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Expert Report on the Current Status of Family Seating Fees and the Potential Economic Impacts of a Prohibition

Executive Summary

This report examines current airline practices regarding seat assignments and advance seat reservations for families traveling with children. Most US carriers have policies to try to seat children with at least one adult traveling on the same reservation, but only some carriers guarantee that families will be seated together. The most reliable way for families traveling by air to ensure that they will be seated together is to purchase advance seating assignments.

Roughly 10 percent of airline passengers travel as part of a family and, in 2022, US carriers collected between $590 million and $1.35 billion in advance seat reservation fees from those passengers. Families who do not pay for advance seating incur economic costs such as increased check-in time and can experience anxiety and stress due to uncertainty in seating arrangements or being separated from their children.

A prohibition against the practice of charging fees for families to be seated together will reduce the full cost of a ticket for families who currently purchase advance seating assignments by 9 to 10 percent. To offset the associated revenue loss, airlines are likely to increase ticket prices for all passengers. Based on demand elasticities reported in the literature, the estimated price increase is $0.85 to $2.46 for domestic travelers and $1.93 to $5.55 for those who travel internationally, or between 0.3% and 1% of the ticket price.

Tables 1 and 2 summarize the estimated changes in consumer surplus and airline revenues for a medium level of the price elasticity of demand (-1.17 for domestic travel and -0.6 for international travel). In general, the larger the absolute value of the price elasticity of demand the greater will be the impact of prohibiting seating fees on prices, consumer surplus and revenues. The appendix contains sensitivity analyses for different price elasticities.

Table 1 shows a benchmark scenario, in which all travelers are assumed to purchase seat reservations in the status quo. For any given price elasticity, this scenario results in the largest impact on prices, consumer surplus, and revenues. Passengers in the target population would gain $2.28 billion per year in consumer surplus ($1.76 billion from domestic travel and $521 million from international travel). Other travelers would lose $2.18 billion in consumer surplus ($1.67 billion domestic and $515 international). Both the target population and other travelers would experience an increase in ticket prices, but for the target population, the elimination of seating fees would outweigh the ticket price increase. Airlines would see an overall reduction of $203 million in revenues.

Table 1: Estimated Change in Annual Consumer Surplus and Airline Revenue if all Travelers Purchase Seat Reservations (in millions)

	Domestic Travelers		**International Travelers on US Carriers**		**Net Effect**
	Target Population	Other Travelers	Target Population	Other Travelers	
Change in Consumer Surplus (millions)	1,757.56	-1,666.44	520.99	-514.57	97.55
Change in Airline Revenue (millions)	120.15	-302.40	-228.89	208.29	-202.85

Table 2 shows estimates for the case in which 37 percent of travelers purchase seat reservations in the status quo, as found in a 2022 survey. In this case, only travelers in the target population who purchase seat reservations in the status quo will experience a net reduction in the full price of their ticket (including seat reservations). These passengers will gain $910 million per year in consumer surplus ($698 million domestic and $212 million international). All other travelers, including families who do not purchase seat reservations in the status quo, will experience an increase in ticket prices without any offsetting benefit from lower seating fees. These travelers will lose a combined $812 million in consumer surplus due to the higher ticket prices. Airlines will experience a net loss of $85 million in revenues.

Table 2: Estimated Change in Annual Consumer Surplus and Airline Revenue if 37% of Travelers Purchase Seat Reservations

	Target Population		Other Travelers	
	Purchasing Seats	**Not Purchasing Seats**	**Purchasing Seats**	**Not Purchasing Seats**
	Domestic Travelers			
Change in Consumer Surplus (millions)	697.95	-39.15	-215.03	-366.07
Change in Airline Revenue (millions)	43.01	-6.83	-37.41	-63.83
	International Travelers on US Carriers			
Change in Consumer Surplus (millions)	212.18	-11.89	-66.37	-112.99
Change in Airline Revenue (millions)	13.07	-2.07	-11.55	-19.7
	Net Effect			
Change in Consumer Surplus (millions)	98.63			
Change in Airline Revenue (millions)	-85.31			

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A. Family Seating Practices

Several US carriers have implemented family seating policies that allow young children to be seated next to an adult traveling on the same reservation. Other US carriers continue to charge a fee for advance seat reservations for families. While all carriers have posted statements saying, at a minimum, that the carrier will make an effort to seat families together, not all of them guarantee this will be the case.

Among the largest foreign carriers, there are likewise several that guarantee free advance seat reservations for young children and an adult traveling on the same reservation, but others charge for advance seat reservations. Some carriers have no information on family seating available on their US websites. Appendix 5 reports the family seating policies of the largest ten foreign carriers operating in the US.

1. General Seating Policies

This section describes the status quo of general seating policies for the major US carriers. The carriers analyzed for this purpose include the largest ten airlines that directly sell tickets to US consumers ("marketing carriers"). These carriers are Alaska Airlines, Allegiant Air, American Airlines, Delta Airlines, Frontier Airlines, Hawaiian Airlines, JetBlue Airways, Southwest Airlines, Spirit Airlines, and United Airlines.

For the purposes of this analysis, it is useful to categorize the carriers into three groups:

Group 1: American, Alaska, JetBlue, Delta, Hawaiian, and United

Airlines in this group offer several different fare classes or fare types. Generally, the offered fare types can be described as Basic Economy, Economy, Premium Economy, and First/Business Class. However, some of these airlines do not offer Basic Economy and Premium Economy on all itineraries.

Airlines in this group offer free seat selection, subject to availability, in Economy, Premium Economy, and First/Business class. They do not offer free seat selection in Basic Economy. American and JetBlue offer advance seat reservations for a fee to customers who purchased Basic Economy tickets. The other airlines in this group do not offer any advance seat reservations on Basic Economy fares.

There are other differences between Economy and Basic Economy fares besides advance seat reservations. For example, unlike Economy fares, Basic Economy fares typically do not include free carry-on luggage.

Group 2: Allegiant, Frontier, and Spirit

The carriers in this group follow a business model of unbundled fares and are sometimes described as "ultra-low-cost carriers". The basic fare does not include advance seat reservations or carry-on bags. Passengers can purchase advance seat reservations for an additional fee, either as a standalone add-on or in a bundle with other services such as baggage or onboard beverages.

Group 3: Southwest

Southwest does not assign seats in advance of boarding. Passengers board in priority groups based on ticket type and time of check-in. Travelers can purchase access to the first priority group for a fee, subject to availability.

2. Family Seating Policies

Each of the ten airlines has a statement on its website describing its family seating policy. The statements are as follows[1]:

Alaska Airlines: "Alaska guarantees that children 13 and under will be seated with at least one accompanying adult, subject to certain conditions. Please contact us or check with an airport agent as soon as possible to review available seating options."

Allegiant Air: "While we will do our best to accommodate families, the availability of seats together cannot be guaranteed. To ensure that your party is seated together, we recommend reserving seats when you book your travel."

American Airlines: "Seats for your family: Keep in mind, if you can't find seats together now, we'll do our best to find them for you before the day of departure. If seats are limited, we'll assign seats so children are next to at least 1 adult in your party."

Delta Airlines: "Delta strives to seat family members together upon request. If you are unable to obtain seat assignments together for your family using delta.com or the Fly Delta mobile app, please contact Reservations to review available seating options."

[1] Accessed on 6/10/2023.

Frontier Airlines: "When one or more of the passengers on a reservation are 13 years of age or younger, Frontier will guarantee adjacent seats for the child or children and an accompanying adult (over age 13) at no additional cost for all fare types subject to limited conditions specified below."

Hawaiian Airlines: "We'll do our best to seat children under age 14 with an accompanying family member. Select your own seats as far in advance as possible by logging in to My Trips. If no suitable seats are available online, let our agents know when you get to the airport, and they'll do their best to reseat you."

JetBlue Airways: "We will always do our best to seat children with an adult family member. For the best seating options, we recommend booking early and selecting seat assignments at the time of booking or with a reservation crewmember (third party service fees may apply). If seats together are not available, please let our airport gate crewmembers know when you arrive at the airport. They will do their best to find a seating solution. We cannot guarantee that seats together will always be available."

Southwest Airlines: "Family boarding after A group for adults with children under 6. If you need and request assistance, Southwest will endeavor to seat a child next to one accompanying passenger (14 and older) to the maximum extent practicable and at no additional cost."

Spirit Airlines: "If Guests with children aged 13 and under do not opt to pre-select seats at the time of booking, our gate agents and Flight Attendants will work to provide adjacent seats when possible."

United Airlines: "If you're flying with children under 12, we have new tools that make it easier for them to sit next to a family member for free. This includes families who have Basic Economy tickets. If seats next to each other aren't available on your flight because of last minute bookings or unscheduled aircraft changes, you can switch to another flight with availability in the same cabin for free and won't be charged for the difference in fare."[2]

3. Illustration of Current Family Seating Policies

To illustrate the impact of current family seating policies, I collected data on hypothetical bookings for one adult and one five-year-old child traveling together for a set of itineraries with each airline. The chosen itineraries cover three routes for each carrier. These routes are at or

[2] https://www.united.com/en/us/fly/travel/inflight/basic-economy.html#your-seats

near the 25th, 50th, and 75th percentile of enplanements for the carrier in 2022.[3] For these routes, sample fares were collected for 5-day advance purchase, 15-day advance purchase, and 45-day advance purchase. This results in nine itineraries per carrier (three routes with three different advance purchase dates). Fares were collected for roundtrips with return travel seven days after departure. The search was conducted in early June 2023.

Alaska Airlines: For all nine itineraries, advance seat selection was available for Economy fares. Basic Economy fares were available for four of the nine itineraries and did not show family seating as an option on the booking screens. For the itineraries that had Basic Economy fares as an available option, the price difference between Economy and Basic Economy was between $50 and $116 per person. In percentage terms, Economy fares were between 8.4% and 24.4% more expensive than Basic Economy fares for those itineraries.

Allegiant Air: For the nine itineraries, advance seat selection cost between $16 and $27 per person, or between 5.3% and 14.3% of the ticket price.

American Airlines: For all nine itineraries, advance seat selection was available for Economy fares. Basic Economy fares were available for two of the nine itineraries and did not show family seating as an option on the booking screens. For the two itineraries that had Basic Economy fares as an available option, the price difference between Economy and Basic Economy was $30 and $54. In percentage terms, Economy fares were 9.7% and 18.0%. more expensive than Basic Economy fares.

Delta Airlines: For all nine itineraries, advance seat selection was available for Economy fares. Basic Economy fares were available for six of the nine itineraries and did not show family seating as an option on the booking screens. For the itineraries that had Basic Economy fares as an available option, the price difference between Economy and Basic Economy was between $60 and $80. In percentage terms, Economy fares were between 15.9% and 30.3% more expensive than Basic Economy fares.

Frontier Airlines: The online reservation system made two adjacent seats available without additional charge for each itinerary.

Hawaiian Airlines: For all nine itineraries, advance seat selection was available for Economy fares. Basic Economy fares were available for two of the nine itineraries and did not show family seating as an option on the booking screens. For the two itineraries that had Basic Economy fares as an available option, the price difference between Economy and Basic Economy was $80. In percentage terms, Economy fares were 13.6% and 15.3%. more expensive than Basic Economy.

[3] Based on Air Carrier Statistics (Form 41 Traffic) T-100 data for 2022. See Appendix Table 1 for the list of itineraries and Appendix 2 for a link to the T-100 data.

JetBlue Airways: For all nine itineraries, advance seat selection was available for Economy fares. Basic Economy fares were available for all nine itineraries and did not show family seating as an option on the booking screens. The price difference between Economy and Basic Economy was between $80 and $291, or 11.5% and 92.4% of the Basic Economy fares.

Southwest Airlines: No assigned seating.

Spirit Airlines: For the nine itineraries, advance seat selection cost between $23 and $75 per person, or between 8.1% and 32.2% of the ticket price.

United Airlines: For all nine itineraries, advance seat selection was available for Economy fares. Basic Economy fares were available for two of the nine itineraries and did not show family seating as an option on the booking screens. For the two itineraries that had Basic Economy fares as an available option, the price difference between Economy and Basic Economy was $60 and $87. In percentage terms, Economy fares were 10.9% and 23.2%. more expensive than Basic Economy.

4. Alternatives to Regulation

USDOT began an effort to encourage airlines to ensure free family seating on commercial flights on July 8, 2022, by issuing a notice that urged them "to do everything in their power to ensure that children who are age 13 or younger are seated next to an accompanying adult with no additional charge." On February 1, 2023, USDOT announced plans for a Family Seating Dashboard that displays which airlines guarantee free family seating.

In the following weeks, four large airlines reacted by announcing new efforts on family seating. On February 20, 2023, United Airlines announced new tools, including a dynamic seating map, making it easier for families to find seats together at no extra charge. The next day, Frontier Airlines announced that it would guarantee free family seating. Within the following two weeks, American Airlines and Alaska Airlines declared that they would do the same.

The Family Seating Dashboard was launched on March 6, 2023. The Dashboard currently shows three airlines (Alaska, American, and Frontier) as having committed to guaranteeing free family seating. As outlined above, all other large domestic carriers have policies to do their best to allow free family seating, but they stop short of guaranteeing it.

There is uncertainty regarding what family seating policies will look like in the future under these alternatives to regulation. Given that seven of the ten large airlines have chosen not to guarantee free family seating despite calls from USDOT and from consumer advocacy groups such as Consumer Reports,[4] it is unlikely that they would issue such guarantees in the absence of

[4] See Airlines: Kids should sit with their parents! (consumerreports.org), accessed on 6/19/2023.

additional pressure from the market or the government. The three airlines currently guaranteeing free family seating may stop doing so over time.

The experience with ancillary fees for checked baggage shows that airlines adopted baggage fees at a time when they were under financial pressure and when competition from low-cost carriers pushed them to unbundle their services and advertise lower ticket prices.[5] It is possible that airlines would re-adopt family seating fees in the future in times of financial or competitive pressure.

