The Evolution of Airline Partnerships in the U.S. Domestic Market

by Aisling Reynolds-Feighan*

Abstract

This paper describes the evolution of the four largest airlines in the U.S. domestic market and focuses on the relationships between the mainline airlines and sets of regional airlines that provide feeder services through contract arrangements. The paper traces the series of mergers occurring over the last 20 years that have resulted in the current industry structures and organization and shows the dominance of the top four carriers directly as well as through their relationships with the main regional airlines. The current structure reflects the impact of different types of contractual arrangements and agreements that have shaped relationships between large numbers of airlines in the domestic U.S. market since deregulation in 1978. The paper sets out the rationale for entering into these agreements, the nature of the relationships and the stages of development of current carrier arrangements. A number of public policy issues are highlighted.

1. *Introduction*

The U.S. domestic passenger airline industry was deregulated in 1978[1] and facilitated the growth and development of airlines based on market conditions and service requirements, with airlines having the freedom to design their networks and determine the communities to serve, the levels and frequency of service, the equipment to deploy and the prices to charge. A large academic literature chronicles many aspects of the airline industry's performance and evolution since deregulation and this has had a significant influence on public policies in many other jurisdictions worldwide.[2] Deregulation of domestic markets and liberalization of international air transport markets has followed in all major continental regions over the last 40 years.[3] A number of features of the U.S. market distinguish it from other major continental regions and these can be summarized as follows:

- The U.S. market has a relatively small total number of domestic air routes given the number of airports served; however, many of these routes are characterized by high frequency of service;
- U.S. air transport communities are smaller in comparison to European, Asian, and Latin American communities receiving equivalent levels of jet air services;
- U.S. air traffic has a relatively low degree of seasonal variation in total annual traffic compared to other regions;
- U.S. airlines are very large with predominantly domestic-focused networks;
- U.S. carriers have faced successive rounds of mergers and takeovers and, as a result, have gained considerable experience in integrating and

* [insert short bio here]. Comments and suggestions on earlier drafts from Kieran Feighan are gratefully acknowledged. Thanks to Brian Feighan for his help with the figures.

[1] *See* Airline Deregulation Act of 1978, Pub. L. No. 95-504, 92 Stat. 1705 (codified as amended in scattered sections of 49 U.S.C.).

[2] For an insightful discussion of U.S. airline deregulation and its results, see BRIAN F. HAVEL, BEYOND OPEN SKIES: A NEW REGIME FOR INTERNATIONAL AVIATION ch. 4 (2009).

[3] *Id.* ch. 5 & 6.

reorganizing factor inputs and output production at increasing scales following consolidation; and

- Most large U.S. carriers provide their domestic services through a mix of in-house air services and air services from a set of regional affiliate carriers, most of which are independently owned.

Regional airlines are subcontracted by the mainline carriers to provide capacity in regional markets, using aircraft and labor supplied by the regional carrier, but flying under the mainline carrier's code and livery. The mainline carrier determines the schedule and takes responsibility for sale and distribution of seats. The mainline carriers have faced significantly higher labor costs compared to the regionals[4] and even when the regional carriers are wholly owned subsidiaries, the regionals operate as separated companies with separate labor agreements. The regional carriers' labor market is generally considered to be more competitive and this has kept costs down.[5] More recent contracts between mainline and regional affiliates have taken the form of capacity purchase agreements.[6] These agreements result in the mainline carrier retaining all revenues and paying a fixed fee for regional departure movements. Scope clauses in labor agreements with mainline (legacy) carriers place limits on the extent to which services may be outsourced to regional carriers. The employment of regional carriers gives mainline carriers operational flexibility and an ability to bypass in-house labor restrictions.[7]

Fageda and Flores-Fillol examine the impact of regional jets and the low-cost business model on thin routes in the United States and Europe and conclude that very different patterns of service are observed in the two markets.[8] Only in the U.S. are the advantages of regional jets exploited on medium-haul routes, where high frequency service may be deployed. In Europe by contrast, low-cost carriers operate on thin routes and utilize larger single aisle jets, along similar lines to Southwest Airlines in the U.S. The authors note that this may also reflect the congested nature of many larger European airports.[9]

This paper will explore the evolution of the carrier networks and relationships between the three largest carriers and their regional affiliates, focusing particularly on the period 1997–2017, and compare their business models to Southwest Airlines. The current industry structure is described and this updates previous studies that have tracked the development and growth of regional carrier operations since the 1990s. Data from the Official Airline Guide (OAG) ex-post daily schedules are used to identify and differentiate air services provided by the mainline carriers and those services provided under contract by regional affiliate partner carriers. The data covers all passenger flights performed between January 1, 1997 and December 31, 2017 and relates to available seating capacity and movements performed. The papers is set out as follows: Section 2 presents a review of

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[4] Barry Hirsch, *Wage Determination in the US Airline Industry: Union Power under Product Market Constraints*, *in* 2 ADVANCES IN AIRLINE ECONOMICS 27–60 (Darin Lee ed., 2007).

[5] Silke Januszewski Forbes & Mara Lederman, *Adaptation and Vertical Integration in the Airline Industry*, 99 AM. ECON. REV. 1831–49 (2009); Silke Januszewski Forbes & Mara Lederman, *The Role of Regional Airlines in the U.S. Airline Industry*, *in* 2 ADVANCES IN AIRLINE ECONOMICS 193–208 (Darin Lee ed., 2007).

[6] Silke Januszewski Forbes & Mara Lederman, *Contract Form and Technology Adoption in a Network Industry*, 29 J. L. ECON. & ORG. 385–413 (2013).

[7] John Bitzan & James Peoples, *U.S. Air Carriers and Work-Rule Constraints: Do Airlines Employ an Allocatively Efficient Mix of Inputs*?, 45 RES. TRANSP. ECON. 9–17 (2014).

[8] Xavier Fageda & Ricardo Flores-Fillol, *Air Services on Thin Routes: Regional Versus Low-Cost Airlines*, 42 REGIONAL SCI. & URBAN ECON. 702–714 (2012).

[9] The air traffic data used in their empirical study comes from a U.K. consulting firm (RDC Aviation) and consists of annual data for approximately 2800 U.S. and 2800 European routes.

previous literature on this topic and summarizes a recent paper by Reynolds-Feighan which uses the 2017 OAG data.[10] Section 3 describes the evolution of the four largest airlines and their regional partners over the period 1997-2018. Section 4 outlines some key public policy issues arising from the analysis and draws some conclusions.

2. *Previous Studies*

Previous comparative analysis has demonstrated some of the unusual features of the U.S. domestic air transport market compared to other major global regions.[11] One key differentiating characteristic is that U.S. air transport communities are smaller than communities in other countries receiving equivalent levels of air service. The geographic and demographic characteristics of the U.S. market gives rise to substantial distances between centers of population and low overall density: the dominance of hub-and-spoke network structures in the domestic U.S. market reflects the fact that most major U.S. airlines provide air transport services to a large number of small communities and link them to larger centers with high volume and high frequency air services.

