011, and 2017.

Figure 16. Average Route-Level HHI by Community Size

Note: Average HHI is calculated weighting by the number of passengers on each route in a given year.

Source: OIG analysis of DOT data

Expansion of Non-Legacy Carriers Was Substantial in Larger Communities, but Modest in Smaller Communities

The divergence in competition on routes serving smaller communities, in comparison to larger communities, can be partially explained by differences in the expansion of non-legacy carriers across different community size groups. The average number of legacy carriers competing on a route fell significantly across all community size groups from 2006 to 2017. At the same time, non-legacy carriers substantially expanded their presence in medium and larger communities, but their expansion in smaller communities was comparatively minor.[23]

[23] All measures throughout this section are defined based on the marketing carrier.

Compared to legacy carriers, non-legacy carriers draw a lesser share of their passengers from smaller communities. Further, the share of non-legacy carriers' passengers originating in smaller communities has declined. In 2006, legacy carriers drew 18.0 percent of their passengers from smaller communities, while non-legacy carriers drew 14.2 percent. By 2017, the proportion of legacy carriers' passengers originating in smaller communities increased slightly to 18.3 percent, while that of non-legacy carriers' fell to 11.7 percent. Table 3 displays the share of passengers drawn from each of the community size groups for legacy and non-legacy carriers in 2006 and 2017.

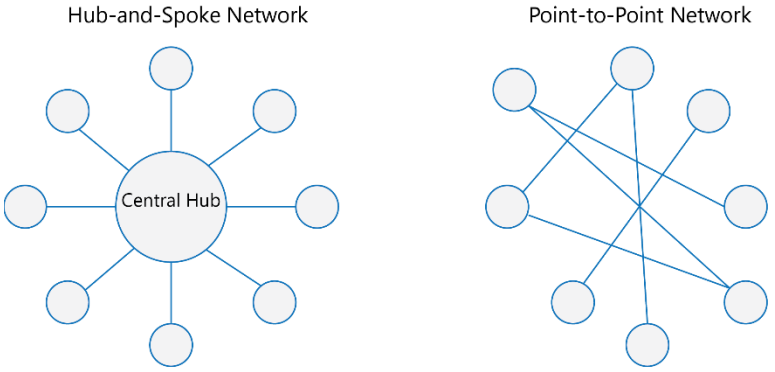
Table 3. Percent of Passengers by Community Size for Legacy and Non-Legacy Carriers

Carrier Type	Year	Small	Medium-Small	Medium	Medium-Large	Large
Legacy	2006	4.1%	13.9%	27.6%	27.4%	26.9%
	2017	4.7%	13.6%	26.0%	28.1%	27.7%
Non-Legacy	2006	2.1%	12.1%	34.8%	23.7%	27.4%
	2017	1.7%	10.0%	36.5%	24.6%	27.3%

Source: OIG analysis of DOT data

One factor that could explain the differential patterns of non-legacy carrier service across different community sizes is their network structure. A simple breakdown of airline network structures may categorize networks as either hub-and-spoke or point-to-point. Hub-and-spoke networks are characterized by the presence of a central hub and several spokes branching out from the hub. Passengers in a hub-and-spoke network are transported between different points on the network through the central hub. Point-to-point networks do not have a central hub and passengers are transported directly between different points on the network. Modern airline networks are most accurately characterized as a hybrid between hub-and-spoke and point-to-point networks. Figure 17 is a graphical representation of the two airline network structures from this simple characterization.

Figure 17. Comparison of Airline Networks



Source: OIG-generated

Non-legacy carriers' networks are more similar than those of legacy carriers' to the point-to-point network.[24] Compared to hub-and-spoke networks point-to-point networks have features that can make it difficult for the carrier to serve smaller communities. They typically require high-density markets, allowing carriers to operate routes at a low average cost per passenger. In addition, they are better suited to carriers which operate a more limited set of aircraft. This means the carrier may not operate smaller aircraft, which are better suited for serving smaller communities.

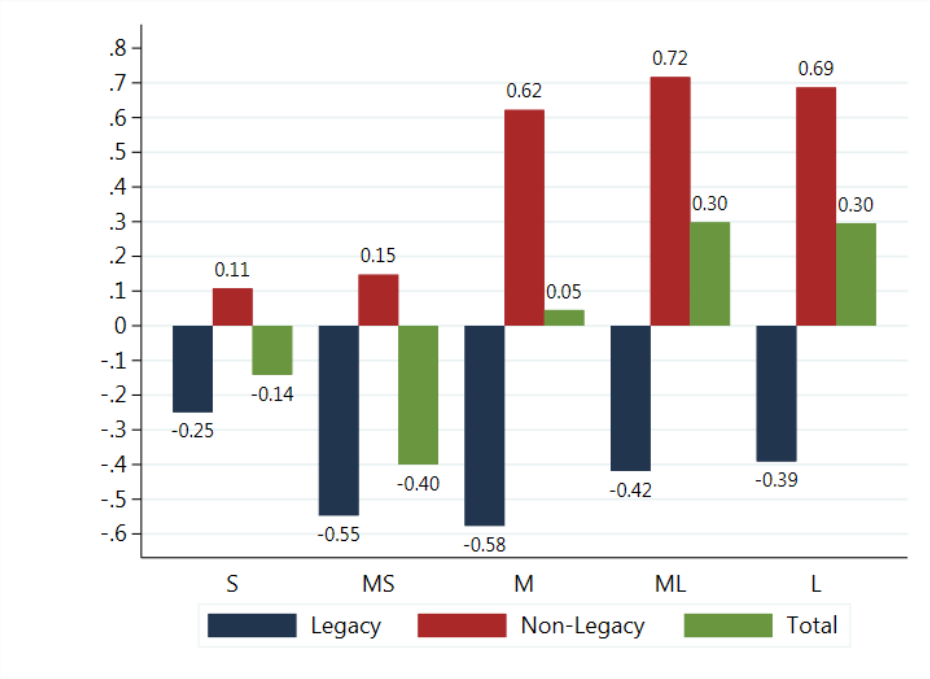
Non-legacy carriers had notably different patterns of network expansion in larger communities than in smaller communities. These carriers substantially expanded their networks in medium-sized and larger communities from 2006 to 2017. For example, the average passenger could choose between 1.48 non-legacy competitors in 2006 in large communities. This rose to 2.17 non-legacy competitors by 2017. By comparison, non-legacy carriers only increased their presence in smaller communities to a minor extent.

The number of legacy competitors declined across all community sizes. For example, the average number of legacy competitors serving a route in a medium-small community fell from 2.63 in 2006 to 2.08 in 2017, a decline of 0.55. Medium-sized communities saw a similarly large decline in legacy competitors, while larger communities saw a somewhat smaller—but still significant—decline. The smallest decline in legacy competitors occurred in small communities. Figure 18 is a bar chart that shows the change in effective competitors across

[24] In 2017, over 30 percent of passengers on each of the three legacy carriers made a connection on the same carrier. Among non-legacy carriers, Southwest had the greatest share of passengers (20 percent) connect to another Southwest flight. Alaska Airlines (12 percent), Frontier Airlines (6 percent), and Sun Country (5 percent) had modest shares of connecting passengers. The three remaining carriers—Spirit, JetBlue, and Allegiant—had a share of connecting passengers below 5 percent.

community sizes broken out by changes in legacy competitors and non-legacy competitors.

Figure 18. Change in Effective Competitors, 2006–2017



Note: Number of effective competitors is calculated weighting by the number of passengers on each route in each year.

Source: OIG analysis of DOT data

Overall, as shown in the figure, in larger communities the robust expansion of non-legacy carriers more than counteracted the decline in legacy carriers. Despite national consolidation, passengers departing from larger communities could choose between more carriers in 2017 than in 2006. The number of legacy competitors also fell in smaller communities, and the number of non-legacy competitors rose. However, the magnitude of entry by non-legacy carriers was not as large as the magnitude of exit by legacy carriers. As a result, passengers flying from smaller communities had fewer carriers to choose between in 2017 than in 2006.

Non-Legacy Carriers Differ Substantially in Their Strategies for Serving Smaller Communities

Although non-legacy carriers as a whole showed limited expansion into smaller communities from 2006 through 2017, these carriers differed notably in their strategies for serving smaller communities. In particular, Alaska Airlines and Allegiant Air offer significantly more service to small communities than other non-legacy carriers.

All of the seven non-legacy carriers drew a smaller share of their passengers from smaller communities in 2017 than in 2006.[25] Further, five of the seven non-legacy carriers drew less than 1 percent of their passengers from small communities in 2017. The other two carriers—Alaska Airlines and Allegiant Air—differ from the other five in ways that help explain their greater propensity to serve passengers in small communities. Table 4 below shows the percent of passengers drawn from each community size group in 2006 and 2017 for the seven largest active non-legacy carriers.

[25] We restrict this discussion to the non-legacy carriers which were active in both 2006 and 2017.

Table 4. Percent of Passengers by Community Size for Non-Legacy Carriers

Carrier Type	Year	Small	Medium-Small	Medium	Medium-Large	Large
Alaska	2006	7.0%	8.7%	24.2%	32.8%	27.2%
	2017	5.8%	7.6%	26.3%	32.9%	27.4%
Allegiant	2006	15.6%	27.6%	51.2%	1.7%	3.9%
	2017	11.8%	29.5%	42.6%	9.2%	6.9%
Frontier	2006	0.6%	9.2%	59.3%	15.5%	15.5%
	2017	0.5%	6.2%	60.7%	18.0%	14.6%
JetBlue	2006	1.0%	9.0%	17.3%	22.7%	50.0%
	2017	0.6%	8.3%	21.3%	30.8%	39.1%
Southwest	2006	1.1%	12.0%	39.0%	19.8%	28.1%
	2017	0.7%	10.4%	40.8%	21.4%	26.8%
Spirit	2006	0.0%	10.9%	15.6%	52.7%	20.8%
	2017	0.3%	7.3%	26.9%	41.2%	24.3%
Sun Country	2006	0.8%	5.9%	19.5%	61.3%	12.6%
	2017	0.1%	4.3%	18.0%	61.2%	16.4%

Source: OIG analysis of DOT data

Unlike the other six non-legacy carriers, Alaska Airlines sells tickets for flights that are operated by its own regional subsidiary, Horizon Air, as well as by other regional partners. In 2017, none of the seven non-legacy carriers operated aircraft with fewer than 100 seats. However, Horizon Air's fleet was composed entirely of 76-seat aircraft at that time. This enabled Alaska Airlines to serve small communities—which may not have sufficient demand to fill larger aircraft—through Horizon and its regional partners.[26] In 2017, there were six small communities—four in Washington and two in Northern California—where Alaska Airlines was the marketing carrier for at least 85 percent of passengers.

There were stark differences between the three ULCC's service to passengers in smaller communities. In 2017, Frontier Airlines and Spirit Airlines drew 6.7 and 7.6 percent of their passengers from smaller communities, respectively, while Allegiant Air drew 41.3 percent. Although Allegiant's passenger share on all flights in 2017 was just 2.4 percent, it was 8.6 percent on flights from small communities and 5.9 percent on flights from medium-small communities. During

[26] Alaska Airlines has also marketed flights that were operated by independent regional carriers.

that year, Allegiant was present at a total of 81 smaller communities. In 34 of these communities, its passenger share exceeded 20 percent. Further, in 12 of these communities Allegiant had the highest passenger share of any airline, and in 5 of these communities its passenger share was at least 90 percent.

