

# Flying the JetBlue Skies: Spirit Merger and Competition in Aviation \*

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## Abstract

In 2024, the attempted merger between JetBlue Airways and Spirit Airlines was blocked following a lawsuit brought by the Department of Justice, becoming the first airline merger within the United States to be blocked following trial. This paper estimates the counterfactual effects from this merger and finds evidence consistent with gains for the average consumer of air travel but harms for extremely price-constrained consumers, consistent with the judgment in the case. In addition, I consider the ramifications of JetBlue's Northeast Alliance with American Airlines for both the aviation industry and proper counterfactual merger evaluation. I find that the Northeast Alliance increased fares at Boston Logan International Airport while decreasing them at Newark Liberty International Airport. JEL Classification: L4, L41

Keywords: airlines; mergers

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\*This is a preliminary draft. Please do not distribute without permission of the author. The author would like to thank the participants of the University of Florida Applied Microeconomics working group and of the Southern Economics Association 2024 conference for helpful feedback. Furthermore, the author would like to thank Brad Shrago for alerting her to the reliance on usage fees by ultra-low cost carriers.

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# 1 Introduction

The 2020's saw JetBlue Airways be involved with two different actions that would be found to be anti-competitive - the Northeast Alliance with American Airlines and an attempted merger with Spirit Airlines. The first of these saw it coordinate operations in four major airports within the northeastern United States, resulting in a state of affairs that was only slightly less than a merger with a competitor. The latter of these saw it attempting to purchase the nation's largest ultra-low cost carrier, Spirit Airlines. Following the failure of the merger to obtain regulatory approval, Spirit would file for bankruptcy in November 2024.

This paper's focus is on JetBlue's attempted merger with Spirit, and specifically the estimation of counterfactual pricing in the event that the merger would have been approved. However, estimation of this counterfactual is complicated by two factors. The first of these is the aforementioned Northeast Alliance. It began in 2020 and would be ultimately dissolved in 2023 following an adverse judgment in a lawsuit brought by the United States Department of Justice and Arizona, California, Florida, Massachusetts, Pennsylvania, Virginia, and the District of Columbia. As JetBlue attempted to acquire Spirit in 2022, while this alliance was still in effect, this complicates attempts to calculate counterfactual pricing due to American's role in shaping the route structure of JetBlue during this time, which would not have been present had the merger ultimately have been approved in 2023 or later.

Unfortunately, it is infeasible to simply use data from before the Northeast Alliance began due to the ramifications of the Covid-19 pandemic. This pandemic saw large changes to travel consumption within the United States, with business travel dramatically lower following the pandemic while consumer travel spending grew. This represents a structural change to the consumer base of the market in a way that makes direct extrapolation of the pre-pandemic period to the post-pandemic period difficult.

To attempt to develop a full picture of the counterfactual world in which the merger was approved, I first analyze the impact of the Northeast Alliance on the overall operations and structure of JetBlue through a differences-in-differences approach. I find evidence for reductions in air fares of approximately 2% at the airports focused on by the alliance, with these declines especially pronounced at Newark Liberty International Airport. However, as discussed in this paper, this may be partially by changes in the presence of JetBlue and American operations at airports outside of the four covered by the agreement due to supply constraints at the time of implementation, which could have increase the air fares at airports outside of the alliance beyond which would have occurred in the counterfactual world without the merger.

Following this, I estimate a structural demand model for both the pre- and post-pandemic periods. I estimate that, in the counterfactual world in which the merger had been approved, one way product fares would have been on average between \$4 and \$12 more expensive in the pre-pandemic markets and between

\$20 cheaper and \$11 more expensive in the post-pandemic markets. However, these estimated price effects ignore substantial heterogeneity on the estimated effect on the minimum fares available within markets - even in the best case simulations I estimate that over 35 markets in each periods would have had the minimum price available increase by over \$60. This is consistent with the judgment in the case against the merger, which noted concerns for the feasibility of continued air travel for the most price constrained consumers.

With these findings outlined, the rest of the paper is organized as follows: Section 2 briefly summarizes the literature on airline mergers; Section 3 goes into detail on the American air travel market, the Northeast Alliance, and the JetBlue-Spirit merger; Section 4 elaborates on my data sources; Section 5 contains my analysis of the Northeast Alliance and the JetBlue-Spirit merger; finally, Section 6 summarizes the findings of this paper and examines their implications for antitrust policy going forwards.

## 2 Literature Review

This paper analyzes the impact of JetBlue’s conduct as it pertains to anti-competitive practices through an active alliance with American and through a court-blocked merger with Spirit. To accomplish this, it draws from the literature analyzing anti-competitive practices within the aviation industry and from the literature analyzing the impact of mergers within the aviation industry on consumer prices. Beyond this focus, it further develops our understanding of the role of low cost carriers and ultra-low cost carriers within the aviation industry through the analysis of more recent data.

Since deregulation, and especially since the turn of the century, the aviation industry has seen a trend towards consolidation of existing carriers through mergers. Studies such as Luo (2014) and Carlton et al. (2019) studying completed mergers of legacy airlines have generally found limited evidence of anti-competitive price effects in markets that both carriers were present in, generally attributed to the documented stronger competitive effects from low cost carrier presence within a market (such as in Morrison (2001); Goolsbee and Syverson (2008); Shrago (2024)).<sup>1</sup> In contrast to these papers focused on mergers of legacy carriers, this paper focuses on a proposed (but ultimately uncompleted) merger between a low cost and an ultra-low cost carrier. As part of this analysis, it conducts a simulation of the merger of these two airlines. Recently, Ciliberto et al. (2021) and Li et al. (2022) have used simulations of legacy carrier mergers to examine the implications of models which account for route entry decisions. Unlike these papers, I treat entry decisions as exogenous, owing in part to limitations from the post-pandemic changes to air travel demand.<sup>2</sup>

Beyond the literature on airline mergers, past research has examined anti-competitive practices within

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<sup>1</sup>An alternative explanation suggested in Le and Yimga (2019) is that efficiencies from the Delta-Northwest and United-Continental mergers were sufficiently able to offset the upwards pricing pressure from increased concentration.

<sup>2</sup>A working paper, Ewen (2023), finds evidence consistent with a decline in business air travel of approximately two-thirds from 2019 to 2022.

the aviation industry. Miller (2010) examined the aftermath of a 1990's case against eight airlines involving potential collusion on fares through an electronic fare database used by travel agents. The author used an event study approach to determine that there was limited evidence of long term price effects from the court case. Zou et al. (2023) examined used differences-in-differences to examine the impact of the Northeast Alliance using data from its first year of operation. Unlike their paper, mine examines evidence from the entirety of the NEA through its unwinding in 2023.

Finally, my paper touches upon the literature examining the role of low cost and ultra-low cost carriers within the aviation industry. While this literature has predominantly focused on the ability of Southwest, the largest low cost carrier, on lowering prices within a market (e.g. Windle and Dresner (1995); Morrison (2001); Goolsbee and Syverson (2008)), there has been movement in recent years to examine the effects of other low-cost carriers, such as JetBlue and Spirit, on prices. For example, Shrago (2024) finds evidence that the presence of ultra-low cost carriers within a market increases the overall range of fares present within the market. My paper examines pricing effects of an ultimately unrealized merger between an ultra-low cost and low-cost carrier, allowing for an increased understanding of the differences between these two airline structures on competitive effects.

### **3 Setting**

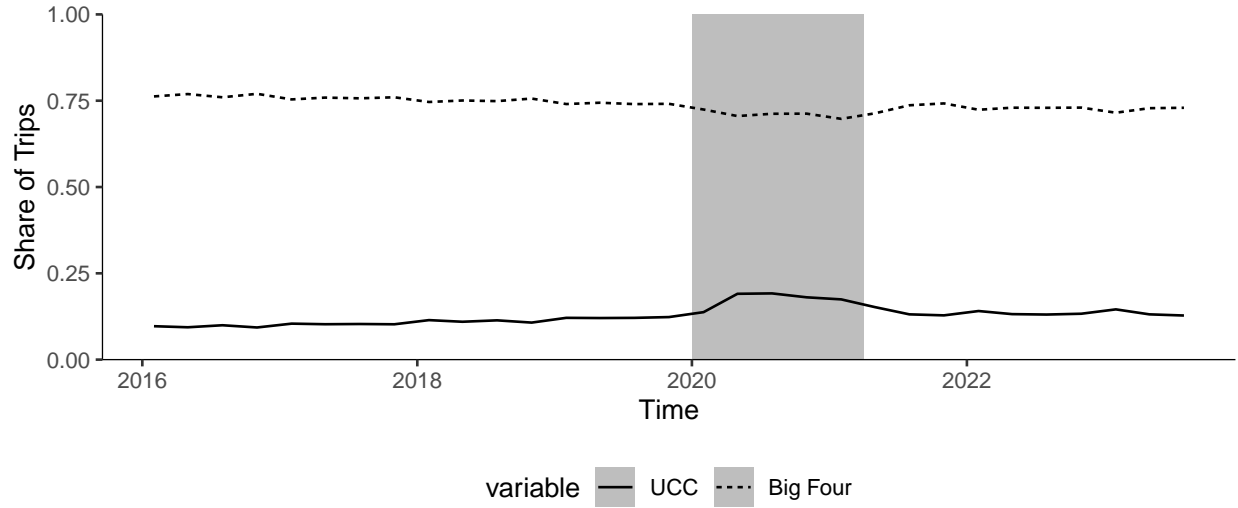
Within this section, I establish key facts about the aviation industry in the United States in Subsection 3.1, then I discuss the Northeast Alliance and JetBlue-Spirit merger in more detail in Subsections 3.2 and 3.3 respectively.

#### **3.1 United States Aviation**

The American airline industry is comprised of three major types of carriers: legacy carriers, low-cost carriers, and ultra-low cost carriers. Beyond their differences in pricing, the firms within each category operate differently. As such, it is worth spending time on these differences, as they inform later analyses within this paper.

Legacy carriers are those firms that operated in the industry since before the 1978 deregulation of fares. At present, these are Delta, American, and United. The legacy carriers operate hub-and-spoke route networks which allow them to connect passengers from smaller markets through centralized hub airports to their final destinations. One consequence of this is that they operate a larger variety of aircraft within their fleets, allowing for more efficient flight operations to these smaller markets at the cost of additional crew training and maintenance expenditures.

Figure 1: Carrier Share of Trips



Derived from DB1B data. Ultra-Low Cost Carriers (UCC) are Spirit, Frontier, and Allegiant. Big Four carriers are Delta, United, American, and Southwest. Shaded region depicts the duration of the coronavirus pandemic before widespread vaccine availability within the United States. Unidirectional trips are plotted. As such, a round-way trip is counted twice.

The non-legacy air carriers are divided into two groups, the low cost and ultra-low cost carriers. Low cost carriers includes Southwest, Alaska, Hawaiian, and JetBlue, while the ultra-low cost carriers are comprised of Spirit, Allegiant, and Frontier.<sup>3</sup> Unlike legacy carriers, both low cost and ultra-low cost carriers favor the usage of direct flights. While this requires them to eschew smaller markets, it allows them to avoid the costly expenditures relating to operating a hub airport. Furthermore, these carriers use only a handful of aircraft models within their fleets.

Ultra-low cost carriers are distinguished from low-cost carriers through the practice of “unbundling,” wherein ticket prices are lower but amenities traditionally included in a fare are additional purchases. While Ryanair in Europe had operated under this model since the early 1990s, a United States firm would not successfully adopt the strategy until Spirit introduced fees for checked baggage in 2010 (Bachwich and Wittman, 2017). While complaints regarding the quality of these airlines are well documented in consumer surveys and the press<sup>4</sup>, these airlines have managed a good deal of competitive success within their segment of the market by targeting highly budget conscious travelers who do not wish to pay fully featured fares. By the later part of the 2010s, trips on ultra-low cost carriers represented over a tenth of the total air travel within the United States (Figure 1). Despite this growth, the industry is still dominated by the “big four” carriers - the three legacy carriers and Southwest who comprise approximately three quarters of the overall passenger trips within the United States.

<sup>3</sup>There exist a number of smaller, more regional focused low-cost carriers, such as Sun Country, which I do not refer to here. Later analyses within this paper treats products from these airlines as from a unified, “Minor Low-Cost Carrier” airline.

<sup>4</sup>e.g. Vasel (2016); Elliott (2022).

As documented in Figure 10, Spirit grew its fleet from under 50 planes before adopting the ultra-low cost model to nearly 200 planes by 2022. This expansion by Spirit brought it into increasing competition with JetBlue.<sup>5</sup> Both firms primarily operate in airports situated along the east coast of the United States in addition to a few major cities in Texas and California, with Spirit’s rapid expansion leading to both firms to increasingly operate out of the same airports (Figure 11).

Despite these similarities in operations, both firms behaved differently in regards to competition by the 2020’s. In 2020, JetBlue created the “Northeast Alliance” (NEA) with American Airlines, which saw them cooperate on setting flights originating to or departing from airports in New York and Boston.<sup>6</sup> Beyond the NEA, the Department of Justice has alleged that JetBlue had taken part in anti-competitive behavior using the Airline Tariff Publishing Company to coordinate fares with other firms.

In contrast, Spirit would compete aggressively and became a maverick firm within the industry. It has maintained a consistent pace of increasing its fleet size over the course of the 2010s and into the 2020s (as graphed in Figure 10) despite the shock to air travel caused by the coronavirus pandemic.<sup>7</sup> This growth in its fleet was required for expansion into new markets. As shown in Shrago (2024), this entry has resulted in greater competition than results from legacy carrier entry. In particular, markets entered by Spirit had increased variance in fares as existing carriers competed for the same highly cost concerned travelers that make up Spirit’s core consumer base by offering paired back, “basic economy” products.

The final element of the industry worth calling attention to is the impact of the coronavirus pandemic on it. A severe drop in air travel occurred almost immediately as consumers and businesses canceled travel plans in accordance with viral concerns and government mandates. While widespread vaccine availability allowed for recovery to 2016 levels of air travel in the second quarter of 2021, passenger levels would not recover to 2019 levels of air travel until halfway into 2022 (see Figure 2).