Reynolds-Feighan looks at feeder airlines and their relationship with the three largest network carriers for 2017.[12] The paper uses detailed OAG data to break out the network structure, operational, and other salient characteristics of each of the regional feeder carriers for each of the three network carriers and identifies the extent of overlap and seasonal variability in capacity provision for different types of markets. The current paper focuses on the evolution of these structures and provides additional insights into the merger processes and their impacts on the speed and timing of restructuring air service delivery in the domestic U.S. market.

The three network carriers are at different stages of development in streamlining and reorganizing their domestic networks. Reynolds-Feighan examines closely the relationships between the three largest airlines and their regional carriers, with service seasonality and the management of capacity across each of the carrier networks getting particular attention.[13] The analysis provides evidence to explain how the large airlines are improving their cost and financial performance as well as significantly improving their operational efficiency through the achievement of high overall load factors. The three network carriers have some similarities in the way that they deploy the regional carrier capacity over the course of the year. There is considerable overlap between the networks and routes served by the regionals and the mainline carriers. What emerges from the analysis is an understanding of how the mainline carriers assess each flight and adjust the equipment and operator used based on bookings and load factors. If demand is sufficiently strong to utilize a mainline carrier jet, then it will be deployed rather than a regional jet operated by one of the feeder airlines. In situations where there are seasonal variations in demand, particularly in smaller communities, regional jet service will be the main type of service provided unless demand is particularly low when no service may be provided for several months. For communities where there is a higher frequency of service, regional jet services may be substituted for mainline service if demand is lower in particular months, or on particular days or time slots. The availability of

[10] Aisling. J. Reynolds-Feighan, *US Feeder Airlines: Industry Structure, Networks and Performance*, 117 TRANSP. RES. PT. A 142–157 (Nov. 2018).
[11] Aisling. J. Reynolds-Feighan, *Small Community Impacts of Liberalization and the Provision of Social Air Services*, *in* AIR TRANSPORT LIBERALIZATION, A CRITICAL ASSESSMENT ch. 12 (Matthias Finger & Kenneth Button eds., 2017).
[12] Reynolds-Feighan, *supra* note 7.
[13] *Id.*

regional jet capacity gives the mainline carrier the flexibility to be able to deploy capacity in smaller increments where demand warrants use of a smaller aircraft.

On routes where there is competition from other carriers, the use of regional jet services allows the mainline carrier to continue operating at a particular frequency all year round rather than cutting back when demand is lower. The mainline carriers often utilize several regional partners on the same route in order to match equipment with the particular demand characteristics that they face. There is a high degree of sophistication in the co-ordination of the schedules for the mainline and regional carrier operations. While there has been discussion and analysis of carrier yield/revenue management systems in the sale of seats in the literature,[14] there has been less discussion of the capacity management decision making when actually delivering the service and deploying aircraft.

Forbes & Lederman conducted a number of studies examining the relationship between regional affiliates and their mainline contracting carriers.[15] They describe the development and evolution of the regional carriers up to 2001 in some detail and undertake a number of empirical studies using annual or sampled data. The studies are quite dated and do not use data beyond 2001.

Tan finds that legacy carriers increase their use of independent regionals on routes where there is stronger competition, particularly from low-cost carriers.[16] The partnership between mainline and regional carriers is associated with lower fares leading to the conclusion that regional carrier growth has encouraged a pro-competitive response from legacy carriers. Data are quarterly and drawn from the U.S. BTS Airline Origin and Destination Survey for the period 1998–2015 and exclude wholly-owned regional carrier service.

Bitzan and Peoples examine allocative efficiency in the U.S. airline industry from 1993-2010 using annual U.S. DOT Form 41 financial and T-100 traffic data.[17] The authors present evidence that the carriers in the more recent period up to 2010 underutilized labor in favor of capital and fuel, in contrast to earlier studies which had suggested that U.S. carriers had overutilized labor relative to other inputs because of restrictive labor practices. Technological improvements (including adoption of regional jets) and flexibility in the use of regional feeder carriers have facilitated the mainline carriers exploiting these cost-saving alternates to in-house capacities.

In the slightly longer time frame in Bitzan and Peoples, cost and productivity changes are examined for full service (FSC), regionals, and low-cost carriers (LCCs) for the period 1993-2014.[18] Again, annual data are utilized and it is demonstrated that the FSCs experienced cost reductions of 10 percent, while regionals experienced a 22 percent reduction. LCCs saw cost increases of 8.5 percent over the same period, reducing the cost

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[14] *See* BIJAN VASIGH, KENNETH FLEMING & BARRY HUMPHRIES, FOUNDATIONS OF AIRLINE FINANCE: METHODOLOGY AND PRACTICE (2d ed. 2015).

[15] Silke Januszewski Forbes & Mara Lederman, *Does Vertical Integration Affect Firm Performance? Evidence from the Airline Industry*, 41 RAND J. ECON. 765–90 (2010); Forbes & Lederman, *supra* note 2; Forbes & Lederman, *supra* note 3.

[16] Kerry M. Tan, *Outsourcing and Price Competition: An Empirical Analysis of the Partnerships between Legacy Carriers and Regional Airlines*, REV. INDUS. ORG., Dec. 2017, at 1-20.

[17] Bitzan and Peoples, *supra* note 4.

[18] John Bitzan & James Peoples, *A Comparative Analysis of Cost Change for Low-Cost, Full-Service, and Other Carriers in the US Airline Industry*, 56 RES. TRANSP. ECON. 25–41 (2016).

advantage traditionally enjoyed over FSCs. Increases in load factors and stage lengths are suggested as the sources of the productivity gains by FSCs.

3. *Evolution of Current U.S. Industry Structure and Relationships*

A key issue for the U.S. market has been the consolidation in the industry, with four very large carriers now dominating the domestic market. Figures 1 and 2 summarize this consolidation trend reported in many industry and academic outlets for the majors from the 1990s to 2018, and includes the regional carriers owned by the majors (Figure 1), as well as the largest independent regional carrier groups (Figure 2). The current surviving carriers are highlighted in bold for each of the main airline groups. The figures show the large number of merger events among both groups of carriers for the 20-year period. Several of the regional carrier groups operate multiple brands and these have remained in place because of contracts with the major carriers.

The current relationships between the four largest major carriers and their regional feeder affiliates are set out in Table 1. The top four carriers produced 83 percent of non-stop available seats and 86 percent of departure movements in the domestic U.S. market in 2017.

Table 2 shows the historical relationships between majors and their regional affiliates for the periods 1997, 2007, and 2012, prior to mergers for Southwest Airlines and Delta Air Lines. Southwest Airlines operated a single aircraft type fleet and through each merger event has continued to prioritize this operational strategy. When AirTran Airways and Valujet merged in the late 1990s, the regional feeder services using regional jets were gradually phased out and replaced by B717 aircraft. Southwest Airlines sold the AirTran fleet of Boeing 717 aircraft after the 2011 merger in order to maintain its single aircraft fleet of Boeing 737s. Southwest is the only large airline that does not operate in smaller regional markets using regional feeder services operated by contracted airlines. In order to deal with seasonal variation in demand, Southwest reduces the services that it offers to some communities in the off-peak months in a number of ways. These include withdrawing service completely for a number of months, reducing the number of non-stop services, substituting indirect services, or including additional segments (stops) between an origin-destination pair.