However, research shows that public reporting of quality metrics can have a positive effect on airline service quality. A study I co-authored shows that airlines have lengthened their scheduled flight times and reduced flight delays substantially in the decade leading up to 2019.[6] This development coincided with increased public attention to flight delays, and it is possible that airlines may have responded to pressure from the flying public to improve their on-time performance. Public pressure to eliminate family seating fees may illicit a similarly positive response and keep airlines from reintroducing such fees.

[5] See Brueckner, Jan K., Darin N. Lee, Pierre M. Picard, and Ethan Singer, "Product Unbundling in the Travel Industry: The Economics of Airline Bag Fees", *Journal of Economics and Management Strategy* Volume 24, Issue 3, Fall 2015.
[6] Forbes, Silke, Mara Lederman, and Zhe Yuan, "Do Airlines Pad Their Schedules?", *Review of Industrial Organization* Volume 54, Issue 1, February 2019.

B. Estimating the Size of the Target Population

1. Estimates Based on the American Travel Survey

The targeted beneficiaries of a prohibition against family seating fees are children under the age of 14 traveling by plane with at least one person who is 14 years or older. This section presents estimates of the number of travelers who fall into this category. For simplicity, I will refer to the target population as "families".

The primary estimates of the size of the target population are based on the Bureau of Transportation Statistics' (BTS) American Travel Survey (ATS) and Air Carrier Statistics (Form 41 Traffic) T-100 data, and the Census Bureau's population statistics. The next subsection will present estimates based on the US Family Travel Survey conducted by the Jonathan M. Tisch Center of Hospitality at New York University.[7]

The ATS was conducted by the BTS in 1995. The survey contains information on long-distance travel over 100 miles for approximately 80,000 households. The survey covers all long-distance trips by these households during a three-month period and includes information on the ages of all family members who participated in each trip, as well as the mode of transport. The data set also includes survey weights for each household-trip pair. These weights can be applied to reflect a representative sample of the US population.

The ATS is the most comprehensive survey available and contains the information needed to estimate the size of the target population, namely the mode of transport and the ages of traveling household members for each trip. However, the survey was only conducted once in 1995. Therefore, I use additional information on changes in demographic composition between 1995 and 2020 and on the number of passengers traveling by plane in 2022 to estimate the size of the target population today.

From the ATS, one can identify each instance of a person under 14 years old ("child") traveling by plane with a person 14 years or older ("adult") from the same household. To estimate the size of the target population, I created a data set that included all plane trips in the survey. For each trip involving a household member under 14, I calculated how many children and how many adults from the same household traveled together. I then took the smaller of the two numbers, which indicates the number of child-adult pairs who would need to be seated together. For example, if a trip involved three children and two adults from the same household, the number of child-adult pairs would be two. If one child traveled with two adults, the number of child-adult pairs would be one.

Using the survey weights, one can calculate that the ATS represents a total of 190,650,338 plane trips conducted during the quarter. The total number of child-adult pairs is 11,117,952.

[7] See Appendix 2 for more details on the datasets.

Multiplying this by two, to get the number of travelers rather than the number of child-adult pairs, results in 22,235,904 travelers. Thus, the target population represents a share of 11.66 percent of all travelers. Appendix Table A-2 shows the number of travelers in the target population and the total number of travelers, as well as the share of travelers in the target population for the entire United States and by census division.

Children under the age of 14 are a smaller share of the population today than they were in 1995. I adjust for this demographic change using data from the 1990, 2000, and 2020 Census of Population. To account for geographic variation, the analysis is done at the level of census divisions. Table 260 in the 1990 Census of Population reports population counts by age and census division. This allows one to calculate the share of under-14-year-olds in each census division in 1990 (see Appendix Table A-3A). Tables DP-1 in the 2000 and 2020 Census of Population contain the population by five-year age groups in each census division. I use the exact counts for age groups 0-4 and 5-9 and estimate the number of children aged 10-13 as 80 percent of the reported number of children aged 10-14 (see Appendix Tables 3B and 3D). I estimate the 1995 shares of children under 14 as the arithmetic mean of the 1990 and 2000 shares (see Appendix Table A-3C). I use the latest Decennial Census from 2020 to estimate the share of this age group in 2022 (see Appendix Table A-3D).

To adjust for demographic changes over time, I first calculate the ratio of the share of children under 14 in 2020 to the share of children under 14 in 1995 for each census division (see Appendix Table A-4A, Column 2). Then, I multiply the share of travelers in the target population in 1995 by this ratio to get an estimate of the share of travelers in the target population for 2022 (see Appendix Table A-4A, Column 3). The estimated share ranges from 4.17 percent in the East South Central Division to 12.85 percent in the Pacific Division.

The final step in this estimation is to multiply the share of travelers in the target population by the total number of travelers to estimate the number of travelers in the target population. I calculate the number of travelers in each census division from the Air Carrier Statistics (Form 41 Traffic) T-100 data for 2022 (see Appendix Table A-4B). The table also shows passengers originating from US territories and from airports outside the US. Passenger numbers are listed separately for domestic and international passengers on US carriers, as well as passengers flying on foreign carriers to or from the US. The passenger totals are 753 million domestic travelers and 103 million international travelers on US carriers. This results in a total of 856 million travelers on US carriers.

To estimate the number of travelers in the target population, I multiply the number of travelers in each census division as reported in Appendix Table A-4B by the estimated shares from Appendix Table A-4A, Column 3. The resulting estimates are shown in Appendix Table A-4C. For flights originating in US territories or internationally, I use the weighted average share of travelers in the target population across all census divisions. This weighted average share is 0.0966. It is calculated by dividing the total number of travelers in the target population in the nine census divisions by the total number of all travelers in the nine census divisions.

The estimated numbers of travelers in the target population in 2022 is 72.8 million persons traveling on domestic flights and 9.8 million persons traveling internationally on US carriers. This results in a total of 82.6 million travelers on US carriers. The share of all travelers who are in the target population is 9.66 percent.

2. Estimates Based on the US Family Travel Survey

An alternative method for estimating the number of travelers in the target population uses data from the US Family Travel Survey 2022. This survey was conducted by Dr. Lynn Minneart at the Jonathan M. Tisch Center for Hospitality at the NYU School of Professional Studies in June and July 2022. The survey had 1002 respondents and was designed to include only persons over the age of 18 who had children younger than 18. The survey found that 85 percent of respondents were likely to travel with their children in the next year. Of those, 36 percent of respondents were planning to travel by plane. This suggests that 30.6 percent of all respondents were likely to travel by plane in the next year.

The average number of children of any age among survey respondents was 2.1, and the average number of children under the age of 14 was 0.88. Multiplying 0.88 by 30.6 percent results in an estimated 0.27 children per family planning to travel by plane in the next year. If each child was seated next to one adult in the same family on the plane, then this implies that 0.54 persons per surveyed family would be affected by the family seating rule.

The survey only included respondents who had children under 18. According to the Census Bureau's publication titled "America's Families and Living Arrangements: 2020", 63.133 million individuals in the US were parents living with children under the age of 18 in 2020. This represents a 19.05 percent share of the overall population in the same year. Multiplying this share by the number of affected persons per family based on the above survey results in an **estimate of 10.28 percent of all plane travelers being part of a party traveling as a family. This is equivalent to 77.4 million persons traveling on domestic flights and 10.6 million persons traveling internationally on US carriers in 2022. This results in a total of 88.0 million travelers on US carriers.**

This estimate from the 2022 US Family Travel Survey is 6.5 percent higher than the estimate based on the ATS. The advantage of the ATS is that it covered a substantially larger number of respondents than the Family Travel Survey (80,000 vs. 1,000). The Family Travel Survey has the advantage that it is based on more recent data. However, the Family Travel Survey does not include survey weights to adjust for the representativeness of survey respondents. The average income of its respondents is higher than that of the general population, and they may be more likely to engage in air travel than a representative American family. Given this issue, my preferred estimate is the one based on the ATS, but it is reassuring that this alternative method results in an estimate of similar magnitude.

C. Estimating Airline Revenues from Family Seating Fees

For the three airlines that have guaranteed free family seating (Alaska, American, and Frontier), family seating revenues should be equal to zero. For the remaining seven large airlines, an estimate of the revenues from family seating fees requires an estimate of how likely families are to pay for seats and an estimate of the amount they pay per seat.

1. Per-Passenger Revenues from Ancillary and Seat Reservation Fees

I examined the 10-k Annual Reports for 2019 and 2022 that were submitted to the Securities and Exchange Commission (SEC) by Alaska Airlines, Allegiant Air, American Airlines, Delta Airlines, Frontier Airlines, Hawaiian Airlines, JetBlue Airways, Southwest Airlines, Spirit Airlines, and United Airlines. 2019 was the last full year before the Covid-19 pandemic severely disrupted airline travel. 2022 is the most recent year available. Frontier Airlines was privately held and not required to submit a 10-k report in 2019. For all other airlines, 10-k reports are available for both years.

Revenues from seating fees are included in passenger revenues reported in the 10-k statements. Two airlines, Spirit in 2019 and Frontier in 2022, report revenues from seat reservation fees as separate line items. Spirit reports total revenues from ancillary fees in 2019 and in 2022, but it only breaks out seating fees as a separate category in 2019. Five other airlines report revenues from ancillary fees, but not seat reservation fees, separately from other passenger revenues in their 10-k reports. These ancillary fees include charges for checked baggage, changed or canceled reservations, in-flight purchases, as well as seat reservations. American Airlines, Hawaiian Airlines, and JetBlue Airlines do not break out revenues from ancillary fees or from seat reservation fees in their 10-k reports.

USDOT reports information on each airline's annual revenues from checked baggage and changed or canceled reservations in the Air Carrier Financial Reports (Form 41 Financial Data), Schedule P-1.2. These fees are included in the ancillary fees reported in the airlines' 10-k statements. One can deduct these revenues from the reported ancillary fee revenues to get a residual, which includes revenues from in-flight purchases, seat reservations, and possibly other charges. These residuals are an upper bound to revenues from seating fees.

Table 3 shows revenue from ancillary fees, baggage and cancellation or change fees, and seat reservation fees for the largest ten US airlines. All dollar figures are in thousands. Column 4 shows the residual ancillary revenues net of baggage and cancellation or change fees. As reported in Column 5, Frontier earned $251 million from seat reservation fees in 2022, and Spirit earned $229 million from seat reservation fees in 2019. These fees represent 29.0 percent and 21.8 percent, respectively, of the residual ancillary fees.

Table 3: Revenues from Ancillary Fees (dollars in thousands)

Type of Fee	(1) Ancillary	(2) Baggage	(3) Cancellation or Change	(4) Residual Ancillary	(5) Seat Reservation
Alaska					
2019	567,000	327,651	191,503	47,846	-
2022	447,000	326,589	192,469	*120,411*	-
Allegiant					
2019	770,206	265,094	38,142	466,970	-
2022	1,025,549	331,052	111,493	583,004	-
American					
2019	-	1,339,124	818,748	-	-
2022	-	1,398,216	30,411	-	-
Delta					
2019	2,469,000	1,035,058	830,172	603,770	-
2022	1,694,000	979,397	100,890	613,713	-
Frontier					
2019	-	459,158	48,633	-	-
2022	1,866,000	743,954	255,924	866,123	251,000
Hawaiian					
2019	-	85,756	22,631	-	-
2022	-	87,193	2,135	-	-
JetBlue					
2019	-	361,414	195,482	-	-
2022	-	624,857	64,024	-	-
Southwest					
2019	711,000	50,824	-	-	-
2022	735,000	66,997	113,372	554,631	-
Spirit					
2019	1,870,750	758,771	62,924	1,049,055	228,876
2022	2,533,548	933,218	16,587	1,583,743	-
United					
2019	2,400,000	1,006,333	625,018	768,649	-
2022	3,400,000	1,118,570	83,629	2,197,801	-

Notes: Ancillary fees in Column 1 and seat reservation fees in Column 4 are from 10-k annual reports. Not all carriers break out these fees in their 10-k reports. Ancillary fees typically include baggage fees, change and cancellation fees, seat reservation fees, and on-board food and beverage purchases. Data in Columns 2 and 3 come from Air Carrier Financial Reports (Form 41 Financial Data), Schedule P-1.2. Column 5 shows total ancillary fees (from Column 1) less baggage and cancellation or change fees (from Columns 2 and 3). Alaska Airlines includes ticket change fees in ancillary revenues until 2021, but not after, and therefore its value in Column 5 shows ancillary fees less baggage fees.

Table 4: Ancillary and Seating Revenues per Passenger

	(1)	(2)	(3)	(4)	(5)
	Number of Passengers	**Residual Ancillary Fees**	**Residual Ancillary Fees per Passenger**	**Seat Reservation Fees**	**Seating Fees per Passenger**
Alaska					
2019	27,107	47,846	1.77	-	-
2022	31,791	120,411	3.79	-	-
Allegiant					
2019	11,509	466,970	40.57	-	-
2022	16,869	583,004	34.56	-	-
American					
2019	117,338	-	-	-	-
2022	150,861	-	-	-	-
Delta					
2019	122,947	603,770	4.91	-	-
2022	141,905	613,713	4.32	-	-
Frontier					
2019	16,713	-	-	-	-
2022	25,464	866,123	34.01	251,000	9.86
Hawaiian					
2019	8,687	-	-	-	-
2022	9,998	-	-	-	-
JetBlue					
2019	32,340	-	-	-	-
2022	39,624	-	-	-	-
Southwest					
2019	124,627	-	-	-	-
2022	157,008	554,631	3.53	-	-
Spirit					
2019	25,777	1,049,055	40.70	228,876	8.88
2022	38,408	1,583,743	41.23	*345,531*	*9.00*
United					
2019	88,105	768,649	8.72	-	-
2022	112,654	2,197,801	19.51	-	-

Note: Passengers are in thousands and include domestic and international travelers. Fees are in thousands of US dollars. Seat reservation fees for Spirit in 2022 are estimated.