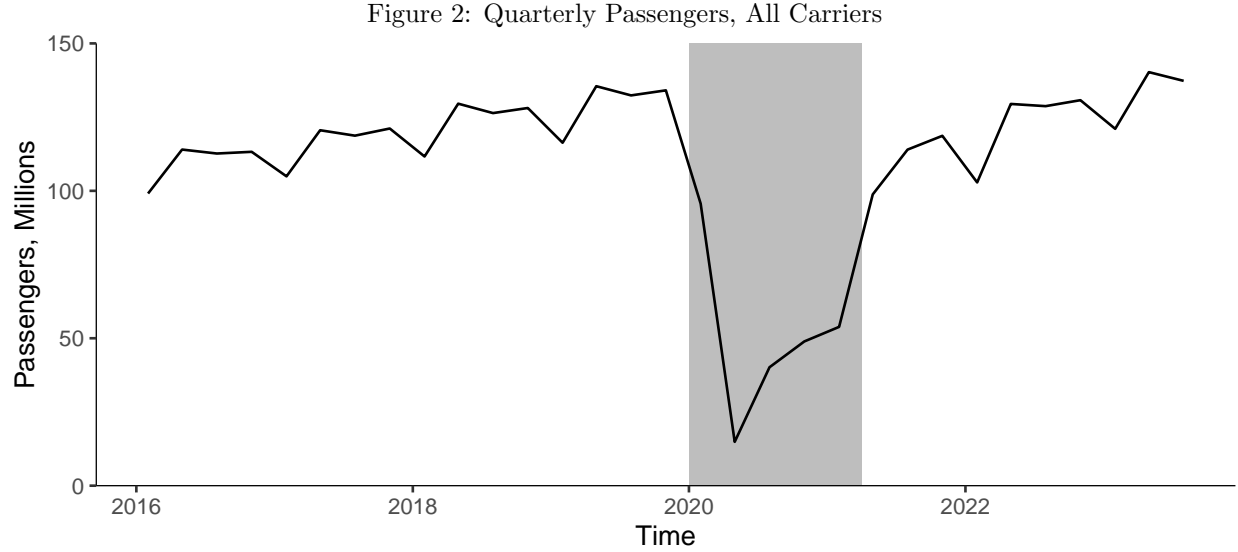
However, this recovery in ridership was not a full return to normal consumption patterns in airfare. Historically, business travel accounted for approximately a third of air travel (examples of these estimates can be found in Berry and Jia (2010) and Bet (2021)). However, following the pandemic, business travel reportedly decreased as businesses switched to telecommunications for meetings (Semuels, 2021). Meanwhile, leisure travelers were able to build savings during the decline in travel, allowing for them to potentially be less price-sensitive following the pandemic.<sup>8</sup> As such, consumption patterns are liable to differ between the

<sup>5</sup>Historically, very few markets had multiple low cost carriers operating within them (Kwoka et al., 2016; Ciliberto et al., 2021). However, in recent years, there are approximately half as many markets with multiple low cost carriers operating within them as there are with a single carrier.

<sup>6</sup>Section 3.2 elaborates on this in more detail.

<sup>7</sup>As depicted in the aforementioned figure, JetBlue’s fleet stagnated following the pandemic due to it delaying orders for aircraft ordered prior to the pandemic (Bellamy III, 2020; Sipinski, 2020).

<sup>8</sup>In a recent working paper, Ewen (2023), this phenomenon appears to have occurred, with a non-negligible share of leisure travelers being less price-sensitively than before the pandemic. In this paper’s Table 7, I find evidence that airfare has become slightly less elastic following the pandemic, consistent with this understanding of the industry’s post-pandemic dynamics.



Source: DB1B Data. Shaded region depicts the duration of the coronavirus pandemic before widespread vaccine availability within the United States, namely, from the first quarter of 2020 through the first quarter of 2021.

pre- and post-pandemic periods despite the recovery in passenger levels.

### 3.2 Northeast Alliance

Prior to its attempted merger with Spirit, JetBlue entered into the Northeast Alliance (NEA) with American Airlines at the start of 2021. The NEA saw the two airlines coordinate operations to behave as if they were in fact a single airline for any routes that touched upon the airports serving New York City and Boston. They jointly decided their network for routes, and operated them so that consumers would be indifferent between the two carriers for these routes<sup>9</sup>, and shared revenue between the firms earned from products within the agreement. The United States Department of Justice along with six states and the District of Columbia brought a lawsuit against the agreement in September 2021 alleging violations of the Sherman Antitrust Act. Following a 2022 trial, the agreement would be found to violate the Sherman Antitrust Act in May 2023 and it was subsequently unwound (Rennison and Chokshi, 2023; Rains, 2023).<sup>10</sup> With this timeline outlined, I will now briefly discuss the features of the NEA, how it differs from traditional aviation alliances, and the issues it poses for estimation of the counterfactual merger effects for the Spirit-JetBlue merger.

Alliances between aviation firms are commonplace within consumer aviation. For example, Delta is part of the “SkyTeam Alliance” and United is part of the “Star Alliance.” These alliances see firms operating code sharing agreements between different carriers, in which airlines can seats on flights operated by other

<sup>9</sup>With the ultimate goal of keeping only one of the two firms active on a given segment, as per the ruling by Judge Leo Sorokin.

<sup>10</sup>Table 1 details a timeline of key events relating to the NEA. Notably, some landing slot leases between the two airlines related to the merger experienced a gradual reversion to their original owners.

Table 1: Northeast Alliance Timeline

Year	Date	Event
2020	Quarter 1-2	JetBlue and American Negotiate Alliance
	July 16	Northeast Alliance Announced
	July 22	Alliance Agreement submitted to DOT
2021	January 10	DOT Terminates Antitrust Review
	February 24	Codesharing Agreement Begins on X Routes
	May 26	Reciprocal Loyalty Earnings Begins
	Early September	NEA Shuttle at JFK Opens
	September 21	DOJ Files Lawsuit Against NEA
2022	September 27 - November 18	NEA-Trial
2023	May 19	NEA Ruled Anti-Competitive
	July 5	JetBlue Drops Appeal Plans
	July 21	NEA Codesharing Ends
	October 31	JFK Shuttle Ceases Operation
	October 31	12 Slot Leases to JetBlue Terminate
2024	March 31	27 Slot Leases to JetBlue Terminate
	March 31	1 Slot Lease to American Terminates
	October 26	Remaining NEA Slot Leases Terminate

airline, with the ticket being under the ticketing airlines' code.<sup>11</sup> These agreements are primarily operated between carriers situated in different countries to allow for better access to foreign markets by consumers as airlines are not normally able to fly routes entirely situated within a foreign country. Benefits to consumers include the earning of frequent flier miles across all stages of a journey, regardless of the operating carrier, easier handling of baggage, and easier bookings. Meanwhile, carriers benefit from being able to offer a wider variety of destinations than would otherwise be possible using only routes that they can fly.

Domestic aviation alliances are rare at present. Unlike alliances between domestic and foreign carriers, these agreements are generally unable to receive waivers from antitrust concerns through the Department of Justice and as such face additional regulatory issues. Traditionally, these domestic agreements only apply to markets that the participating airlines do not compete within and the two airlines maintain separate routing decisions, operations, and planning.

In contrast, the NEA was structured to act as if it was a merger between the two firms on affected routes. The two firms jointly scheduled flights within the selected cities, with the intent to minimizing overlap in routes operated by both firms<sup>12</sup>, and coordinated operations at the airports impacted by the agreement.<sup>13</sup> Furthermore, as two of the impacted airports featured slot and gate controls,<sup>14</sup> the NEA saw these firms

<sup>11</sup>This allows, for example, for passengers of the Canadian airline Westjet to book connecting flights into the United States by using Delta flights for the intranational legs of their trip.

<sup>12</sup>It is not clear how effective this was. As documented in Figure 9, the levels of shared routes at each of the four impacted airports was within historically normal levels.

<sup>13</sup>One example of this coordination is the shuttle operated by the two airlines at JFK to allow customers to transfer between the terminals used by each airline without having to clear security a second time on a connecting trip (Griff, 2021).

<sup>14</sup>A slot controlled airport is one in which airlines are assigned specified time slots by the FAA for departures and arrivals to



share slot permits and coordinate on sharing gates at the effected airports. This would be found by the trial court to have increased barriers to entering the New York City air travel market by deterring these firms by selling off landing slots to other firms. Finally, the two firms shared revenue from these markets to align their incentives with those of the NEA.

Table 2: American, JetBlue Overlap at NEA Airports

Year	JFK		BOS		LGA		EWR	
	Ticket	Operating	Ticket	Operating	Ticket	Operating	Ticket	Operating
<b>Q1</b>								
2023	75.4	23.7	69.1	21.4	67.3	4.2	46.7	7.7
2022	77.0	29.7	75.0	29.1	73.9	8.9	47.6	8.3
2021	18.6	24.4	26.8	21.7	50.0	33.3	9.5	13.6
2019	22.4	23.3	22.9	20.0	8.1	6.7	0.0	0.0
<b>Q2</b>								
2023	70.0	15.9	63.1	22.2	68.3	5.4	46.7	7.7
2022	68.3	26.5	70.3	21.9	75.0	6.4	45.5	17.4
2021	57.7	21.1	57.4	28.6	27.3	7.4	28.6	13.6
2019	21.1	21.0	21.2	25.0	8.9	5.6	0.0	0.0
<b>Q3</b>								
2023	69.0	16.9	63.9	19.0	61.0	4.1	40.0	7.7
2022	73.8	21.9	73.8	24.2	75.9	6.4	57.1	7.1
2021	63.6	25.9	58.9	23.1	30.4	3.2	37.5	14.8
2019	19.6	20.3	21.6	21.6	8.9	5.6	0.0	0.0
<b>Q4</b>								
2022	72.1	25.4	66.1	21.1	69.8	2.0	46.7	7.7
2021	71.9	25.8	73.2	23.2	75.0	4.3	43.5	7.7
2019	15.3	17.5	22.0	19.2	6.8	5.4	0.0	0.0

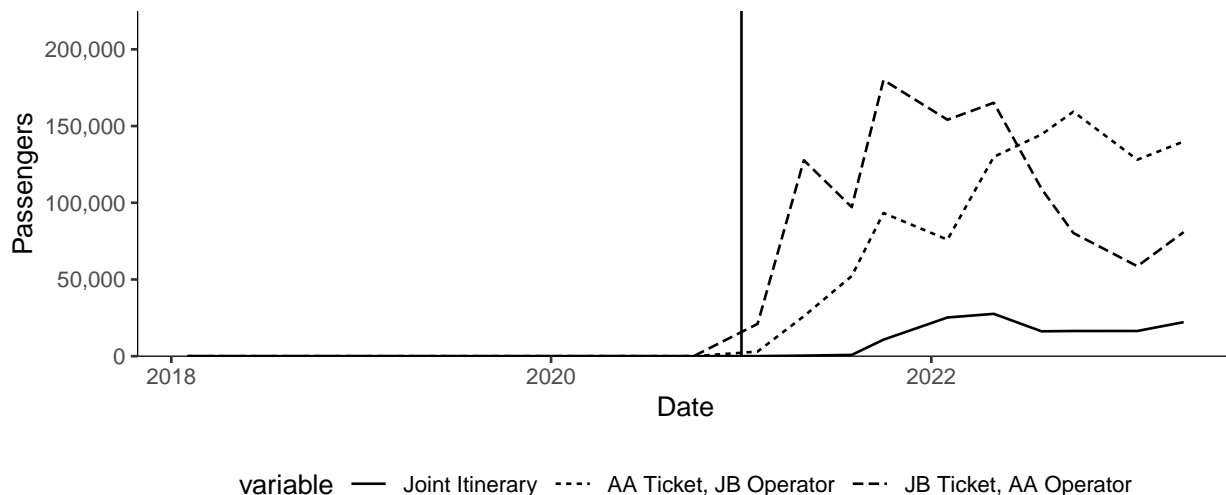
Each cell is the percent of markets originating from the specified airport with both carriers present in the market as either the ticketing carrier or as the operating carrier. Ticketing carriers are responsible for buying and selling of tickets while the operating carrier handles flight operations. Data for the first quarter of 2021 should be interpreted cautiously as this was before the recovery in air travel documented in Figure 2.

Figure 3 plots three measures of the implementation of the NEA: those of passengers on joint itineraries taking flights operated by both firm over the course of a unidirectional trip and those on itineraries ticketed to one carrier but operated by the other on at least one leg of the trip. This figure indicates that the vast majority of customers who used the NEA used it to book tickets with one carrier for flights operated, at least partially, by the other carrier. Interestingly, relatively few customers booked connecting fares with legs operated by different carriers. Furthermore, this plot is consistent with the notion that the NEA would not come into full effect until around the fourth quarter of 2021.<sup>15</sup>

allow for better coordination of runway usage in congested airports. These slots are set in advance of individual operation days and can be transferred between airlines as if they were property.

<sup>15</sup>This reinforces the value of the replication exercises in this paper when compared to Zou et al. (2023) which only had access to data through the end of 2021 for its analysis.

Figure 3: Northeast Alliance Passenger Uptake



A joint itinerary is one in which both JetBlue and American Airlines operated flights on one or more legs of the unidirectional trip. The ticketing carrier collects fares and issues tickets, the operating carrier operates the flights. Itineraries are classified as an "AA Ticket, JB Operator" if the entire itinerary was issued by American Airlines and JetBlue operated at least one leg of the trip. The vertical line reflects the start of the alliance.

### 3.3 JetBlue-Spirit Merger Attempt

In February 2022, Spirit announced its intention to merge with fellow ultra-low cost carrier Frontier (Schaper and Hernandez, 2022). This prompted a counter offer from JetBlue in April for ownership of Spirit, which would lead to the attempted merger between Spirit and Frontier being called off in July amid a lack of support from Spirit shareholders (Josephs, 2022a,b). By mid-October, Spirit shareholders approved the acquisition by JetBlue (Koenig, 2022). The next year would see the United States Department of Justice, the District of Columbia, Massachusetts, and New York file suit to block the merger in March (Chokshi, 2023). Following a trial in the winter of 2023, the merger would be blocked on January 16, 2024, and the parties would ultimately decide against appealing the verdict (Chapman and Koenig, 2024). These events are summarized in Table 3.

JetBlue publicly considered the acquisition of Spirit to be a top priority for the company, choosing to not appeal the ruling blocking its Northeast Alliance with American Airlines in favor of focusing its resources on overcoming the lawsuit seeking to block the merger with Spirit (Aratani, 2023). Beyond these legal resources, it directed resources towards trying to win public favor over the merger. Notably, it coordinated comment submissions to a Department of Transportation regulatory filing regarding the merger with pro-merger comments sourced from its employees.<sup>16</sup> Despite this, following the ruling against the merger it would ultimately choose to drop its appeals, with some financial analysts noting a significant deterioration

<sup>16</sup>Some employees went on to dispute that these comments accurately reflected their views see Birnbaum (2023); Birnbaum and Nylen (2023) In Appendix B, I use stance detection techniques to analyze comments left on this filing in more detail.

Table 3: JetBlue-Spirit Merger Timeline

Year	Date	Event
2022	February 7	Frontier-Spirit Merger Announced
	April 5	First JetBlue Offer for Spirit Released
	May 6	Spirit Rejects JetBlue Offer
	July 27	Frontier-Spirit Merger Attempt Collapses
	July 28	Spirit Board Approves JetBlue Merger
	October 19	Spirit Shareholders Approve Merger
2023	March 7	Department of Justice Files Suit
	October 31 - December 5	JetBlue-Spirit Merger Trial
2024	January 16	JetBlue-Spirit Merger Blocked
	March 4	JetBlue, Spirit Drop Appeal Plans

of Spirit’s financial stability between 2022 and 2024 (Sider, 2024).

I now turn my attention to the ruling by Judge Young which ultimately blocked the JetBlue-Spirit merger attempt. The judgment identifies five key cities for his ruling: Orlando, San Juan, Miami and Fort Lauderdale (termed “South Florida”), New York City, and Boston. These cities were identified on the basis that the majority of passengers in markets with competition between JetBlue and Spirit departed from these cities. These largely align with the cities in which the two firms would have the largest share of departing passengers within 2022 (Table 12). However, the cities indicated ignores the firms’ role in multiple smaller markets within Puerto Rico, namely Ponce and Aguadilla, where the two firms comprise the vast majority of the market.