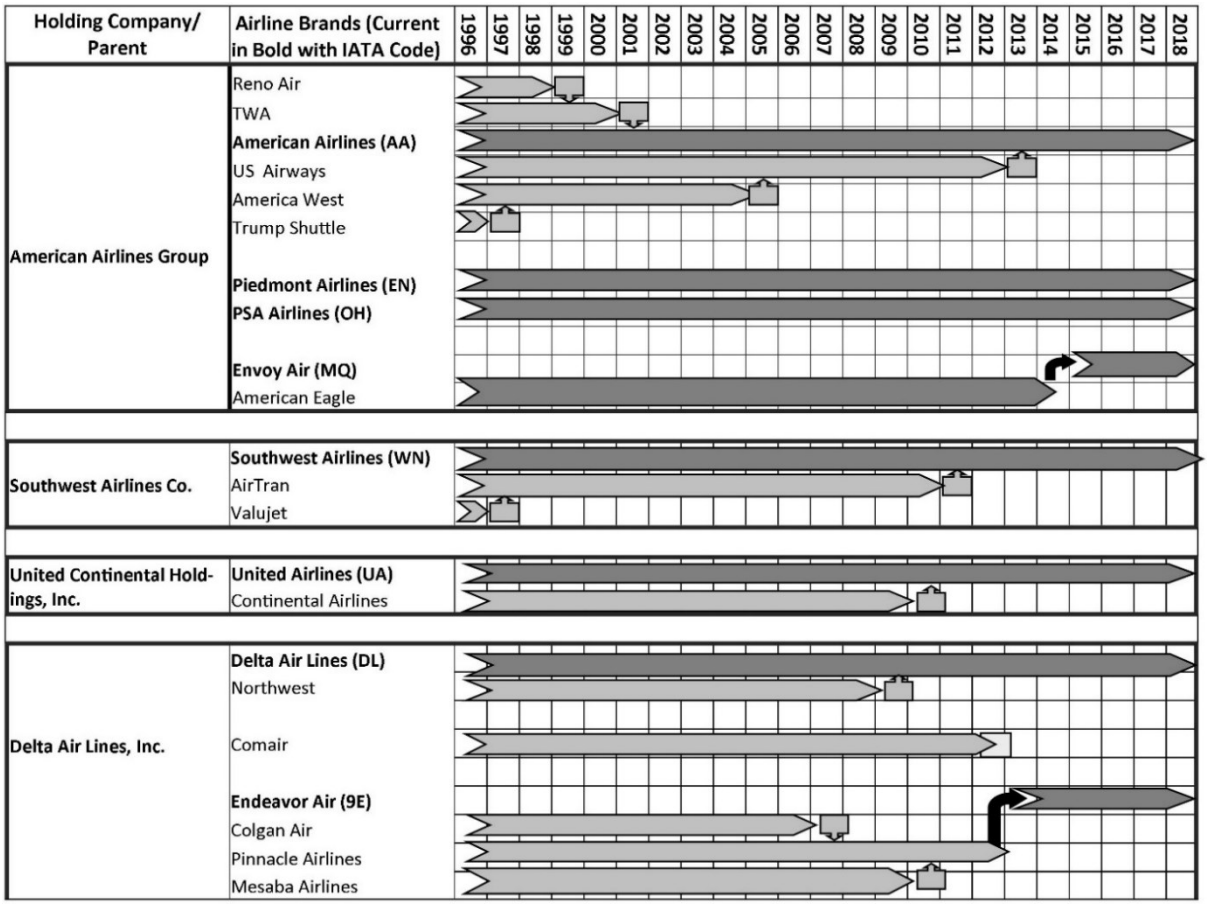
The Southwest Airlines network in 2017 consisted of 104 airports, 16 of which were non-US. The airports were categorised on the basis of the FAA Hub Classification scheme, which assigns air traffic communities to a hierarchical class, based on the share of annual air traffic activity[19]. The Southwest network is smaller than the other three large carriers in terms of the number of airports and communities served, and consisted of 24 of 30 large FAA hubs, 29 of 31 medium FAA hubs, 32 of 72 small FAA hubs and just 3 of the 249 'non-hubs'. The average number of months of service across the full network was 10 months, with large, medium and non-hubs having almost 11 months of service, while international airports had an average of 8.2 months of service. The number of communities served each month was recorded and broken down by whether the services were non-stop or multi-stop[20]. 50-56% of

[19] The FAA developed its hub structure in the 1950s as a reporting and funding evaluation mechanism. This approach groups airports into communities based on the cities and metropolitan areas that they serve. Large hubs are identified as those communities receiving 1 per cent or more of the annual traffic. Medium hubs are those communities receiving between 0.25 per cent and 1 per cent of annual traffic; small hubs receive 0.05 per cent to 0.25 per cent of annual traffic. Non-hubs are those communities receiving less than 0.05 per cent of annual traffic.

[20] Southwest Airlines assign a unique flight number to each routing depending on the number of stops. In November for example, service between an origin-destination pair may be direct or multi-stop with a different flight code indicating the particular routing.