Table 4 shows the number of passengers for all airlines, as well as the revenues from residual ancillary fees and seat reservation fees if available (repeated from Table 3). The table also shows these fees on a per-passenger basis. As noted earlier in this report, Allegiant, Frontier and Spirit pursue business models of low base fares and high ancillary fees (sometimes called "ultra-low-cost"). Not surprisingly, the per-passenger residual ancillary fees are substantially higher for these airlines than for their competitors. Southwest charges little or not at all for some services (e.g., baggage) while not offering others (e.g., seat reservations). The remaining airlines offer "basic economy" and "regular economy" fares, with the latter being more expensive but typically including seat reservations. These airlines have lower per-passenger ancillary fee revenues than the ultra-low-cost carriers, but keep in mind that many of these airlines receive higher revenues in the form of higher-priced regular economy fares.

As in Table 3, the revenues from seat reservation fees for Frontier in 2022 and for Spirit in 2019 come from the airlines' 10-k annual reports. **The average seating fee revenue is $9.86 per passenger for Frontier in 2022 and $8.88 for Spirit in 2019.**

I estimate Spirit's seat reservation revenue in 2022 based on available data. One can calculate that, in 2019, seat reservation fees represented 21.8 percent of Spirit's residual ancillary fee revenues. I assume that this ratio remained constant between 2019 and 2022. Applying this ratio to Spirit's 2022 residual ancillary fee revenues of $1.583 billion, I estimate Spirit's seat reservation revenue in 2022 to be 345 million. This yields an estimated **average seating fee revenue for Spirit of $9.00 per passenger in 2022.**

Nine of the ten airlines do not report how much they typically charge per seat reservation. Allegiant publishes on its website that its fees range from $0 to $80. My investigation of sample itineraries, reported above, found seat reservation fees between $16 and $75 for Allegiant and Spirit. For airlines that offer Basic Economy and Economy fares, I found that the price differences between the two types of fares, when both were available, ranged from as low as $30 to as high as $291, with many price differences being in the $60 to $80 range. Advance seat reservations are typically not the only difference between Basic Economy and Economy fares. For example, Basic Economy often does not include free carry-on luggage. The price difference between Basic Economy and Economy fares is therefore an upper bound of the value of advance seat reservations.

Given that the airline industry is highly competitive, I assume that the price for advance seat reservations is similar across airlines and that the remaining price differences between Basic Economy and Economy fares are due to options such as free carry-on luggage or earlier boarding.

Based on the information from the two airlines that separately reported revenues from seat reservation fees, the **estimated seating fee revenue per passenger was approximately $9.43 in 2022**. This represents the arithmetic mean between Frontier's reported revenue per passenger and Spirit's estimated revenue per passenger. **This estimate is an average that includes**

passengers who did not make an advance seat reservation and paid $0 and other passengers who paid a value greater than $9.43 for their seats.

2. Revenues from Seat Reservation Fees Charged to Families

Assuming that families are equally likely to make a seat reservation as other travelers, the estimated average revenue per traveler in the target population (i.e., for each member of a child-adult pair traveling together) will be equal to the estimate of $9.43 above. We can multiply $9.43 by the estimated number of travelers in the target population for the seven airlines that do not guarantee free family seating.

The Air Carrier Statistics (Form 41 Traffic) T-100 database reports 856 million air travelers carried by US airlines in 2022. If one excludes passengers who traveled on one of the three airlines that guarantee free family seating, the remaining number of travelers is 647.9 million. Of those, 579.1 million traveled domestically and 68.8 million traveled internationally (see Appendix Table A-5).

Using the above estimate that 9.66 percent of all travelers are in the target populations, results in 55.9 million domestic passengers and 6.6 million passengers traveling internationally on US carriers.[8] Multiplying these numbers by $9.43 yields **estimated current revenues from family seating fees of $527.5 million from domestic passengers and $62.6 million from international passengers on US carriers, for a total estimated revenue of $590.1 million for US carriers.**

If families are more likely to make seat reservations than other travelers, then the revenue from family seat reservations would be higher. One can derive an upper bound estimate by assuming that all families who are aware of the seating fees pay for advance seat reservations unless the airline guarantees free family seating. An Ipsos survey carried out on behalf of Airlines for America in January 2023 asked participants if they had purchased a fare that did not include carry-on baggage or seat selection in the previous year. Of respondents who answered yes, 85 percent said that they were fully aware of the additional charges for carry-on bags and seat selection. Based on this information, an upper bound estimate would assume that 85 percent of families purchase advance seat reservations unless free family seating is guaranteed.

The average cost of a seat reservation per person is not reported in publicly available data. One can derive an estimate of this cost using the average seating fee revenue per traveler combined with an estimate of the share of travelers who purchase seat reservations. A study that examined the introduction of airline baggage fees in 2008 and 2009 found that the introduction of a $15 fee per bag reduced average ticket prices by $4.86, and a fee of $20 per bag lowered ticket prices

[8] 9.66 percent of 579.1 million is equal to 55.9 million, and 9.66 percent of 68.8 million is equal to 6.6 million.

by $7.86 on average.[9] The introduction of these fees would have been revenue neutral if between 32.4 and 39.3 percent of travelers paid to check their bags.

One can use these percentages as estimates of how many travelers would be willing to pay for other ancillary services, such as advance seat reservations. Additionally, a survey conducted by Skyscanner in 2022 found that 37 percent of US respondents would be willing to pay a fee for advance seat selection, while 35 percent were willing to pay for extra baggage.[10]

If 37 percent of travelers purchase advance seat assignments and the average revenue per passenger is $9.43, then the average fee per reservation must be $25.49.[11] Note that this is the fee for each direction of travel. In other words, passengers with a one-way ticket pay on average $25.49, while passengers with a roundtrip ticket pay two times that amount, or $50.98.

To obtain an upper bound for airline revenues from family seating, I use this value of $25.49 per reservation and assume that 85 percent of the travelers who are currently subject to family seating fees purchase advance seat reservations. This yields the **upper bound estimates of family seating fee revenues of $1.21 billion from domestic passengers and $144 million from international passengers on US carriers, for a total estimated revenue of $1.35 billion for US carriers**.

[9] See Brueckner, Jan K., Darin N. Lee, Pierre M. Picard, and Ethan Singer, "Product Unbundling in the Travel Industry: The Economics of Airline Bag Fees", *Journal of Economics and Management Strategy* Volume 24, Issue 3, Fall 2015.
[10] See https://www.partners.skyscanner.net/hubfs/Reports/Horizons-Nov2022.pdf .
[11] 37 percent of $25.49 is equal to $9.43.

D. Economic Impacts of a Family Seating Fee Prohibition

To assess the potential impacts of a prohibition against the practice of charging fees for families to be seated together during air travel, I assume that the status quo is that airlines would charge seat reservation fees to families for the foreseeable future unless they were required to stop due to a prohibition. In addition, I assume that consumer behavior would not change without a change in family seating policies.

1. Implementation Costs

This section considers the implementation costs of enabling ticket reservation systems to offer free advance seat reservations to any child under 14 and an accompanying adult. I consider an implementation that would allow the ticket reservation system to identify bookings with children under 14 and accompanying adults and let those individuals reserve seats together at no charge. The implementation should make this possible for bookings conducted directly with the airlines or through third parties.

Three airlines – Alaska, American, and Frontier – implemented free family seating in February and March 2023, and United announced that it had developed a dynamic seat map in February 2023. To my knowledge, the companies have not made public statements about the costs of implementing these systems. The *Wall Street Journal* reported in February 2023 that United had been working on its dynamic seat map since the previous summer.[12] This suggests a timeline for implementation of six to eight months in United's case.

USDOT's September 2022 report titled "Enhancing Transparency of Airline Ancillary Service Fees Regulatory Impact Analysis (RIN 2105-AF10)"[13] explains the airline industry's booking structure (see Section 6 of the report). Airlines sell their services directly via their own websites and call centers and indirectly through third parties such as online or brick-and-mortar travel agencies. Traditionally, airlines and travel agents have made use of Global Distributions Systems (GDS) that provide information about available tickets and are able to process bookings. Legacy data formats used by GDSs do not always allow for ancillary fee information to be displayed or for ancillary services to be booked through the GDS.

Airlines can offer free family seating if they are able to personalize the pricing of seats based on the ages of the individuals in a reservation. Implementing this capability is an upfront cost. Once

[12] Slider, Alison and Dawn Gilbertson, "United Airlines to Ease Family Seating Fees", *The Wall Street Journal*, February 20, 2023.

[13] https://www.federalregister.gov/documents/2022/10/20/2022-22214/enhancing-transparency-of-airline-ancillary-service-fees .

implemented, there should be no or very low ongoing costs of using the system. The implementation of free family seating has different requirements for reservations that are made over the phone and those that are made online. In the former case, the agent making the reservation needs to be able to set the price of advance seat reservations to zero. For online reservations, the system needs to be able to recognize eligible parties (i.e., children under 14 and an accompanying adult) and quote them a price of zero for their advance seat reservations.

Current online reservation systems proceed in several steps. On the first screen, they typically present price quotes for an itinerary. The customer can see prices for all flights available on the day of travel. Often, prices are shown for different ticket classes, such as basic economy and regular economy. Ancillary fees are typically not shown until later, but USDOT has proposed regulation that would require ancillary fees to be disclosed on the first screen.

After choosing the flights and ticket class(es), the customer is asked to enter personal information for all travelers, including their dates of birth. The next step commonly offers ancillary services including seat reservations. Some of the ancillaries carry a fee while others may be available to the customer free of charge. For example, many regular economy tickets allow passengers to reserve some seats at no charge, but so-called "preferred seats" are often associated with additional costs.

The airline industry is in the process of transitioning to personalized pricing. Such pricing strategies can tailor ticket prices or ancillary fees to the customer's identity or purchase history.[14] Since the 1980s, the industry has used the so-called "EDIFACT" standard for distributing information between airlines and travel agents.[15] This standard does not easily support personalized pricing. More recently, the International Air Transport Association (IATA) has developed the so-called "New Distribution Capability" (NDC), which is a data transmission standard that facilitates communication between airlines and third-party sellers, such as travel agents.[16] Importantly, the NDC enables dynamic and personalized fare offers including individualized pricing of ancillary services.[17]

The NDC is a communication standard for third-party bookings, not a method for pricing tickets sold directly by airlines. Airlines will need to implement free seat reservations for qualifying families in their own internal reservation systems as part of a personalized pricing strategy. Once personalized pricing is implemented in internal systems, the NDC should allow airlines to

[14] See, for example, Fiig, Le Guen, and Gauchet (2018), "Dynamic Pricing of Airline Offers", *Journal of Revenue Pricing Management*, https://www.iata.org/contentassets/0688c780d9ad4a4fadb461b479d64e0d/dynamic-pricing--of-airline-offers.pdf .
[15] See, for example, https://amadeus.com/en/insights/blog/ndc-is-here-and-ready-to-go .
[16] See https://www.iata.org/en/programs/airline-distribution/retailing/ndc/ .
[17] See, for example, https://www.sabre.com/insights/new-distribution-capability for more detail.

implement the same pricing for third-party bookings. The system will allow airlines to maintain a different fee structure for other travelers.

The NDC exceeds the capabilities needed to offer free family seating via third-party sellers. Consequently, the costs of implementing the NDC can be considered an upper bound to the costs of implementing a ticket reservation system that allows free family seating to be offered via third-party sellers. Moreover, for airlines that have already adopted the NDC, the costs of implementing free family seating should be quite low. Airlines that still use the EDIFACT standard, however, may find it more costly to implement free family seating, especially for reservations made via third-party sellers.

A 2019 report by the management consulting firm McKinsey outlines a possible transition from the traditional flight distribution system to personalized pricing with NDC-based distribution.[18] The report estimates that the transition would cost the global airline industry (including airlines outside the United States) about $3 billion. A 2021 report by IATA calculates that this is equivalent to about 10 percent of current airline information technology spending.[19]

IATA previously maintained an index of companies that had adopted the NDC. This has now been incorporated into IATA's Airline Retailing Maturity (ARM) index.[20] As of October 2023, IATA's ARM company list indicates that American Airlines, Hawaiian Airlines, Spirit Airlines, and United Airlines have the ability to display seat maps, seat availability, and pricing via the NDC standard. This leaves Alaska Airlines, Allegiant, Delta, Frontier Airlines, and JetBlue as still needing to implement the NDC. United additionally has the capability to personalize offers based on customer characteristics. Other US airlines may also have these NDC capabilities, but they have not yet been certified by IATA.

I calculate two estimates of implementation cost. The first assumes that all airlines that have adopted the NDC standard have also already implemented personalized pricing. The second estimate assumes that airlines that have adopted the NDC standard have not yet adopted personalized pricing. I do not include Southwest Airlines in either estimate because it does not allocate seats in advance.

Following the McKinsey report and IATA's calculations cited above, I estimate the implementation costs as 10 percent of the airlines' current information technology spending. Recall that the NDC exceeds the capabilities needed to offer free family seating. Therefore, the costs of implementing family seating may be lower than the estimates presented here.

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[18] See https://www.mckinsey.com/industries/travel-logistics-and-infrastructure/our-insights/airline-retailing-the-value-at-stake .

[19] See, https://www.iata.org/contentassets/47c4d32973014560beef3cc421bdf402/airline-retailing-an-industry-vision-for-offers-and-orders.pdf .

[20] See https://retailing.iata.org/armi/registry, accessed on October 15, 2023.