In section 2.F of the judgment, the potential effects of the merger are listed as decreased airline seats, increased market concentration, increased debt for JetBlue, and increased prices for consumers. Table 4 documents the aircraft in JetBlue and Spirit’s fleets in 2022. Both airlines predominantly fly Airbus manufactured aircraft, with wider variety in JetBlue’s fleet than Spirit’s, using five different versions of the Airbus A321 aircraft<sup>17</sup> Should Spirit’s Airbus A320 and Airbus A321 have been adjusted to the predominant seat configurations of JetBlue’s aircraft, a total of 20 seats would be lost on each Airbus A320 and 69 seats would be lost on each Airbus A321, for a total of 4,799 seats lost. This would reflect a loss of approximately 13% of the seats on Spirit’s aircraft.<sup>18</sup> These rough calculations closely track the estimate of an 11% reduction in seats accepted by the trial court in its decision.<sup>19</sup>

This paper estimates the counterfactual increase in market concentration and increase in prices in Section 5.2.3.

<sup>17</sup>Two of these configurations reflect solely different seat configurations. The other three configurations are on the Airbus A321neo, a revision of the earlier aircraft.

<sup>18</sup>If instead, Spirit’s Airbus A321 were adjusted to the 200 seat configuration rather than the 159 configuration, then this would be 3500 seats lost or a loss approximately 9.9% of Spirit’s seat capacity.

<sup>19</sup>The court further estimated a decline in annual departures of over 6.1 million. As I neither possess data on flight schedules nor model flight schedules endogenously, I am unable to assess this claim.

Table 4: JetBlue, Spirit Fleet Composition - 2022

Manufacturer	Model	Seats	Count	Total Seats
<b>JetBlue</b>				
Airbus	A220	140	14	1960
Airbus	A320	150	11	1650
Airbus	A320	162	119	19278
Airbus	A321	159	35	5565
Airbus	A321	200	28	5600
Airbus	A321neo	138	5	690
Airbus	A321neo	160	2	320
Airbus	A321neo	200	16	3200
Embraer	E190	100	55	5500
<b>Spirit</b>				
Airbus	A319	145	31	4495
Airbus	A320	182	133	24206
Airbus	A321	228	30	6840

Source: B-43 Inventory Data.

## 4 Data and Summary Statistics

The primary dataset used in the creation of this paper is the Bureau of Transportation Statistics’ Airline Origin and Destination Survey (DB1B). This is a 10% sample of all domestic itineraries within the United States. It includes data on pricing, distance, carrier, and number of connecting flights. Within the literature, it has been the preferred data for domestic air travel for decades (e.g. Ciliberto et al. (2021); Berry and Jia (2010); Goolsbee and Syverson (2008); Peters (2006)).

Notably, the fare data only includes the price of the base airfare, and does not account for additional spending by consumers on airline fees (such as for checked bag fees on Spirit). As Spirit and the other ultra-low cost carriers focus on “unbundled” fares, these airline fares are liable to be reported as systematically lower than the full price paid by consumers after taking into account spending on checked baggage or in-flight refreshments. This inhibits a full estimation of effects of the merger on consumer surplus as products should be understood as solely each airline’s base fare. However, this still permits insight to be gained into the accuracy of the decision blocking the merger as it focused on the impact to consumers relying on the cheapest airfares for the ability to travel.

Markets in consumer aviation are defined by origin airport, destination airport, year, and quarter. Within this definition, originating and terminating airports are used as the determinants of a market rather than the metropolitan statistical areas that these airports reside in. This accounts for the known phenomenon that consumers do not treat airports within a metropolitan statistical area as interchangeable.<sup>20</sup> Within this

<sup>20</sup>For an example of this phenomenon, Goolsbee and Syverson (2008) observes differential impacts on pricing of prospective

paper, products within a market are further defined by carrier and non-stop status.<sup>21</sup> Appendix A details the sample construction methodology and restrictions on markets within the sample (such as excluding markets that consist of airports that are fewer than 150 miles apart.)

Market size is defined as the geographic mean of the population of the origin and destination metropolitan statistical areas population. This is a standard assumption within this literature (such as in (Ciliberto et al., 2021)). This is calculated using the United State Census Bureau’s annual estimates of metropolitan statistical area population. The outside good within a market is defined as the decision to consume air travel between an origin and destination airport pair. As such, the outside good includes not making a trip; making a trip by car or bus; and making a trip between two different airports within the same metropolitan area.

For the analysis of the Northeast Alliance in Section 5.1, data on state level coronavirus cases from the Centers for Disease Control and Prevention was used. Airport markets were assigned to this data on the basis of the state of the principal city within the origin and destination metropolitan areas.<sup>22</sup> Coronavirus patients who were tested outside of their home county were included in the alternate county’s testing data. As such, I believe that state level data is more reliable than county level data. Furthermore, the virus saw seasonal trends that were different between regions. This suggesting that quarter level controls would be insufficient. Beyond this data, census bureau state-level and MSA-level estimates of personal income were used as controls for discretionary income.<sup>23</sup>

Summary statistics for product level data are included in Table 5. Both product prices and consumers fell on average following the pandemic, with the average itinerary becoming 22 real dollars cheaper while having 700 fewer passengers take it. Delta slightly decreased as a share of total products by 3 percentage points while Southwest, Spirit, and the ‘Other’ carrier increased their product offerings by approximately one percentage point. Products are slightly more likely to include an intermediate stop following the pandemic, consistent with an increase in the average itinerary distance of approximately 10 miles.

Summary statistics for market level characteristics are included in Table 6. Despite the post-pandemic period having fewer overall markets included in the sample, JetBlue and Spirit competed in over a hundred additional markets in this period than in the years leading up to the pandemic. Additionally, there was on average roughly a third of an additional firm in the post-pandemic period in the average market, driven by firms operating a single product within the market. Finally, it is observing noting that the number of customers within the average marker decreased aby approximately 16,000 customers between the two periods.

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firm entry at the airport level than would be expected if airports were treated as interchangeable by consumers.

<sup>21</sup>As such, each carrier is assumed to have either 0, 1, or 2 products within a market.

<sup>22</sup>For example, the New York City market was assigned New York

<sup>23</sup>There is a significant delay in releases of these estimates for MSA. As such, the state-level data allows for a longer sample to be analyzed. On the shared quarters, I do not observe any notable differences in the estimated coefficients through the use of state or MSA level income data.

Table 5: Product Level Summary Statistics

	Mean	(SD)	Minimum	Median	Maximum
<b>Pre-Pandemic</b>					
Price (2017 USD)	234.01	(68.85)	33.12	236.38	810.58
Passengers	4257.23	(10192.88)	100	810	192050
Distance (1000s)	1.42	(0.69)	0.15	1.28	4.8
Extra Distance	0.14	(0.21)	0	0.06	3.71
Nonstop	0.28	(0.45)	0	0	1
Origin Destinations	30	(33.39)	1	13	180
Origin Presence (%)	36.26	(31.28)	0.54	19.57	100
Delta	0.25	(0.43)	0	0	1
American	0.22	(0.41)	0	0	1
United	0.14	(0.35)	0	0	1
Southwest	0.25	(0.43)	0	0	1
JetBlue	0.03	(0.17)	0	0	1
Spirit	0.03	(0.18)	0	0	1
Other Carrier	0	(0.06)	0	0	1
Observations	307289				
<b>Post-Pandemic</b>					
Price (2017 USD)	212.77	(75.21)	27.96	209.94	737.78
Passengers	3531.43	(8648.27)	100	690	144930
Distance (1000s)	1.41	(0.67)	0.15	1.28	3.86
Extra Distance	0.14	(0.19)	0	0.07	1.83
Nonstop	0.26	(0.44)	0	0	1
Origin Destinations	29.24	(33.72)	1	12	187
Origin Presence (%)	34.77	(30.92)	0.53	18.42	100
Delta	0.22	(0.41)	0	0	1
American	0.22	(0.41)	0	0	1
United	0.13	(0.34)	0	0	1
Southwest	0.26	(0.44)	0	0	1
JetBlue	0.03	(0.16)	0	0	1
Spirit	0.04	(0.2)	0	0	1
Other Carrier	0.01	(0.1)	0	0	1
Observations	265196				

A product is defined as a set of origin airport, destination airport, year, quarter, firm, and nonstop status. “Origin Destinations” is the number of airports served from the originating airport across all firms, “Origin Presence” is the fraction of these destinations served by the ticketing carrier. The pre-pandemic sample includes all quarters of the years 2017 through 2019. The post-pandemic sample includes data from the second quarter of 2021 through the second quarter of 2023.

Table 6: Market Level Summary Statistics

	Mean	(SD)	Minimum	Median	Maximum
<b>Pre-Pandemic</b>					
Minimum Miles (1000s)	1.18	(0.64)	0.15	1.02	2.95
Average Miles (1000s)	1.23	(0.66)	0.15	1.07	4.39
Number of Firms	2.93	(1.49)	1	3	9
Number of Products	3.52	(2.1)	1	3	15
Number of Customers	14974.29	(28289.99)	260	4150	406050
HHI	8044.07	(4347.52)	1611.61	7058.6	56397.84
Observations	87363		JetBlue Markets	7628	
Spirit & JetBlue Markets	1418		Spirit Markets	7158	
<b>Post-Pandemic</b>					
Minimum Miles (1000s)	1.19	(0.64)	0.15	1.04	2.96
Average Miles (1000s)	1.24	(0.66)	0.15	1.1	2.98
Number of Firms	3.21	(1.56)	1	3	9
Number of Products	3.79	(2.16)	1	3	14
Number of Customers	13375.81	(25085.61)	230	3840	317370
HHI	7479.76	(4410.86)	1460.46	6260.03	20000
Observations	70016		JetBlue Markets	5977	
Spirit & JetBlue Markets	1554		Spirit Markets	9148	

A market is defined as a set of origin airport, destination airport, year, and quarter. The average miles reported within a market is weighted by itinerary passengers. The pre-pandemic sample includes all quarters of the years 2017 through 2019. The post-pandemic sample includes data from the second quarter of 2021 through the second quarter of 2023.

Aside from this, overall market characteristics are similar in terms of miles flown and market concentration between the two periods.

## 5 Analysis

This section is organized into four subsections. In Section 5.1, I use a differences-in-differences causal inference design to analyze the Northeast Alliance’s effects on airfare and route offerings. Following this, I examine the ramifications of the alliance for simulating the counterfactual world in which the JetBlue-Spirit merger was allowed to occur. In Section 5.2.1, I develop a structural model of demand for the airline industry and analyze its results. In Section 5.2.2, I describe a brief structural model of supply for the airline industry which is used in conjunction with the demand model for the counterfactual merger simulation detailed in Section 5.2.3.

### 5.1 Northeast Alliance

The first of these areas of investigation is to evaluate the NEA’s impact on the offering of codeshare itineraries by JetBlue and American in nonstop markets impacted by the NEA. To analyze this, for origin-destination

Figure 4: Probability of American, JetBlue Codeshares Observed

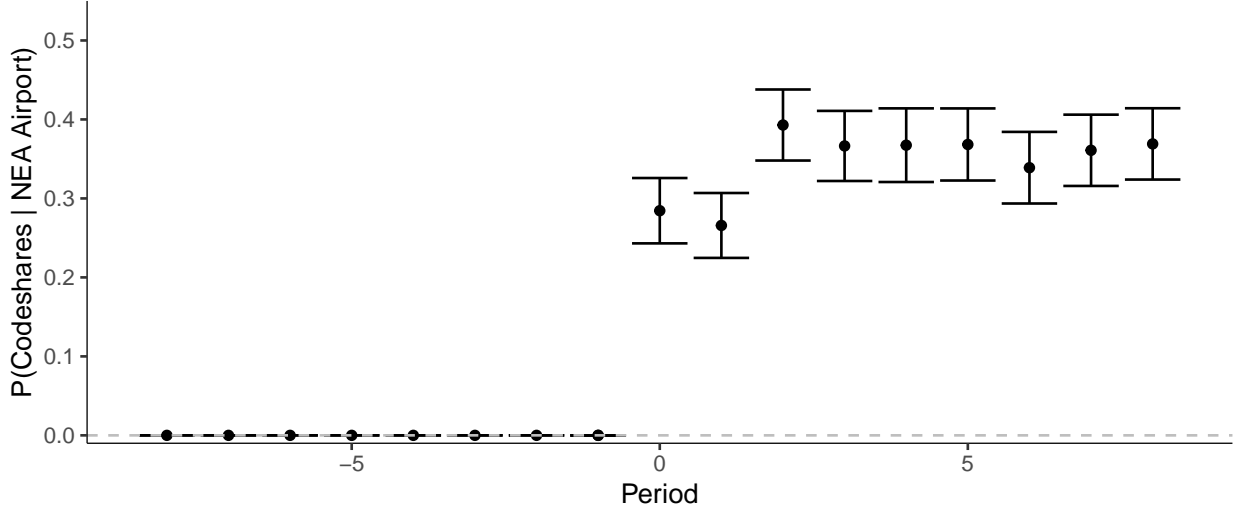


Figure plots the estimated event study coefficients from Table 13. Dependent variable is the probability that within a nonstop market, at least one passenger took planes operated by both American and JetBlue as part of their itinerary. Base period is 2021 Quarter 2. All data from 2020 and the first quarter of 2021 is excluded, as such, Period -1 is the fourth quarter of 2019.

airport pair  $j$  at time  $t$ , I estimate the model

$$Y_{jt} = \alpha N_j + \sum_{T=-8}^8 \delta_T P_{t=T} + \sum_{T=-8, t=8}^8 \gamma_T N_j P_{t=T} + \epsilon_{jt}$$

where  $Y_{jt}$  is a dummy variable that is 1 if at least one itinerary was recorded was a codeshare itinerary with flights operated by either JetBlue or American and ticketed by the other,  $N_j$  is a dummy variable if at least one endpoint airport was covered by the NEA agreement,  $P_{t=T}$  is a variable which is 1 if  $t = T$  and 0 otherwise, and  $\epsilon_{jt}$  is a random error term. In this and later analyses within this section, 2019 quarter 4 is defined as period "-1", and 2021 quarter 2 is defined as period "0". This excludes the duration of the pandemic before widespread vaccine availability.<sup>24</sup> Beyond concerns about capturing coronavirus irregularities, this excludes the first quarter of 2021 which covers a period of time both before and after the NEA agreement was implemented. Results for this estimation are depicted in Figure 4.

As would be expected, no codesharing itineraries are booked before the start of the NEA and any market covered by it had approximately a 37% chance of having codeshare routes following the implementation of the agreement. Beyond the numerical significance of these estimates, they help confirm the overall implementation timeline. The first two quarters following the implementation of the merger saw fewer markets with codesharing tickets than the other quarters. This is consistent with the implementation timeline of the

<sup>24</sup>As depicted in Figure 2, the second period of 2021 saw air travel return to 2016 levels. As such, this should represent a more typical environment for the industry.



agreement publicized in the press, with additional markets added to the codesharing agreement over time. As such, this reinforces the value of the increased observational period compared to past research which had data through the end of 2021.