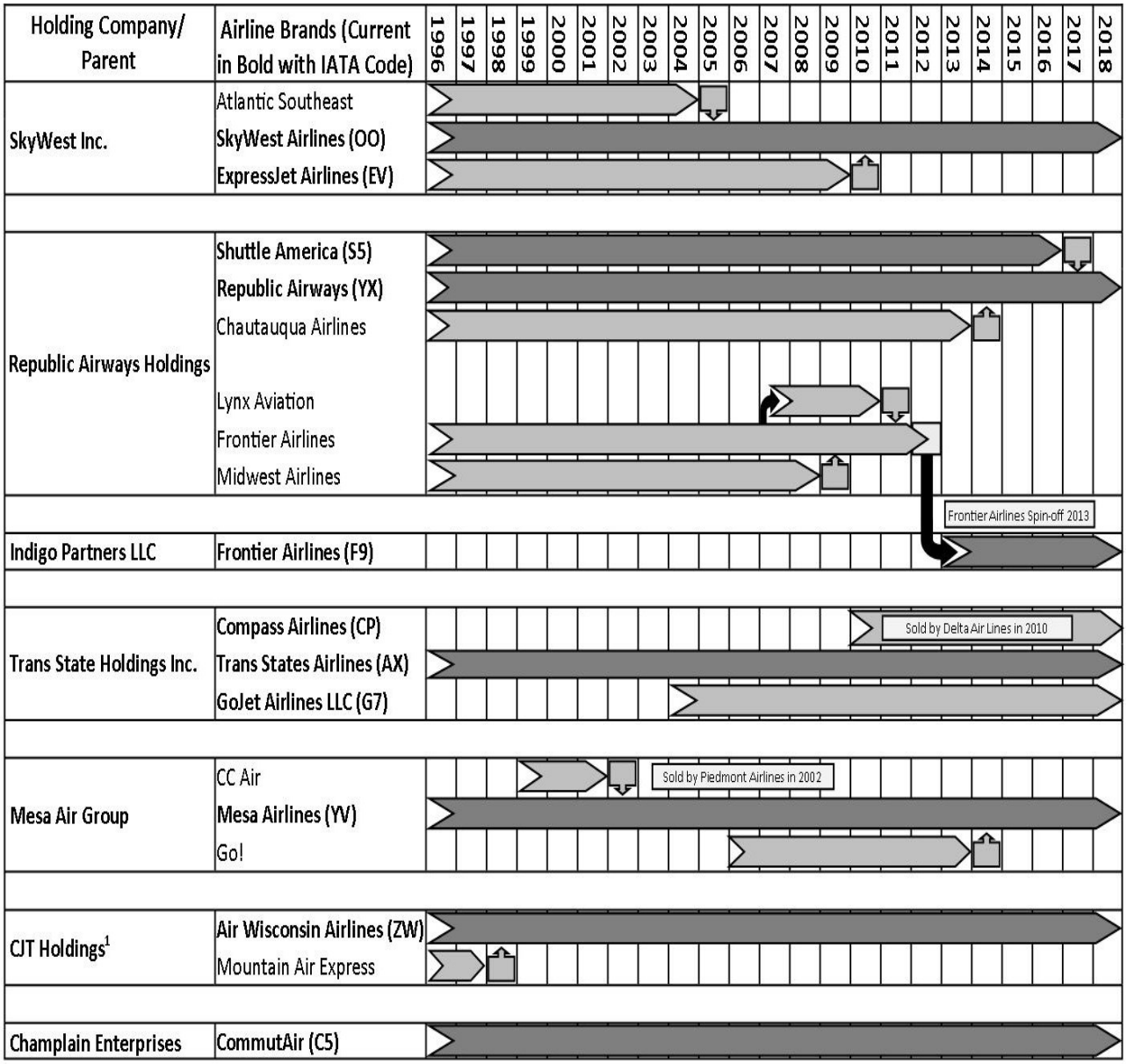
seats were on non-stop flights, depending on the month, with the highest proportion of non-stop flights during June and July, and the lowest proportion in November and December. A further 25-26% of seats were on one-stop flights, 11-13% on 2-stop flights and 8-11% on 3 or more-stop flights. The increased proportion of multi-stop routings were operated in the off-peak months compared to the peak summer months. Southwest Airlines was the largest carrier operating in the domestic U.S. market in 2017 with over 140 million passenger enplanements.[21]

Figure 1: Diagrammatic Representation of Major Airline Group Mergers, 1996-2018



[21] U.S. BUREAU TRANSP. STATISTICS (BTS), 2017 TRAFFIC DATA FOR U.S AIRLINES AND FOREIGN AIRLINES U.S. FLIGHTS, Release No. BTS 16-18 (2017), https://www.bts.gov/newsroom/2017-traffic-data-us-airlines-and-foreign-airlines-us-flights.

Figure 2: Diagrammatic Representation of Regional Airline Group Mergers, 1996-2018



Indicates merger event

Extended presentation of merger activities originally presented in Reynolds-Feighan (2018).[22]

[22] Reynolds-Feighan, *supra* note 7.

Table 1: Top Four U.S. Carriers and their Regional Affiliate Carriers, Aircraft Size, Airline Seating Capacity, Departure Movement Shares and Share of All U.S. Domestic Traffic in 2017

Major Airline/Regional Affiliate	Share of mainline carrier seating capacity (%)	Share of domestic departure movements (%)	Average number of seats per movement	Share of all U.S. domestic Seats (movements)
Southwest Airlines Co. (WN)	100%	100%	149	21% (17.5%)
Delta Air Lines Inc. (DL)	76%	56%	159	22% (23.7%)
SkyWest Airlines Inc.	8%	15%	59	
Endeavor Air Inc.*	7%	13%	65	
ExpressJet Airlines Inc.	4%	7%	65	
Compass Airlines	2%	3%	76	
GoJet Airlines LLC	2%	3%	71	
Republic Airlines	2%	2%	72	
Shuttle America	0%	0%	73	
United Air Lines Inc. (UA)	76%	51%	168	16% (17.4%)
ExpressJet Airlines Inc.	7%	16%	49	
SkyWest Airlines Inc.	7%	14%	54	
Republic Airlines	3%	5%	70	
GoJet Airlines LLC	2%	3%	70	
Trans States Airlines	2%	5%	50	
Mesa Airlines Inc.	2%	3%	70	
CommutAir	1%	2%	50	
Air Wisconsin Airlines Corp	0%	1%	50	
Shuttle America	0%	0%	70	
American Airlines (AA)	69%	47%	160	24% (27.4%)
PSA Airlines Inc.*	7%	12%	66	
Envoy Air*	7%	13%	59	
Republic Airlines	5%	7%	76	
Mesa Airlines Inc.	4%	5%	76	
SkyWest Airlines Inc.	3%	5%	61	
Air Wisconsin Airlines Corp	2%	4%	50	
Compass Airlines	1%	2%	76	
Piedmont Airlines*	1%	2%	50	
ExpressJet Airlines Inc.	1%	1%	59	
Trans States Airlines	1%	1%	50	

Source: Compiled from OAG Databases (* indicates wholly owned subsidiary).

For Delta Air Lines, Table 2 sets out the evolution of the complex series of relationships between the mainline carrier and the set of regional feeders in 1997, 2007, and 2012 as mergers took place. Delta Air Lines merged with Northwest Airlines Inc. in 2009 and began streamlining and reorganizing the networks of the mainline and regional feeder

carriers. Northwest Airlines had a smaller reliance on regional feeders and, by 2012, the merged airline had 37 percent of its seating capacity (61 percent of domestic movements) provided by regional carriers. By 2017, the airline had gradually reduced the number of regional affiliates to seven partners. Both Delta and Northwest had owned regional carriers and these operations were merged and streamlined into Endeavor Air Inc. by 2012. Delta Air Lines maintains full ownership of this carrier and has agreements with its pilots union to recruit a percentage of mainline pilots from the regional airline.[23] In light of the global pilot shortage in 2017/18[24] and the expected retirement of a significant share of Delta Air Lines pilots between 2018 and 2027, Delta is likely to retain ownership of its regional carrier.[25]

[23] Delta Air Lines has an agreement to fill 35 percent of pilot vacancies from the regional affiliate pilot pool. *See* Endeavor-to-Delta Pilot Hiring Program & Commitment (2014), http://www.endeavorair.com/documents/EtD_Hiring_Program_Overview_61314.pdf. Delta Air Lines argues that their commitment to regional affiliate pilots is not a "flow through" program, as Endeavor pilots may not return to the regional carrier, nor may Delta pilots flow down to Endeavor Air as a right.

[24] *See, e.g.*, Jamie Freed, Chayut Setboonsarng & Allison Lampert, *Airlines Struggle with Global Pilot Shortage*, REUTERS.COM (June 6, 2018, 4:07 AM), www.reuters.com/article/us-airlines-iata-pilots-analysis/airlines-struggle-with-global-pilot-shortage-idUSKCN1J20XK; Jamie Smyth & Ben Bland, *China Buys Up Flying Schools as Pilot Demand Rises*, FINANCIAL TIMES (May 10, 2018), www.ft.com/content/448b059e-4ea4-11e8-9471-a083af05aea7.