Allegiant built its business around offering infrequent service from smaller communities to leisure destinations. Passengers attempting to use Allegiant to reach destinations not served directly by the airline may face difficulties for a few reasons. First, Allegiant's routes are often low frequency. For example, in 2017, more than half of its routes flew three times or fewer per week. Thus, same-day connections to other Allegiant flights may not have been available. Second, Allegiant's operations tend to be seasonal. For example, in 2017, Allegiant had 64.3 percent more departures in July than in September. Third, Allegiant has based a significant share of their service to mid-sized and larger metropolitan areas at secondary airports. For instance, Allegiant's operations in the Orlando, FL, area are based out of Orlando Sanford International Airport (SFB), while the community's primary airport is Orlando International Airport (MCO).[27] Passengers seeking to connect from an Allegiant flight to almost any other carrier's service would need to exit SFB, drive over 30 miles to MCO, and pass through MCO security screening.

Flying From Smaller Communities Became Relatively More Expensive, but Lack of Data on Growing Fees Hinders Analysis

Passengers flying from smaller communities' pay a price premium, and this premium has risen significantly in recent years. However, our analysis was limited by a lack of information on ancillary fees. Certain fees have grown dramatically in recent years, but are not reflected in DOT data on prices or ancillary fee revenue. This lack of data could impact the Department's understanding of both the costs to consumers and airline industry competition. It could also impact understanding of the effect on tax receipts supporting the Airport and Airway Trust Fund (AATF) of airlines' increased reliance on ancillary fees. In particular, we conservatively estimate that airlines' use of booking fees for purchasing tickets on their websites may reduce AATF excise tax revenue by $60.6 million in 2019 alone.

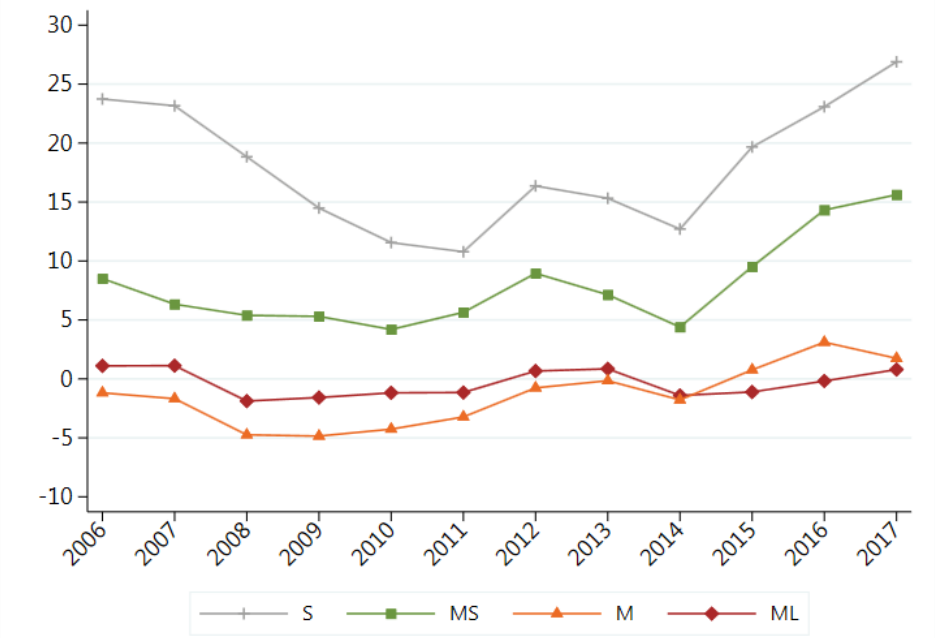
[27] In 2017, Allegiant accounted for 97.9 percent of departures from SFB but had no departures from MCO. Other carriers had 130,461 departures at MCO compared to 189 departures at SFB.

Flying From Smaller Communities Became Relatively More Expensive

From 2006 through 2017, passengers flying from smaller communities paid a significant price premium, compared to passengers on similar flights in large communities. Passengers flying roundtrip from small communities were estimated to have paid a 21 percent premium in 2005, which rose to 27 percent in 2017. The premium for medium-small communities rose from 8.5 percent to 15.6 percent over the same period. In contrast, passengers flying from medium and medium-large communities consistently paid similar prices to passengers in large communities.

From 2008 to 2010, the price premium associated with flying out of smaller communities fell to a relative low point, and then fluctuated between 2011 and 2014. However, since 2014, the price premium paid by passengers from smaller communities has increased steadily, surpassing 2005 levels. Figure 19 is a line graph showing the percent price premiums by community size. The baseline for our calculation of these price premiums is large community prices.

Figure 19. Price Premium Percent by Community Size



Note: Baseline is the large community price

Source: OIG analysis of DOT data

We focused on the price premium—the percentage difference between prices paid in large versus other community size groups—because jet fuel prices varied

considerably from 2006 through 2017, and they are a significant component of airline costs. We estimated these price premiums using quality-adjusted price indices for the different community size groups. The quality factors accounted for included: the number of seats per aircraft type; circuity or ratio of miles flown to miles between the origin and destination, which accounts for the directness of flights; the distance between communities; the number of trip segments; and the carriers marketing the flights. See exhibit A for details on our price premium estimation.

We calculated the prices using the DOT database reporting airfares—the Airline Origin and Destination Survey (DB1B)—with Government and airport charges removed.[28] We adjusted the reported fares to include the average ancillary fees—baggage and change/cancellation fees—on which DOT collects revenue data through its Form 41 P-1.2. Revenue information associated with other ancillary fees is not identifiable given current reporting requirements and ancillary fees are not included in the reported airfares. For example, the booking fee charged by ULCCs for reservations made online or over the phone is likely incurred by the vast majority of passengers but is not included in the DB1B. As a result, fares listed in the DB1B for ULCCs are likely significantly lower than passengers' cost of purchasing tickets—even if the passenger does not add ancillary services outside of the booking fee. If the Department tracked such ancillary fees, it would improve the accuracy of its information regarding the cost of air travel to passengers.

Limited Data on Ancillary Fees Could Limit DOT's Ability To Oversee Airlines' Competitive Practices

Lack of data on many ancillary fees and their associated revenue could hinder DOT's oversight of the airline industry. Effective economic oversight by the Department is important to ensure the efficiency of our transportation system. Airlines' pricing of ancillary services is also an important dimension of airline competition. However, DOT does not collect data on these prices. This lack of information could pose challenges to the Department's understanding of competitive practices in the industry.

Pricing of ancillary services is an important consideration for antitrust authorities evaluating prospective mergers in the airline industry. DOJ raised concerns over a prospective increase in ancillary fees in its complaints filed against the two most recent mainline carrier mergers. In its complaint filed against the proposed

[28] We obtained this version of the DB1B, the Superset, from Airline Data Inc.

merger between US Airways and American Airlines, DOJ stated "…industry consolidation has left fewer, more-similar airlines, making it easier for the remaining airlines to raise prices, impose new or higher baggage and other ancillary fees, and reduce capacity and service." In this complaint, DOJ stated that even a modest increase in ancillary fees could cost consumers millions.[29] Likewise, DOJ's complaint filed against the proposed merger between Virgin Atlantic and Alaska Airlines stated that the merger would likely result in higher fees.[30]

Consequently, airlines' offerings and pricing of ancillary services represent an important aspect of competition in the industry. For example, Alaska Airlines notes that fee pricing is a significant competitive factor in the industry.[31] Also, growth of ULCCs may exert competitive pressure on mainline carriers, which influences their product offerings. For example, in 2017, American Airlines introduced its Basic Economy product to compete with ULCCs.[32]

Limited information on the prices paid by passengers for ancillary services could hamper DOT's ability to provide adequate information on the flying public's cost of air transportation between different communities. The Wendell H. Ford Aviation Investment and Reform Act[33] requires covered airports to produce a written competition plan to gain approval for passenger facility charges (PFC) and as a condition of certain grants. Airports' competition plans are required to incorporate information on airfares and how they compare to airfares at other airports, using DOT data. The Department also releases a quarterly report that provides information on airfares across city-pair markets. Air carriers differ substantially in terms of the airports and routes they serve, as well as the share of revenue they earn from fees for ancillary services. As a result, reported airfares may closely approximate passengers' full cost of flying from some communities, but understate it for communities served by carriers that draw substantial revenue from ancillary fees.

Without supplementary data on ancillary fees and their associated revenues, the Department's airfare data also may not accurately capture changes in the cost of air travel to the public over time. From 2010 to 2018, airlines introduced new fees for ancillary services such as seat selection and online booking. If the average charge incurred by passengers for such ancillary services has risen, comparing

[29] Amended Complaint, U.S., et al. v. US Airways Group, Inc., et al., 38 F.Supp.3d 69, No.13-cv-1236 (D.D.C. 2014)
[30] Complaint, U.S. v. Alaska Air Group, Inc., et al., No. 16-cv-02377 (D.D.C. June 23, 2017) (unpublished).
[31] Alaska Air Group Inc., 2017 Form 10-K, (2018).
[32] American Airlines Group Inc., 2017 Form 10-K, (2018).
[33] P.L. 106-181, section 155. Covered airports include any commercial service airport that has more than 0.25 percent of the total number of passenger boardings each year at all such airports and where one or two air carriers control over 50 percent of passenger boardings.

airfares over time may not accurately convey changes in passengers' cost of flying over time.[34]

Increases in ancillary fees may cause the cost of flying to change, even if airfares remain the same. For example, we queried Spirt Airlines' website in both March and August of 2019. For each query, we selected a round-trip itinerary from Baltimore/Washington Thurgood Marshall International Airport (BWI) to Boston Logan International Airport (BOS).[35] For the March query, the total cost to a purchaser was $106.60. For the August query, the total cost was $112.60. A $6 increase—from $39.98 to $45.98—in the booking fee was the only component of the total price that changed. Table 5 below displays the results of the queries.

[34] For example, Airlines For America's webpage lists the average domestic round-trip airfare in the United States over time. They present both a "Base Fare" as well as an "All-In Fare". The latter incorporates the average baggage and change/cancellation fees using data from DOT's Form 41 Schedule P-1.2. This data shows that while the average baggage and change/cancellation fees increased from $5.88 to $23.47 from 2007 through 2009, the average baggage and change/cancellation fees declined slightly from $23.47 to $21.85 from 2009 through 2018. However, because this data does not account for any other ancillary fees such as seat selection or booking fees, it does not completely represent the change in costs incurred by passengers from 2009 through 2018.

[35] The outbound leg for each query was Flight 1028, which was scheduled to depart BWI around 6 a.m. and arrive in BOS around 7:30 a.m. The inbound leg for each query was Flight 1027, which was scheduled to depart BOS around 10 p.m. and arrive at BWI around 11:30 p.m. The queried itineraries do not include any ancillary services other than the booking fee.

Table 5. Example of Price Components for Travel on Spirit Airlines, March and August 2019

Price Type	Price Component	Query 3/8/2019	Query 8/21/2019	Difference
Total Round Trip Price	All	$106.60	$112.60	$6.00
Flight Price	Flight	$0.02	$0.02	-
	Regulatory Compliance Charge	$13.02	$13.02	-
	Fuel Charge	$22.32	$22.32	-
	Booking Fee[a]	$39.98	$45.98	$6.00
	Total	$75.34	$81.34	$6.00
Government Fees and Taxes	Security Fee	$11.20	$11.20	-
	Segment Fee	$8.40	$8.40	-
	Passenger Facility Fee	$9.00	$9.00	-
	Federal Excise Tax	$2.66	$2.66	-
	Total	$31.26	$31.26	-

[a] Spirit Airlines refers to this as "Passenger Usage Charge."