I now turn my attention to identifying the effects of the NEA on airfare. Past literature on the aviation industry has generally used one of two outcomes of interest: either the average market fare or the average per-mile fare ("market yield"). While the literature has largely focused on fares in evaluating the effects of anti-competitive practices (such as in Luo (2014); Carlton et al. (2019)), the only existing study (Zou et al., 2023) to evaluate the NEA focused on yields as its variable of interest. As such, I estimate models with both fares and yields as outcomes to allow for easier comparison of my results with the past literature.

I model the average airfare  $Y_{jt}$  for origin-destination pair  $j$  in period  $t$  as

$$Y_{jt} = \alpha N_j + \sum_{T=-8}^8 \delta_T P_{t=T} + \sum_{T=-8, t=8} \gamma_T N_j P_{t=T} + \beta X_{jt} + \epsilon_{jt}$$

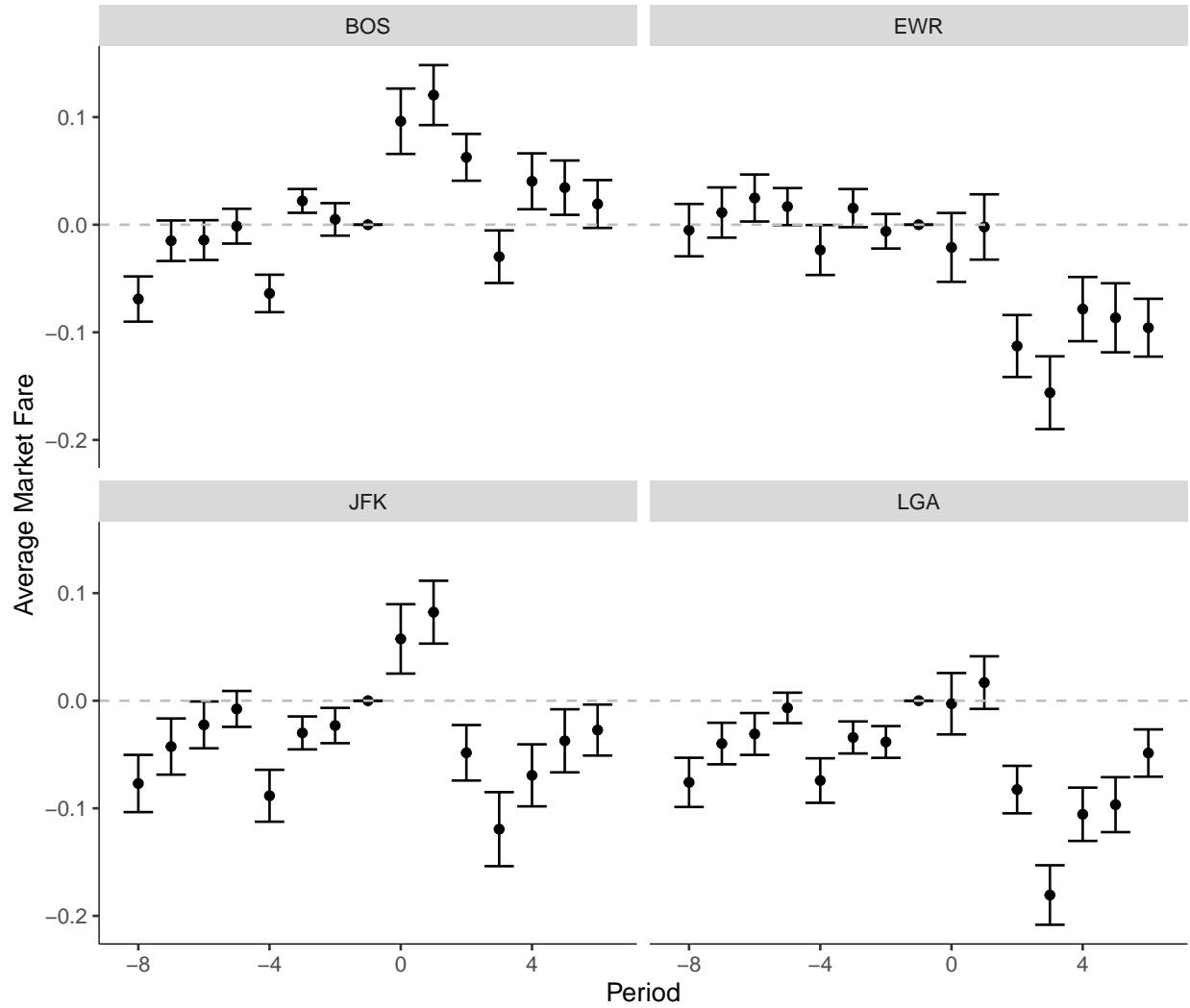
where  $N_j$  is a dummy variable if the market includes an endpoint covered by the NEA agreement,  $P_{t=T}$  is a variable which is 1 if  $t = T$  and 0 otherwise,  $X_{jt}$  is a vector of additional market level controls which includes the log of the geometric mean income of the origin and destination metropolitan statistical areas, the log of the geometric mean population of the origin and destination metropolitan statistical areas, the lagged HHI for these markets, state coronavirus rates, the lagged share of nonstop flights, and the lagged average distance traveled within the market. Finally,  $\epsilon_{jt}$  is a random error term.

These results are plotted in Figure 12. As is evident in the figure, the presence of substantial pre-trends suggests that the differences-in-differences inference strategy is invalid to use here. However, adding additional airport interaction terms for the each airports covered by the NEA agreement removes the pre-trends for both of Boston Logan International Airport (BOS) and Newark Liberty International Airport (EWR). These results are depicted in Figure 5. It appears that the NEA increased fares at BOS and decreased fares at EWR. That the estimated coefficients for Newark are negative is consistent with the evidence from Table 2 that markets with Newark as the originating airport had the least overlap between the carriers before the agreement, suggesting that the potential for anti-competitive effects from the alliance was limited.

## 5.2 Spirit Merger

With these findings regarding the Northeast Alliance established, I now turn my attention towards estimating the effect that the JetBlue-Spirit merger would have had on prices had it been allowed to be completed. To

Figure 5: NEA Market Fare - Airport Interaction Results



Coefficients from a model based on the model reported in Table 16 but which includes airport-time interaction terms are reported. Base period is 2021 Quarter 2. All data from 2020 and the first quarter of 2021 is excluded, and as such, Period -1 is the fourth quarter of 2019. Standard errors clustered at the level of origin-destination pairs are reported.

do this, I estimate a model of demand, assume that Bertrand-Nash competition with differentiated products describes the supply side of the market, and then estimate three merger counterfactuals (a best case, worst case, and 'average' case for merger outcomes).

Before beginning these analyses, it is important to consider the implications of one critical assumption used within them, namely that firms treat overall market structure as exogenously determined. The largest consequence of this is that routing cannot respond to demand shocks within a given quarter. Furthermore, this assumption does not allow for the merging firms to change which markets they operate in following the merger.

This creates a problem for proper inference of the counterfactual world in which the merger had been completed. As discussed in the previous subsection, the NEA had included a reorganization of the route networks of each of the collaborating firms as part of the agreement.<sup>25</sup> As such, counterfactuals using markets between 2021 and 2023 are those in which the JetBlue-Spirit merger is allowed to be completed while the NEA is in effect and without any resulting reorganization of routes. However, as the NEA would ultimately be ruled against before the trial for the Spirit merger, it is unclear as to the likelihood of this world existing.

Unfortunately, it is not possible to simply use markets from before the implementation of the NEA as this would require the usage of data from before the coronavirus pandemic. As documented in press sources and in a working paper (Ewen, 2023), air travel demand dynamics have greatly changed following the pandemic. In part thanks to the rise of telecommunications software such as Zoom, low-price elasticity business travel has lessened. Concurrently to this, American consumers acquired additional savings during the pandemic which they were able to use on additional consumption following the pandemic (Klitgaard and Higgins, 2023). As such, the change of the price elasticity of air travel following the pandemic is a priori ambiguous.

To try to resolve these issues, I conduct all analyses within this section on two samples - the "pre-pandemic" sample from the first quarter of 2017 through the fourth quarter of 2019 and a "post-pandemic" sample consisting of data from the second quarter of 2021 through the end of the second quarter of 2023. By comparing the results from these two samples, a more complete picture can emerge of the counterfactual world in which the JetBlue-Spirit merger had been completed despite the issues facing each sample's overall credibility.

### 5.2.1 Demand Model and Results

I use a random coefficient nested logit model to estimate demand, in line with the model originally documented in Berry et al. (1995). Adopting the best notation described in Conlon and Gortmaker (2020), each

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<sup>25</sup>One consequence of this is that NEA codeshare products ticketed to JetBlue are included as JetBlue products for purposes of the merger simulation.

consumer  $i$  in market  $t$  has indirect utility from buying product  $j$  as defined by

$$U_{ijt} = \delta_{jt} + \mu_{ijt} + \epsilon_{ijt}$$

Where  $\delta_{jt}$  is the mean utility across consumers in market  $t$  for product  $j$ ,  $\mu_{ijt}$  is consumer level deviation from this mean utility, and  $\epsilon_{ijt}$  is an unobserved consumer-level shock.  $\delta_{jt}$  is parameterized as

$$\delta_{jt} = \alpha p_{jt} + x_{jt}\beta + F_{jt}\gamma + \epsilon_{jt}$$

where  $p_{jt}$  is the price of product  $j$  in market  $t$ ,  $x_{jt}$  is a vector of observed itinerary characteristics<sup>26</sup>, and  $\epsilon_{jt}$  is a product level shock shared by all consumers within a market. Within this model,  $\mu_{ijt}$  is parameterized as

$$\mu_{ijt} = \sigma_p p_{jt} \nu_{ip} + \sum_k \sigma_k x_{kjt} \nu_{ik}$$

with the  $\nu$  parameters drawn from a normal distribution with mean zero and estimated variance. Finally,  $\epsilon_{ijt}$  are assumed to arise from a type 1 extreme value distribution so that market shares will be of the discrete choice nested logit variety. Within this model specification, air fare is included within one nest while the outside good is included in the other nest.

Consumer  $i$  purchases itinerary  $j$  if it has greater utility than all other products in the market. As such, market shares can be obtained by integrating over the consumers, resulting in the market share of each product being defined by

$$s_{jt} = \int \frac{e^{\delta_{jt} + \mu_{ijt}}}{\sum_{j'} e^{\delta_{jt} + \mu_{ijt}}} d\nu_i$$

Within this model, the contribution to utility shared by consumers,  $x_{jt}$ , contains the distance between the origin and destination airports within the market, the squared distance, a dummy variable which is one if an itinerary does not include any intermediate stops between the origin and destination airports, the difference between the miles flown by the itinerary and the minimum number of miles flown within the market, the square of this difference, a dummy variable which is 1 if the origin or destination airport are in Florida or Las Vegas, and the ratio of the number of destinations served out of the origin airport by the carrier divided by the total number of destinations served out of that airport. This last measure is intended to proxy for rewards program strength of the carrier at the origin airport.  $F_{jt}$  is a vector of controls which includes fixed effects for each year-quarter and carrier. The variables included in  $x_{jt}$  are intended to be largely unresponsive to demand shocks - these characteristics of a product are determined primarily by a carrier's network structure and the geography between the origin and destination airports. As such, these

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<sup>26</sup>Namely nonstop status and miles flown

characteristics should not change in response to unobserved quarterly demand shocks.

Four sets of instruments are used to account for the endogeneity of prices and shares within a market. The first set consists of cost shifters created by multiplying dummy variables for origin or destination airport being a hub of the ticketing carrier by the miles traveled and the square of the miles traveled. The second set of instruments, employed to account for endogeneity in market shares, consists of the differentiation instruments described in Gandhi and Houde (2019) constructed from a dummy variable that is 1 for a nonstop flight, the miles covered by the itinerary, the square of the miles covered by the itinerary, and the service ratio of the carrier out of the destination airport. The third set of instruments, employed to instrument for the nesting parameter  $\lambda$  consists solely of the number of products within a market. Finally, all remaining exogenous regressors and their interactions comprise the final set of instruments.<sup>27</sup>

Results for the estimation of this model’s coefficients for both periods are included in Table 7. With the exception of nonstop flight status and the tourist route dummy variable, all variables are predicted to influence consumer demand in both periods. However, of the variables which allow for random effects, only price takes a significant coefficient, of roughly 0.6. Finally, I estimate a nesting parameter of a little over a tenth in both periods. This is consistent with high degrees of substitutability between air travel and the outside good, which is inconsistent with most previous literature’s estimates of the nesting parameter. As such, consumers are predicted to have a high willing to enter (leave) the market in response to a price decrease (increase).

JetBlue’s products are more elastic than Spirit’s, consistent with it targeting less budget conscious travelers than Spirit. Consumers are estimated to have become less price elastic between the pre-pandemic and post-pandemic periods. This is consistent with the notion that despite the decline in business travel following the pandemic, leisure travelers’ spending patterns changed to be less price sensitive, perhaps due to excess savings acquired during the pandemic period or the desire to makeup for lost vacations.

### 5.2.2 Supply Model and Results

The consumer aviation market is assumed to operate under Bertrand competition with differentiated products following the exogenous determination of quarterly route structure. This allows for recovery of marginal costs through the estimated demand elasticities. These are included with the estimates of Demand within Table 7. I estimate a slight increase in markups of approximately two percentage points between the pre- and

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<sup>27</sup>Other instruments for price were considered, including interactions between the gas miles variable and characteristics of the origin airport and interactions between the exogenous variables. However, the selection of price shifters used in the final model had the best performance across the tests documented in Tables ???. The final specification chosen (column 4) has the benefit of passing the Wu-Hausman test while failing the Test of Over Identification by the least amount of the tested models. As noted in Nevo (2001), provided enough observations it is virtually impossible to pass the over-identification test, and as such, I am not concerned with the result. For comparison purposes, the instrument comparison table on the main period of interest (2021 Q2 through 2023 Q2) is included as Table ??.

Table 7: Demand Estimation Results

Variable	Pre-Pandemic	Post-Pandemic
<b>Linear Coefficients</b>		
Price	-3.05*** (0.38)	-3.11*** (0.44)
Nonstop	0.838 (1.3)	1.16 (0.8)
Miles Flown	1.34*** (0.12)	2.29*** (0.24)
Miles Flown <sup>2</sup>	-0.141*** (0.039)	-0.343 (0.17)
Origin Prescence	0.0117*** (0.00045)	0.00812*** (4e-04)
Extra Miles	-2.65*** (0.11)	-2.34*** (0.13)
Extra Miles <sup>2</sup>	1.62*** (0.069)	0.527*** (0.11)
Tourist Route	0.0221 (0.028)	0.149*** (0.03)
<b>Nonlinear Coefficients</b>		
Price	0.591*** (0.14)	0.599*** (0.12)
Nonstop	0.249 (5.4)	0.0814 (10)
Miles Flown	0.0152 (2.5)	0.066 (3.1)
<b>Nesting Coefficient</b>		
Nesting Parameter	0.132*** (0.047)	0.115*** (0.032)
<b>Summary Statistics</b>		
Period	2017Q1-2019Q4	2021Q2-2023Q2
N Products	307289	265196
N Markets	87363	70016
Mean Elasticity	-5.591	-5.211
Spirit Mean Elasticity	-4.28	-3.44
JetBlue Mean Elasticity	-5.39	-5.18
Mean Markup	0.191	0.21

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$  Products are defined as a Carrier-Nonstop pair within an Origin-Destination-Year-Quarter market. Origin Service Ratio is the fraction of direct routes out of the originating airport operated by the carrier divided by the number of distinct direct routes out of that airport. Extra Miles is the average additional miles flown with a connecting itinerary minus the minimum miles flown within a market. A tourist product is one that serves the Las Vegas metropolitan statistical area or an airport in Florida.

post-pandemic periods.