Delta Airlines includes IT-related expenses (specifically, the amortization of capitalized software) as a separate line item in its 10-k annual reports, but none of the other airlines break out IT costs in their 10-k's. I draw on Delta's 2019 and 2022 annual reports, which show the amortized IT-related expenses for the years 2017-2022 (see Appendix Table A-6). The average annual amortization over these years is $286 million (in 2022 US dollars). I divide this number by Delta's total number of passengers in 2022 (see Table 4) and to calculate the IT cost per passenger as $2.02.

My first estimate of family seating cost assumes that only Alaska Airlines, Allegiant, Delta, Frontier Airlines, and JetBlue still need to implement NDC and personalized pricing capabilities. I multiply the IT cost of $2.02 per passenger by the sum of passengers for Alaska Airlines, Allegiant, Delta, Frontier Airlines, and JetBlue in 2022. This calculation yields $516.4 million. McKinsey estimated that the costs of implementing the NDC and personalized pricing are 10 percent of IT costs. This results in an estimated implementation cost of $51.64 million.

My second estimate assumes that the airlines that have already implemented the NDC still need to implement personalized pricing. I assume that the cost of implementing personalized pricing for airlines that already have NDC capabilities are 50 percent of the full implementation costs. I apply these additional costs to American, Hawaiian, Spirit, and United. Recall that Southwest does not assign seating and is therefore not included in these calculations. The estimated implementation costs for American, Hawaiian, Spirit, and United in this scenario are $31.5 million. The full estimated implementation costs in this scenario are $83.14 million.

To summarize the estimated costs of implementing NDC and personalized pricing for airlines that do not yet have these capabilities are between $51.64 million and $83.14 million. These capabilities exceed what is needed to implement free family seating and should therefore be considered as upper bound estimates.

2. Benefits to Families Traveling by Air

This section considers benefits that would accrue to families if airlines were required to seat them together without charging a fee. These benefits fall into several categories: Direct savings from not having to pay for seats, additional trips taken by families, mental health benefits, and time savings. While the savings in seat fees represent a benefit from the perspective of the family traveling together, from a societal perspective, it represents a transfer from airlines to families. I analyze these transfers separately as a distributional impact.

As stated above, an Ipsos survey from January 2023 found that 85 percent of travelers were aware of ancillary fees for baggage and seating. Families who are fully aware of the seat

reservation fees face a trade-off: They can either pay the seat reservation fee or they can choose not to pay the fee and risk being separated on the flight. For families who do not pay the fee, there will likely be non-quantifiable costs, such as the costs of anxiety and stress or the time costs of talking to gate agents to get a seat assignment.

If travelers decide this trade-off rationally, they will compare the cost of the seating fee to the costs of facing separation from their children and choose the option with the lower cost. This would imply that families who have a high cost of anxiety or time will choose to pay the fee because, for them, the fee is less than the cost of anxiety or time. Families whose cost of anxiety or time is less than the fee will choose not to purchase seat assignments. This implies that, for families who do not purchase seat assignments, the implied cost of anxiety or time is less than the seat reservation fee. However, these costs likely are greater than zero. In other words, even families who are aware of the seating fees and choose not to purchase seat reservations suffer a cost greater than zero when airlines do not offer free family seating. These families will benefit from free family seating, and their benefit will equal a value between zero and the cost of the seat reservation.

Travelers who are unaware of the seat reservation fees are likely not to purchase seat reservations. For these travelers, the costs of anxiety or time may be higher than the seating fee. These travelers might have purchased seat reservations if they had been aware of the seating fees.

2.1. Additional Trips Taken

Families may choose to take additional trips if a change in family seating policies lowers their costs of flying. This would affect families who currently purchase advance seat reservations. It will likely also impact some families who would not have purchased seats but who would have experienced costs of anxiety or stress or time costs of talking to a gate agent.

I will discuss estimates of additional trips that might be taken by families under a policy of free family seating below as part of the distributional impact. There, I will also discuss likely effects on the price of air travel.

3. Unquantified Benefits

3.1. Anxiety, Stress, and Mental Health

Free family seating would likely benefit the mental health of parents and children. Children experience separation anxiety when they are not able to be with their parents or other trusted adults. Adults may also experience anxiety or distress if they worry about their children while being separated from them.

As Mihalopoulos *et al*. (2015) point out, anxiety-related disorders are the most common mental health conditions in children and adults and carry individual and societal costs related to, among other things, poor school and work performance and social functioning.[21] While anxiety experienced due to temporary separation is different from an anxiety disorder, individuals likely still experience emotional distress from the separation. A recent study by Pella *et al.* (2020) estimates the mean annual costs of anxiety disorders in children at $6,405.[22] A 2008 study by Bodden *et al.* found an annual cost of €2,748 in the Netherlands.[23] This translates to about $4,344 in current US dollars.

Complaints submitted by travelers to USDOT reveal general concerns about young children being separated from their parents and specific issues relating to children's and adults' anxiety. For example, one comment reads: "My wife and I were worried about how it's conceivable to have a 4 year old or a 2 year old sit without their parent/guardian. Who would feed them? Who would give them to drink? … Who would make sure that their neighbor is a safe individual for them to sit next to? Besides, they would cry non stop out of fright from the moment they are separated from us." Other comments say, for example: "My ten year old was visibly having an anxiety attack.", "My wife was having a panic attack.", and "My kids were scared out of their mind and crying."

Concerns that the child would not be able to receive help from a parent in case of an emergency, or that the parent's attempt to give such assistance would create a hazard, are voiced repeatedly in the complaints. For example,

- "One of [my children] has special needs. God forbid there is an emergency who will help my children?"

[21] Cathrine Mihalopoulos, Theo Vos, Ronald M. Rapee, Jane Pirkis, Mary Lou Chatterton, Yu-Chen Lee, and Rob Carter (2015), "The population cost-effectiveness of a parenting intervention designed to prevent anxiety disorders in children", *Journal of Child Psychology and Psychiatry* 59(6), 1025-1033.
[22] Jeffrey E. Pella, Eric P. Slade, Paige J. Pikulski, and Golda S. Ginsburg (2020), "Pediatric Anxiety Disorders: A Cost of Illness Analysis", *Journal of Abnormal Child Psychology* 48, 551-559.
[23] Denise H.M. Bodden, Carmen D. Dirksen, and Susan M. Bogels (2008), "Societal Burden of Clinically Anxious Youth Referred for Treatment: A Cost-of-illness Study", *Journal of Abnormal Child Psychology* 36, 487-497.

- "My younger son should not be someone else's responsibility in the event of an emergency."
- "… a safety hazard, because you can be sure I'd dive over seats to get to [my child] if I had to."
- "… when I am traveling with my toddler, it is not a safe alternative to have him seated away from me on a plane with strangers who would have no obligation to care for him should there be an in flight emergency."
- "… in an emergency, I'd do everything I could to get to my child before anything else."

Another set of concerns that is mentioned repeatedly in the complaints is the danger of child molestation if the child is left without parents or other trusted adults. For example,

- "We don't feel comfortable having [our 11-year-old daughter] sit with strangers considering there is no background check (i.e. for child molestation) given to whomever sits next to her."
- "[L]eaving a [4-year-old] with strangers would be a social services issue and neglect… Can you assure me that none of the people on the flight have any criminal records … nor have ever taken part of exploiting a child?"
- "Allowing parents to sit next to their children is one easy way to prevent sexual assault of children on an airplane."

In 2018, the Federal Bureau of Investigation (FBI) issued a statement alerting the public to sexual assault on planes.[24] The statement said that the number of reported cases had increased from 38 in 2014 to 63 in 2017. A 2017 survey by the Association of Flight Attendants found that one in five flight attendants had witnessed a passenger being sexually assaulted or had a sexual assault reported to them.[25] According to the U.S. Department of Justice, "[a]s many as 1 in 4 girls and 1 in 20 boys experience sexual abuse before age 18."[26]

In sum, the unquantified benefits to families include improved mental health because children and parents will no longer need to suffer from anxiety related to their separation on the plane or worry that separated children would be sexually assaulted. Another unquantified benefit is the removal of potential safety hazards coming from parents trying to reach their separated children in the case of an emergency.

Passengers who do not travel with children will likely also experience unquantified benefits if family seating fees are prohibited. In the status quo, some of these travelers are seated next to children who are separated from their parents. If the separated children suffer anxiety and react physically, the passengers seated next to them will likely be affected. The benefit to other

[24] See https://www.fbi.gov/news/stories/raising-awareness-about-sexual-assault-aboard-aircraft-042618 .
[25] See https://www.afacwa.org/metoo#a1 .
[26] See https://www.nsopw.gov/en/SafetyAndEducation/QuestionsAndAnswers .

travelers of eliminating the anxiety experienced by separated children is difficult to quantify. Outside the US, AirAsia X and Singapore-based Scoot offer child-free zones on some of their flights, and the European Corendon Airlines recently announced that it would introduce child-free zones in November 2023.[27] In its announcement, Corendon set the price of reserving a seat in the child-free zone at $48, which would be charged in addition to the ticket price.

3.2. Time Savings

Families will save time if they no longer need to contact the airline or a gate agent to obtain seats together. Currently, Delta, Hawaiian, JetBlue, and United Airlines do not automatically guarantee free family seating but state that they will make an effort to seat families together. These airlines recommend contacting the airline as soon as possible after booking to make seat reservations. Allegiant and Spirit also do not offer free family seating and recommend that families who have not purchased seat assignments contact a gate agent at the airport.

Airline call center wait times vary and are typically longer during busy travel periods or when an airline has experienced weather-related or other disruptions to its network. In recent years, it was not uncommon for travelers to report wait times of several hours.[28] Complaints received by USDOT mention "hours spent trying to get a hold of their customer service" and "[a]fter waiting for over an hour and thirty minutes, I finally spoke with a rep over the phone". Even if passengers are able to avoid long wait times, it will take some time to receive the seat assignments from the airline.

4. Transfers (Distributional Effects)

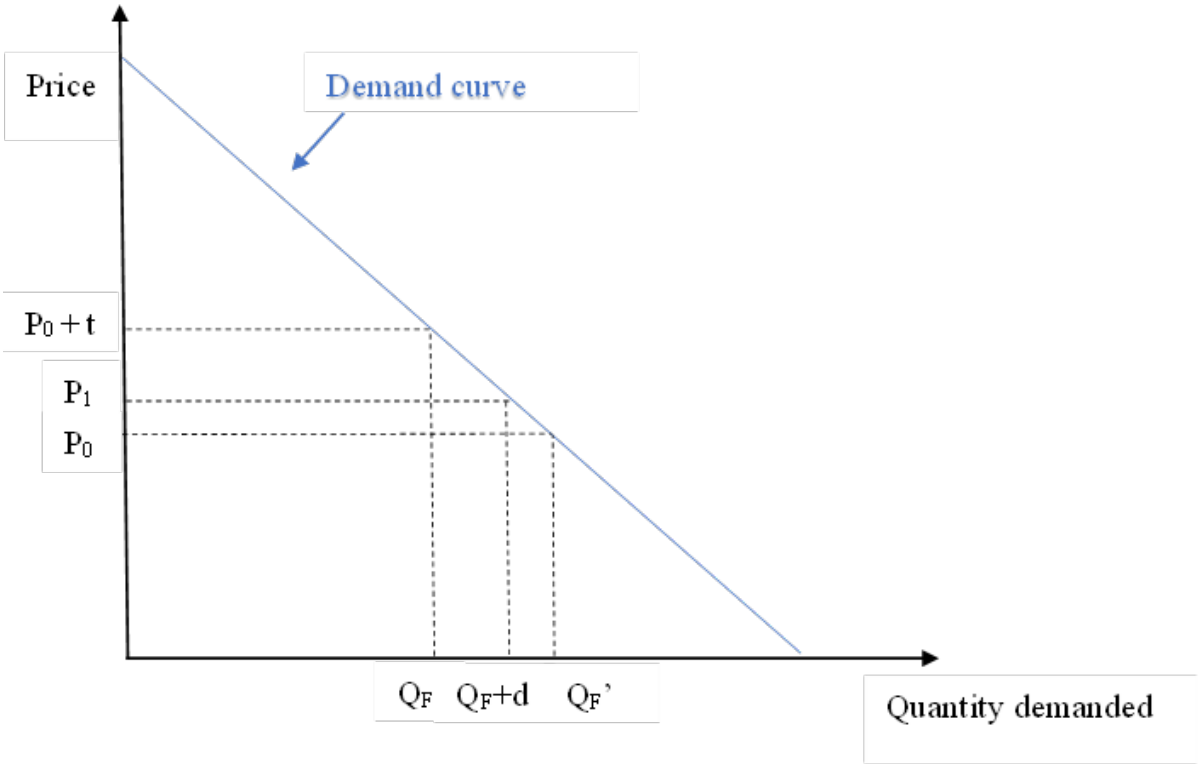
Transfers or distributional effects will arise, for example, if ticket prices or flight offerings change due to the prohibition of family seating fees. For the analysis of distributional effects, I assume that a prohibition against family seating fees does not affect the number of flights or seats being offered and that the supply of airline tickets will remain constant.

However, it is quite likely that a change in family seating policies will affect ticket prices. This is because for families with children under the age of 14 the cost of flying will be reduced.

[27] https://www.airlineratings.com/news/child-free-zones-which-airlines-guarantee-a-child-free-flight , https://www.insider.com/airline-launches-child-free-zones-on-flights-for-48-dollars-2023-8 and https://www.travelandleisure.com/corendon-airlines-child-free-zone-7963992 .
[28] See, for example, https://www.washingtonpost.com/travel/tips/airline-customer-service-hold-times/ and https://www.wsj.com/articles/airline-customer-service-wait-times-11650999776 .

Consequently, one would expect that – if ticket prices remained the same – the quantity of airline tickets demanded by families would increase. This effect is illustrated in Figure 1.