Source: Queries from Spirit Airlines' webpage on 3/8/2019 and 8/21/2019

In addition, information obtained from Securities and Exchange Commission (SEC) filings and carriers' webpages indicates that booking fees have increased considerably in recent years.[36] For example, by September 2019, typical per segment online booking fees included: $22.99 for Spirit Airlines, $21 for Frontier Airlines,[37] and $18 for Allegiant Air. In comparison, per-segment online booking fees were: $5 for Spirit Airlines in 2010, $0 for Frontier Airlines until 2015, and $13 for Allegiant in 2018.

GAO has noted that steps are needed to address the limited availability of data on ancillary fees. In response to a 2010 GAO recommendation,[38] DOT issued a Notice of Proposed Rulemaking on July 15, 2011, which required carriers to

[36] Allegiant Air refers to their booking fee as an "Electronic Carrier Usage Charge." Frontier Airlines refers to their booking fee as a "Carrier Interface Charge." Spirit Airlines refers to their booking fee as a "Passenger Usage Fee."
[37] Frontier Airlines does not list the level of this fee on their webpage. However, online queries typically showed a fee of $21 per segment, with a lower fee appearing on some discounted itineraries.
[38] GAO, *Consumers Could Benefit from Better Information about Airline-Imposed Fees and Refundability of Government-Imposed Taxes and Fees* (GAO-10-785), July 2010.

report revenues on 19 separate charges for ancillary services.[39] However, DOT withdrew the proposed rule on December 14, 2017, citing concerns about the potential reporting burden on the industry—while acknowledging there would be benefits of collecting and publishing this information.[40]

Effective economic oversight of competitive practices in the airline industry is critical to ensuring the efficiency of our transportation system. Airlines' ancillary service pricing strategies now represent an important aspect of airline competition. As a result, the Department's lack of data on ancillary fees could hinder the Office of Aviation Analysis's ability to effectively inform the Department on issues related to airline competition.

Increased Reliance on Ancillary Fees Could Impact Airport and Airway Trust Fund Receipts

Unlike domestic airfares, fees charged by airlines for many ancillary services are not subject to the 7.5 percent excise tax on transportation of persons by air. Revenue collected from this excise tax constitutes an important funding source for the Airport and Airway Trust Fund (AATF). As a result, increased reliance on ancillary fees, as opposed to revenue from airfare, could result in diminished AATF receipts.[41] One type of fee in particular—booking fees charged by some carriers for purchasing tickets through the carrier's webpage or call center—may result in foregone AATF revenues of $60.6 million in 2019.

Baggage revenue is the only ancillary revenue that is both identifiable from DOT data and not subject to the 7.5 percent excise tax. In a 2017 report, GAO used this information to estimate that an additional $309 million in excise taxes would have been credited to the AATF in 2016 had baggage fees been subject to the tax. Because DOT does not separately record revenues associated with other ancillary fees, it is difficult to determine the scale of foregone AATF receipts that could

[39] Federal Register 76-136 (July 2011), pp. 41726-41731. The categories were (1) Booking fees, (2) priority check-in and security screening, (3) baggage, (4) in-flight medical equipment, (5) in-flight entertainment/internet access, (6) sleep sets, (7) in-flight food/non-alcoholic drinks, (8) alcoholic drinks, (9) pets, (10) seating assignments, (11) reservation cancellation and change fees, (12) charges for lost ticket, (13) unaccompanied minor/passenger assistance fee, (14) frequent flyer points/points acceleration, (15) commissions on travel packages, (16) travel insurance, (17) duty-free and retail sales, (18) one-time access to lounges, and (19) other.

[40] Federal Register 82-239 (December 2017), pp. 58777–58778.

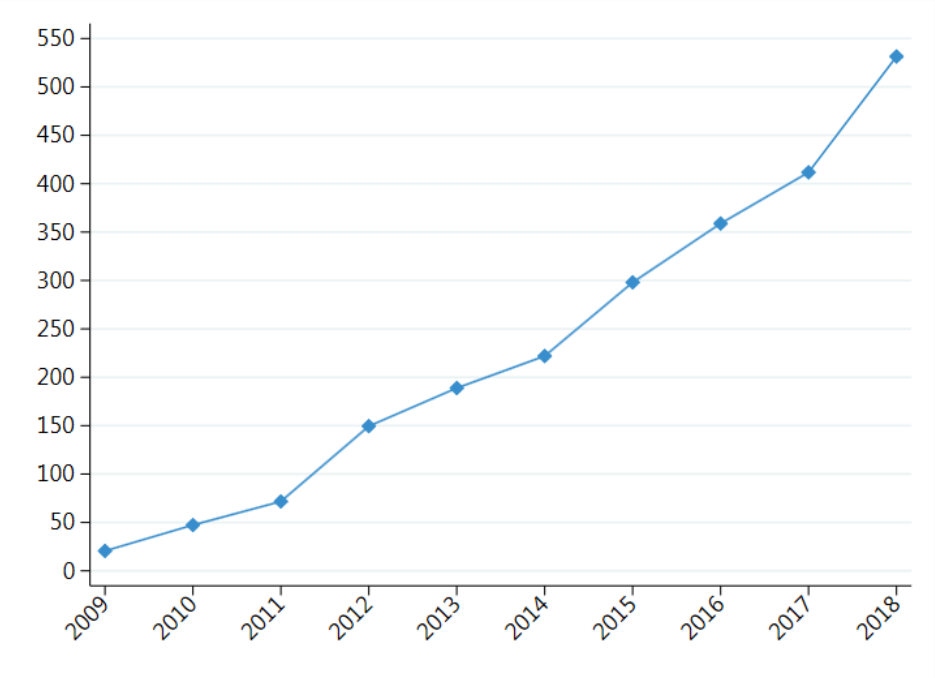
[41] Section 122 of the FAA Reauthorization Act of 2018 mandated that the Secretary of Transportation commission an organization to conduct a study that includes an analysis of airlines' ancillary fees and their impact on taxable revenue. The report was released in January 2020 and estimates the impact of baggage fees on excise tax revenues. The report also recommends that Congress include ancillary fees in the domestic passenger ticket tax. For more details, see RAND Corporation, *U.S. Airport Infrastructure Funding and Financing*, 2020.

result from airlines' reliance on ancillary fees more generally. However, the limited data available from public filings suggests foregone receipts from other ancillary fees may be significant and increasing.

Public filings indicate seat selection fees represent a significant and growing revenue source for some carriers. For example, in 2018 JetBlue reported $274 million in revenue from its "Even More Space" upgrade, a 14.0 percent increase from 2017. Spirit Airlines reported $180 million in revenue from seat selection in 2018, a 36.7 percent increase from 2017. While some other carriers also charge seat selection or seat upgrade fees, we were unable to find associated revenue levels in public filings. Further, it is not possible to determine seat selection fees or revenues using DOT data.[42]

The limited information available also appears to indicate that booking fee revenues are sizeable and growing. Spirit Airlines is the only ULCC that has publicly reported its booking fee revenue, which has grown steadily since 2009. In 2018, it reached over $531 million. Figure 20 is a line graph of Spirit Airlines' booking fee revenue from 2009 through 2018.

Figure 20. Spirit Airlines' Booking Fee Revenue ($Millions)



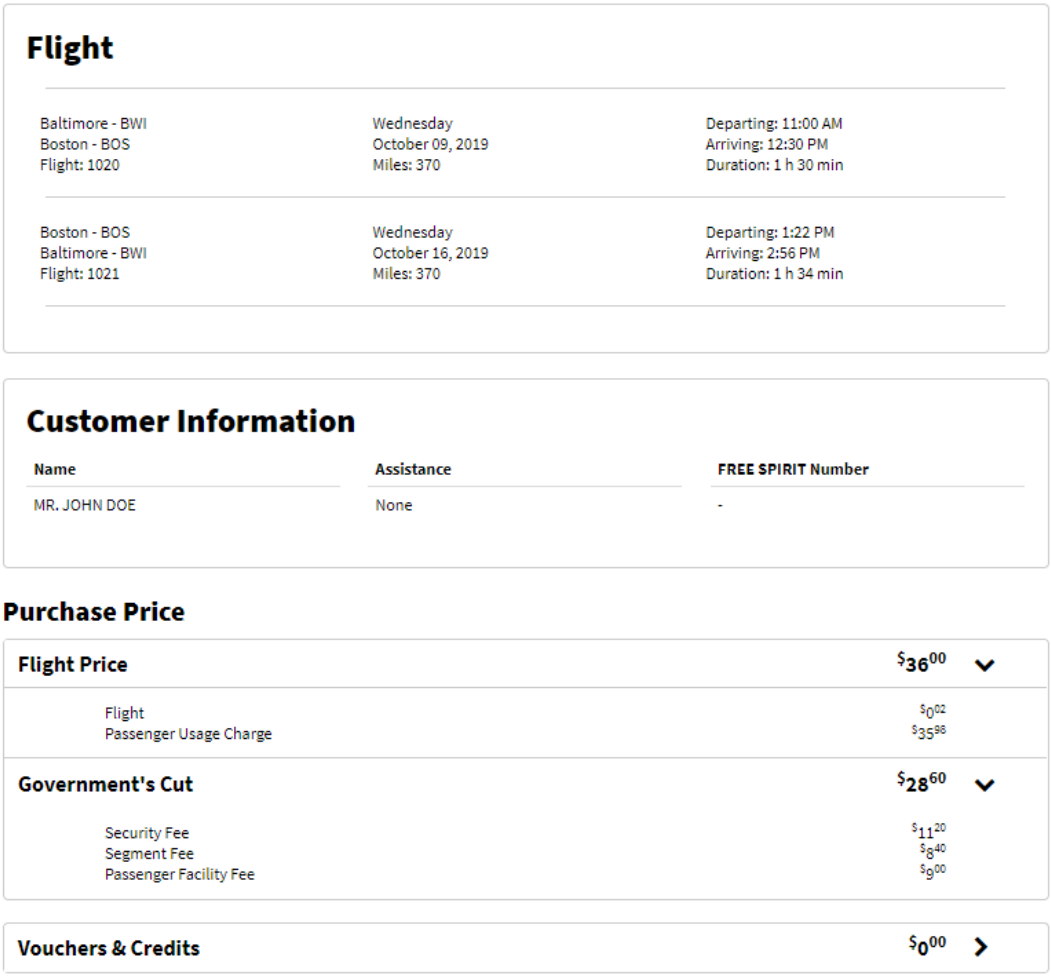
Source: OIG generated from information in Spirit Airlines' SEC filings

[42] Specifically, we are referring to seat selection and upgrade fees. Ticket class upgrades, on the other hand, are included as part of the airfare and so are included in the prices recorded in the DB1B.

More specifically, booking fees can represent a large share of the total amount paid by purchasers to the air carrier for a ticket, which could significantly limit—or eliminate entirely—the amount of excise tax collected. For example, as shown in figure 21, on September 3, 2019, we found Spirit Airlines[43] offering a round trip between Baltimore and Boston for $64.60 total; $36 represented charges collected by Spirit Airlines, and $28.60 represented charges collected for government or airport purposes.[44] However, the $36 collected by Spirit Airlines is further broken down into two components: $0.02 for the "Flight" and $35.98 for the "Passenger Usage Charge." If the airline only collects the 7.5 percent excise tax on the Flight component, the carrier would not collect any excise taxes on this $.02 itinerary. Figure 21 is a screenshot of the query described above. Note that there is no reference here to Federal Excise Tax, which can be seen in our earlier example from table 5 above.