### 5.2.3 Merger Simulation

I can now turn my attention to simulation of the Spirit-JetBlue merger. For each of the pre-pandemic and post-pandemic periods, I estimate three counterfactuals mergers. These are respectively, a best case merger (where the merged product takes the lowest marginal cost and best unobservables of the two products), an average case merger (where the merged product takes the average of the two firms marginal costs and the average of the estimated unobservables), and a worst case scenario (where the merged product takes the greater of the marginal costs of the two firms and the lowest unobservable characteristics).<sup>28</sup> In each of these scenarios, I assume that the combined firm’s connecting products take on the minimum of the miles flown, implicitly assuming that in all of these simulations that the combined firm will take advantage of better routing.

Table 8 contains the estimated price effects from the merger on individual product prices. In both the best and average case scenarios, I estimate declines in the average prices of products in markets wherein both JetBlue and Spirit competed. In the worst case scenario, I estimate an increase of average fare paid of approximately \$4. These trends are consistent between the pre-pandemic and post-pandemic estimates.

While my estimated results are consistent with efficiencies from the merger resulting in savings for the average consumers in two of the three scenarios, it is worth noting that in the judge’s opinion within the case, the key risk of harm was to low-income consumers who may not be able to fly if the minimum fare within the market increased. The overall change in this fare, in twenty dollar intervals, is expounded upon in Table 9. Across all of my simulations, at least 14 markets are estimated to have the minimum price within the market increase by over \$80. Within both periods, these in the best case scenario markets are primarily between airports in the New York and Boston areas and various destinations within the Southern portion of the United States (such as Houston and Dallas). As such, it is consistent with the finding of the key markets of concern within the trial.

Now that the results on prices have been expounded upon, we can now turn our attention to how the simulations predict market concentration would change. Notably, as ultra-low cost airlines earn a significant amount of their income through axillary fares, which are not included within my dataset, estimation of market shares based on revenue are liable to understate these carriers within the market. As such, for these simulations, I calculate both an HHI calculated using market shares of airfare income as well as an HHI

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<sup>28</sup>An additional simulation, not reported in this paper, solely reassigns the Spirit products to JetBlue, to capture short run pricing impacts of JetBlue internalizing Spirit’s pricing decisions. However, simulation resulted in very little changes to prices and quantities. This is not altogether unsurprising, as the effects of Spirit on competition has generally been to promote the introduction of more varied fares (Shrago, 2024), which my data construction methodology abstracts from.

Table 8: Simulated Price Effects of Merger

	N	Mean	(SD)	Minimum	Median	Maximum
<b>Pre-Pandemic</b>						
<b>Prices</b>						
Observed	12074	2.04	(0.69)	0.47	1.98	4.91
Best Case	10106	2.08	(0.66)	0.47	2.02	5.06
Average Case	10106	2.12	(0.64)	0.46	2.06	5.15
Worst Case	10106	2.16	(0.64)	0.47	2.09	5.09
<b>Market Average Price</b>						
Observed	1418	2.01	(0.43)	0.93	1.95	3.1
Best Case	1418	1.72	(0.6)	0.8	1.54	3.46
Average Case	1418	2	(0.51)	1.02	1.91	3.49
Worst Case	1418	2.02	(0.5)	0.94	1.92	3.44
<b>% Change Average Price</b>						
Best Case	1418	-15.32	(16.62)	-53.97	-17.16	32.49
Average Case	1418	-0.67	(10.53)	-38.97	-0.51	37.89
Worst Case	1418	0.39	(10.58)	-36.7	0.62	48.53
<b>Post-Pandemic</b>						
<b>Prices</b>						
Observed	13650	1.96	(0.78)	0.35	1.89	5.25
Best Case	11496	2.01	(0.77)	0.4	1.94	5.33
Average Case	11496	2.05	(0.74)	0.4	1.99	5.33
Worst Case	11496	2.1	(0.74)	0.4	2.04	5.33
<b>Market Average Price</b>						
Observed	1554	1.95	(0.55)	0.65	1.89	3.57
Best Case	1554	1.72	(0.68)	0.61	1.68	3.69
Average Case	1554	2.04	(0.64)	0.75	1.96	3.91
Worst Case	1554	2.06	(0.64)	0.76	1.96	3.92
<b>% Change Average Price</b>						
Best Case	1554	-13.62	(18.16)	-59.47	-10.51	41.04
Average Case	1554	4.25	(9.96)	-32.5	3.92	49.12
Worst Case	1554	5.4	(10.03)	-26.21	5.09	51.1

Products from markets without both JetBlue and Spirit presence are excluded.

Table 9: Change in Minimum Fare Available in Market

	Pre-Pandemic			Post-Pandemic		
	Best	Average	Worst	Best	Average	Worst
< 20	1388	850	743	1426	848	763
20-40	73	453	306	56	390	254
40-60	35	168	278	36	213	256
60-80	22	44	168	25	77	180
80 <	15	18	38	11	26	101

The best case merger scenario is one in which the combined firm inherits the minimum average cost and greatest unobservables of each firm, the average case merger scenario has the combined JetBlue-Spirit inherit the average of the two firms' product characteristics, and the worst case scenario has the combined JetBlue-Spirit inherit the greatest marginal cost and lowest unobservables. Prices are in 2017 dollars.



Table 10: Simulated Change in Market Shares

	Passenger Shares			Revenue Shares		
	Best	Average	Worst	Best	Average	Worst
<b>Pre-Pandemic</b>						
< 0	294	276	392	795	518	446
0 - 100	42	63	46	63	58	42
100 - 1000	347	495	481	414	553	491
1000 - 3000	429	583	516	248	383	478
3000 <	421	116	98	13	21	76
<b>Post-Pandemic</b>						
< 0	549	441	287	1202	808	346
0 - 100	52	133	115	57	157	117
100 - 1000	303	585	748	235	472	761
1000 - 3000	267	323	386	60	116	324
3000 <	383	72	18	0	1	6

calculated using carrier shares of passengers within the market. These results are reported in Table 10. Under every simulation model, I predict significant increases in market concentration under the passenger criterion, driven by an ascendant JetBlue. This is the opposite of the revenue shares criterion, which predicts significant declines in market concentration under the revenue criterion in all but the worst case scenarios. However, even under this more favorable metric, over 170 markets are predicted to have increases about 100 points creating a structural presumption of illegality under the Department of Justice’s 2023 merger guidelines. Overall, these results are consistent with a merger which would decrease consumer welfare in various markets while having effects that are pro-competitive at the national level.

## 6 Conclusion

Within this paper, I retrospectively analyzed the Northeast Alliance’s effect on fares and codesharing tickets while prospectively simulating the thwarted JetBlue-Spirit merger’s impacts on airfare. I find mixed evidence for anti-competitive effects arising from the Northeast Alliance. In contrast, I find counterfactual price effects from the JetBlue-Spirit merger consistent with the ruling in the case. I estimate that this merger would have harmed extremely price sensitive travelers by raising airfares by over \$60 dollars in over 35 markets with both the pre-pandemic and post-pandemic periods. This effect persists between different simulations, with the worst case scenario predicting over 200 markets having price increases over \$60 in both periods.

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# Appendices

## A Data Processing Methodology

As detailed in Section 4, the Bureau of Transportation Statistics’ Airline Origin and Destination Survey (DB1B) database was the primary data set used for this research. After compiling the DB1B into a single dataset for the years 2015 through the second quarter of 2023, some observations were excluded from the sample. Itineraries with fares lower than \$15 were excluded to remove air travel purchased through frequent flier rewards points (X% of fares were excluded this way.). Similarly, in line with prior work<sup>29</sup>, fares of over \$1,500 dollars were excluded to avoid fares which were erroneously recorded (X% of fares were excluded this way). Beyond fares, itineraries were excluded from the sample if they had three or more layovers<sup>30</sup> or if they had a leg outside of the continental United States.<sup>31</sup>

Beyond this excluding of individual itineraries, additional filtering rules were placed on products and markets. All markets within the year 2020 and the first quarter of 2021 were dropped to avoid contamination from the worst of the coronavirus pandemic. Furthermore, markets were excluded if they had fewer than 500 passengers fly within them, or had origin and destination airports closer than 150 miles. This restriction is in line with the past-literature (such as Ciliberto and Williams (2014)) and serves to not only improve computational speed but also account for these markets facing stronger competition from the outside good than other, more distant markets. Finally, products with fewer than 100 passengers were excluded from the sample to reduce the influence of product offerings that are liable to be nonstandard within the market and thus do not meaningfully contribute to competition.

In calculating product shares, the total number of buyers of each product is considered to be ten times the number of passengers who bought it as the DB1B is a 10% sample of the data. Additionally, all markets with origin and destination airports with distance between them of 150 miles or fewer are dropped. A total of X% of itineraries were removed and Y% of markets were removed through this. Following this, the hundred largest airports by passenger flows in the second quarter of 2022 were identified<sup>32</sup> and all other airports were excluded (X% percent of markets representing X% of consumers were excluded this way).

As part of the handling of price data, prices were modified in two ways. For Spirit itineraries completed before 2020, fares had an additional 22.99 times the number of trip legs added to them. This accounts for Spirit’s additional usage fee placed on itineraries which were not booked in-person at the airport, and which

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<sup>29</sup>such as Berry and Jia (2010)

<sup>30</sup>These reflect substantially distinct consumption behavior. A total of X% of observations were excluded this way.

<sup>31</sup>As noted in Ciliberto et al. (2021), these flights receive subsidies from the United States Postal Service. As such, proper marginal cost recovery is infeasible while including them in the sample.

<sup>32</sup>This was chosen as the last quarter before the board of Spirit approved the merger.

the majority of consumers paid.<sup>33</sup> Following this modification, prices were re-expressed in terms of 2017 United States dollars to account for inflation.

## B Merger Comments Analysis

As part of the merger proposal, JetBlue and Spirit filed an application with the Department of Transportation for the transference of operating certificates from Spirit to the combined firm, to be effective after the completion of the merger. As part of this, the public was allowed to leave public comments on the regulatory filing. Within this section, I employ stance detection techniques to analyze these comments at scale. While these comments are largely irrelevant to the result of this particular merger (namely, that it would be rejected following a suit brought by the Department of Justice), I am aware of no existing paper to use these techniques as part of the case study of a merger.

Stance detection, in brief, is the task of detecting the position held by the author of a text regarding some topic. In this context, it is to determine if the author of a comment left on the regulatory filing supported or opposed the proposed JetBlue-Spirit merger. This context is particularly suitable for the use of modern machine learning models as focused and direct. Therefore, an unsupervised zero shot model should be effective with minimal issues with trying to gauge potentially contradictory statements that could be found in a longer work.

The stance detection problem should not be confused with that of the sentiment analysis problem. Sentiment analysis intends to capture the emotions expressed in a text rather than the feelings held towards the text’s author. As an example of how these differ, consider the comment “Competition is good for a healthy economy.”<sup>34</sup> Using a pre-trained sentiment detection model developed for analyzing financial sentiment data, FinBERT,<sup>35</sup> this statement is judged to possess positive sentiment. However, it is correctly judged to oppose the merger by the stance detection model used within my analysis.

This paper uses the pre-trained model documented in Laurer et al. (2024) to detect the stances of each comment left on the docket. Each comment is assessed for the probabilities that each comment agrees with the statements “The author of this comment {approves of, disagrees with} the merger.” As these statements are mutually exclusive, the probabilities assigned for each comment sum to 1. As documented in Figures 6 and 7, most comments are strongly polarized, suggesting that the language model had little difficulty in assigning stances to comments. Looking over a sample of fifty comments, all are sorted as would be expected based on my understanding of the text. As such, I believe that the model is suited for analyzing the public

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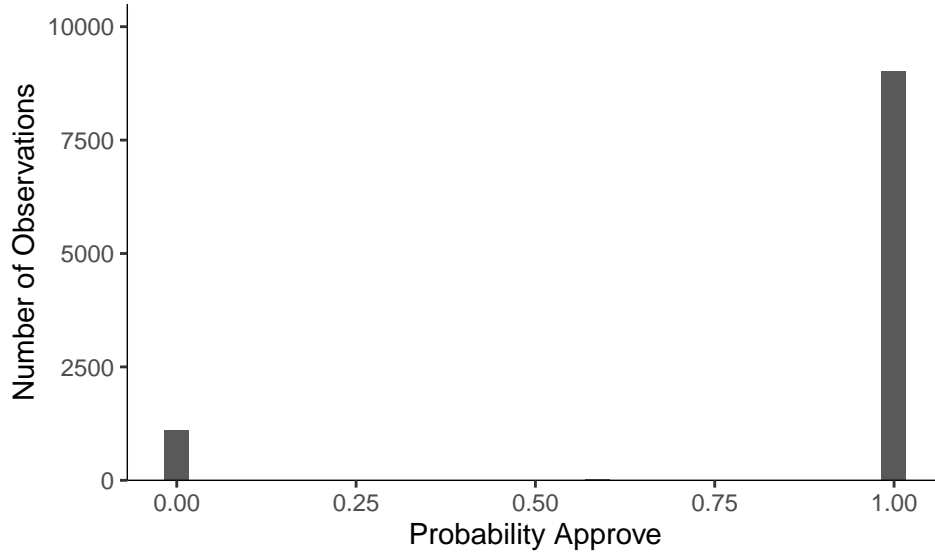
<sup>33</sup>As documented in Shrager (2024), these fees were included in DB1B releases following 2020.

<sup>34</sup>This is an actual comment left on the regulatory docket.

<sup>35</sup>Model documentation is contained in Araci (2019)



Figure 6: Probability Comments Approve



Data is sourced from the Department of Transportation regulatory filing regarding the JetBlue-Spirit merger (DOT-OST-2023-0024). “Probability Approve” is the probability that a comment approves of the merger.