[25] Delta Air Lines estimated that 10,000 current pilots would retire between 2015 and 2025. *See infra* note 8.

Table 2: Historic Relationships for Southwest Airlines and Delta Air Lines Carriers and their Regional Affiliates, 1997, 2007 and 2012

Carrier (mainline in bold)	Share of seats	Share of movements	Seats per mvmt	Carrier (mainline in bold)	Share of seats	Share of movements	Seats per mvmt	Carrier (mainline in bold)	Share of seats	Share of movements	Seats per mvmt
1997				2007				2012			
Southwest Airlines											
AirTran	53%	39%	126	**AirTran**	100%	100%	123	**Southwest Airlines**	100%	100%	136
Comair	10%	33%	33	**Southwest Airlines**	100%	100%	136				
Valujet Airlines	37%	31%	110								
Valujet Airlines	100%	100%	113								
Southwest Airlines	100%	100%	132								
Delta Air Lines Inc.											
Delta Air Lines	81%	54%	194	**Delta Air Lines Inc.**	61%	33%	194	**Delta Air Lines Inc.**	63%	39%	206
Comair Inc.	5%	14%	40	ExpressJet Airlines Inc.	13%	21%	60	Endeavor Air Inc.	13%	22%	56
Atlantic Southeast	5%	12%	56	PSA Airlines Inc.	10%	17%	53	ExpressJet Airlines Inc.	10%	16%	57
SkyWest Airlines Inc.	3%	11%	40	SkyWest Airlines Inc.	8%	13%	43	SkyWest Airlines Inc.	6%	10%	45
Business Express	2%	7%	33	Chautauqua Airlines	3%	6%	44	PSA Airlines Inc.	4%	6%	59
Delta Express	3%	3%	107	Freedom Airlines	3%	6%	39	Compass Airlines	3%	3%	75
Northwest Airlines Inc.	88%	64%	211	Shuttle America	2%	2%	70	Shuttle America	2%	2%	74
Mesaba Airlines	7%	20%	57	ExpressJet Airlines Inc.	1%	1%	50	Chautauqua Airlines	1%	1%	50
Express Airlines	4%	15%	26	Big Sky Airlines	<1%	1%	19	GoJet Airlines LLC	<1%	<1%	70
Hawaiian Airlines Inc.	1%	<1%	199	Pinnacle Airlines Inc.	<1%	<1%	70	Mesaba Airlines	<1%	<1%	68
Mahalo Air	<1%	<1%	46	**Northwest Airlines Inc.**	77%	52%	156				
Ozark Airlines	<1%	<1%	397	Pinnacle Airlines Inc.	17%	32%	50				
Alaskan Airlines	<1%	<1%	143	Mesaba Airlines	6%	15%	50				
Horizon Air	<1%	<1%	37	Compass Airlines	<1%	<1%	72				

Source: Compiled from OAG Databases, 1997, 2007 and 2012.

Delta Air Lines agreed to cease service contracts with ExpressJet in 2018, with the regional carrier returning 19 leased aircraft financed by Delta and placing the remaining Delta Connection branded fleet with other major airline partners.[26] The ExpressJet fleet consisted of smaller Bombardier CRJ700s and CRJ900s with 60-76 seats. Delta has placed substantial orders for the 130-140 seater Airbus 220s (a joint venture between Airbus and Bombardier but manufactured by the latter) which will come on stream over the next five years and further expand the range of aircraft types in its mainline fleet. Delta already operates the 100-seater Boeing 717 aircraft which it initially acquired as part of the

[26] The mainline partner in many instances owns or leases regional aircraft and places them with a regional affiliate as part of a service contract. It has not been possible to establish exactly how many aircraft are owned by the mainline partner from annual reports and SEC filings.

Northwest merger in 2009. Depending on union agreements with its pilots, the airline may place some of the newer 100+ seater jet aircraft with regional partners.[27]

Table 3 shows the historical relationships between majors and their regional affiliates for the periods 1997, 2007, and 2012, prior to mergers for United Airlines. United Airlines merged with Continental Airlines in 2010 and a total of 14 different regional carriers had contracts to provide varying levels of feeder services: eight regional carriers each were contracted to United and Continental to feed their domestic hubs, with Chautauqua Airlines and Colgan Air having contracts with both of the carriers. The table details the carriers and their shares of seats and movements between 1997 and 2012. By 2017, the merged United Airlines had nine regional affiliates, none of which were wholly owned subsidiaries. United operated the largest network of airports and routes among the networked carriers, with roughly one quarter of available seats (and half of departure movements) being provided by the regional partner airlines.

The United Airlines mainline route network in 2017 overlapped significantly, and to a much greater extent compared to Delta and American, with all of the regional carrier networks contracted to provide feeder services.[28] This reflects the fact that United does not own any regional carrier and will deploy larger aircraft when the route characteristics support mainline operations. United significantly expanded its domestic network in recent years and by contracting many of the services to be provided by regional carriers, did not commit to acquisition of new fleets and labor resources. However the pilot shortage may be problematic for United Airlines in the next few years as the airline does not have the possibility of "flow through" arrangements for sourcing regional carrier pilots transferring to the mainline operation. United Airlines has a maximum number of regional affiliate 76-seater aircraft specified as part of its 2012 scope clause and this limit was reached in December 2017. One possibility discussed in the industry journals is that United may purchase a regional carrier in order to facilitate further service expansion and boost the pipeline of pilots.[29]

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[27] Relations between air carriers and labor unions in the United States are governed by the Railway Labor Act (RLA). Under the RLA, collective bargaining agreements generally contain "amendable dates" rather than expiration dates, and the RLA requires that a carrier maintain the existing terms and conditions of employment following the amendable date through a multi-stage and usually lengthy series of bargaining processes overseen by the National Mediation Board (NMB) (Delta Air Lines, 2018). Pilot unions demanded 'scope clauses' in the 1990s and 2000s to regulate the use of subcontracted regional airline services by mainline carriers. The scope clauses set limits on the maximum size of aircraft permitted for the regional carriers to operate under mainline contracts: initially these were set at 50 seats, but expanded to 76 seats (2012 agreements) until 2019-2020 (United Airlines will be first to renegotiate in January 2019). *See* Edward Russell, *Are US Airlines at their Next Scope Crossroads?* FLIGHTGLOBAL.COM (Mar. 20, 2018), www.flightglobal.com/news/articles/analysis-are-us-airlines-at-their-next-scope-crossr-446881/.

[28] Detailed in Reynolds-Feighan, *supra* note 7.