[43] For additional examples, on February 17, 2020, we found Allegiant Air offering a roundtrip itinerary that charged $1.12 for the flights, a $36 booking fee, and $0.08 in excise taxes. On February 17, 2020, we also found Frontier Airlines offering a roundtrip itinerary that charged $0.87 for the flights, a $42 booking fee, and $0.06 in excise taxes.
[44] The Security Fee, Segment Fee, and Passenger Facility fee listed here are charged based on the number of segments, and are not affected by the price of the itinerary.

Figure 21: Spirit Airlines Itinerary Listing $.02 Flight Cost and No Collection of Excise Tax



Flight

Baltimore - BWI Boston - BOS Flight: 1020	Wednesday October 09, 2019 Miles: 370	Departing: 11:00 AM Arriving: 12:30 PM Duration: 1 h 30 min
Boston - BOS Baltimore - BWI Flight: 1021	Wednesday October 16, 2019 Miles: 370	Departing: 1:22 PM Arriving: 2:56 PM Duration: 1 h 34 min

Customer Information

Name	Assistance	FREE SPIRIT Number
MR. JOHN DOE	None	-

Purchase Price

Flight Price	$36.00
Flight	$0.02
Passenger Usage Charge	$35.98
Government's Cut	$28.60
Security Fee	$11.20
Segment Fee	$8.40
Passenger Facility Fee	$9.00
Vouchers & Credits	$0.00

Source: Screenshot from query on Spirit Airlines' webpage from September 3, 2019

Based on Allegiant Air and Frontier Airlines' passenger enplanements and the share of their passengers incurring a booking fee, as well as Spirit Airlines' reported booking fee revenue, the combined revenue from booking fees earned by all three ULCCs in 2018 may have been roughly $1 billion. Further, revenue earned on booking fees could keep increasing if:

- ULCCs continue to increase the share of revenue they earn from booking fees,
- ULCC growth continues to outpace the industry as a whole, or
- Additional carriers begin charging passengers for booking tickets online.

Notably, ULCC online booking fees differ from other ancillary service fees in several ways. First, consumers are automatically opted-in to the booking fee when they use ULCCs' websites to book a ticket—unlike optional fees such as baggage fees and seat selection fees. To opt out of this fee, consumers must purchase their ticket at the airport.[45] However, service counters selling the tickets may have limited hours.[46] Second, when consumers opt out of the fee by purchasing a ticket at the airport, they may not be offered the same price for baggage as when booking online. For example, as of June 17, 2019, Allegiant Air typically charged $18 to $25 per direction for carry-on bags purchased while booking online; $45 after booking, but prior to departure; and $50 at the airport. Third, many ancillary services, such as in-flight meals, increase carrier costs. Because online distribution is likely the ULCCs' least costly form of distribution, ULCCs' cost of distributing tickets is lower for passengers who choose to book tickets online than for those who book at the airport.

We spoke with Internal Revenue Service (IRS) officials on September 13, 2019, to discuss the tax treatment of airlines' booking fees. Specifically, we asked about booking fees associated with purchasing tickets on the carrier's webpage or over the phone. IRS officials stated that they have not made a ruling on the taxability of such booking fees.

We estimate that booking fees charged by ULCCs may result in foregone AATF revenue between $60.6 million and $74.5 million in 2019. We computed these figures using information on each of the ULCCs' enplanements over the past 12 months, the range of booking fees typically charged by the carriers, and the share of passengers who purchase a ticket through the carrier's webpage or call center. In both estimates, we assume that no foregone revenue is associated with tickets purchased through a third-party channel or the carrier's ticket counter. The difference between the estimates arises from the range in booking fees charged. If carriers charge a range of booking fees, the high-end estimate assumes that all passengers purchasing through a direct channel pay the higher fee—which available information indicates is the typical fee charged. Our low-end estimate makes the more conservative assumption that half of passengers purchasing through a direct channel pay the discounted booking fee, whereas the other half pay the higher fee.

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[45] Two of the three ULCCs—Frontier Airlines and Spirit Airlines—sell some of their tickets through third-parties, such as Expedia. Examining a small number of itineraries on these carriers' webpages and Expedia's website, we found that bookings made through Expedia on 07/08/2019 were between $6 and $15 more expensive than on the carriers' webpages. So, it does not appear that consumers using this third party could have avoided the cost of the booking fee.

[46] For example, as of 6/19/2019, Allegiant's ticket counter at Orlando Sanford International Airport —Allegiant's busiest airport—was open on Wednesdays, Thursdays, and Fridays from 9:00 a.m. to 11:00 a.m. Allegiant's webpage notes that airport ticket purchases are typically available for one hour following each scheduled departure.

Taxability of ancillary services—including booking fees—lies outside the mandated authority of the Department. However, the level of foregone revenue that may result from carriers' use of booking fees could have a notable impact on the AATF.

Conclusion

The structure of the airline industry transformed considerably from 2005 through 2017. During this period, the characteristics of airline service to all community size groups have also evolved. Small- and medium-sized communities have experienced the greatest percent changes according to a range of measures. EAS-subsidized service now accounts for a greater share of small community flights. Further, the impacts of airline industry dynamics underscore the continuing need for the Department to collect and analyze adequate data to accurately capture the industry's effects on all communities and travelers.

Recommendations

To enhance the Department's analytical and advisory capability with respect to monitoring the cost of airline service to the flying public, we recommend that:

1. The Bureau of Transportation Statistics issue a Reporting Directive clarifying that air carriers are to include booking fees, along with any/all fees required to board the aircraft, in the fare line item reported to the Office of Airline Information's Origin and Destination Survey.

To improve the Department's ability to assess competitive conditions in the airline industry and to monitor risks to the Airport and Airway Trust Fund, we recommend that the Assistant Secretary for Aviation and International Affairs direct:

2. The Office of Aviation Analysis to develop a process to regularly collect, maintain, and use information from airlines' website disclosures of all fees charged for optional or ancillary services as a screening mechanism for significant changes in these fees. For each mainline carrier and posted fee, this information should include—but not necessarily be limited to—identification of the type of each service and its price (or price range).

To ensure that airlines and airline passengers are treated equitably in the collection of air transportation excise taxes and to support the integrity of the Airport and Airway Trust Fund, we recommend that:

3. The Department request a Revenue Ruling or policy statement from the Department of Treasury regarding the taxation of airline booking fees and, if appropriate, that the Department of Treasury take action to assess the relevant tax. If the Department of Treasury finds that these fees are taxable—and assuming no change in the conditions underlying our calculation of their impact on the Airport and Airway Trust Fund in 2019—this could conservatively result in $60.6 million in funds put to better use in every year following the determination.

Agency Comments and OIG Response

We provided DOT with our draft report on February 26, 2020, and received its formal response on April 28, 2020. DOT's response is included in its entirety as an appendix to this report.

The Office of Inspector General holds all of its work to the highest standards of evidence, and the evidence supporting each report is independently reviewed for sufficiency, appropriateness, and reasonableness. The audit objective for this report was to detail recent aviation industry trends, particularly as they relate to small- and medium-sized communities. Developments in the airlines' treatment of ancillary fees constitute an important aviation industry trend with significant potential impacts for the Department and the traveling public. The Department's statement that online booking fees—the focus of the report's analysis of ancillary fees—are primarily charged by airlines serving mostly larger communities is inaccurate. For example, one of the three carriers that charges this fee draws a far greater share of its passengers from smaller communities than any other carrier.[47]

In its response, the Department criticizes the integrity of our methodology and quantitative analysis because, in its view, the report's conclusions and recommendations relating to ancillary fees go beyond the stated audit objective. However, for the reasons stated here and in the report itself, ancillary fee concerns fit well within the audit scope. Moreover, the Department had ample opportunity to criticize our audit work on its merits. However, after OIG addressed their concerns about our initial draft, DOT officials did not further question our evidence or analysis in the several meetings held to discuss subsequent drafts.

Still, the Department concurs with recommendation 1. Its actions in this regard will significantly improve the accuracy of the effective ticket prices reported by

[47] In 2017, 41.3 percent of Allegiant Air's enplanements were in smaller communities. For comparison, 18.3 percent of legacy carriers' enplanements were in smaller communities.

carriers that charge passengers substantial ancillary fees to board an aircraft. This information is critical to the Department's ability to assess the status of airline competition.

Similarly, we recommend that the Department develop a process to regularly collect and maintain the ancillary fee information airlines disclose on their websites. However, the nonconcurrence with recommendation 2 limits DOT's ability to ensure that airlines comply with the reporting directive it will issue in response to recommendation 1, as well as limit its awareness of trends affecting airline competition. The Department states that it already monitors changes in the airline industry, including ancillary fees. However, its current monitoring practices failed to detect that online booking fees had become a substantial revenue source for ULCCs—totaling around $1 billion in 2018—until notified by OIG in the course of this audit. Recommendation 2 constitutes what we believe to be the minimal action the Department can take to ensure it is aware of future significant changes in ancillary fees. Otherwise, the Department faces the risk that its ticket price data will be an inaccurate source of information about costs to airline passengers.

Finally, we reiterate that the purpose of recommendation 3 is to obtain clarification on an issue that puts the AATF at risk. While it is not clear whether online booking fees are taxable under current law, ULCCs have reallocated an increasing share of the total boarding cost to online booking fees. Our report presents a dramatic, but not singular, example in which a carrier charged $35.98 for using its website to book a ticket and $0.02 for the ticket itself. This illustrates that carriers may be able to entirely avoid collecting the ticket tax by treating nearly the entire value of the purchase as a booking fee. In this example, the cost breakdown did not list any taxes as 7.5 percent of $0.02 rounds to $0.00. Absent a ruling or policy statement on the taxability of online booking fees—carriers may be able to effectively opt out of collecting the ticket tax. We cannot predict that this practice will be implemented on a broader scale, but the possibility exposes the AATF to a considerable, if not existential, threat.

Recommendation 3 asks the Department to ask Treasury whether booking fees are currently taxable under the ticket tax but does not recommend that the Department itself take any specific position. We believe clarification and resolution of this issue is necessary to either properly recoup ticket tax proceeds or conduct long-term solvency planning for the AATF. As the beneficiary of the ticket tax, it is appropriate for DOT to inform the Treasury about industry trends that may affect the collection or application of that tax, as well as the solvency of the AATF.

Actions Required

We consider recommendation 1 resolved but open pending completion of DOT's planned actions. We consider recommendations 2 and 3 open and unresolved and request that DOT reconsider its position and provide us with its revised response within 30 days of the date of this report in accordance with DOT Order 8000.1C.

Exhibit A. Scope and Methodology

We conducted this performance audit between January 2018 and February 2020 in accordance with generally accepted Government auditing standards as prescribed by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Our objectives for this self-initiated audit were to (1) detail recent aviation industry trends, particularly as they relate to service to small- and medium-sized communities; and (2) provide a descriptive analysis of factors associated with changes in airline service to small- and medium-sized communities. Note that this report addresses only the first audit objective, since we plan to address the second objective in a later report. Specifically, we detail trends in airline service levels; numbers of passengers flown; airline service quality, including connectivity; and airline competition, including prices paid by airline passengers—particularly as they relate to small and medium-sized communities.