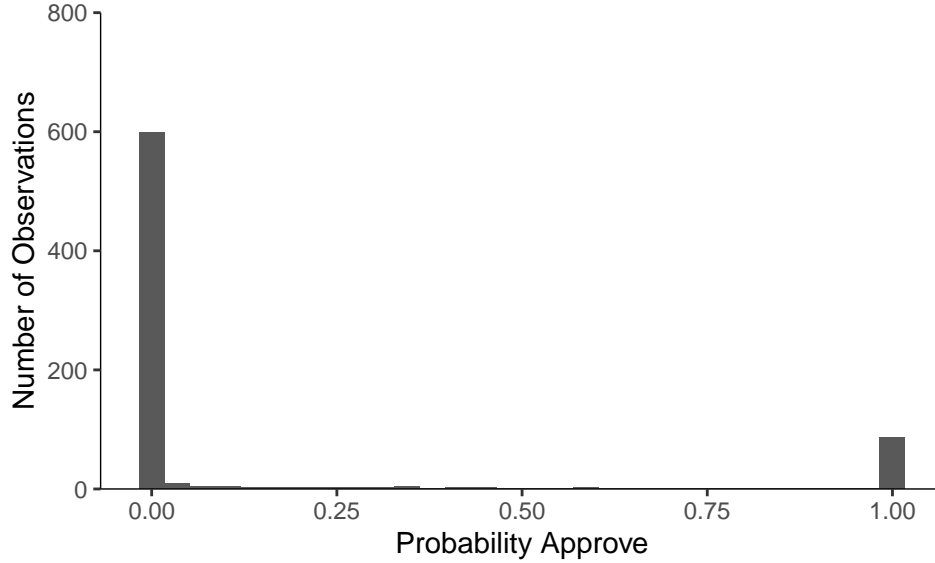
comments left on the regulatory filings.

Table 11 contains summary statistics for these comments. Most comments approve of the merger. However, of those comments which are unique, the vast majority disapprove of the merger. On average, comments which approve of the merger are longer than those that disapprove. This table provides a helpful demonstration of the difference between the stance detection and sentiment detection problems - the majority of disapproving comments expressed their views with neutral sentiment. Finally, the table documents the state of origin for the comments.

Figure 8 plots the distribution of submitted comments on each day after the regulation was available for commenting upon. In the first twenty days, virtually every comment left on the docket supported the merger. Virtually every comment left on the docket after this period was opposed the merger. This may reflect asymmetry in the the resources available to JetBlue, Spirit, and anti-merger consumer welfare organizations.<sup>36</sup>

<sup>36</sup>The exact legitimacy of the sentiments in these duplicate comments was a matter of some public debate, with some lawmakers alleging that they represented an “astroturf campaign” (Birnbaum, 2023)

Figure 7: Probability Comment Approves - Unique Comments Only



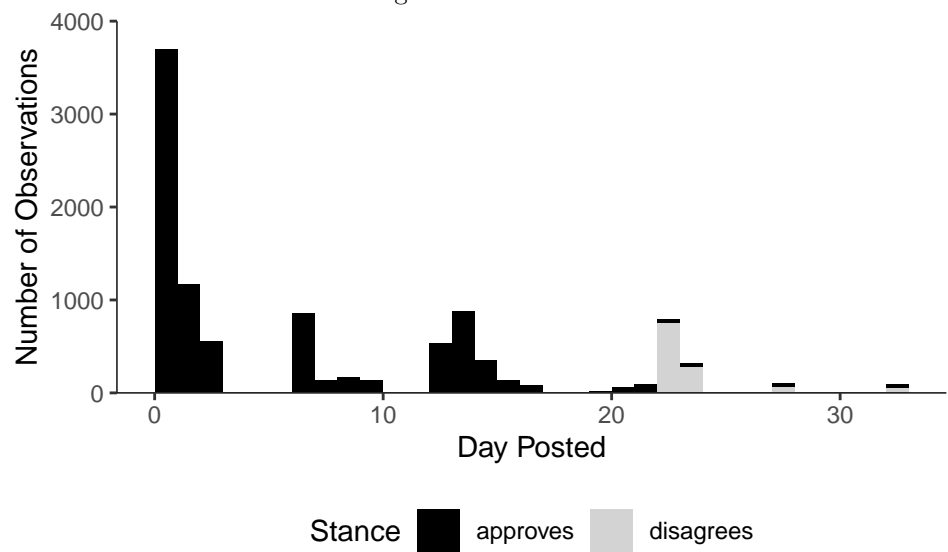
Data is sourced from the Department of Transportation regulatory filing regarding the JetBlue-Spirit merger (DOT-OST-2023-0024). “Probability Approve” is the probability that a comment approves of the merger.

Table 11: Stance Detection Summary Statistics

	Mean	(SD)	Minimum	Median	Maximum
P(Approves)	0.89	(0.31)	0	1	1
Approving Comment P(Approves)	1	(0.02)	0.51	1	1
Disapproving Comment P(Approves)	0.01	(0.04)	0	0	0.49
New York Comment	0.14	(0.35)	0	0	1
Florida Comment	0.35	(0.48)	0	0	1
Massachusetts Comment	0.05	(0.22)	0	0	1
Puerto Rico Comment	0.01	(0.12)	0	0	1
Observations	10185				

Data is sourced from the Department of Transportation regulatory filing regarding the JetBlue-Spirit merger (DOT-OST-2023-0024). Comments have the stance with the highest probability assigned to them. This is the “Stance Probability.” Similarly, “Sentiment Assigned Probability” is the sentiment with the highest probability assigned to a comment by the language model. Comment length is in characters.

Figure 8: Timeline of Submitted Comments



Data is sourced from the Department of Transportation regulatory filing regarding the JetBlue-Spirit merger (DOT-OST-2023-0024). Comments have the stance with the highest probability assigned to them.

## C Additional Figures and Tables

### C.1 Additional Descriptive Figures and Tables: Northeast Alliance

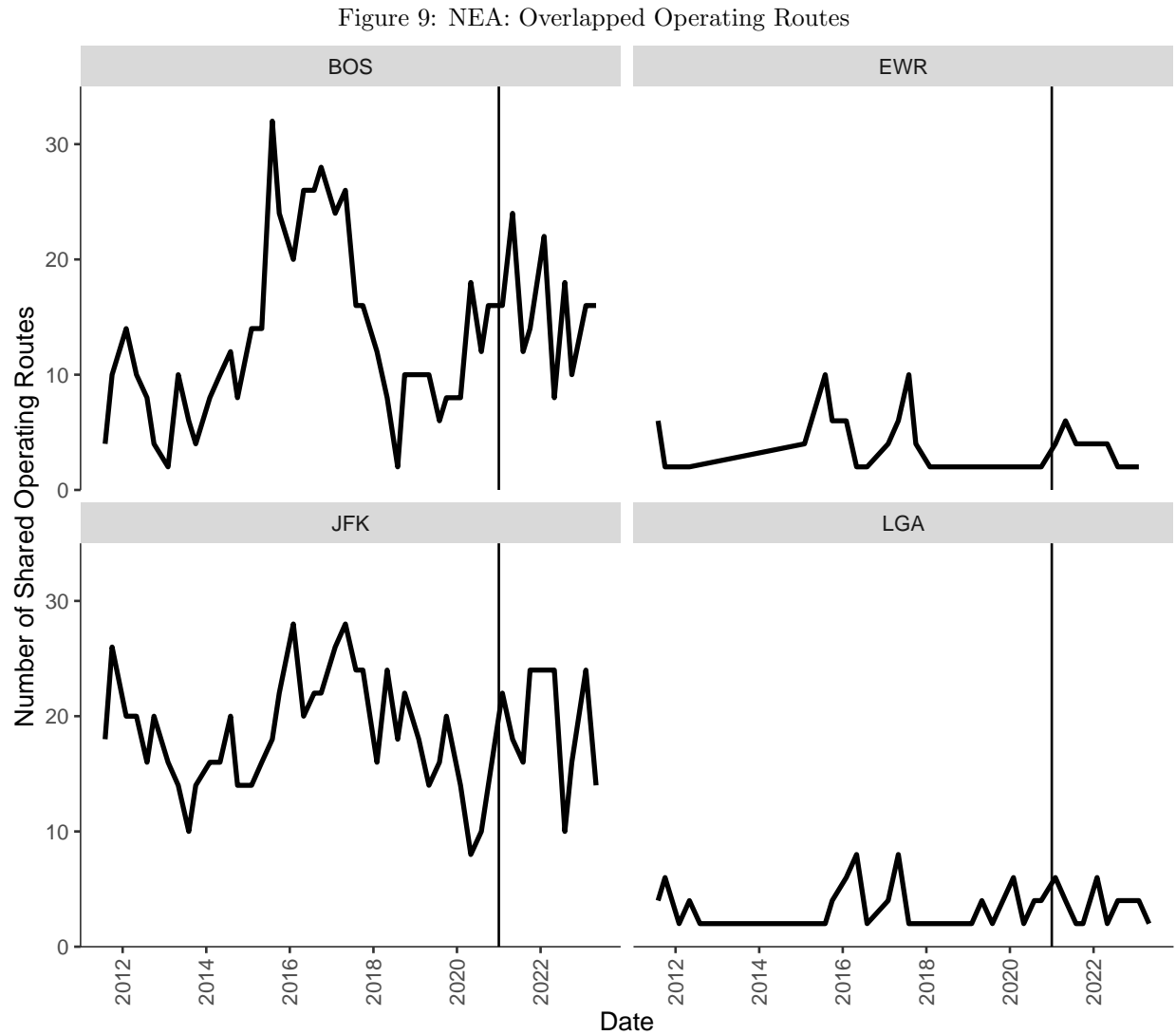
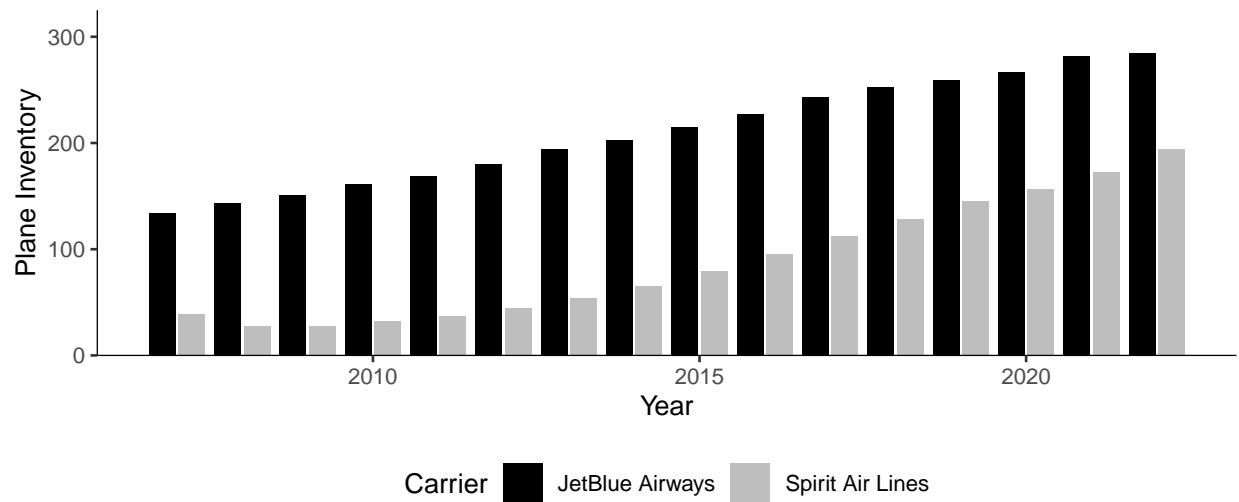


Figure plots the number of routes operated by both JetBlue and American within a given quarter. The vertical line represents the start of the Northeast Alliance in January 2021.

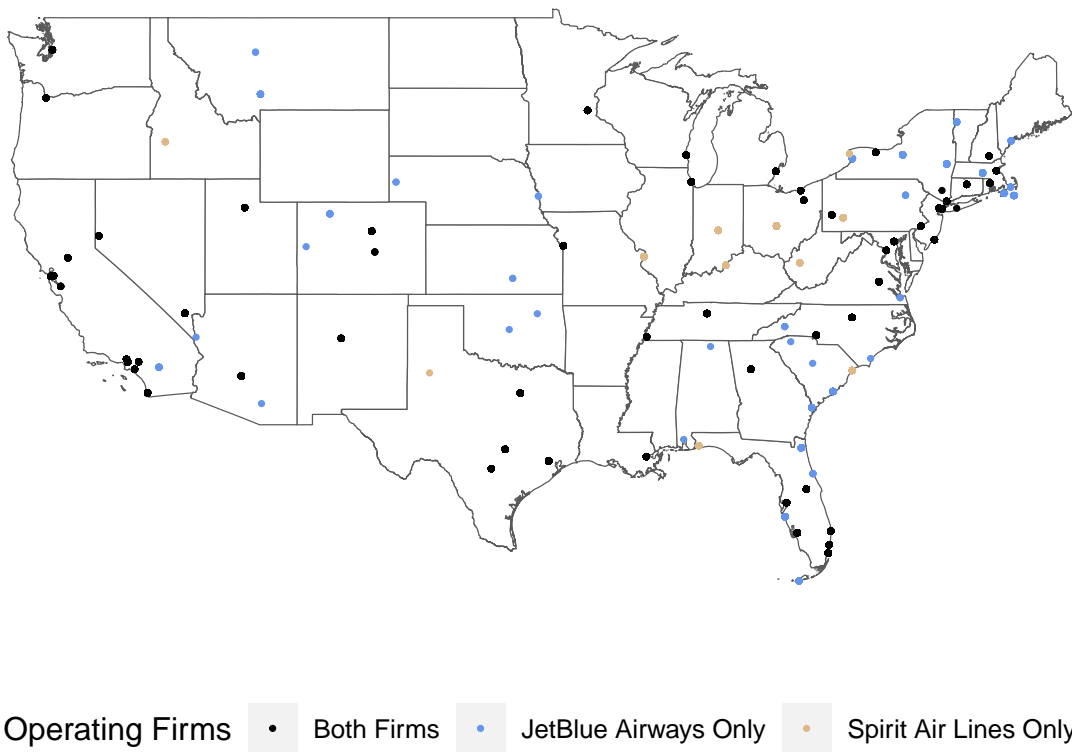
## C.2 Descriptive Figures and Tables: JetBlue, Spirit

Figure 10: JetBlue, Spirit Fleet Size Over Time



Source: B-43 Inventory Data. Each bar is the number of airplanes in a given firm's inventory within a given year.

Figure 11: JetBlue, Spirit Airports - 2022



Derived from DB1B Data. Beyond the United States mainland, both carriers operated in Puerto Rico.

Table 12: JetBlue and Spirit: Overlap Cities - 2022

City	Firm Passengers	Total Passengers	Share
Ponce, PR	106320	106320	1.000
Aguadilla, PR	251180	321170	0.782
San Juan, PR	1848180	4149260	0.445
Boston, MA	4262240	12136460	0.351
West Palm Beach/Palm Beach, FL	919690	2960650	0.311
Miami, FL	5885260	19049140	0.309
Charlotte Amalie, VI	155220	584450	0.266
New York, NY	8243150	32401400	0.254
Hartford, CT	596840	2358950	0.253
Orlando, FL	4890200	19981730	0.245
Fort Myers, FL	964970	4577540	0.211
Detroit, MI	1330090	7481070	0.178
Cleveland, OH	567000	3537960	0.160
Richmond, VA	235760	1474130	0.160
New Orleans, LA	774190	4909390	0.158
Las Vegas, NV	2783710	18384770	0.151
Tampa, FL	1371860	9955070	0.138
Pittsburgh, PA	391900	3023570	0.130
Los Angeles, CA	2839960	22400620	0.127
Philadelphia, PA	844170	7694760	0.110

Derived from DB1B Data. Cities are ordered by the combined share of passengers who used JetBlue or Spirit flights as a share of the total passengers departing from the city within 2022. Cities in which only one firm operates are excluded.