[29] Continental Airlines once owned ExpressJet, which currently operates as a United regional partner and is part of the SkyWest group of carriers. American Airlines ended its contract with ExpressJet during 2018 as did Delta Air Lines, leaving United as the exclusive partner from 2019. Bloomberg reported in December 2017 that United was exploring the possibility of acquiring ExpressJet. *See* Michael Sasso, *United Express Investing in Regional Airline ExpressJet* (Dec. 8, 2018), www.bloomberg.com/news/articles/2017-12-08/united-is-said-to-mull-investing-in-regional-airline-expressjet. The shortage of qualified pilots at both regional and major airlines is discussed in Rebecca Lutte and Kent Lovelace, *Airline Pilot Supply in the US: Factors Influencing the Collegiate Pilot Pipeline*, 6 J. AVIATION TECH. & ENGINEERING 53–63 (2016). Since 2013, regional pilot training requirements have increased substantially (from 250 flying hours minimum to 1,500 hours) and this has increased the cost of training and reduced the appeal of the career path given the lack of clear pathways from regional carriers to major airlines. This is likely to place upward pressure on regional pilot wages and create recruiting problems for the major airlines as their senior pilots retire.

Table 4 shows the historical relationships between majors and their regional affiliates for the periods 1997, 2007, and 2012 prior to mergers for American Airlines. American Airlines merged with US Airways in 2013. At that time, American Airlines had three regional affiliates (one of which, American Eagle, was a wholly owned subsidiary), while US Airways had nine partners, three being wholly owned subsidiaries. From Table 4, it is clear that US Airways in 2007 and 2012 had a much higher reliance on regional partners to provide its domestic air service requirements compared to American Airlines or America West Airlines. Since the merger in 2013, American Airlines has been reducing the number of regional partners as contract periods end, but still has the largest reliance on regional feeders of the three network carriers (10 regional affiliates, 30 percent of domestic seating capacity and 53 percent of departures in 2017).[30] There is considerable overlap in the networks of the regional affiliates with each other and with the mainline carrier: a relatively small proportion of routes operated by the regional affiliates were single carrier routes for the 12 months of 2017, with most routes having two, three, or four other carriers (flying under an AA flight code) at some stage during the year. American Airlines is at an earlier stage in the reorganization of its merger networks when compared with Delta and United.[31]

Equipment: The share of total domestic air traffic capacity provided on different categories of equipment was examined using the OAG databases and broken down between wide-bodied jets (two aisle), narrow jets (single aisle and 100 or more seats), regional jets (less than 100 seats) and turboprops. The shares of available seats and movements are set out for the four largest carrier groups (and the many pre-merger airline brands) in Tables 5 and 6 for 1997, 2007, 2012, and 2017. From the tables, it is clear that the big shift from turboprops to regional jets occurred between 1997 and 2007. We can also note a shift away from wide-body jets in favor of narrow-body and regional jets for domestic services between 1997 and 2012, but then an increase in their share from 2012 to 2017. The use of regional jets peaked in 2012 (34 percent of total seating capacity combined for the three largest airlines and their constituent companies of that year) and has fallen significantly for Delta and United in the period between 2012 and 2017 as Table 6 shows. United Airlines and Delta Air Lines were the most dependent on regional jets in 2012, with 41 percent and 37 percent respectively of their available domestic seating capacity provided via regional jets; in 2017 both Delta and United had just under one quarter of their total available seats on regional jets.

US Airways had 31 percent of its available seats on regional jets in 2007, with another 9 percent being provided on turboprop aircraft. By 2012, US Airways had reduced turboprop services and regional jet seating capacity rose to 34 percent. In 2017, only American Airlines and United Airlines still had some turboprop air services, though both of these carriers ceased using these aircraft types by 2018. It is noted from the table once again that Southwest Airlines' all narrow-jet fleet operation is a longstanding characteristic of the low-cost carrier.

Returning to Tables 2, 3, and 4, it can be noted that the average number of seats per movement has been increasing among the regional partners over the four years reported. In

[30] The American Airlines contract with Compass Airlines came about because of a dispute with the pilots at Envoy Air in 2014 relating to the number of regional aircraft purchased and operated by the wholly-owned affiliate. During 2018, American Airlines cut back on the number of regional affiliates, ending its contract with Air Wisconsin, migrating its service arrangement with ExpressJet to SkyWest and shifting service provided by Trans State Airlines to Envoy Air. *See* Justin Bachman, *American Airlines Drops Two Regional Carriers as It Streamlines*, BLOOMBERG.COM (May 4, 2018), https://www.bloomberg.com/news/articles/2018-05-04/american-air-to-end-regional-deals-with-expressjet-trans-states.

[31] Reynolds-Feighan, *supra* note 7.

2007, few of the regional airlines averaged more than 50 seats per movement, while in 2017 (Table 1), many more of the regional airlines have 70-80 seats per movement. Delta Air Lines has the highest average number of seats per movement across its group of regional affiliates.

Table 3: Historic Relationships for United Airlines Carriers and their Regional Affiliates, 1997, 2007 and 2012

Feeder/ Contractor Carrier	Seats	Move-ments	Seats per mvmt	Feeder/ Contractor Carrier	Seats	Move-ments	Seats per mvmt	Feeder/ Contractor Carrier	Seats	Move-ments	Seats per mvmt
1997				2007				2012			
United Air Lines Inc.											
Continental Airlines	68%	45%	142	**Continental Airlines**	65%	37%	126	**Continental Airlines**	64%	35%	180
Continental Express	12%	30%	42	ExpressJet Airlines Inc.	22%	36%	48	ExpressJet Airlines Inc.	26%	44%	50
America West Airlines	15%	10%	125	Continental Express	5%	8%	49	CommutAir	3%	6%	40
SkyWest Airlines Inc.	3%	9%	30	Chautauqua Airlines	4%	7%	50	Colgan Air	2%	5%	34
Gulfstream Int'l Airlines Inc	1%	3%	21	Colgan Air	2%	4%	34	Chautauqua Airlines	2%	3%	50
Colgan Air	<1%	1%	19	CommutAir	1%	4%	24	SkyWest Airlines Inc.	1%	2%	58
Air Canada	1%	1%	65	Gulfstream Int'l Airlines Inc	1%	5%	20	Gulfstream Int'l Airlines Inc	1%	3%	19
Air Nova	<1%	<1%	85	RegionsAir	<1%	<1%	34	Trans States Airlines	1%	1%	50
Continental Micronesia	<1%	<1%	146	**United Airlines**	56%	35%	141	Shuttle America	<1%	1%	70
Frontier Airlines Inc	<1%	<1%	19	SkyWest Airlines Inc.	18%	34%	43	**United Air Lines Inc.**	54%	30%	192
United Airlines	86%	55%	202	Ted	10%	6%	156	SkyWest Airlines Inc.	21%	34%	43
Atlantic Coast Airlines	3%	11%	37	Mesa Airlines Inc.	7%	12%	46	ExpressJet Airlines Inc.	9%	14%	50
Mesa Airlines Inc.	3%	10%	23	Shuttle America	3%	4%	70	Shuttle America	4%	5%	70
WestAir Commuter Airlines	3%	10%	24	Trans States Airlines	2%	4%	50	GoJet Airlines LLC	3%	4%	66
Great Lakes Airlines	2%	8%	22	GoJet Airlines LLC	2%	2%	66	Mesa Airlines Inc.	3%	3%	66
Air Wisconsin Airlines Corp	3%	3%	100	Chautauqua Airlines	1%	1%	50	Trans States Airlines	3%	4%	50
SkyWest Airlines Inc.	1%	2%	30	Colgan Air	0%	1%	33	ExpressJet Airlines Inc.	2%	4%	50
United Express	1%	2%	64					Colgan Air	1%	2%	34
Continental Connection	<1%	<1%	20								
Continental Airlines	<1%	<1%	19								
Gulfstream Intern'l Airlines Inc	<1%	<1%	19								