To meet objective one, we analyzed Census and multiple DOT datasets that highlighted changes in activity, competition, prices, and service quality from 2005 through 2017. We reviewed airline industry research conducted by Government agencies as well as academic economists and transportation researchers with a focus on articles that analyzed competitive practices and service to smaller communities. In addition, we interviewed representatives of the Regional Airline Association (RAA), Airlines for America, and the Air Line Pilots Association. We also met with DOT officials to obtain information on key drivers of commercial air service practices and to understand the Department's role in monitoring and regulating the commercial air service industry.

Importantly, we used the 2010 U.S. Census data to define and separate communities into five size groups—small, medium-small, medium, medium-large, and large—based on Census's statistical areas and population within the contiguous United States. We used the Department's Bureau of Transportation Statistics (BTS) T-100 and the Department's list of Essential Air Service (EAS) recipients and transportation facilities to assess changes in departures and destinations, passenger and seats totals, and connectivity. We used the Department's Airline Service Quality Performance (ASQP)—in addition to the EAS and facility data—to assess changes in service quality, such as the rate of cancelations, on-time performance, and the minutes of delay associated with late flights.

We used a pre-processed version (SS1B) of the Department's origin-destination survey data (DB1B), which removes the excise tax and segment PFC fees, to assess changes in competitive conditions. In addition, we used the T-100, the Department's list of transportation facilities and list of changes in airline ownership, RAA annual reports and Security and Exchange Commission (SEC) filings to assess changes in competitive conditions.

We assessed changes in the relative cost of flying from smaller communities by utilizing the SS1B, the Department's facility data, BTS T-100, and BTS Form 41 P1.2, which collects quarterly airline financial data. We ran regressions on the data to generate price indices over the sample period to assess changes in the relative cost of flying. We assessed changes in booking fees and foregone AATF revenue by utilizing archived and current air carrier websites, SEC filings and BTS T-100. We used the Department's guidance and BTS Form 41 P1.2 data to assess the potential impacts of insufficient ancillary fee data.

In the following sections, we detail our definition of communities and community size groups, data preparation, and data analysis. First, we discuss our process for defining communities and their corresponding size groups. Second, we outline the datasets used in this audit and provide additional detail on our data preparation. Third, we detail our methodology for our connectivity, market structure, and foregone tax revenue computations as well as for constructing our price indices.

Defining Communities and Size Groups

In this section, we detail our definition of communities, our mapping of airports into their communities, and our definition of community size groups.

Defining Communities and Their Airports

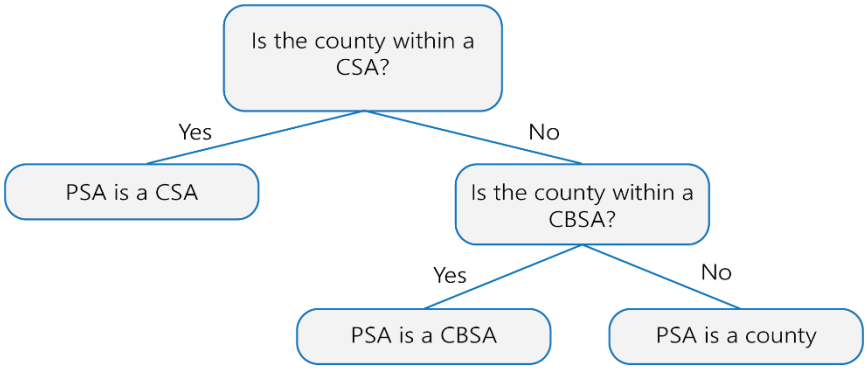
To construct airports' catchment areas, we followed Wittman's 2014 report on air service accessibility,[48] and used Primary Statistical Areas (PSA). We refer to the constructed catchment areas throughout our report as communities. PSAs are defined based on two census definitions—Core Based Statistical Areas (CBSA) and Combined Statistical Areas (CSA). The CBSA represents a county or set of counties[49] with at least one urbanized area or cluster with a population of at least 10,000, plus adjacent counties with significant social and economic integration

[48] Michael D. Wittman, *An Assessment of Air Service Accessibility in U.S. Metropolitan Regions, 2007–2012* (Report No. ICAT-2014-02), 2014.

[49] The term counties is used here to refer to counties or county-equivalents. For example, Louisiana is divided into parishes rather than counties, and we treat parishes as a county-equivalent.

with the core county based on commuting ties.[50] The CSA is a higher level of aggregation, which consists of two or more CBSAs that have a significant employment interchange. For CBSAs within a CSA, the PSA is defined identically to the CSA. Also, for CBSAs that do not lie within a CSA, the PSA is defined identically to the CBSA. For counties that are not located within a CBSA—those without an urban cluster with a population of at least 10,000—we define the PSA as the county. Figure 22 is a flowchart that illustrates our process for assigning counties to their PSA.

Figure 22. Construction of PSAs



Source: OIG generated

We used information from Census and FAA to determine which airports lie within each PSA. The Census information listed counties alongside their corresponding CBSA or CSA, which we used to construct the PSAs. FAA's information included the county of each airport in the United States, which we used to assign airports to PSAs.[51]

We decided to conduct our analysis at the community level—rather than at the airport level—because smaller airports do not always fall within smaller communities, and the impact of changes in service on passengers at a smaller airport may differ if there are alternative airports nearby. For example, the closest airport to Worcester, MA, is Worcester Regional Airport (ORH). However, Worcester is also located around 50 miles from Boston Logan International Airport (BOS) and T. F. Green International Airport (PVD) in Providence, RI. On the other hand, the closest airport to Knoxville, TN, is McGhee Tyson Airport (TYS). The nearest alternative airports are Tri-Cities Regional Airport (TRI) and Chattanooga Metropolitan Airport (CHA), both around 100 miles away. Because

[50] CBSAs may correspond to either a Metropolitan Statistical Area or a Micropolitan Statistical Area.
[51] We were unable to merge the census data into the airport data for a small group of airports. Because these airports represented a miniscule share of passenger enplanements over our timeframe—0.005 percent—we dropped these airports.

prospective travelers from Worcester have alternative airports nearby, while prospective travelers from Knoxville do not, change in service at the local airport may not have as great an impact on travelers from Worcester as it has on travelers from Knoxville. Therefore, our definition groups ORH with other airports in the Boston-Worcester-Providence CSA. On the other hand, TYS is not grouped with any other airports. See exhibit F for a list of our multiple airport PSAs.

While there are several possible ways to define communities, we chose our definition for two major reasons. First, we wanted to define communities in a manner that enabled us to cover all airports in the contiguous United States—without requiring us to make ad-hoc assessments of individual airports. Second, we valued a definition that—to the extent possible without an ad hoc characterization—aligned with airports' catchment areas. Our evidence suggests that these two considerations are reasonably addressed by our definition.

Defining Community Size Groups

We constructed five community size groups—small, medium-small, medium, medium-large, and large—based on community population data from the U.S. Census Bureau. By construction, the combined populations of communities within each of these size groups represents roughly 20 percent of the population of the contiguous 48 United States. This definition is conceptually similar to a categorization of routes that was used in GAO's 2014 report on airline competition,[52] in which each route size group accounts for roughly 20 percent of passenger enplanements.[53]

We encoded communities by sorting communities by their population. Beginning with the largest community in the country (New York-Newark, NY-NJ-CT-PA) and proceeding iteratively to the community with the next highest population, we classified communities as large until the cumulative population of these communities was approximately 20 percent. At this point, we classified the next-largest community as medium-large and similarly proceeded to label the next largest communities as medium-large until the cumulative population of medium-large and large communities combined was approximately 40 percent. We continued this process to code medium, medium-small, and small communities until all the communities were classified into one of the five size groups. Therefore, the entire population of the contiguous 48 United States was accounted for in one of the size groups.

[52] GAO, *Airline Competition: The Average Number of Competitors in Markets Serving the Majority of Passengers Has Changed Little in Recent Years, but Stakeholders Voice Concerns about Competition* (GAO-14-515), June 2014.
[53] We chose the number of groups—five—to align with GAO's definition and for exposition.

We considered a few other factors when deciding upon our categorization of communities into size groups. First, we wanted to define categories in a manner that would not require us to make any ad hoc assessments of individual communities. The process described in the preceding paragraph satisfies this criteria, as communities were categorized based on Census data. Second, we valued a definition that did not directly use information about the communities' airline service—such as enplanements—to categorize communities. Our categorization achieves this by using information on populations without using any information on airline service.[54] Third, we wanted a definition that would reasonably align with terminology used in the industry and the Department. We compared our definition to terminology used by airlines in public presentations and filings, as well as to documentation for communities that received a Small Community Air Service Development Program grant from DOT. In both cases, we determined our terminology is largely consistent.[55]

Data Preparation

In this section, we discuss the sources and preparation of the data used in the report.

T-100 Database

The T-100 data was downloaded from the BTS online portal. This database reports monthly air carrier traffic information from certified U.S. air carriers. The data includes monthly information on air traffic. This includes the origin, destination, operating carrier, number of departures performed, passengers, and seats.

We prepared the T-100 data with a few additional filters and restrictions. We restricted the data by dropping flights with either an origin or destination outside the contiguous United States. Additionally, we filtered the data by retaining only flights that represent scheduled passenger service, and dropping observations with zero recorded departures or potentially erroneous passenger data. We also restricted the data to airports that had at least 2,500 enplanements in at least 1 year between 2005 and 2017, and flights that either had at least 5 average

[54]Airline service may indirectly affect this grouping through its impact on a community's population.

[55] Between 2005 and 2016, 92 percent of communities which received a Small Community Air Service Development Program grant from the USDOT are categorized by our approach as small or medium-small. In a February 2018 management presentation, Allegiant listed examples of cities and their size categorization. The example in their smallest origin category ("tiny") is classified by our algorithm into our smallest origin category (S); the example in their second-smallest origin category ("small") is classified into our second-smallest category (MS); and the example in their third-smallest origin category ("mid-size") is classified into our third-smallest category (M).

passengers or those that had between 2 and 5 average passengers with at least 8 departures per month.

SS1B Database

We obtained our ticket price data—the Superset 1B (SS1B)—from Airline Data, Inc. This data is a pre-cleaned version of DOT's Origin and Destination Survey (DB1B). The DB1B contains quarterly data on a 10 percent sample of airline tickets from reporting carriers. Specifically, the DB1B is collected from carriers that operate any aircraft that are designed for a maximum seating capacity of more than 60 seats. The SS1B data is produced primarily using the DB1B data, and is cross-validated with the T-100. Additionally, the SS1B data pre-filters fares[56] and removes excise taxes.

We further prepared the SS1B data in a few additional ways. We dropped flights with either an origin or destination outside the contiguous United States, and also dropped open-jaw itineraries.[57] For the price index analysis, we augmented the data by merging in information on ancillary revenues from BTS Form Schedule P-1.2 so that the reported prices include these average charges. Specifically, we computed for each quarter and carrier the per-passenger revenue associated with two fields—baggage and change/cancellation fees—and merged these two fields into the SS1B. Finally, we deflated the ticket prices listed in the SS1B to a base period of the first quarter of 2005 using the Consumer Price Index from the Bureau of Labor Statistics.

Additional Datasets

Table 6 below lists additional data sets we used, a brief explanation of each data set, and how these data sets were used in our report.

[56] Specifically, observations are filtered if they have a one-way price below $25 because these fares historically represented purchases made with frequent flyer points.
[57] Open-jaw itineraries are those where a passenger returns from a different airport than their outbound destination.