Figure 1: Air Travel Demand from Families



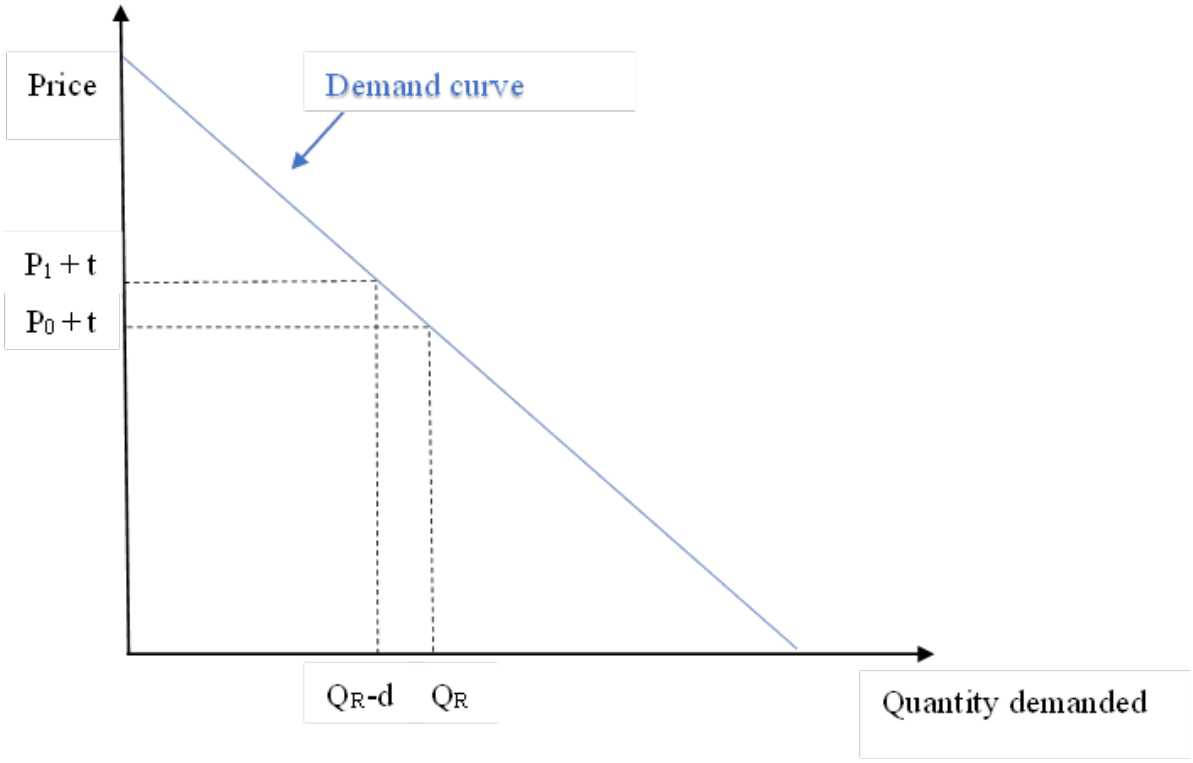
The figure shows the demand curve for families. Prior to the policy change, families who are purchasing seat reservations pay a price of $p_0 + t$, where p_0 is the ticket price, not including a seat reservation, and t is the seat reservation fee. The number of tickets purchased by these travelers is Q_F.

If the ticket price did not adjust, then these travelers would pay p_0 if they no longer needed to pay a seating fee. The quantity demanded by these travelers would then be Q_F'. This quantity is greater than Q_F.

Figure 2 illustrates the demand from travelers who are not directly affected by the elimination of family seating fees. These travelers need to continue to pay seat reservation fees because they do not meet the criteria for free seating. The figure shows that under the status quo, these passengers pay a price of $p_0 + t$ when they purchase advance seat reservations. The quantity

demanded by these passengers is Q_R. Without any price adjustments, the quantity demanded by these travelers would not change.

Figure 2: Demand from Other Travelers



Increased demand from passengers who travel as a family will put upward pressure on equilibrium prices. If the supply of airline tickets remains constant, then a market equilibrium is reached once the ticket price has increased far enough so that the quantity demanded at the new price is equal to the supply of airline tickets.

As the price of airline tickets increases, demand from passengers who do not travel with children will decrease. This is because these travelers will not experience any cost savings due to the elimination of family seating fees, but they will be subject to higher ticket prices for air travel. A new equilibrium is reached when the increase in the number of passengers who travel as part of a family (and therefore benefit from the elimination of seating fees) is equal to the decrease in the number of other travelers (who no longer want to travel due to the increase in ticket prices).

In the figures, this new equilibrium price is p_1. Traveling families will pay p_1 and receive free advance seat reservations, and other travelers will pay p_1 + t when they purchase seat

reservations. In the new equilibrium, the quantity demanded by families will be $Q_F + d$ and the quantity demanded by other travelers will be $Q_R - d$. The total quantity will equal $Q_F + Q_R$, both before and after the elimination of family seating fees.

Appendix 3 shows how to calculate the price increase, $p_1 - p_0$, in this setting. The price increase will depend on the percentage of travelers who are making advance seat reservations. As shown in Appendix 3, if the proportion of travelers making advance seat reservations ranges from 37% to 100%, then the average price increase will range from $0.85 to $2.46 per direction for domestic travelers and between $1.93 and $5.55 for international travelers. Given the average one-directional ticket prices of $248.64 for domestic travel and $560.68 for international travel in the first quarter of 2023 (see Appendix 3), these price changes are equivalent to **price increases between 0.34% and 1%.**

Passengers who travel as a family and purchase advance seat reservations would benefit from the elimination of family seating fees despite the ticket price increase because these travelers would no longer have to pay for seat reservations. Given the average seat reservation fee of $25.49 for domestic travelers, travelers in the target population will benefit from a reduction in their full ticket price (including seat reservations) of between $23.03 and $24.64 for domestic travelers and between $51.82 and $55.44 for international travelers. This is equivalent to an average **price reduction of between 9.3% and 9.9%.**

The change in the number of travelers in each group will depend on the price elasticity of demand (see Appendix 3). As reported in the appendix, estimates of the price elasticity of demand for air travel range from -0.6 to -2.0. This implies that the elimination of family seating fees would lead to an increase in the number of passengers traveling as families (children under 14 and the accompanying adults) of between 5.6% and 19.8%. The elimination of family seating fees would lead to a reduction in other travelers of between 0.2% and 2.0%. As explained in Appendix 3, the absolute number of travelers would remain the same because the increase in the number of affected travelers would equal the decrease in the number of other travelers (in absolute value).

The estimated impact of a prohibition of family seating fees on consumer surplus and airline revenue is shown in detail in Appendix 4. Tables 5 and 6 repeat the information from Tables 1 and 2 in the Executive Summary. These tables summarize the estimated impacts on consumer surplus and airline revenue for a medium level of the price elasticity of demand (-1.17 for domestic travel and -0.6 for international travel). Sensitivity analyses that vary the price elasticity of demand are shown in Appendix 4.

The estimates presented in Tables 5 and 6 are annual changes, calculated for a single year (2022). As explained above, the elimination of family seating fees would benefit families traveling with children under 14, while other travelers would experience a price increase and be negatively affected. There are likely also non-quantifiable benefits to families and to other travelers. These non-quantifiable benefits are not included in the calculations presented in Tables 5 and 6 and in Appendix 4.

Airlines would lose some of their seat reservation revenues, although these losses would be offset to some extent by the higher ticket prices that airlines would be able to charge. Airlines would also have to pay the fixed costs of implementing the changes. These fixed costs are not included in the calculations presented in Tables 5 and 6 and in Appendix 4.

The appendix shows calculations for a range of different price elasticities of demand found in the academic literature. All calculations are done for a scenario in which all passengers purchase seat reservations in the status quo, as well as a scenario in which 37% of travelers purchase seat reservations in the status quo, as estimated from the 2022 Skyscanner survey.

Table 5: Estimated Change in Consumer Surplus and Airline Revenue if all Travelers Purchase Seat Reservations (in millions)

	Domestic Travelers		**International Travelers on US Carriers**		**Net Effect**
	Target Population	Other Travelers	Target Population	Other Travelers	
Change in Consumer Surplus (millions)	1,757.56	-1,666.44	520.99	-514.57	97.55
Change in Airline Revenue (millions)	120.15	-302.40	-228.89	208.29	-202.85

Table 5 shows estimates assuming that the price elasticity of demand is at a medium level (-1.17 for domestic travelers and -0.6 for international travelers) and all travelers purchase seat reservations. This is a benchmark case in which a prohibition of family seating fees would have the largest impact on prices. In this case, passengers in the target population would gain an estimated $2.28 billion in consumer surplus compared to the status quo ($1.76 billion from domestic travel and $521 million from international travel). Other travelers would lose consumer surplus compared to the status quo because the elimination of the family seating would raise the prices of airline tickets. The estimated loss to other travelers is $2.18 billion ($1.67 billion from domestic travel and $515 million from international travel). The net impact on overall consumer surplus would be an improvement of $97 million.

Table 5 also shows that airlines are estimated to lose $203 million in revenues as a result of the prohibition of family seating fees. Appendix Table B-1 shows more details on these calculations, and Appendix Table B-3 shows a sensitivity analysis under different price elasticities of demand.

Table 6 shows summary results for a scenario in which 37% of travelers purchase seats in the status quo (based on the 2022 Skyscanner survey). The calculations assume that the price elasticity of demand is at a medium level (-1.17 for domestic travelers and -0.6 for international travelers). Appendix Table B-2 shows the calculations in detail. **The estimated increase in consumer surplus for travelers in the target population who purchase seats in the status quo is $910 million per year ($698 million from domestic travel and $212 from international travel). All other travelers on US carriers, including travelers in the target population who do not purchase seats in the status quo, would experience a combined reduction in consumer surplus of $811 million per year.** The reduction in consumer surplus for these travelers is due to the increase in ticket prices and the reduction in the number of travelers from this group. Fewer passengers in this group travel if family seating fees are prohibited because of the increase in ticket prices resulting from the prohibition.

The net impact on consumer surplus across all groups would be an increase of $99 million per year. These estimates do not include non-quantifiable benefits. Airline revenues are estimated to fall by $85 million in this scenario.

Appendix Table B-4 shows a sensitivity analysis with different levels of the price elasticity of demand. In general, the higher the price elasticity of demand, the larger will be the impact of a prohibition of family seating fees on consumer surplus and airline revenues. This is because, under higher price elasticities, consumers react more strongly to changes in ticket prices and fees.

If the price elasticity of demand is at the low end (-0.8 for domestic travelers and -0.6 for international travelers), then passengers in the target population who travel on US carriers and purchase seats in the status quo are estimated to experience an increase in consumer surplus of $894 million per year. All other travelers would lose an estimated $812 million per year in consumer surplus. The net impact on overall consumer surplus would be and improvement of $82 million per year. US airlines would lose an estimated $73 million per year in revenue.

Under a very high price elasticity (-2.0 for all travelers), passengers in the target population who travel on US carriers and purchase seats in the status quo are predicted to experience an increase in consumer surplus of $942 million. The combined loss in consumer surplus for all other travelers would be $810 million per year. The net increase in overall consumer surplus would be $132 million. US airlines would lose an estimated $109 million in revenues per year.

Overall, a prohibition of family seating fees is estimated to benefit families who purchase seats in the status quo and reduce consumer surplus for other travelers due to higher ticket prices. Despite the predicted increase in ticket prices, the net effect on airline revenues is estimated to be negative due to the loss in seat reservation revenues from families.

Table 6: Estimated Change in Consumer Surplus and Airline Revenue if 37% of Travelers Purchase Seat Reservations

	Target Population		Other Travelers	
	Purchasing Seats	**Not Purchasing Seats**	**Purchasing Seats**	**Not Purchasing Seats**
	Domestic Travelers			
Change in Consumer Surplus (millions)	697.95	-39.15	-215.03	-366.07
Change in Airline Revenue (millions)	43.01	-6.83	-37.41	-63.83
	International Travelers on US Carriers			
Change in Consumer Surplus (millions)	212.18	-11.89	-66.37	-112.99
Change in Airline Revenue (millions)	13.07	-2.07	-11.55	-19.7
	Net Effect			
Change in Consumer Surplus (millions)	98.63			
Change in Airline Revenue (millions)	-85.31			

E. APPENDIX 1: List of Abbreviations

ARM	Airline Retailing Maturity
ATS	American Travel Survey
BTS	Bureau of Transportation Statistics
EDIFACT	Electronic Data Interchange for Administration, Commerce and Transport
GDS	Global Distribution System
IATA	International Air Transport Association
NDC	New Distribution Capability
SEC	Securities and Exchange Commission
US	United States
USDOT	United States Department of Transportation

F. APPENDIX 2: List of Data Sets Used

Name of Data Set	Source	Website Link
1990 Census of Population, General Population Characteristics	US Census Bureau	https://www.census.gov/library/publications/1992/dec/cp-1.html
2000 Census of Population and Housing, Profiles of General Demographic Characteristics	US Census Bureau	https://www.census.gov/library/publications/2001/dec/2kh.html
2020 Decennial Census of Population and Housing, Table DP1 - Profile of General Demographic and Housing Characteristics	US Census Bureau	https://data.census.gov/table?q=DP1&g=010XX00US$0300000&y=2020
Air Carrier Financial Reports (Form 41 Financial Data), Schedule P-1.2	BTS	https://www.transtats.bts.gov/Fields.asp?gnoyr_VQ=FMI
Air Carrier Statistics (Form 41 Traffic) T-100	BTS	https://www.transtats.bts.gov/Tables.asp?QO_VQ=EEE
American Travel Survey	BTS	https://www.transtats.bts.gov/Tables.asp?QO_VQ=IDI
US Family Travel Survey 2022	Family Travel Association, Dr. Lynn Minneart, NYU School of Professional Studies	https://www.researchgate.net/publication/364736098_US_FAMILY_TRAVEL_SURVEY_2022

G. APPENDIX 3: Calculating the Price Change as a Result of a Family Seating Fee Prohibition

If implemented, a prohibition against family seating fees will reduce the effective price paid by travelers in the target population who would have purchased a seat in the absence of the policy. Following the law of demand, this implies that the quantity of airline tickets demanded by travelers in the target population will increase (lower price implies higher quantity demanded).