### C.3 Estimation Results: Northeast Alliance

Table 13: Probability of American, JetBlue Codesharing Flights

	Model 1
(Intercept)	0.00000 (0.00000)
NEA Market: Period -8	0.00000 (0.00000)
NEA Market: Period -7	-0.00000 (0.00000)
NEA Market: Period -6	0.00000 (0.00000)
NEA Market: Period -5	0.00000 (0.00000)
NEA Market: Period -4	-0.00000 (0.00000)
NEA Market: Period -3	-0.00000 (0.00000)
NEA Market: Period -2	-0.00000 (0.00000)
NEA Market: Period 0	0.28446 (0.02111)***
NEA Market: Period 1	0.26577 (0.02097)***
NEA Market: Period 2	0.39294 (0.02295)***
NEA Market: Period 3	0.36645 (0.02264)***
NEA Market: Period 4	0.36740 (0.02378)***
NEA Market: Period 5	0.36830 (0.02329)***
NEA Market: Period 6	0.33890 (0.02313)***
NEA Market: Period 7	0.36092 (0.02303)***
NEA Market: Period 8	0.36902 (0.02303)***
R <sup>2</sup>	0.33984
Adj. R <sup>2</sup>	0.33971
Num. obs.	84533

\*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.1$

Dependent variable is the probability that within a nonstop market, at least one passenger took an itinerary with JetBlue or American as the ticketing carrier and the other firm operated at least one leg of the trip. Base period is 2021 Quarter 2. All data from 2020 and the first quarter of 2021 is excluded, as such, Period -1 is the fourth quarter of 2019. Standard errors are clustered at the level of origin, destination airport pairs.



Figure 12: NEA Effect on Market Fare

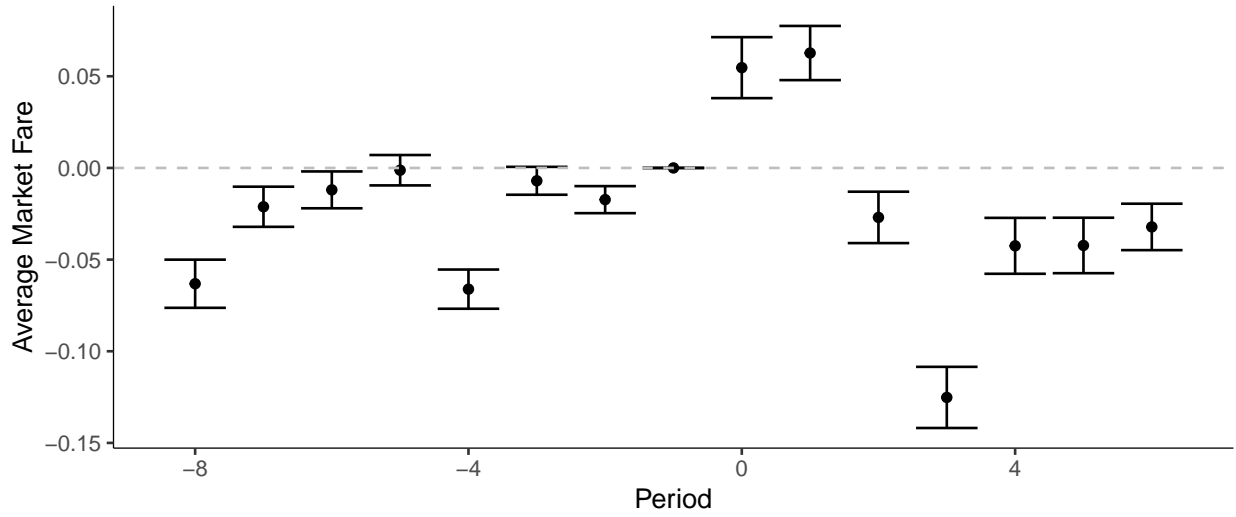


Figure plots the event study coefficients from the second column of Table 16. Base period is 2021 Quarter 2. All data from 2020 and the first quarter of 2021 is excluded, and as such, Period -1 is the fourth quarter of 2019. Standard errors clustered at the level of origin-destination pairs are reported. Results from an alternative specification with Yield as the outcome of interest are detailed in Figure 15 and Table 17.

Figure 13: American, JetBlue Fare Difference

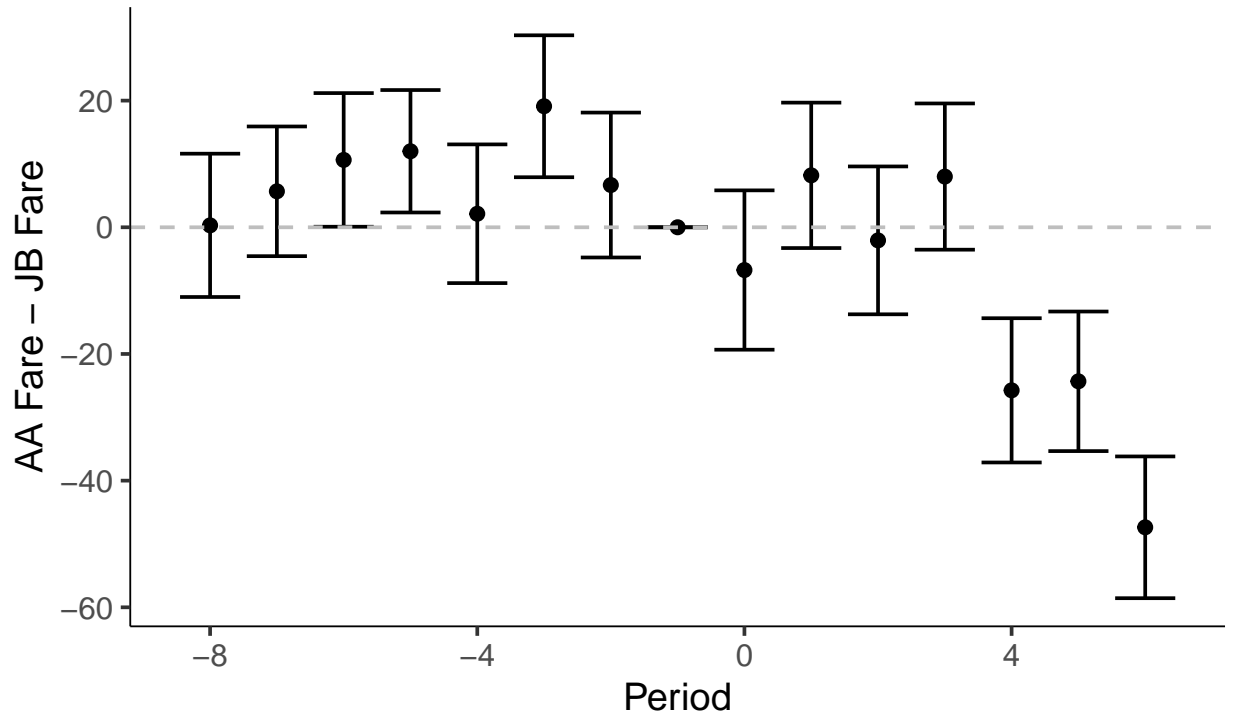


Figure plots the estimated event study coefficients from Table 14 Base period is 2021 Quarter 2. All data from 2020 and the first quarter of 2021 is excluded , as such, Period -1 is the fourth quarter of 2019.

Table 14: American, JetBlue Fare Difference

	Model 1	Model 2	Model 3	Model 4	Model 5
NEA_Market:Period-8	-0.26906 (5.75228)	0.30596 (5.77309)		-0.29184 (5.75995)	
NEA_Market:Period-7	5.09132 (5.17678)	5.67806 (5.22338)		5.13022 (5.19612)	
NEA_Market:Period-6	10.03942* (5.35652)	10.63729** (5.38161)		10.14576* (5.37598)	
NEA_Market:Period-5	11.76106** (4.92281)	12.00179** (4.93152)		11.84893** (4.93757)	
NEA_Market:Period-4	2.18901 (5.58228)	2.13655 (5.58620)	1.98855 (5.59391)	2.14272 (5.57950)	1.95626 (5.59321)
NEA_Market:Period-3	19.12171*** (5.73553)	19.10709*** (5.71661)	19.07312*** (5.72866)	19.35021*** (5.75325)	19.47877*** (5.76216)
NEA_Market:Period-2	6.44965 (5.83867)	6.67093 (5.83683)	6.51433 (5.84524)	6.53793 (5.85405)	6.69157 (5.85874)
NEA_Market:Period0	-7.25121 (6.41124)	-6.75069 (6.41684)	-7.08500 (6.42156)	-7.16336 (6.41050)	-7.06777 (6.41885)
NEA_Market:Period1	7.49030 (5.86068)	8.20226 (5.85658)	7.10715 (5.90042)	7.62169 (5.85369)	6.14813 (5.88378)
NEA_Market:Period2	-4.28124 (5.97452)	-2.06886 (5.95494)	-2.11545 (5.93054)	-4.84285 (5.95360)	-3.70597 (5.92021)
NEA_Market:Period3	6.88578 (5.91318)	8.00691 (5.88990)	6.39743 (5.93723)	6.51208 (5.90607)	3.90301 (5.92192)
NEA_Market:Period4	-27.21576*** (5.80239)	-25.74536*** (5.80982)		-27.46203*** (5.80723)	
NEA_Market:Period5	-26.01830*** (5.61729)	-24.31807*** (5.62150)		-26.10865*** (5.60841)	
NEA_Market:Period6	-48.46402*** (5.71876)	-47.36784*** (5.70989)		-48.99718*** (5.71473)	
NEA_Market:Period7	-47.09005*** (5.89402)			-47.65451*** (5.89024)	
NEA_Market:Period8	-45.42148*** (5.59951)			-46.27267*** (5.57531)	
Standard Controls	Yes	Yes	Yes	Yes	Yes
Income Data		MSA	MSA	State	State
Sample	Full	Full	Two Years	Full	Two Years
R <sup>2</sup>	0.09762	0.07689	0.03263	0.10155	0.04425
Adj. R <sup>2</sup>	0.09545	0.07449	0.02960	0.09933	0.04127
Num. obs.	15838	13534	6712	15838	6748

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$ 

Dependent variable is the difference of the average fare within a market of American Airlines less the average fare of JetBlue. Base period is 2021 Quarter 2. All data from 2020 and the first quarter of 2021 is excluded, as such, Period -1 is the fourth quarter of 2019. Standard errors are clustered at the level of origin, destination airport pairs.

Table 15: American, JetBlue Yield Difference

	Model 1	Model 2	Model 3	Model 4	Model 5
NEA_Market:Period-8	0.00726 (0.00579)	0.00694 (0.00576)		0.00725 (0.00578)	
NEA_Market:Period-7	0.01378** (0.00595)	0.01326** (0.00591)		0.01381** (0.00594)	
NEA_Market:Period-6	0.01266** (0.00549)	0.01191** (0.00545)		0.01274** (0.00549)	
NEA_Market:Period-5	0.00666 (0.00515)	0.00642 (0.00513)		0.00672 (0.00514)	
NEA_Market:Period-4	0.00219 (0.00478)	0.00197 (0.00475)	0.00220 (0.00477)	0.00215 (0.00478)	0.00234 (0.00480)
NEA_Market:Period-3	0.00695 (0.00463)	0.00684 (0.00462)	0.00698 (0.00463)	0.00712 (0.00462)	0.00728 (0.00463)
NEA_Market:Period-2	0.00886* (0.00508)	0.00859* (0.00505)	0.00858* (0.00506)	0.00892* (0.00507)	0.00892* (0.00507)
NEA_Market:Period0	0.00933* (0.00532)	0.00886* (0.00527)	0.00954* (0.00526)	0.00939* (0.00532)	0.01012* (0.00529)
NEA_Market:Period1	0.02109*** (0.00537)	0.02124*** (0.00531)	0.02080*** (0.00529)	0.02119*** (0.00535)	0.02065*** (0.00531)
NEA_Market:Period2	0.01420*** (0.00539)	0.01417*** (0.00536)	0.01564*** (0.00535)	0.01379** (0.00539)	0.01521*** (0.00536)
NEA_Market:Period3	0.01652*** (0.00547)	0.01754*** (0.00541)	0.01642*** (0.00541)	0.01624*** (0.00545)	0.01494*** (0.00543)
NEA_Market:Period4	-0.00850 (0.00530)	-0.00878* (0.00529)		-0.00868 (0.00529)	
NEA_Market:Period5	-0.00560 (0.00531)	-0.00544 (0.00531)		-0.00566 (0.00530)	
NEA_Market:Period6	-0.02115*** (0.00585)	-0.02175*** (0.00586)		-0.02154*** (0.00586)	
NEA_Market:Period7	-0.02522*** (0.00588)			-0.02563*** (0.00590)	
NEA_Market:Period8	-0.01742*** (0.00589)			-0.01804*** (0.00592)	
Standard Controls	Yes	Yes	Yes	Yes	Yes
Income Data		MSA	MSA	State	State
Sample	Full	Full	Two Years	Full	Two Years
R <sup>2</sup>	0.14162	0.13168	0.12855	0.14334	0.12850
Adj. R <sup>2</sup>	0.13956	0.12943	0.12582	0.14123	0.12578
Num. obs.	15838	13534	6712	15838	6748

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$ 

Dependent variable is the difference of the average yield within a market of American Airlines less the average yield of JetBlue. Base period is 2021 Quarter 2. All data from 2020 and the first quarter of 2021 is excluded, as such, Period -1 is the fourth quarter of 2019. Standard errors are clustered at the level of origin, destination airport pairs.