Table 6. Description of Additional Data Used

Data	Source	Explanation	Uses
Airport locations	DOT/FAA	Information extracted from FAA's Airport Data and Contact Information query tool, including airport codes, addresses, and geographic coordinates.	Used with PSA boundary data to encode each airport into its PSA.
PSA boundaries	U.S. Census Bureau	For each county or county equivalent, lists its CBSA and/or CSA, if applicable, as defined by the Office of Management and Budget in August, 2017.	Used with airport location data to encode each airport into its PSA.
PSA populations	U.S. Census Bureau	Data on the population of each county or county equivalent from the 2010 Census.	Used to classify PSAs into a size group.
BTS Form 41 Schedule P-1.2	DOT/BTS	Quarterly financial data provided for select US airlines, including information on baggage and reservation change/cancellation fees.	Used to adjust price index data to include the average baggage and change/cancellation fees for each carrier-quarter.
EAS contracts	DOT/Office of the Secretary	Information on each EAS contract from 2005 through 2018, including origins and destinations.	Used to define EAS communities and routes with an EAS subsidy over our period of analysis.
Airline ownership	DOT/Air Carrier Fitness Division	Information on ownership changes recorded by DOT's Air Carrier Fitness Division.	Used to define airlines' holding companies over time.
Airline Service Quality Performance	DOT/BTS	Flight-level data on delays and cancellations, which includes whether the flight was cancelled and the delay in minutes.	Used to compute delays and cancellation rates in the service quality section.

Source: OIG generated

Data Analysis

In this section, we detail our connectivity measures, market structure measures, and the estimation of our price indices. In addition, we describe our calculation of foregone tax revenue associated with booking fees.

Connectivity

We used the T-100 data from 2005 through 2017 to construct a community-level measure of connectivity based on Wittman and Swelbar's Airport Connectivity Quality Index (ACQI).[58] The ACQI computes airport connectivity based on the frequency of available scheduled flights, the quantity and quality of nonstop destinations, and the quantity and quality of connecting destinations.

We made two adjustments to the ACQI, and refer to our measure as the Community Connectivity Quality Index (CCQI). First, we defined connectivity at the community level rather than the airport level to align with our interest in studying airline service across communities, rather than airports. As shown in exhibit F, there are several multi-airport communities in our data, and accounting for each of a passenger's airport options—rather than just a single airport—is important to measure connectivity in those multi-airport communities. Second, the quality measures for destinations, whether direct or indirect, are based on the community size group's share of total enplanements. In contrast, Wittman and Swelbar compute this parameter using each FAA hub type's share of total enplanements. Accounting for these changes, the CCQI for community p is computed as

$$CCQI_p = \underbrace{\sum_{i \in I} (f_{pc} * d_{pc} * w_c)}_{\substack{Quality\ of \\ nonstop\ service}} + \alpha \underbrace{\sum_{j \in J} (d'_{pc'} * w_{c'})}_{\substack{Quality\ of \\ connecting\ service}}$$

where $i \in I$ denotes a nonstop destination and $j \in J$ denotes a destination that can be reached by connecting through a nonstop destination (i.e., a one-stop destination).

The quality of nonstop destinations is represented by the first summation, and includes:

1. f_{pc}, which is the average number of daily scheduled flights per destination from PSA p to community of size c;[59]
2. d_{pc}, which is the number of nonstop destinations of size c served from PSA p; and

[58] Michael D. Wittman and William Swelbar, "Capacity Discipline and the Consolidation of Airport Connectivity in the United States," *Transportation Research Record: Journal of the Transportation Research Board*, vol. 2449, no. 1 (2014), pp. 72–78.
[59] Community sizes are defined in the same manner as described in the first section of this exhibit.

3. w_c, which is the weight attached to destination size c as determined by its enplanement share, as described in the final paragraph of this subsection.

Connecting service is represented by the second summation, and is multiplied by a scaling factor to account for the differential impact of connecting versus nonstop service on connectivity. This piece of the computation includes:

4. d'_{pc}, which is the number of connecting destinations of size c' served from PSA p;
5. $w_{c'}$, which is the weight attached to connecting destination of size c'; and
6. α, which is a scaling factor for connecting versus nonstop service.

The CCQI includes three parameters that are defined outside the model—α, w_c and $w_{c'}$. First, we chose the scaling factor on connecting service (α) based on literature regarding the ACQI and the Quality Service Index, which is a model used by airlines to compute market share based on path quality. In Quality Service Index models, this parameter has generally fallen between 0.03 and 0.20, and $\alpha = 0.125$ is used in the ACQI α parameter. We followed the ACQI and specified $\alpha = 0.125$ in our CCQI. We defined the relative quality of a destination airport, denoted by $w_{c'}$ for connecting destinations and w_h for nonstop destinations, based on the domestic share of enplanements of the PSA size group.[60] Specifically, we computed the average domestic enplanement share of a PSA within each size group, and then normalized the weights relative to the average enplanement share of a large PSA. Table 7 below lists the weights assigned by community size group.

Table 7. Weights Assigned by Community Size Group

Community Size Group	Weight (w_c)
Large	1.000
Medium-Large	0.632
Medium	0.218
Medium-Small	0.026
Small	0.003

Source: OIG-generated

[60] The ACQI computes these weights based on the share of enplanements by FAA hub type.

We computed the average change in connectivity for each of our community size groups over time by computing the passenger-weighted average connectivity in each community size group for each year from 2005 through 2017. This is given by $CCQI_{ct} = \frac{\sum_{p \in c} pax_{pt} * CCQI_{pt}}{\sum_{p \in c} pax_{pt}}$, where pax_{pt} represents a community's passengers in year t, and we sum over all communities p in community size group c. We then normalized the CCQI of each community size group in each year based on its 2005 CCQI:

$$\widetilde{CCQI}_{ct} = \frac{CCQI_{ct}}{CCQI_{c,2005}}$$

By construction, for any community size group c, $\widetilde{CCQI}_{c,2005} = 1$. In any year, the normalized CCQI score of a community size group c can be converted into a percentage change since the baseline year of 2005 as $\%\Delta CCQI_{ct} = \frac{\widetilde{CCQI}_{ct} - \widetilde{CCQI}_{c,2005}}{\widetilde{CCQI}_{c,2005}}$.

Market Structure

To conduct our market structure and competition analysis, we began by taking additional steps to further prepare the SS1B database. Specifically, we dropped interline itineraries—which are those with multiple marketing carriers on the same itinerary.[61] We also used information on airline ownership to encode the holding company of each airline over time, and—unless otherwise noted—conducted our analysis at the level of holding companies rather than individual airlines. The data was aggregated to the level of holding company–route–year prior to conducting the analysis. We used the term route to refer to the origin community–destination community pair throughout this section.

We computed the HHI for each route-year combination using holding companies' squared market shares of passengers. Letting t represent the year, $j \in J$ the holding company (e.g., "American Airlines Group"), and $r \in R$ the route, the HHI for each route-year combination is given by

$$HHI_{rt} = 10{,}000 * \sum_{j \in J} s_{jrt}^2$$

After computing the HHI for each route in our data, we aggregated the data to the community size group–year level, by computing the passenger-weighted HHI for each community size group in each year. Letting c represent a community size group (e.g., small communities) and pax_{rt} represent the number of passengers on

[61] We retained itineraries which have multiple operating carriers, as long as they had one marketing carrier. For example, a one-stop itinerary which is marketed by Alaska Airlines with one leg operated by Alaska Airlines and the other operated by Horizon Air would not be dropped from our data.

a route in a given year, the passenger-weighted HHI for a community size group in a given year is computed by

$$HHI_{ct} = \frac{\sum_{r \in R} pax_{rt} * HHI_{rt}}{\sum_{r \in R} pax_{rt}}$$

By passenger-weighting in this manner, the HHI presented represents the average HHI faced by a passenger within a community size group in a given year. For example, consider a simple scenario with only two routes in small communities: Bozeman Yellowstone International Airport (BZN) to Denver International Airport (DEN)—with 200 passengers and an HHI of 10,000—and Duluth International Airport (DLH) to O'Hare International Airport (ORD)—with 100 passengers and an HHI of 2,500. The passenger-weighted HHI in this example is given by $\frac{200}{300} * 10{,}000 + \frac{100}{300} * 2{,}500 = 7{,}500$. The route with more passengers is given greater weight. As a result, the HHI lies closer to the HHI of BZN to DEN than the HHI of DLH to ORD.[62]

Our computations for effective competitors involve an identical passenger-weighting to our computations for the HHI. As a result, this measure represents the average number of effective competitors faced by a passenger within a community size group in a given year. Specifically, the route-level effective competitors was given by $EC_{rt} = \sum_{j \in J} 1[s_{jrt} \geq 0.05]$ where $1[.]$ represented an indicator function. The community size group's passenger-weighted number of effective competitors in a given year was then given by

$$EC_{ct} = \frac{\sum_{r \in R} pax_{rt} * EC_{rt}}{\sum_{r \in R} pax_{rt}}$$

Continuing with the earlier example, assume that the route from BZN to DEN with 200 passengers has 1 effective competitor, while the route from DLH to ORD with 100 passengers has 2 effective competitors. The passenger-weighted effective competitor in this example is given by: $\frac{200}{300} * 1 + \frac{100}{300} * 2 \approx 1.33$. Once again, because the route with more passengers was given greater weight, the number of effective competitors lies closer to the 1 effective competitor of the BZN to DEN route than to the 2 effective competitors of the DLH to ORD route.

Price Indices

We estimated our hedonic price indices using techniques outlined by Aizcorbe's 2014 guide to price index and hedonic techniques.[63] The methodology behind estimation of hedonic price indices provides an explicit way to control for

[62] We did not filter out routes with low passenger counts throughout the report. We ran a sensitivity check of our analysis where we dropped low passenger routes. Because routes with few passengers receive a relatively small weight in both the HHI and effective competitor computations, our results did not change notably.
[63] Ana M. Aizcorbe, *A Practical Guide to Price Index and Hedonic Techniques* (Oxford University Press, 2014).

changes in product characteristics when constructing a price index. Specifically, we estimated a dummy variable hedonic price index for each community size group by estimating a regression of prices on variables including dummy variables for each year-community size group combination. We also included product characteristics in the regression to account for changes in product characteristics over time. These characteristics included the type of airline (e.g., legacy carrier); the number of segments flown to reach the destination; the geodesic distance; the circuity of the itinerary, defined as the ratio of an itinerary's total distance to that of a nonstop itinerary on the same route; and the number of seats on the plane relative to the typical number of seats a particular aircraft historically contained, in order to account for changes in seat density during this period.

Prior to running our regression, we aggregated the data to the level of origin-destination-marketing carrier-product-year-quarter. Letting t represent the year, m represent a specific product defined by a set of characteristics X_{kmt}, and D_{mct} represent a dummy variable equal to 1 if product m is in community group c during time period t, we estimated a passenger-weighted ordinary least squares regression of the form[64]

$$\ln P_{mt} = \alpha + \beta_k X_{kmt} + \delta_{ct} D_{mct} + \epsilon_{mt}$$

where P_{mt} represents product m's price at time t. By construction, the coefficient δ_{ct} was allowed to vary across community size group and time. The price index for community group c at time t is then given by $e^{\delta_{ct}}$, and can be interpreted relative to the price of a product in a large community at time $t = 2006$ (the omitted category). In the report, we present the price premium relative to that of a large community for each community size group and each year. For year t' and community size group c', the price premium was computed as $e^{\delta_{c't'}} - e^{\delta_{Lt'}}$ where L denotes the large community group. This represents the difference—in absolute percentage points—between the prices in community group c' at time t' and the prices in large communities at time t'.