This appendix shows the calculations for finding the new equilibrium price, under the assumption that the supply of seats is not affected by the policy change. If the supply is fixed and the quantity demanded increases, then the price must increase to equilibrate supply and demand.

I will show how to calculate the new equilibrium price under two different assumptions. First, I will assume that all travelers purchase advance seat reservations in the baseline. This assumption simplifies the calculations and is helpful as an illustration of the predicted price effects. This scenario yields the highest possible price increase in this model.

The second assumption is, more realistically, that travelers in the target population and other travelers purchase advance seat reservations at the rate of 37% in the status quo. This rate is based on the Skyscanner survey from 2022 (see Section C.2 of the main text).

Scenario #1: All Travelers Purchase Seat Reservations in the Baseline

The quantity response to a given price decrease or increase is given by the price elasticity of demand for the product. The price elasticity of demand is defined as the percent change in the quantity demanded as the result of a one percent increase in the price. Because of the law of demand (price increases lead to a reduction in quantity demanded), the price elasticity of demand must be negative.

There are several studies examining price elasticities of demand in the US airline industry. A study conducted by InterVISTAS for IATA in 2007 found price elasticities ranging from -1.2 to -1.5 and recommended using a value of -1.4.[29] The study was based on USDOT's Databank 1A data from 1994 to 2005. Berry and Jia (2010) used the USDOT's Databank 1B to estimate price elasticities for the years 1999 and 2006.[30] They found elasticities ranging from -1.6 to -2.0 in 2006, with a preferred value of -1.7. For 1999, the range of elasticities was -1.4 to -1.7 with a preferred value

[29] InterVISTAS Consulting Inc. (2007), "Estimating Air Travel Demand Elasticities, Final Report", Prepared for IATA.
[30] Steven Berry and Panle Jia (2010), "Tracing the Woes: An Empirical Analysis of the Airline Industry", *American Economic Journal: Microeconomics* 2, 1-43.

of -1.6. Mumbower *et al.* (2014) estimated elasticities based on online price and booking data from 2010 and found elasticities of -1.3 at the median price and -2.0 at the mean price.[31]

As reported in the Regulatory Impact Analysis for Accessible Lavatories on Single-Aisle Aircraft (RIN 2105-AE89), other studies have found that the price elasticity of demand for air travel is between 0.8 and 1.54 for domestic travel and between 0.6 and 0.66 for international travel. Here, elasticities are reported in absolute value.[32] The report uses the values of 1.17 for domestic travel and 0.6 for international travel as the preferred values and conducts sensitivity analyses for lower and higher elasticities. I will use the same range of values here to calculate the economic impact of prohibiting family seating fees. Additionally, I will show estimates for an elasticity of -2.0, as found in some of the recent studies.

Before getting into the calculations, let us define some necessary variables and parameters:

- p_0: The average price of an airline ticket (without seat reservations) in the baseline
- p_1: The average price of an airline ticket (without seat reservations) if family seating fees were prohibited
- t: The average seat reservation fee
- d: The increase in the number of airline tickets demanded by travelers in the target population if family seating fees were prohibited
- Q_F: The number of tickets sold to travelers in the target population in the baseline
- Q_R: The number of tickets sold to other travelers in the baseline
- e: The price elasticity of demand

Because the number of available tickets is assumed to be unaffected by a prohibition of family seating fees, it must be true that the *increase* in the number of airline tickets demanded by travelers in the target population after the prohibition of these fees is equal (in absolute value) to the *decrease* in the quantity of airline tickets demanded by other travelers. Then, the total number of tickets demanded will remain the same, but the identity of some of the travelers will change (i.e., more travelers in the target population and fewer other travelers). The ticket price will increase to equilibrate supply and demand, but travelers in the target population will experience a lower effective price than in the baseline because they will no longer pay for advance seat reservations.

[31] Stacey Mumbower, Laurie A. Garrow, and Matthew J. Higgins, "Estimating flight-level price elasticities using online airline data: A first step toward integrating pricing, demand, and revenue optimization", *Transportation Research Part A* 66, 196-212.

[32] Price elasticities of demand are negative values due to the Law of Demand: As the price of a product falls, the quantity demanded of the product increases. It is common in the economics discipline to report price elasticities of demand in absolute value, i.e., as positive numbers.

By definition, the price elasticity of demand is equal to the percent change in quantity demanded divided by the percent change in the price. We can use existing estimates of the price elasticity of demand to predict how the quantity demanded will respond to a price change.

The percent change in the quantity demanded by travelers in the target population is equal to d/Q_F. The percent change in price for these travelers is $(p_1 - p_0 - t)/(p_0 + t)$. This is because these travelers pay $p_0 + t$ in the baseline and they will pay p_1 if family seating fees are prohibited.

For other travelers, the percent change in the quantity demanded is equal to $-d/Q_R$. This is because the increase in travelers in the target population, d, must be equal in absolute value to the decrease in other travelers, -d. The percent change in price for these other travelers is $(p_1 - p_0)/(p_0 + t)$. These travelers pay $p_0 + t$ in the baseline and will pay $p_1 + t$ if family seating fees are prohibited.

It must then be true that:

$$e = \frac{\frac{d}{Q_F}}{\frac{p_1 - p_0 - t}{p_0 + t}} = \frac{\frac{-d}{Q_R}}{\frac{p_1 - p_0}{p_0 + t}}$$

This expression simplifies to:

$$\frac{p_1 - p_0}{Q_F} = \frac{t}{Q_R} - \frac{p_1 - p_0}{Q_R}$$

The predicted price increase, $(p_1 - p_0)$, is therefore equal to:

$$p_1 - p_0 = \frac{t * Q_F}{Q_F + Q_R}$$

For domestic travelers, we can calculate the predicted price change as follows, based on the estimates presented in the main text: I calculate in the main text that the average seating fee, t, is equal to $25.49. The number of domestic travelers in the target population, Q_F, is equal to 72.75 million, and the number of other domestic travelers, Q_R, is equal to 680.2 million. This implies a predicted price increase for domestic travelers of $2.46 if family seating fees are prohibited. This is the price of a ticket for one direction of travel, not including advance seat reservations.

In the first quarter of 2023, 39% of domestic tickets were one-way tickets with an average price of $277 and the remaining 61% were roundtrip tickets with an average price of $461.[33] The weighted average price for a one-directional ticket is given by the share of tickets that were one-way times the price of those tickets plus the share of tickets that were roundtrip times one-half the price of those tickets. This weighted average is $248.64. This comes from the following calculation: 0.39*$277 + 0.61*0.5*$461 = $248.635, which is rounded to $248.64.

The $2.46 price increase would apply for each direction of a roundtrip flight, i.e., it needs to be applied to one-half of the price of a roundtrip ticket. The average percentage increase in ticket prices would be given by $2.46 divided by $248.64. This is equal to approximately a 1 percent price increase.

For international travelers, there is limited information on ticket prices. I use data from the FAA Aerospace Forecast[34] to estimate average ticket prices and seating fees for international travelers. Table 16 in the FAA forecast reports that, in 2022, the revenue per passenger mile was 15.58 cents for domestic travel and 15.33 cents for international travel. According to Table 10 in the report, domestic revenue passenger miles in 2022 were 633 billion and international passenger miles were 211 billion. This implies total domestic revenue of $98.6 billion (calculated from $0.1558 per passenger mile times 633 billion passenger miles) and total international revenue of $32.3 billion (calculated from $0.1533 per passenger mile times 211 billion passenger miles). Total domestic enplanements were 612 million and total international enplanements were 89 million. From these numbers, one can calculate the domestic revenue per enplanement as $161.15 and the international revenue per enplanement as $363.44.

The ratio of international revenue per enplanement to domestic revenue per enplanement is $363.44/$161.15 = 2.255. I apply this ratio to the average domestic ticket price (for traveling in one direction) calculated above to estimate the international ticket price as $248.64*2.255 = $560.68. I apply the same ratio to the average seating fee for domestic travel to estimate the average seating fee for international travel as $25.49*2.255 = $57.48.

We can now calculate the predicted price change for international travelers from the formula above. The number of international travelers in the target population, Q_F, is equal to 18.114 million. Of those, 9.807 million travel on US carriers and 8.307 million travel on foreign carriers.[35] The number of other international travelers, Q_R, is equal to 169.57 million. 93.21 million of these travelers fly on US carriers and the remaining 76.36 million travel on foreign carriers. The predicted price increase for international travelers if family seating fees are prohibited is $5.55.

[33] See https://www.bts.gov/newsroom/first-quarter-2023-average-air-fare-decreases-41-fourth-quarter-2022.
[34] See https://www.faa.gov/dataresearch/aviation/aerospaceforecasts/faa-aerospace-forecast-fy-2023-2043.
[35] I include international travelers on foreign airlines in this calculation because, on international routes, flights on foreign airlines are a substitute for flights on US carriers.

This is the price of a ticket for one direction of travel, not including advance seat reservations.[36] The price increase is approximately equal to 1 percent of the ticket price.

Scenario #2: 37% of Affected and of Unaffected Travelers are Purchasing Seat Reservations in the Baseline

We will define variables and parameters as above, with the exception of the change in the quantity demanded, d. This is because we now need to distinguish four different groups of travelers:

- Group A: Travelers in the target population who are purchasing seat reservations in the baseline
- Group B: Travelers in the target population who are *not* purchasing seat reservations in the baseline
- Group C: Other travelers who are purchasing seat reservations in the baseline
- Group D: Other travelers who are *not* purchasing seat reservations in the baseline

Group A will experience an effective price reduction due to an elimination of family seating fees because they will no longer have to purchase seat reservations. All other groups experience no change in their expenditures for seat reservations – either because they were not purchasing them in the first place (groups B and D) or because they still have to pay for seat reservations (group C) – but will experience an increase in the ticket price if family seating fees are eliminated. It follows, then, that group A will increase its demand for airline tickets and all other groups will decrease their demand for airline tickets. Moreover, the increase in demand from group A must equal the decrease from the three other groups combined (in absolute value).

We will label the increase in demand from group A d_A and the decreases in demand from the other three groups $-d_B$, $-d_C$, and $-d_D$.

We will further use the parameter s to denote the share of travelers buying seat reservations. In our case, s is equal to 0.37 or 37%.

Using the definition of the price elasticity of demand, we can write down the four following equations.

For Group A:

$$e = \frac{\frac{d_A}{sQ_F}}{\frac{p_1 - p_0 - t}{p_0 + t}}$$

[36] For international travel it is common that one-way tickets are substantially more expensive than one half of a roundtrip ticket. This estimate is a weighted average of one-way and roundtrip tickets.

For Group B:

$$e = \frac{\frac{-d_B}{(1-s)Q_F}}{\frac{p_1 - p_0}{p_0}}$$

For Group C:

$$e = \frac{\frac{-d_C}{sQ_R}}{\frac{p_1 - p_0}{p_0 + t}}$$

For Group D:

$$e = \frac{\frac{-d_D}{(1-s)Q_F}}{\frac{p_1 - p_0}{p_0}}$$

Given that $d_A = -d_B - d_C - d_D$, one can show that

$$(p_1 - p_0) * \left(\frac{sQ_F}{p_0 + t} + \frac{sQ_R}{p_0 + t} + \frac{(1-s)(Q_F + Q_R)}{p_0} \right) = t * \frac{sQ_F}{p_0 + t}$$

Using the values for these quantities in our setting, one can calculate that, for domestic travelers, the implied price increase, ($p_1 - p_0$), is equal to \$0.85. In percentage terms, this would be approximately a 0.34 percent price increase. For international travelers, the implied price increase is equal to \$1.93, which is also a 0.34 percent price increase.

H. APPENDIX 4: Estimated Impact on Consumer Surplus and Airline Revenues

In this appendix, I estimate the impact of a prohibition of family seating fees on consumer surplus and airline revenues. The estimates in this appendix are annual numbers, calculated for a single year (2022). The estimates are based on annual passenger numbers presented in the main text of the report and the predicted price increases shown in Appendix 3. I show how consumer surplus and revenues would be impacted under a range of different demand elasticities. The calculations shown here only include quantifiable impacts of a family seating fee prohibition. Non-quantifiable impacts are not included in these calculations, but they may nevertheless be important.

Figures 1 and 2 in the main text show the demand for air travel and illustrate how a change in the price of airline tickets would affect the quantity demanded. Figure 1 shows this for travelers in the target group, and Figure 2 shows the effect on other travelers.

Consumer surplus is represented in the figures as the area under the demand curve and above the price that consumers pay. If the demand curve is linear, then the consumer surplus is given by the area of a triangle. In other cases, the consumer surplus can be computed using integration. In general, the consumer surplus depends on the shape of the demand curve. For my calculations, I will assume that the demand curve is linear.

Effect on the Target Population:

Families traveling with children under the age of 14 who pay for advance seat reservations in the status quo would experience a net price reduction if family seating fees were prohibited. Even though prices for tickets without seat reservations would increase, the savings that these travelers experience from receiving free seat reservations exceeds the price increase, resulting in a net price reduction. These families would experience an increase in their consumer surplus. Part of this increase would come from the reduction in the price paid by families who would have flown even if they had to pay for advance seat reservations. The remaining increase in consumer surplus comes from families who would not travel if they had to pay for advance seat reservations but would travel if they did not have to pay for seat reservations.