Source: Compiled from OAG Databases, 1997, 2007 and 2012

Table 4: Historic Relationships for American Airlines Carriers and their Regional Affiliates, 1997, 2007 and 2012

Feeder /Contractor Carrier	Seats	Movements	Seats per mvmt	Feeder /Contractor Carrier	Seats	Movements	Seats per mvmt	Feeder /Contractor Carrier	Seats	Movements	Seats per mvmt
1997				2007				2012			
American Airlines											
American Airlines	84%	61%	181	**American Airlines**	76%	49%	177	**American Airlines**	74%	50%	169
American Eagle	16%	39%	42	Envoy Air	21%	44%	41	Envoy Air	22%	43%	51
Business Express	<1%	<1%	34	Trans States Airlines	2%	3%	50	Executive Airlines	3%	4%	72
America West Airlines	65%	55%	139	Chautauqua Airlines	1%	2%	44	Chautauqua Airlines	2%	4%	44
Continental Airlines	29%	25%	211	Executive Airlines	1%	1%	64	**US Airways**	61%	38%	177
Mesa Airlines	3%	14%	41	RegionsAir	<1%	<1%	19	Republic Airlines	10%	11%	83
Continental Express	3%	7%	49	**America West Airlines**	83%	66%	142	Air Wisconsin Airlines Corp	9%	16%	50
Reno Air	99%	95%	83	Mesa Airlines Inc.	17%	30%	53	PSA Airlines Inc.	7%	11%	55
American Eagle	1%	5%	34	Air Midwest	1%	4%	19	Mesa Airlines Inc.	6%	8%	53
Trans World Airlines	89%	65%	129	**US Airways**	46%	27%	128	Piedmont Airlines	5%	10%	41
Trans State Airlines Inc.	11%	35%	30	America West Airlines	15%	9%	135	Chautauqua Airlines	1%	2%	50
US Airways/US Air	78%	46%	120	Air Wisconsin Airlines Corp	9%	14%	50	SkyWest Airlines Inc.	1%	2%	50
US Airways Express	20%	53%	27	Mesa Airlines Inc.	8%	8%	57	Trans States Airlines	1%	1%	50
US Airways Shuttle	3%	1%	151	PSA Airlines Inc.	7%	10%	56	Colgan Air	<1%	1%	34
				Piedmont Airlines	6%	12%	41				
				Republic Airlines	5%	6%	74				
				Colgan Air	2%	6%	29				
				Chautauqua Airlines	2%	3%	52				
				Trans States Airlines	1%	1%	50				
				Air Midwest	1%	3%	19				

Source: Compiled from OAG Databases, 1997, 2007 and 2012

The changes observed between 2012 and 2017 reflect a number of factors. As the average aircraft size operated by the regional affiliates increased, these services could be more easily substituted for mainline jet services where demand was lower than necessary to support use of larger jets. As noted earlier however, several of the major airlines have scope clauses that limited the total number of regional jets that could be operated, though the maximum number of seats on these aircraft has risen from 50 to 76. The recent increase in wide-bodied jets reflects the growing congestion at busier airports and their deployment on heavily trafficked routes.

Table 5: Traffic Shares by Equipment Type for 1997 and 2007 Airlines, Categorized by the 2017 Airline Groups (American Airline, Delta Air Lines, United Airlines, and Southwest Airlines)

2017 GROUP	**Flight Codes/Brands in 1997**	Share of all U.S. domestic seats 1997	Available Seats*				Departure Movements			
			Jet-Wide	Jet-Narrow	Regional Jet	Turboprop	Jet-Wide	Jet-Narrow	Regional Jet	Turboprop
American Airlines (AA)	American Airlines (AA)	10.2%	8%	66%	11%	16%	4%	46%	11%	39%
	America West Airlines (HP)	3.5%	1%	93%	1%	5%	0%	79%	1%	19%
	Reno Air (QQ)	0.9%	0%	99%	0%	1%	0%	95%	0%	5%
	Trans World Airlines (TW)	5.4%	6%	62%	21%	11%	2%	42%	21%	35%
	US Air/US Airways (US)[3]	14.3%	1%	71%	9%	20%	0%	40%	7%	53%
Delta Air Lines (DL)	Delta Air Lines (DL)	11.4%	17%	68%	5%	11%	7%	50%	10%	33%
	Northwest Airlines (NW)	10.7%	7%	78%	5%	11%	2%	58%	6%	34%
United Airlines (UA)	Continental Airlines (CO)	6.7%	2%	74%	9%	16%	0%	49%	9%	42%
	United Airlines (UA)	15.0%	12%	77%	0%	11%	4%	54%	0%	42%
Southwest Airlines (WN)	Airtran Airways (FL)	0.3%	0%	90%	2%	8%	0%	71%	4%	25%
	Valujet Airlines (J7)	0.3%	0%	100%	0%	0%	0%	100%	0%	0%
	Southwest Airlines (WN)	12.8%	0%	100%	0%	0%	0%	100%	0%	0%

2017 GROUP	**Flight Codes /Brands in 2007**	Share of all U.S. domestic seats 2007	Available Seats*				Departure Movements			
			Jet-Wide	Jet-Narrow	Regional Jet	Turboprop	Jet-Wide	Jet-Narrow	Regional Jet	Turboprop
American Airlines (AA)	American (AA)	13.3%	5%	70%	22%	2%	2%	47%	45%	6%
	America West (HP)	0.9%	0%	83%	15%	2%	0%	66%	25%	9%
	US Airways (US)	11.0%	0%	59%	31%	9%	0%	35%	43%	22%
Delta Air Lines (DL)	Delta (DL)	13.6%	7%	55%	36%	3%	3%	31%	61%	6%
	Northwest (NW)	8.4%	0%	76%	19%	5%	0%	51%	34%	14%
United Airlines (UA)	Continental (CO)	7.5%	2%	63%	31%	4%	1%	36%	51%	12%
	United (UA)	12.0%	7%	59%	28%	5%	2%	38%	44%	16%
Southwest Airlines (WN)	AirTran (J7)	3.5%	0%	100%	0%	0%	0%	100%	0%	0%
	Southwest (WN)	17.1%	0%	100%	0%	0%	0%	100%	0%	0%

Data source: Computed from Official Airline Guide (OAG) Historical Max Plus databases. Note that for each airline in this table, traffic shares are computed based on flight codes and therefore include feeder services of regional affiliates flying under mainline carrier codes.