We adjusted the prices used in the price index to partly account for changes in ancillary fees throughout our period of analysis. We did this by using the Form 41 Schedule P-1.2 data to compute, for each quarter and each carrier, the per-passenger average baggage and change/cancellation fees, and added these averages to the associated ticket prices.

There are two notable shortcomings, which arise in our ancillary fee adjustment, that result from data limitations. First, this calculation implicitly assumes that the

[64] We ran the regression in semilog form for two primary reasons. First, the semilog model can accommodate characteristics that may be equal to zero whereas a log-log model cannot. Second, it is more likely that the errors are homoscedastic in a semilog model than in a linear model.

average per-passenger baggage and change/cancellation fees do not vary across community size groups. For example, if passengers in small communities across all airlines were more likely than passengers in large communities to pay baggage fees, our adjustment would underestimate the impact of these fees on passengers in small communities.[65] Absent more granular data on ancillary fees, it is not feasible for us to test this assumption. Second, because other ancillary fees are not separately identifiable, fees such as seat assignment fees and booking fees were not included in this adjustment.

Foregone Tax Revenue

We estimated the foregone tax revenue—which could result if tax is not collected on ULCCs' booking fees—using information on the level of these carriers' booking fees, the share of booking across their various distribution channels, and their passenger enplanements. We computed two estimates—a high-end estimate and a low-end estimate—using two different sets of assumptions. In our recommendation, we report the more conservative estimate.

For each of our calculations, we used information from BTS on the number of domestic passenger enplanements for the three ULCCs from August 2018 through July 2019—the most recent twelve months of available data. We used data on booking fees as of September, 2019. Also, two carriers—Allegiant Air and Spirit Airlines —listed the typical levels of this fee on their websites or other documentation. While Frontier Airlines notes the existence of this fee on their website, we were unable to find the level of this fee listed. Thus, the level of Frontier's booking fee was determined through online queries for flights of varying prices. We also used information compiled from SEC filings to determine the share of passengers who either book through the carrier's website or over the phone. Notably, Frontier Airlines and Spirit Airlines allow passengers to book through third-party entities such as Expedia, and we are unable to determine whether the booking fees apply to fares booked through such third-party channels.[66] For both estimates, we assumed that the foregone revenue was only associated with bookings made through the carrier's website or their call center.

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[65] This assumption differs from the possibility that ancillary fees differ across community size groups due to differences in airlines' strategies towards different size communities. Because we merge this information in at the carrier-quarter level, any differences arising from differences in the carriers which serve each route are accounted for in our adjustment. Specifically, we cannot account for differences in ancillary fees within-airline but across community size group.

[66] The most recently available data regarding whether any revenue from third-party bookings is recognized by the carriers as a booking fee comes from Spirit Airline's 2017 10-K filing. In that filing, Spirit Airlines reports that the booking fee is "charged for tickets sold through the Company's primary sales distribution channels. The primary sales distribution channels for which passenger usage fees are charged include sales through the Company's website, sales through the third-party provided call center and sales through travel agents; the Company does not charge a passenger usage fee for sales made at its airport ticket counters."

Table 8 below lists the information we used to compute our estimate of foregone AATF revenue.

Table 8. Information Used to Compute Foregone AATF Revenue

Airline	Information Type	Value
Allegiant Air	Domestic enplanements, 08/2018–07/2019	14,528,629
	Higher online booking fee	$18
	Lower online booking fee	$18
	Share booking through carrier's webpage	0.938
Frontier Airlines	Domestic enplanements, 08/2018–07/2019	20,005,002
	Higher online booking fee	$21
	Lower online booking fee	$10
	Share booking through carrier's webpage or call center	0.630
Spirit Airlines	Domestic enplanements, 08/2018–07/2019	28,858,678
	Higher online booking fee	$22.99
	Lower online booking fee	$11.99
	Share booking through carrier's webpage or call center	0.729

Source: Enplanements from BTS, booking fees from carriers' webpages, and share of bookings by distribution channel from carriers' SEC filings

For the high-end estimate, we assume that all passengers pay the higher of the two booking fees listed in the table above. The estimates shown in table 9 below are produced by computing 7.5 percent of the product of each carrier's domestic enplanements and its higher online booking fee, multiplied by the share purchased through the website or call center. For the low-end estimate, we assume that for the two carriers that charge a varying booking fee, 50 percent of enplanements carry the higher of the two booking fees listed and 50 percent carry the lower of the two. The rest of the computation is done in the same was as our high-end estimate. Allegiant Air's booking fee does not vary across itineraries, so their low-end estimate is equivalent to their high-end estimate. Frontier Airlines and Spirit Airlines attach a lower booking fee to certain reservations, which explains the difference between the high-end and low-end estimates of the foregone revenue associated with these carriers. Table 9 lists the

estimated foregone revenue for each carrier in the low-end and high-end scenarios.

Table 9. Estimated Foregone Revenue

Carrier(s)	Low-End Estimate	High-End Estimate
Allegiant Air	$18.4 million	$18.4 million
Frontier Airlines	$14.7 million	$19.8 million
Spirit Airlines	$27.6 million	$36.3 million
Total	$60.6 million	$74.5 million

Source: OIG analysis of data compiled from BTS, carriers' SEC filings, and carriers' webpages

We believe our estimates represent a conservative estimate of foregone tax revenue during 2019 for a few reasons.[67] First, this computation uses information on enplanements over the past 12 months, which includes August 2018 through December 2018. Because all three ULCCs have seen increasing passenger enplanements in recent years, it is likely that passenger enplanements for August 2019 through December 2019 will exceed those from August 2018 through December 2018. Second, the low-end assumes that half of passengers traveling on Frontier Airlines and Spirit Airlines pay the lower booking fee, but available information suggests the higher booking fee is more common. For example, Spirit notes that the $22.99 per-segment fee applies to most reservations.[68] Third, available information suggests the share of passengers who pay a booking fee could be higher than the figures used in our calculation. Allegiant Air lists 93.8 percent of its revenue as earned through its webpage—we use this figure for our calculation—but of the remaining 6.2 percent likely includes a significant number of passengers who purchased tickets over the phone, thus incurring a booking fee.[69] Further, we used the most recently available data for Frontier Airlines' and Spirit Airlines' share of bookings through their webpage or over the phone. For each carrier, this data shows an increasing share of bookings through

[67] In addition to the computational assumptions listed here, this estimate does not account for changes in traveler behavior which could result from requiring carriers to collect the excise tax on booking fees. Imposing this tax would raise the relative price of travel on a ULCC. This could result in substitution of passengers from a ULCC to a non-ULCC as well as substitution of passengers across modes of transportation. Accounting for substitution across carriers would increase estimates of foregone revenue, while accounting for substitution across modes would decrease estimates of foregone revenue. We do not have empirical evidence regarding which of these effects would predominate, and determining which effect predominates is outside the scope of this report.

[68] Spirit Airlines, General Terms and Conditions, August 2019.

[69] The 6.2 percent of revenue associated with passengers which do not book through Allegiant's webpage ostensibly includes those who book over the phone or at the airport. While the latter do not incur a booking fee, it is possible these represent a relatively small share of this 6.2 percent. For example, Spirit Airlines' 2018 10-K filing shows 5.8 percent of distribution came through their call center.

the carrier's webpage or call center. Therefore, the share of passengers booking through the carrier's webpage or call center may be higher in 2019 than it was when these carriers most recently reported the data.[70]

[70] Spirit Airlines most recently reported this data in 2018. From 2017 to 2018, the share of passengers booking through either Spirit's website or their call center rose from 71.6 percent to 72.9 percent. Frontier Airlines most recently reported this data in 2016. From 2015 to 2016, the share of passengers booking through Frontier's website, mobile application, or another direct channel rose from 58 percent to 63 percent.

Exhibit B. Organizations Visited or Contacted

Department of Transportation

Aviation Consumer Protection Division

Bureau of Transportation Statistics

Office of the Secretary

Office of Aviation Analysis, Air Carrier Fitness Division

Office of Aviation Analysis, Competition and Policy Analysis Division

Office of Aviation Analysis, Essential Air Service and Domestic Analysis Division

Office of Aviation Analysis, Small Community Air Service Development Program

Other Organizations

Airlines for America

Air Line Pilots Association

Internal Revenue Service

Government Accountability Office

Regional Airline Association

Treasury Inspector General for Tax Administration

Exhibit C. List of Acronyms

AATF	Airport and Airway Trust Fund
ACQI	Airport Connectivity Quality Index
BTS	Bureau of Transportation Statistics
CBSA	Core Based Statistical Area
CCQI	Community Connectivity Quality Index
CSA	Combined Statistical Area
DB1B	Origin and Destination Survey
DOJ	Department of Justice
DOT	Department of Transportation
EAS	Essential Air Service
FAA	Federal Aviation Administration
FTC	Federal Trade Commission
GAO	Government Accountability Office
HHI	Hirschman-Herfindahl Index
ICAT	International Center for Air Transportation
IRS	Internal Revenue Service
L	Large (Community)
LCC	Low-cost carrier
M	Medium (Community)
MIT	Massachusetts Institute of Technology
ML	Medium-Large (Community)
MS	Medium-Small (Community)
OIG	Office of Inspector General
PFC	Passenger Facility Charge
PSA	Primary Statistical Area
S	Small (Community)
SEC	U.S. Securities and Exchange Commission
SS1B	Superset 1B
ULCC	Ultra-low-cost carrier

Exhibit D. Major Contributors to This Report

BETTY **KRIER**	CHIEF ECONOMIST
JERROD **SHARPE**	SENIOR ECONOMIST
BRAD **SHRAGO**	SENIOR ECONOMIST
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CELESTE **BORJAS**	ASSOCIATE COUNSEL
SUSAN **CROOK-WILSON**	WRITER-EDITOR
JANE **LUSAKA**	WRITER-EDITOR

Exhibit E. Categorization of Select Airlines

Carrier	Code	Segment	Category	Detailed Category
American Airlines Inc.	AA	Mainline	Legacy	Not Applicable
Continental Air Lines Inc.	CO	Mainline	Legacy	Not Applicable
Delta Air Lines Inc.	DL	Mainline	Legacy	Not Applicable
Northwest Airlines Inc.	NW	Mainline	Legacy	Not Applicable
United Air Lines Inc.	UA	Mainline	Legacy	Not Applicable
US Airways Inc.	US	Mainline	Legacy	Not Applicable
AirTran Airways Corporation	FL	Mainline	Non-Legacy	LCC/Other
Alaska Airlines, Inc.	AS	Mainline	Non-Legacy	LCC/Other
America West Airlines Inc.	HP	Mainline	Non-Legacy	LCC/Other**
JetBlue Airways	B6	Mainline	Non-Legacy	LCC/Other
Midwest Airlines, Inc.	YX*	Mainline	Non-Legacy	LCC/Other
Southwest Airlines Co.	WN	Mainline	Non-Legacy	LCC/Other
Sun Country Airlines	SY	Mainline	Non-Legacy	LCC/Other
Virgin America	VX	Mainline	Non-Legacy	LCC/Other
Allegiant Air	G4	Mainline	Non-Legacy	ULCC
Frontier Airlines Inc.	F9	Mainline	Non-Legacy	ULCC***
Spirit Air Lines	NK	Mainline	Non-Legacy	ULCC
Air Wisconsin Airlines Corp	ZW	Regional	Not Reportable	Not Applicable
Atlantic Southeast Airlines	EV*	Regional	Not Reportable	Not Applicable
Chautauqua Airlines Inc.	RP	Regional	Not Reportable	Not Applicable
Colgan Air	9L	Regional	Not Reportable	Not Applicable
Comair Inc.	OH*	Regional	Not Reportable	Not Applicable
Commutair	C5	Regional	Not Reportable	Not Applicable
Compass Airlines	CP	Regional	Not Reportable	Not Applicable
Endeavor Air Inc.	9E	Regional	Not Reportable	Not Applicable
Envoy Air	MQ	Regional	Not Reportable	Not Applicable
ExpressJet Airlines Inc.	EV*/XE	Regional	Not Reportable	Not Applicable

Carrier	Code	Segment	Category	Detailed Category
Freedom Airlines	F8	Regional	Not Reportable	Not Applicable
GoJet Airlines LLC	G7	Regional	Not Reportable	Not Applicable
Horizon Air	QX	Regional	Not Reportable	Not Applicable
Mesa Airlines Inc.	YV	Regional	Not Reportable	Not Applicable
Mesaba Airlines	XJ	Regional	Not Reportable	Not Applicable
Piedmont Airlines	PT	Regional	Not Reportable	Not Applicable
PSA Airlines Inc.	OH*	Regional	Not Reportable	Not Applicable
Republic Airlines	YX*	Regional	Not Reportable	Not Applicable
Shuttle America Corp.	S5	Regional	Not Reportable	Not Applicable
SkyWest Airlines Inc.	OO	Regional	Not Reportable	Not Applicable
Trans States Airlines	AX	Regional	Not Reportable	Not Applicable

Note: We do not report ownership status of regional airlines because this information may not be publically available for all carriers.