Effect on Other Travelers:

All other travelers would experience a decrease in their consumer surplus. This group includes passengers who do not travel with children and families who do not pay for seat reservations in

the status quo.[37] The decrease in consumer surplus results from the price increase that these travelers would experience. Part of the decrease in consumer surplus comes from passengers who purchase tickets even after the price increase and now pay a higher price for their ticket. The remaining decrease in consumer surplus comes from passengers who choose to no longer travel because of the price increase.

Effect on Airlines:

Airlines would experience a change in their revenue if family seating fees were prohibited. I assume that the number of travelers would not change. The price of a ticket that does not include seat reservations would increase, positively impacting airline revenues. However, the airlines would lose the revenues from seat reservation fees for families. I calculate the net impact on airline revenues under different values of the price elasticity of demand.

Calculations:

Table B-1 shows the estimated impact of a family seating fee prohibition for the scenario in which all travelers purchase seat reservations. In this table, I assume a price elasticity of -1.17 for domestic travelers and -0.6 for international travelers. The table summarizes the status quo quantities and prices for the target population and other travelers, both domestically and internationally. One can calculate the percent price change for the target population and then apply the price elasticity of demand to estimate the percent quantity change for this population. From this estimate, one can calculate the change in the number of passengers from the target population that would result if family seating fees were prohibited. This is shown as "Quantity Change" in the table.

Keeping the total number of travelers constant requires that the additional number of travelers in the target population is equal to the reduction in the number of other travelers. This is reflected in the "Quantity Change" row in the table. The table shows the changes in consumer surplus for each group, as well as the change in revenue from the group.

Table B-2 shows the same calculations for the scenario in which 37% of travelers in each group purchase seat reservations in the status quo. Panel A shows domestic travelers, Panel B shows international travelers on US carriers, and Panel C shows international travelers on foreign carriers.

Tables B-3 and B-4 present sensitivity analyses for different values of the price elasticity of demand. Table B-3 considers the case in which all travelers purchase seats in the status quo, and Table B-4 assumes that 37% of travelers purchase seats in the status quo. The estimates use

[37] These families may experience non-quantifiable benefits which are not included in these calculations.

elasticities ranging from -0.8 to -2.0 for domestic travelers and from -0.6 to -2.0 for international travelers. The "medium elasticity" scenario (-1.17 domestic and -0.6 international) is the one shown in Tables B-1 and B-2.

Tables B-3 and B-4 show estimated changes in consumer surplus and airline revenue. Table B-3 breaks out estimates for domestic travelers, international travelers on US carriers, and international travelers on foreign carriers. Table B-4 additionally breaks out the estimates for travelers who buy seats in the status quo and those who do not buy seats in the status quo.

In all cases, the estimated change in consumer surplus is positive for travelers in the target population who purchase seat reservations in the status quo and negative for other travelers. These changes are partly due to price effects (travelers in the target population face lower prices if family seating fees are prohibited, while other travelers face higher prices) and partly due to quantity effects (more travelers in the target population will choose to travel if family seating fees are prohibited and some of the other travelers will no longer travel).

The changes in revenue are sometimes positive and other times negative. These changes depend both on the price change and the change in the number of travelers in each group.

Table B-1: Estimated Change in Consumer Surplus and Airline Revenue if all Travelers Purchase Seat Reservations

	Domestic Travelers		International Travelers on US Carriers		International Travelers on Foreign Carriers	
	Target Population	Other Travelers	Target Population	Other Travelers	Target Population	Other Travelers
Quantity in Status Quo (millions)	72.75	680.20	9.81	93.21	8.31	76.36
Price in Status Quo (dollars)	274.13	274.13	618.16	618.16	618.16	618.16
Price with Prohibition (dollars)	251.10	276.59	566.23	623.71	566.23	623.71
Percent Price Change	-8.40%	0.90%	-8.40%	0.88%	-8.40%	0.91%
Price Elasticity of Demand	-1.17	-1.17	-0.6	-0.6	-0.6	-0.6
Percent Quantity Change	9.83%	-1.05%	9.83%	-1.03%	9.83%	-1.07%
Quantity Change (millions)	7.15	-7.15	0.49	-0.49	0.42	-0.42
Quantity with Prohibition (millions)	79.90	673.05	10.30	92.71	8.73	75.94
Change in Consumer Surplus (millions)	1,757.56	-1,666.44	520.99	-514.57	441.29	-421.53
Change in Airline Revenue (millions)	120.15	-302.40	-228.89	208.29	-193.88	162.11

Table B-2: Estimated Change in Consumer Surplus and Airline Revenue if 37% of Travelers Purchase Seat Reservations

Panel A: Domestic Travelers

	Domestic Travelers			
	Target Population		Other Travelers	
	Purchasing Seats	Not Purchasing Seats	Purchasing Seats	Not Purchasing Seats
Quantity in Status Quo (millions)	26.92	45.83	251.67	428.52
Price in Status Quo (dollars)	274.13	248.64	274.13	248.64
Price with Prohibition (dollars)	249.50	249.50	274.99	249.50
Percent Price Change	-8.99%	0.34%	0.31%	0.34%
Price Elasticity of Demand	-1.17	-1.17	-1.17	-1.17
Percent Quantity Change	10.51%	-0.40%	-0.37%	-0.40%
Quantity Change (millions)	2.83	-0.18	0.98	1.67
Quantity with Prohibition (millions)	29.75	45.65	250.75	426.80
Change in Consumer Surplus (millions)	697.95	-39.15	-215.03	-366.07
Change in Airline Revenue (millions)	43.01	-6.83	-37.41	-63.83

Panel B: International Travelers on US Carriers

	International Travelers on US Carriers			
	Target Population		Other Travelers	
	Purchasing Seats	Not Purchasing Seats	Purchasing Seats	Not Purchasing Seats
Quantity in Status Quo (millions)	3.63	6.18	34.49	58.72
Price in Status Quo (dollars)	618.16	560.68	618.16	560.68
Price with Prohibition (dollars)	562.61	562.61	620.09	562.61
Percent Price Change	-8.99%	0.34%	0.31%	0.34%
Price Elasticity of Demand	-0.6	-0.6	-0.6	-0.6
Percent Quantity Change	10.51%	-0.40%	-0.36%	-0.40%
Quantity Change (millions)	0.38	-0.02	0.13	0.22
Quantity with Prohibition (millions)	4.01	6.15	34.36	58.48
Change in Consumer Surplus (millions)	212.18	-11.89	-66.37	-112.99
Change in Airline Revenue (millions)	13.07	-2.07	-11.55	-19.70

Panel C: International Travelers on Foreign Carriers

	International Travelers on Foreign Carriers			
	Target Population		Other Travelers	
	Purchasing Seats	Not Purchasing Seats	Purchasing Seats	Not Purchasing Seats
Quantity in Status Quo (millions)	3.07	5.23	28.25	48.11
Price in Status Quo (dollars)	618.16	560.68	618.16	560.68
Price with Prohibition (dollars)	562.61	562.61	620.09	562.61
Percent Price Change	-8.99%	0.34%	0.31%	0.34%
Price Elasticity of Demand	-0.6	-0.6	-0.6	-0.6
Percent Quantity Change	10.51%	-0.40%	-0.36%	-0.40%
Quantity Change (millions)	0.32	-0.02	0.11	0.19
Quantity with Prohibition (millions)	3.40	5.21	28.15	47.91
Change in Consumer Surplus (millions)	179.72	-10.07	-54.38	-92.57
Change in Airline Revenue (millions)	11.07	-1.76	-9.46	-16.14

Table B-3: Sensitivity Analysis (Assuming that all Travelers Purchase Seat Reservations)

	Domestic Travelers	**International Travelers on US Carriers**	**Total on US Carriers**	International Travelers on Foreign Carriers
Elasticity (Low)	***-0.8***	***-0.6***		*-0.6*
Travelers in the Target Population				
Change in Consumer Surplus (Millions)	1,731.5	521.0	**2,252.5**	441.3
Change in Airline Revenue (Millions)	-447.6	-228.9	**-676.5**	-193.9
Other Travelers				
Change in Consumer Surplus (Millions)	-1,669.2	-514.6	**-2,183.8**	-421.5
Change in Airline Revenue (Millions)	323.0	208.3	**531.3**	162.1
Elasticity (Medium)	***-1.17***	***-0.6***		*-0.6*
Travelers in the Target Population				
Change in Consumer Surplus (Millions)	1,757.6	521.0	**2,278.6**	441.3
Change in Airline Revenue (Millions)	120.1	-228.9	**-108.7**	-193.9
Other Travelers				
Change in Consumer Surplus (Millions)	-1,666.4	-514.6	**-2,181.0**	-421.5
Change in Airline Revenue (Millions)	-302.4	208.3	**-94.1**	162.1
Elasticity (High)	***-1.54***	***-0.66***		*-0.66*
Travelers in the Target Population				
Change in Consumer Surplus (Millions)	1,783.6	522.3	**2,305.9**	442.4
Change in Airline Revenue (Millions)	687.9	-201.0	**487.0**	-170.2
Other Travelers				
Change in Consumer Surplus (Millions)	-1,663.7	-514.4	**-2,178.1**	-421.4
Change in Airline Revenue (Millions)	-927.8	177.5	**-750.3**	136.0
Elasticity (Very High)	***-2.0***	***-2.0***		*-2.0*
Travelers in the Target Population				
Change in Consumer Surplus (Millions)	1,816.0	550.9	**2,366.8**	466.6
Change in Airline Revenue (Millions)	1,393.8	422.8	**1,816.6**	358.1
Other Travelers				
Change in Consumer Surplus (Millions)	-1,660.2	-511.4	**-2,171.6**	-418.8
Change in Airline Revenue (Millions)	-1,705.3	-509.5	**-2,214.9**	-445.9

Table B-4: Sensitivity Analysis (Assuming that 37% of Travelers Purchase Seat Reservations)

	Domestic Travelers	**International Travelers on US Carriers**	**Total on US Carriers**	International Travelers on Foreign Carriers
Elasticity (Low)	***-0.8***	***-0.6***		*-0.6*
Travelers in the Target Population, Buying Seats				
Change in Consumer Surplus (Millions)	686.9	206.6	**893.5**	175.0
Change in Airline Revenue (Millions)	-180.3	-91.3	**-271.6**	-77.3
Travelers in the Target Population, Not Buying Seats				
Change in Consumer Surplus (Millions)	-39.2	-11.9	**-51.1**	-10.1
Change in Airline Revenue (Millions)	7.7	4.7	**12.5**	4.0
Other Travelers, Buying Seats				
Change in Consumer Surplus (Millions)	-215.2	-66.3	**-281.4**	-54.3
Change in Airline Revenue (Millions)	42.5	26.4	**69.0**	21.6
Other Travelers, Not Buying Seats				
Change in Consumer Surplus (Millions)	-366.3	-112.9	**-479.2**	-92.5
Change in Airline Revenue (Millions)	72.4	45.0	**117.3**	36.8
Elasticity (Medium)	***-1.17***	***-0.6***		*-0.6*
Travelers in the Target Population, Buying Seats				
Change in Consumer Surplus (Millions)	698.0	206.6	**904.5**	175.0
Change in Airline Revenue (Millions)	43.0	-91.3	**-48.3**	-77.3
Travelers in the Target Population, Not Buying Seats				
Change in Consumer Surplus (Millions)	-39.2	-11.9	**-51.0**	-10.1
Change in Airline Revenue (Millions)	-6.8	4.7	**-2.1**	4.0
Other Travelers, Buying Seats				
Change in Consumer Surplus (Millions)	-215.0	-66.3	**-281.3**	-54.3
Change in Airline Revenue (Millions)	-37.4	26.4	**-11.0**	21.6
Other Travelers, Not Buying Seats				
Change in Consumer Surplus (Millions)	-366.1	-112.9	**-478.9**	-92.5
Change in Airline Revenue (Millions)	-63.8	45.0	**-18.9**	36.8

Table B-4 continued

	Domestic Travelers	**International Travelers on US Carriers**	**Total on US Carriers**	International Travelers on Foreign Carriers
Elasticity (High)	***-1.54***	***-0.66***		*-0.66*
Travelers in the Target Population, Buying Seats				
Change in Consumer Surplus (Millions)	709.0	207.1	**916.1**	175.4
Change in Airline Revenue (Millions)	266.3	-80.3	**186.0**	-68.0
Travelers in the Target Population, Not Buying Seats				
Change in Consumer Surplus (Millions)	-39.1	-11.9	**-51.0**	-10.1
Change in Airline Revenue (Millions)	-21.4	4.0	**-17.4**	3.4
Other Travelers, Buying Seats				
Change in Consumer Surplus (Millions)	-214.9	-66.3	**-281.2**	-54.3
Change in Airline Revenue (Millions)	-117.4	22.4	**-94.9**	18.4
Other Travelers, Not Buying Seats				
Change in Consumer Surplus (Millions)	-365.8	-112.8	**-478.7**	-92.4
Change in Airline Revenue (Millions)	-200.0	38.2	**-161.9**	31.3
Elasticity (Very High)	***-2.0***	***-2.0***		*-2.0*
Travelers in the Target Population, Buying Seats				
Change in Consumer Surplus (Millions)	722.7	219.2	**941.9**	185.7
Change in Airline Revenue (Millions)	543.9	165.0	**708.9**	139.7
Travelers in the Target Population, Not Buying Seats				
Change in Consumer Surplus (Millions)	-39.1	-11.8	**-50.9**	-10.0
Change in Airline Revenue (Millions)	-39.5	-12.0	**-51.5**	-10.1
Other Travelers, Buying Seats				
Change in Consumer Surplus (Millions)	-214.8	-66.1	**-280.9**	-54.2
Change in Airline Revenue (Millions)	-216.8	-66.8	**-283.5**	-54.7
Other Travelers, Not Buying Seats				
Change in Consumer Surplus (Millions)	-365.5	-112.6	**-478.1**	-92.2
Change in Airline Revenue (Millions)	-369.3	-113.7	**-483.1**	-93.2

I. APPENDIX 5: Family Seating Policies of Foreign Carriers

The ten largest foreign carriers operating in the US in 2022 were Air Canada, British Airways, Lufthansa, Volaris, Air France, Westjet, Turkish Airlines, Aeromexico, Emirates, and Virgin Atlantic.[38] Their family seating policies are described below. Statements in quotation marks were copied from the respective airlines' websites.