Table 6: Traffic Shares by Equipment Type for 2012 And 2017 Airlines, Categorized by the 2017 Airline Groups (American Airline, Delta Air Lines, United Airlines and Southwest Airlines)

2017 GROUP	**Flight Codes/Brands in 2012**	Share of all U.S. domestic seats 2012	Available Seats*				Departure Movements			
			Jet-Wide	Jet-Narrow	Regional Jet	Turboprop	Jet-Wide	Jet-Narrow	Regional Jet	Turboprop
American Airlines (AA)	American (AA)	15.0%	3%	71%	23%	3%	2%	48%	46%	4%
	US Airways (US)	14.0%	0%	60%	34%	5%	0%	38%	51%	11%
Delta Air Lines (DL)	Delta (DL)	24.9%	2%	61%	37%	0%	1%	38%	60%	1%
United Airlines (UA)	Continental (CO)	8.2%	2%	62%	31%	6%	1%	35%	50%	14%
	United (UA)	11.6%	4%	50%	41%	5%	1%	28%	58%	12%
Southwest Airlines (WN)	Southwest (WN)	13.2%	0%	100%	0%	0%	0%	100%	0%	0%

2017 GROUP	**Flight Codes/Brands in 2017**	Share of all U.S. domestic seats 2017	Available Seats*				Departure Movements			
			Jet-Wide	Jet-Narrow	Regional Jet	Turboprop	Jet-Wide	Jet-Narrow	Regional Jet	Turboprop
American Airlines (AA)	American (AA)	23.9%	5%	62%	32%	1%	2%	42%	53%	2%[1]
Delta Air Lines (DL)	Delta (DL)	22.1%	5%	70%	24%	-	3 %	54%	44%	-
United Airlines (UA)	United (UA)	15.9%	10%	66%	24%	1%	4%	46%	48%	2%[2]
Southwest Airlines (WN)	Southwest (WN)	20.9%	0%	100%	0%	-	0%	100%	0%	-

* Jet-Wide are wide-bodied jet aircraft with two aisles; Narrow jets have a single aisle and more than 100 seats; Regional jets are jet aircraft with 100 seats or less.
1/ American Airlines ceased turbo prop air services in July 2018 with the retirement of the last Dash 8 aircraft from the Piedmont Airlines fleet.[32]
2/ United Airlines ceased turbo prop air services in May 2018 with retirement of the last Bombardier Q200 aircraft from the CommutAir fleet (domestic U.S. operations with these aircraft ceased in January 2018).[33]
3/ US Air changed its name to US Airways during 1997.
Data source: Computed from Official Airline Guide (OAG) Historical Max Plus databases. Note that for each airline in this table, traffic shares are computed based on flight codes and therefore include feeder services of regional affiliates flying under mainline carrier codes.

Public Policy Implications and Conclusions

The regional carriers have been a significant sector in the provision of domestic air services and that role has grown in the last twenty years, though it is largely hidden because of how the services are provided. Since the late 1990s, the large major carriers have been consolidating through multiple mergers and so too have the regional airlines, most of which operate entirely under contract with the majors. As regional carriers have moved from operating turboprop aircraft to regional jets, their range, capacity, operating capability and

[32] *See* Ben Mutzabaugh, *End of an Era: American Ends Turboprop Flying with Dash 8 Retirement*, USA TODAY.COM (July 13, 2018, 1:28 PM), https://www.usatoday.com/story/travel/flights/todayinthesky/2018/07/09/american-ends-turboprop-flying-dash-8-retirement/768834002/.
[33] *See* Gladys Roman, *Farewell to United Express Turboprop Flights*, COMMUTAIR NEWS (Jan. 8, 2018), http://www.flycommutair.com/farewell-to-united-express-turboprop-flights/.

acceptance has favorably improved and their share of total U.S. air traffic has increased as a result, peaking in the aftermath of the great recession in 2012/13. The contractual arrangements governing the relationships between the majors and the regionals are long-term in nature and designed to: (i) contain the major airlines' costs; (ii) delineate the type of service provided by the majors and regionals; and (iii) fully integrate the service capacity into the mainline operation with sufficient flexibility to fine-tune equipment allocation with demand conditions on a daily basis.

The gap between the equipment operated by major airlines and regional airlines has narrowed significantly, with the most recent variants of the dominant regional jet fleets[34] moving to 80-100 seat capacity. As new aircraft become available, new contracts and agreements will need to be negotiated between the mainline carriers, their unions, and the regional carriers. The advantage of having a wider range of equipment choices available is that it allows for streamlining of capacity to match demand in an ever more refined manner. Making changes to fleets and their associated labor requirements is a slow and gradual process, often constrained by union agreements and safety regulations. It was noted that US communities enjoy relatively high levels of air services given the demographics characteristics compared to other global regions, especially Europe and Asia. The balancing of short run demand and cost fluctuations against longer run equipment adjustments will impact on the economics of service provision over time.

It is likely that American Airlines will gradually consolidate its three wholly owned regional carriers, just as Delta Air Lines did following its merger with Northwest Airlines. Continued ownership of the regional subsidiaries is also likely given the shortage of pilots worldwide, and the ongoing need for a pipeline of suitably qualified crew. The long-term availability of qualified pilots will depend on the generalized costs of pilot qualification and professional development and wage rates at regional airlines. Pilot training costs have increased significantly and put upward pressure on wages for the regional airlines, which will affect the economics of contracted service provision in the next decade. The long-term effects of pay rates for key labor skills and outsourcing of core service requirements need to be closely monitored in an industry which has experienced a series of adverse shocks and requires constant short-term adjustments and re-orientations. It is likely that the regional carriers will be particularly vulnerable where labor shortages are concerned, as wage rates have been significantly lower than for the major carriers in the past. This in turn will affect the continuity of air services to smaller communities since it is the majors that make all of the scheduling decisions.

The expansion of regional airline services has given rise to the achievement of economic, technical, and environmental efficiencies which have resulted in: (i) sustainable air service to a larger number of communities in the most recent period; (ii) greater likelihood of continuity in air services all year round; (iii) better capacity utilization (matching of equipment to demand characteristics) at a micro scale reflected in increased load factors; and (iv) improved financial performance of the major airlines.

The three large network carriers also operate extensive international networks directly, and in conjunction with multiple partner airlines through involvement in global airline alliance groups. In this arena too, carriers have improved their management and deployment of capacity with increasing numbers of code-share flights, particularly in the post-2010 period. Further research examining these relationships and the capacity management practices within the alliance groups, would bring additional insights into the

[34] Bombardier and Embraer.

functioning of airline operations in international environments, where ownership regulations constrain the extent to which mergers and acquisitions can take place.

A number of factors will present challenges to the industry in the coming years and will require scrutiny by policymakers in terms of their implications for safety, security, and accessibility for a significant proportion of the population. The provision and levels of air services for communities, particularly small and medium-sized communities, has an important role in regional economic development and growth. The number of major and regional airlines has declined significantly and this has resulted in a smaller number of much larger airlines deciding on levels and extent of domestic air services. The majors have reduced the number of regional partners, with increasing reliance on a small number of regional carrier groups and movement towards more exclusive arrangements. These changes in airline industry structure and organization need to be monitored to ensure the long-term adequacy of air accessibility and population mobility.