Figure 14: American, JetBlue Yield Difference

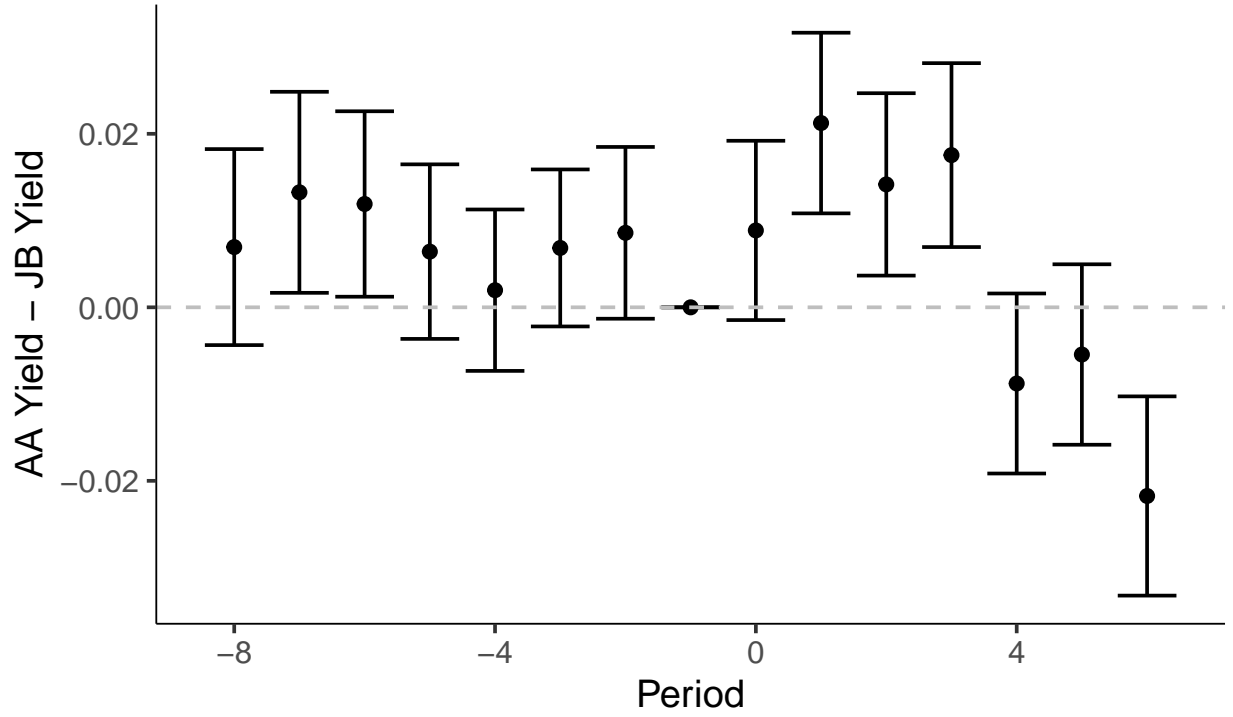


Figure plots the estimated event study coefficients from Table 15 Base period is 2021 Quarter 2. All data from 2020 and the first quarter of 2021 is excluded, as such, Period -1 is the fourth quarter of 2019.

Figure 15: NEA Market Yield Graph

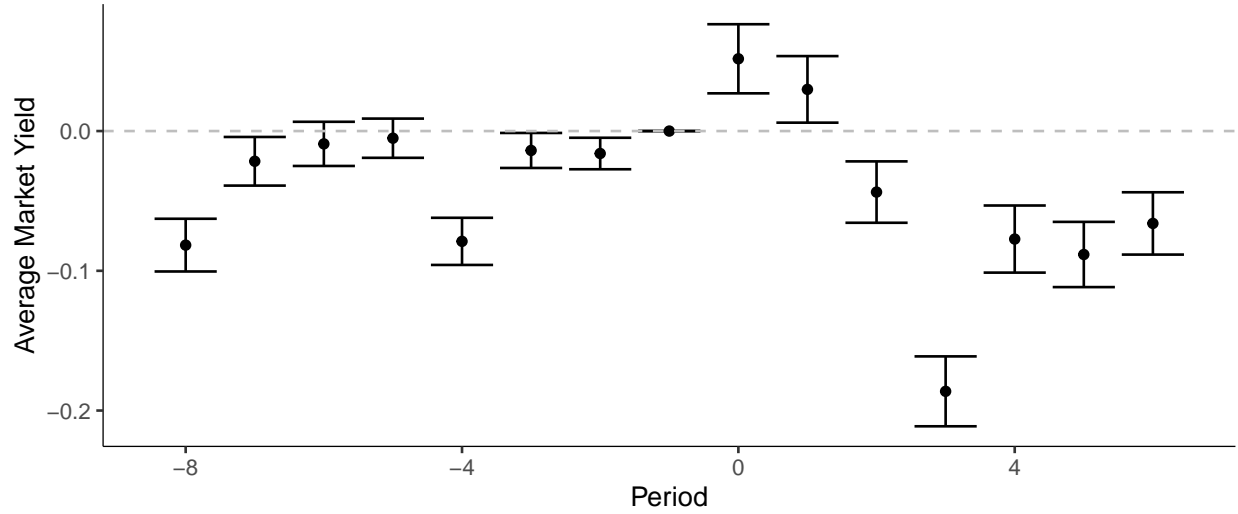


Figure plots the event study coefficients from Table 17. Base period is 2021 Quarter 2. All data from 2020 and the first quarter of 2021 is excluded, and as such, Period -1 is the fourth quarter of 2019. Standard errors clustered at the level of origin-destination pairs are reported.

Table 16: NEA Market Fare Effects

	Model 1	Model 2	Model 3	Model 4	Model 5
NEA Market: Period -8	-0.06122*** (0.00646)	-0.06316*** (0.00671)		-0.06101*** (0.00646)	
NEA Market: Period -7	-0.01927*** (0.00534)	-0.02117*** (0.00559)		-0.01842*** (0.00534)	
NEA Market: Period -6	-0.01314*** (0.00490)	-0.01196** (0.00512)		-0.01242** (0.00491)	
NEA Market: Period -5	-0.00142 (0.00403)	-0.00124 (0.00423)		-0.00136 (0.00404)	
NEA Market: Period -4	-0.06271*** (0.00520)	-0.06611*** (0.00546)	-0.06628*** (0.00548)	-0.06277*** (0.00521)	-0.06320*** (0.00525)
NEA Market: Period -3	-0.00405 (0.00373)	-0.00701* (0.00388)	-0.00668* (0.00392)	-0.00369 (0.00373)	-0.00353 (0.00379)
NEA Market: Period -2	-0.01490*** (0.00363)	-0.01729*** (0.00376)	-0.01718*** (0.00380)	-0.01500*** (0.00364)	-0.01475*** (0.00367)
NEA Market: Period 0	0.05228*** (0.00831)	0.05472*** (0.00849)	0.05803*** (0.00852)	0.05115*** (0.00832)	0.05473*** (0.00835)
NEA Market: Period 1	0.06194*** (0.00724)	0.06269*** (0.00754)	0.07076*** (0.00755)	0.05766*** (0.00725)	0.06668*** (0.00724)
NEA Market: Period 2	-0.02105*** (0.00685)	-0.02698*** (0.00715)	-0.02567*** (0.00709)	-0.02321*** (0.00690)	-0.02187*** (0.00683)
NEA Market: Period 3	-0.11727*** (0.00816)	-0.12518*** (0.00851)	-0.11799*** (0.00839)	-0.12430*** (0.00834)	-0.11633*** (0.00817)
NEA Market: Period 4	-0.03153*** (0.00745)	-0.04249*** (0.00778)		-0.03621*** (0.00753)	
NEA Market: Period 5	-0.03405*** (0.00741)	-0.04228*** (0.00772)		-0.04054*** (0.00748)	
NEA Market: Period 6	-0.02544*** (0.00620)	-0.03217*** (0.00646)		-0.02937*** (0.00625)	
NEA Market: Period 7	-0.07937*** (0.00741)			-0.08426*** (0.00749)	
NEA Market: Period 8	-0.01882*** (0.00647)			-0.02268*** (0.00651)	
Standard Controls	Yes	Yes	Yes	Yes	Yes
Income Data		MSA	MSA	State	State
Sample	Full	Full	Two Years	Full	Two Years
R <sup>2</sup>	0.61326	0.62880	0.63120	0.61787	0.62754
Adj. R <sup>2</sup>	0.61321	0.62874	0.63113	0.61782	0.62748
Num. obs.	315451	247613	135042	315451	149299

\*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.1$ 

Dependent variable is the average log-market fare within a market. Base period is 2021 Quarter 2. All data from 2020 and the first quarter of 2021 is excluded, as such, Period -1 is the fourth quarter of 2019. "Standard controls" are the log of mean population between the origin and destination metropolitan statistical areas, presence of Spirit and Southwest, per-capita origin and destination state-level coronavirus cases, and lagged HHI. Standard errors clustered at the level of origin-destination pairs are reported.

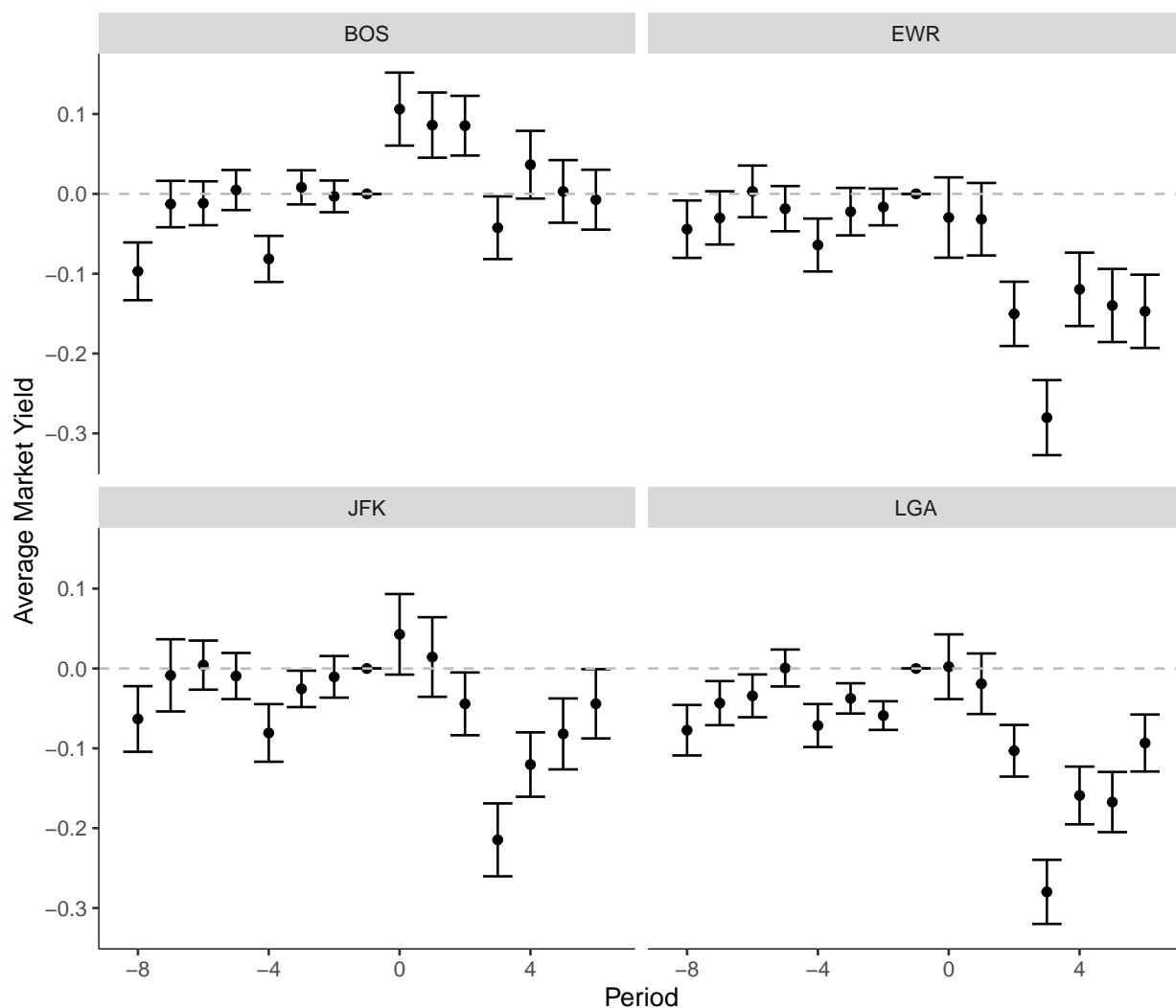
Table 17: NEA Market Yield Effects

	Model 1	Model 2	Model 3	Model 4	Model 5
NEA Market: Period -8	-0.06428*** (0.00922)	-0.07176*** (0.00978)		-0.06185*** (0.00928)	
NEA Market: Period -7	-0.02398*** (0.00832)	-0.02421*** (0.00892)		-0.02086** (0.00834)	
NEA Market: Period -6	-0.01135 (0.00743)	-0.01091 (0.00797)		-0.00878 (0.00753)	
NEA Market: Period -5	-0.00715 (0.00662)	-0.00640 (0.00707)		-0.00654 (0.00673)	
NEA Market: Period -4	-0.07072*** (0.00775)	-0.07726*** (0.00831)	-0.07736*** (0.00836)	-0.07070*** (0.00782)	-0.07120*** (0.00792)
NEA Market: Period -3	-0.01197** (0.00596)	-0.01631*** (0.00631)	-0.01618** (0.00635)	-0.01024* (0.00603)	-0.01032* (0.00611)
NEA Market: Period -2	-0.02129*** (0.00567)	-0.02264*** (0.00585)	-0.02258*** (0.00588)	-0.02138*** (0.00574)	-0.02125*** (0.00579)
NEA Market: Period 0	0.04575*** (0.01231)	0.04465*** (0.01266)	0.04648*** (0.01274)	0.03926*** (0.01236)	0.04240*** (0.01249)
NEA Market: Period 1	0.03620*** (0.01156)	0.02897** (0.01204)	0.04233*** (0.01213)	0.01812 (0.01157)	0.03545*** (0.01169)
NEA Market: Period 2	-0.02383** (0.01028)	-0.03941*** (0.01080)	-0.04115*** (0.01073)	-0.03494*** (0.01044)	-0.03606*** (0.01037)
NEA Market: Period 3	-0.15107*** (0.01157)	-0.18307*** (0.01232)	-0.16857*** (0.01216)	-0.17971*** (0.01202)	-0.16118*** (0.01182)
NEA Market: Period 4	-0.04455*** (0.01110)	-0.07413*** (0.01187)		-0.06549*** (0.01134)	
NEA Market: Period 5	-0.05753*** (0.01104)	-0.08431*** (0.01172)		-0.08478*** (0.01115)	
NEA Market: Period 6	-0.03800*** (0.01058)	-0.06637*** (0.01120)		-0.05583*** (0.01075)	
NEA Market: Period 7	-0.10473*** (0.01135)			-0.12589*** (0.01163)	
NEA Market: Period 8	-0.03183*** (0.01051)			-0.04931*** (0.01065)	
Standard Controls	Yes	Yes	Yes	Yes	Yes
Income Data		MSA	MSA	State	State
Sample	Full	Full	Two Years	Full	Two Years
R <sup>2</sup>	0.17082	0.22105	0.23156	0.21218	0.22591
Adj. R <sup>2</sup>	0.17072	0.22093	0.23143	0.21208	0.22579
Num. obs.	323906	254726	135167	323906	149515

\*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.1$ 

Dependent variable is the average log market yield within a market. Base period is 2021 Quarter 2. All data from 2020 and the first quarter of 2021 is excluded, as such, Period -1 is the fourth quarter of 2019. "Standard controls" are the log of mean population between the origin and destination metropolitan statistical areas, presence of Spirit and Southwest, per-capita origin and destination state-level coronavirus cases, and lagged HHI. Standard errors clustered at the level of origin-destination pairs are reported.

Figure 16: NEA Market Yield - Airport Interactions



Coefficients from a model based on the model reported in Table 17 but which includes airport-time interaction terms are reported. Base period is 2021 Quarter 2. All data from 2020 and the first quarter of 2021 is excluded, and as such, Period -1 is the fourth quarter of 2019. Standard errors clustered at the level of origin-destination pairs are reported.