* Code was used for different carriers at different times between 2006 and 2017

** America West Airlines Inc. only operated under the holding company of US Airways during the period of our price and market structure analysis

*** Frontier Airlines transitioned to the ULCC model later in this period

Source: OIG analysis of DOT data. Mainline carriers are listed if they were the marketing carriers for at least 0.1 percent of passengers from 2006 through 2017. Regional carriers are listed if they were the operating carriers for at least 0.1 percent of passengers from 2006 through 2017.

Exhibit F. List of Multi-Airport PSAs

PSA	PSA Size	Population	Airports
Boston-Worcester-Providence, MA-RI-NH-CT	ML	7,893,376	BED, BID, BOS, EWB, HYA, MHT, ORH, PSM, PVC, PVD, WST
New York-Newark, NY-NJ-CT-PA	L	23,076,664	ABE, EWR, FRG, HPN, HVN, ISP, JFK, LGA, MMU, SWF, TTN
Los Angeles-Long Beach, CA	L	17,877,006	BUR, LAX, LGB, ONT, OXR, PMD, PSP, SNA
Las Vegas-Henderson, NV-AZ	M	2,195,401	BLD, HII, IFP, IGM, LAS, VGT
San Jose-San Francisco-Oakland, CA	L	8,153,696	CCR, OAK, SCK, SFO, SJC, STS
Miami-Fort Lauderdale-Port St. Lucie, FL	ML	6,166,766	FLL, MIA, PBI, VRB
Washington-Baltimore-Arlington, DC-MD-VA-WV-PA	L	9,051,961	BWI, DCA, HGR, IAD
Albuquerque-Santa Fe-Las Vegas, NM	MS	1,146,049	ABQ, LAM, SAF
Chicago-Naperville, IL-IN-WI	L	9,840,929	GYY, MDW, ORD
Cleveland-Akron-Canton, OH	M	3,515,646	BKL, CAK, CLE
Dallas-Fort Worth, TX-OK	ML	6,851,398	AFW, DAL, DFW
Flagstaff, AZ	S	134,421	FLG, GCN, PGA
Houston-The Woodlands, TX	ML	6,114,562	EFD, HOU, IAH
Modesto-Merced, CA	MS	770,246	MCE, MER, MOD
Orlando-Deltona-Daytona Beach, FL	M	2,818,120	DAB, MCO, SFB
Philadelphia-Reading-Camden, PA-NJ-DE-MD	ML	7,067,807	ACY, ILG, PHL
San Juan, WA	S	15,769	ESD, FRD, S31
Seattle-Tacoma, WA	ML	4,274,767	BFI, OKH, SEA
Salt Lake City-Provo-Orem, UT	M	2,271,696	OGD, PVU, SLC
Atlanta--Athens-Clarke County--Sandy Springs, GA	ML	5,910,296	AHN, ATL
Bakersfield, CA	MS	839,631	BFL, IYK
Buffalo-Cheektowaga, NY	MS	1,215,826	BUF, IAG
Bozeman, MT	S	89,513	BZN, WYS
Cincinnati-Wilmington-Maysville, OH-KY-IN	M	2,174,110	CVG, LUK
Columbus-Marion-Zanesville, OH	M	2,308,509	CMH, LCK

PSA	PSA Size	Population	Airports
Charlotte-Concord, NC-SC	M	2,375,675	CLT, JQF
Charleston-Huntington-Ashland, WV-OH-KY	MS	708,228	CRW, HTS
Detroit-Warren-Ann Arbor, MI	ML	5,318,744	DTW, FNT
Duluth, MN-WI	S	279,771	DLH, HIB
Edwards-Glenwood Springs, CO	S	125,734	ASE, EGE
Grand Rapids-Wyoming-Muskegon, MI	MS	1,379,237	GRR, MKG
Brownsville-Harlingen-Raymondville, TX	MS	4,28,354	BRO, HRL
Jacksonville-St. Marys-Palatka, FL-GA	M	1,470,473	JAX, SGJ
Key West, FL	S	73,090	EYW, MTH
Memphis-Forrest City, TN-MS-AR	MS	1,353,087	MEM, UTA
Minneapolis-St. Paul, MN-WI	ML	3,684,928	MSP, STC
Ogdensburg-Massena, NY	S	111,944	MSS, OGS
Phoenix-Mesa-Scottsdale, AZ	ML	4,192,887	AZA, PHX
Pittsburgh-New Castle-Weirton, PA-OH-WV	M	2,660,727	LBE, PIT
Portland-Vancouver-Salem, OR-WA	M	2,921,408	PDX, SLE
Cape Coral-Fort Myers-Naples, FL	MS	940,274	APF, RSW
Santa Maria-Santa Barbara, CA	MS	423,895	SBA, SMX
San Diego-Carlsbad, CA	M	3,095,313	CLD, SAN
Springfield-Branson, MO	MS	520,589	BBG, SGF
North Port-Sarasota, FL	MS	897,121	PGD, SRQ
St. Louis-St. Charles-Farmington, MO-IL	M	2,892,497	BLV, STL
Tampa-St. Petersburg-Clearwater, FL	M	2,783,243	PIE, TPA
Virginia Beach-Norfolk, VA-NC	M	1,779,243	ORF, PHF

Source: OIG analysis of U.S. Census Bureau and FAA data

Appendix. Agency Comments

U.S. Department of Transportation

Office of the Secretary of Transportation

Deputy Assistant Secretary

1200 New Jersey Avenue, S.E.
Washington, D.C. 20590

MEMORANDUM

Date: April 27, 2020

Subject: INFORMATION: Management Response to Office of Inspector General (OIG) Draft Report on Airline Service to Small- and Medium-Sized Communities

From: David E. Short
Deputy Assistant Secretary of Transportation for Aviation and International Affairs

To: Charles A Ward, Assistant Inspector General for Audit Operations and Special Reviews

The stated objective of the OIG draft report is "to detail recent aviation industry trends, particularly as they relate to service to small- and medium-sized communities." The Department neither endorses the conclusions reached in this self-initiated audit nor has it verified the data, methodology, or quantitative analysis in the report. OIG did not provide sufficient, appropriate evidence to provide a reasonable basis for its findings and recommendations based on its audit objectives. Specifically, the report's recommendations focus on concerns relating to ancillary fees, yet the linkage between ancillary fees and service to smaller communities is tangential at best, since the fees on which the report focuses are primarily charged by airlines serving mostly larger communities.

Upon review of the OIG's draft report, we concur with Recommendation 1 to issue a Reporting Directive clarifying that air carriers are to include booking fees, along with any/all fees required to board the aircraft, in the fare line item reported to the Office of Airline Information's Origin and Destination Survey ("O & D Survey"). The Survey is the primary source of ticketed itinerary price information for scheduled airline services in the United States. Recommendation 1 highlights inconsistent reporting by some airlines who have failed to include all of the charges and fees a passenger must reasonably pay to board the aircraft. The Department strives to ensure the accuracy of the Survey as the industry evolves, and will accordingly complete actions to implement Recommendation 1 by December 31, 2020.

The Department does not concur with Recommendation 2 to assess competitive conditions in the airline industry and to monitor risks to the Airport and Airway Trust Fund (AATF) by developing a process to regularly collect, maintain and use information from airlines' website disclosures of all fees charged for optional or ancillary services as a screening mechanism for significant changes in these fees. As part of its ongoing mandate, the Department already monitors changes in the airline industry, including ancillary fees, product unbundling and, now re-bundling, to ensure that the

Department's analysis of airline competition, as well as its policies, remain consistent with commercial developments. The implementation of Recommendation 1 will address the first concern OIG has raised, which focuses on how ancillary fees influence competition in the airline industry. The O&D Survey is the primary source of information on the cost of passenger air travel throughout the national air transportation system. By clarifying that passenger fares reported in the Survey include all charges that a passenger must reasonably pay to board the aircraft, the Department will ensure that the basic cost of air transportation will be fully accounted for despite dynamically changing industry trends to unbundle service offerings, or (more recently) to re- bundle the product.

The second concern OIG identified as a basis for Recommendation 2 is the risk ancillary fees, which are not subject to airline ticket taxes, pose to the Airport and Airway Trust Fund. As the draft report acknowledges, the Department is not responsible for determining taxable charges that fund the AATF nor for forecasting taxable airline revenues. The U.S. Treasury is responsible for forecasting tax receipts that go into the Airport and Airway Trust Fund as well as determining which airline charges are subject to airline ticket taxes. In general, it is the U.S. Treasury's decision to determine whether there is a need to monitor airlines' ancillary fees to determine risks to their forecasting methodologies.

The Department also does not concur with Recommendation 3 for the Department to request a Revenue Ruling or policy statement from the Department of Treasury regarding the taxation of airline booking fees. The predicate for the request for investigation is OIG's own study and the Department believes OIG is best suited to represent its own findings and recommendations to the Treasury Department directly. The FAA monitors receipts due to the AATF based on the parameters established by the Treasury Department. The Department believes that this division of responsibilities is appropriate and eliminates potential conflicts of interest that could occur among the Department's primary stakeholders. For example, while increasing the scope of airline charges to be taxed could increase receipts under the AATF, increased taxation could be implemented in ways that discriminate among airline business models, or could reduce overall demand for air transportation (especially on the margins where some airlines, like ultra-low-cost carriers, compete for passengers who would otherwise not travel). The Department believes that the current structure for administering the AATF is appropriate and is not inclined to take actions inconsistent with the existing organizational framework and division of responsibilities among the agencies involved.

We appreciate this opportunity to respond to the OIG draft report. Please contact Madeline M. Chulumovich, Director, Audit Relations and Program Improvement at (202) 366-6512 if you have any questions or require additional information about these comments.

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OIG conducts audits and investigations on behalf of the American public to improve the performance and integrity of DOT's programs to ensure a safe, efficient, and effective national transportation system.

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