Air Canada: Families with children under 14 are assigned seats in proximity to each other at no extra charge. If no such seats are available, the reservation can be changed to another flight or canceled at no extra charge.

British Airways: Free advance seat assignment included in all fare classes.

Lufthansa: For most destinations, Lufthansa charges a fee for advance seat reservations. Lufthansa's US website (lufthansa.com) does not list information on family seating, such as whether children will be seated next to an adult in their party. For flights to Italy: "[i]n accordance with the Italian ENAC regulation … you are entitled to an advance seat reservation free of charge if you … are traveling with a child between the ages of 2 and 12."

Volaris: Volaris charges a fee for advance seat reservations. Volaris' US website (volaris.com) does not list information on family seating, such as whether children will be seated next to an adult in their party.

Air France: "We guarantee that children between 2 and 11 years old will be seated next to one of their accompanying adults at the latest on the day of their flight's departure. If you are traveling with children over 2 years old, you can choose your seat when booking your trip or can be seated side by side by an agent at the airport. You will receive side-by-side seating at no extra chose [sic] at the latest on the day of your flight's departure to/from the United States."

Westjet: "All children under 14 will be seated with an adult, for no extra charge. You can select seats for your family when you book your flight to ensure that you will sit together. If you don't see seats together on our seat map, don't worry, it's not too late. If seats are limited, we'll assign seats so children are next to at least 1 adult in your travel group. If it is not possible to assign seats at the time of check-in, when it's time to board, we'll ask for volunteers to change seats so you can sit together. If after two requests no one volunteers, we will try to make accommodations onboard by asking for volunteers to change seats to allow children under 14 to sit with an adult travelling on the same itinerary. If we are still unable to arrange seats for you together, you can choose to sit apart, change to the next available flight that has seats together

[38] Based on total number of passengers reported in Air Carrier Statistics (Form 41 Traffic) T-100 data for 2022. See Appendix 2 for a link to the data set. Air Canada's regional partner, Jazz, is listed as a separate entity in the Form 41 data, but is combined here with Air Canada because Jazz does not sell tickets directly to passengers.

– any difference in fare and change fees will be waived, or cancel your flight for no fee and a full refund to your original form of purchase."

Turkish Airlines: Turkish Airlines charges a fee for advance seat reservations. Turkish Airlines' US website (turkishairlines.com) does not list information on family seating, such as whether children will be seated next to an adult in their party.

Aeromexico: Aeromexico's Basic Economy fare does not include advance seat reservations, but other fare classes do. Aeromexico's US website (aeromexico.com) does not list information on family seating, such as whether children will be seated next to an adult in their party.

Emirates: Emirates offers Basic Economy fares that do not include advance seat reservations, but it states on its US website (emirates.com) that it will seat families together. However, the website does not state any details on how family seating is done for travelers on Basic Economy fares. Other fare classes include advance seat reservations.

Virgin Atlantic: Virgin Atlantic's Basic Economy fare does not include advance seat reservations, but other fare classes do. Virgin Atlantic's US website (virginatlantic.com) does not list information on family seating, such as whether children will be seated next to an adult in their party.

J. Appendix Tables

Appendix Table A-1: Sample Itineraries

Carrier	Itinerary 1	Itinerary 2	Itinerary 3
Alaska	Denver, CO - Oakland, CA	San Francisco, CA - Anchorage, AK	Orlando, FL - Portland, OR
Allegiant	Memphis, TN - Las Vegas, NV	Bloomington, IL - Tampa Bya, FL	Asheville, NC - Sarasota, FL
American	Madison, WI - Washington, DC	Philadelphia, PA - Atlanta, GA	San Antonio, TX - Phoenix, AZ
Delta	Newark, NJ - Kansas City, MO	Denver, CO - Philadelphia, PA	Cincinatti, OH - Fort Myers, FL
Frontier	Cleveland, OH - Miami, FL	Norfolk, VA - Denver, CO	Tampa, FL - Trenton, NJ
Hawaiian	Honolulu, HI - Boston, MA	Oakland, CA - Honolulu, HI	Seattle, WA - Honolulu, HI
JetBlue	Fort Lauderdale, FL - Ontario, CA	Los Angeles, CA - Fort Myers, FL	Boston, MA - Austin, TX
Spirit	Newark, NJ - Tampa, FL	Los Angeles, CA - Nashville, TN	Orlando, FL - Las Vegas, NV
United	Seattle, WA - Albany, NY	Louisville, KY - Washington, DC	Detroit, MI - Denver, CO

Notes:

- Itinerary 1 is at or near the 25th percentile of enplanements for the carrier in 2022. Itinerary 2 is at or near the 50th percentile, and Itinerary 3 is at or near the 75th percentile.
- Enplanements are calculated based on Air Carrier Statistics (Form 41 Traffic) T-100 data (see Appendix 2).

Appendix Table A-2: Affected Travelers in 1995

Census Division	Affected Travelers (1995)	All Travelers (1995)	Affected Travelers in Percent (1995)
New England	957,351	10,215,920	9.37
Middle Atlantic	2,486,409	25,209,759	9.86
East North Central	2,970,405	28,437,183	10.45
West North Central	1,055,775	10,842,806	9.74
South Atlantic	2,965,268	27,649,925	10.72
East South Central	333,929	6,905,637	4.84
West South Central	2,457,339	21,620,115	11.37
Mountain	1,931,974	15,923,988	12.13
Pacific	7,077,455	43,845,007	16.14
Total	**22,235,904**	**190,650,338**	**11.66**

Note: Data are from American Travel Survey (1995), using household-level survey weights.

Appendix Table A-3A: 1990 Census of Population, General Population Characteristics

Table 260: Age and Sex by Race and Hispanic Origin

Census Division	Population under 14	Total Population	Under 14 Share in Percent
New England	2,425,300	13,206,943	18.36
Middle Atlantic	6,963,455	37,602,286	18.52
East North Central	8,629,193	42,008,942	20.54
West North Central	3,717,279	17,659,690	21.05
South Atlantic	8,279,583	43,566,853	19.00
East South Central	3,083,070	15,176,284	20.32
West South Central	5,945,517	26,702,793	22.27
Mountain	3,100,616	13,658,776	22.70
Pacific	8,180,751	39,127,306	20.91
Total	**50,324,764**	**248,709,873**	**20.23**

Appendix Table A-3B: 2000 Census of Population and Housing, Profiles of General Demographic Characteristics

Table DP-1. Profile of General Demographic Characteristics: 2000

Census Division	Population under 14	Total Population	Under 14 Share in Percent
New England	2,604,564	13,922,517	18.71
Middle Atlantic	7,544,824	39,671,861	19.02
East North Central	9,044,309	45,155,037	20.03
West North Central	3,808,013	19,237,739	19.79
South Atlantic	9,807,210	51,769,160	18.94
East South Central	3,319,377	17,022,810	19.50
West South Central	6,721,925	31,444,850	21.38
Mountain	3,832,459	18,172,295	21.09
Pacific	9,465,078	45,025,637	21.02
Total	**56,147,761**	**281,421,906**	**19.95**

Note: Table DP-1 reports population under 5, 5 to 9 years, and 10 to 14 years. Here, population 10 to 13 years is estimated as 80 percent of population 10 to 14.

Appendix Table A-3C: 1995 Estimate of Population

Arithmetic Mean of 1990 and 2000 Population

Census Division	Population under 14	Total Population	Under 14 Share in Percent
New England	2,514,932	13,564,730	18.54
Middle Atlantic	7,254,140	38,637,074	18.78
East North Central	8,836,751	43,581,990	20.28
West North Central	3,762,646	18,448,715	20.4
South Atlantic	9,043,397	47,668,007	18.97
East South Central	3,201,224	16,099,547	19.88
West South Central	6,333,721	29,073,822	21.78
Mountain	3,466,538	15,915,536	21.78
Pacific	8,822,915	42,076,472	20.97
Total	**53,236,262**	**265,065,890**	**20.08**

Appendix Table A-3D: 2020 Census of Population and Housing

Table DP1 - Profile of General Demographic and Housing Characteristics

Census Division	Population under 14	Total Population	Under 14 Share in Percent
New England	2,214,353	15,116,205	14.65
Middle Atlantic	6,688,255	42,492,943	15.74
East North Central	7,968,844	47,368,533	16.82
West North Central	3,878,387	21,616,921	17.94
South Atlantic	10,686,753	66,089,734	16.17
East South Central	3,327,300	19,402,234	17.15
West South Central	7,661,384	40,774,139	18.79
Mountain	4,449,398	24,919,150	17.86
Pacific	8,958,248	53,669,422	16.69
Total	**55,832,922**	**331,449,281**	**16.85**

Note: Table DP-1 reports population under 5, 5 to 9 years, and 10 to 14 years. Here, population 10 to 13 years is estimated as 80 percent of population 10 to 14.

Appendix Table A-4A: Estimated Share of Affected Travelers in 2022

Location of Origin Airport (Census Division)	(1) Share of Affected Travelers in 1995	(2) Ratio of Share of Under 14's in 2020 to Share of Under 14's in 1995	(3) Estimated Share of Affected Travelers in 2022
New England	9.37	0.79	7.40
Middle Atlantic	9.86	0.84	8.27
East North Central	10.45	0.83	8.67
West North Central	9.74	0.88	8.57
South Atlantic	10.72	0.85	9.14
East South Central	4.84	0.86	4.17
West South Central	11.37	0.86	9.80
Mountain	12.13	0.82	9.95
Pacific	16.14	0.80	12.85

Notes:

- Column (1) data are from Appendix Table A-2.
- Column (2) data are from Appendix Tables 3C and 3D.
- Column (3) is Column (1) multiplied by Column (2).

Appendix Table A-4B: Number of Passengers in 2022

Location of Origin Airport	Number of Passengers on Domestic Flights by US Carriers in 2022	Number of Passengers on International Flights by US Carriers in 2022	Number of Passengers on International Flights by Foreign Carriers in 2022
New England	22,253,256	1,102,028	1,889,489
Middle Atlantic	67,945,664	12,124,854	9,194,526
East North Central	71,751,376	3,740,505	3,407,868
West North Central	33,853,824	1,078,791	206,594
South Atlantic	192,607,504	17,318,180	9,879,580
East South Central	23,254,550	48,046	155,173
West South Central	91,732,992	8,095,306	2,612,663
Mountain	105,470,224	2,239,787	2,332,626
Pacific	137,665,600	5,432,389	12,046,581
US Territories	6,413,211	398,768	322,677
Outside US	0	51,434,712	42,620,212
Sum	**752,948,201**	**103,013,366**	**84,667,989**
US Carrier Total		**855,961,567**	
All Carrier Total		*940,629,556*	

Source: Air Carrier Statistics (Form 41 Traffic) T-100 data.

Appendix Table A-4C: Estimated Number of Affected Travelers in 2022

Location of Origin Airport	Estimated Number of Affected Travelers on Domestic Flights by US Carriers in 2022	Estimated Number of Affected Travelers on International Flights by US Carriers in 2022	Estimated Number of Affected Travelers on International Flights by Foreign Carriers in 2022
New England	1,647,692	81,597	139,903
Middle Atlantic	5,617,977	1,002,524	760,234
East North Central	6,218,407	324,175	295,346
West North Central	2,899,797	92,405	17,696
South Atlantic	17,605,581	1,582,995	903,058
East South Central	969,831	2,004	6,471
West South Central	8,992,869	793,608	256,127
Mountain	10,489,933	222,766	232,000
Pacific	17,689,103	698,025	1,547,905
US Territories	619,517	38,521	31,171
Outside US	0	4,968,601	4,117,119
Sum	**72,750,708**	**9,807,221**	**8,307,031**
US Carrier Total		**82,557,929**	
All Carrier Total		*90,864,960*	

Note: Estimated number of travelers for US census divisions is obtained by multiplying the estimated shares from Appendix Table A-4A, Column 3 by the numbers from Appendix Table A-4B. For US territories and flights originating outside the US, the estimated number of travelers is obtained by multiplying the numbers from Appendix Table A-4B by 0.0966, the weighted average share of affected travelers across census divisions.

Appendix Table A-5: Number of Passengers in 2022

Carrier	Domestic	International	Total
Alaska Airlines	29,878,122	1,913,336	31,791,458
Allegiant	16,827,212	41,892	16,869,104
American Airlines	120,554,448	30,306,916	150,861,364
Delta	122,484,640	19,420,112	141,904,752
Frontier	23,415,072	2,048,582	25,463,654
Hawaiian	9,637,017	361,388	9,998,405
JetBlue	30,508,098	9,115,926	39,624,024
Southwest	153,161,568	3,846,000	157,007,568
Spirit	33,850,212	4,557,293	38,407,505
United	87,444,528	25,209,342	112,653,870
Other Domestic Carriers	125,187,280	6,192,576	131,379,856
US Carriers Total	**752,948,197**	**103,013,363**	**855,961,560**
Foreign Carriers	-	*84,644,040*	*84,644,040*

Source: Air Carrier Statistics (Form 41 Traffic) T-100 data.

Appendix Table A-6: Delta Airlines' Amortized Expenses of Capitalized Software, 2017-2022

Year	in Current Dollars (Millions)	in 2022 Dollars (Millions)
2017	187	225
2018	205	242
2019	239	276
2020	304	346
2021	301	320
2022	307	307
Average		**286**

Note: From Delta Airlines' 2019 and 2022 10-k annual reports. Expenses reported in current dollars are not adjusted for inflation. The last column adjusts all expenses for inflation by converting them to 2022 dollars.