

# **The Role of Regional Airlines in the U.S. Airline Industry**

by

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## **Abstract**

We describe the role of regional or commuter airlines in the U.S. airline industry. Most major carriers subcontract service on low-density short and medium-haul routes to regional airlines which operate as separate companies. We describe the history of these regional airlines, and their growing role for passenger traffic in the last decade. We explore the organizational relationships between majors and regionals and the contribution of the regional jet to the growth of regional airline service.

## **I. Introduction**

In 2005, U.S. regional airlines – carriers which operate aircraft with fewer than 90 seats – carried almost 135 million passengers or approximately one in five domestic travelers. They completed over 14,000 daily departures and had a combined fleet of over 2,700 aircraft. Regional airline service has increased steadily over the past decade and there are no indications that this trend is likely to slow. Yet, despite the increasingly important role played by regional airlines, this segment of the industry has received surprisingly little attention from airline economists. Indeed, the academic literature has traditionally focused on the roles of large network carriers and, more recently, the so-called “low-cost carriers”, leaving regional airlines virtually untouched. This chapter documents the role and extent of regional air service in the U.S. commercial aviation industry and introduces some of the key economic issues that affect regional airlines.

The organization of the chapter is as follows. In Section II, we discuss the role of regional airlines and document the extent of regional airline participation in the industry. In Section III, we discuss the history of regional airlines, tracing their origins to the small, unregulated air taxi operations that served small communities during the pre-deregulation era. Section IV discusses the nature of the relationship between regionals and the major carriers with which they partner and highlights some of the organizational economics issues that these relationships raise. Section V describes the emergence and diffusion of the regional jet. A final section briefly speculates on the future role of regional airlines.

## **II. The Role of Regional Airlines**

In the United States, regional airlines operate short- and medium-haul scheduled airline service, often connecting smaller communities with larger cities. Almost all regional airlines

operate under codeshare agreements with one or more major carriers.<sup>3</sup> Under these agreements, the regional operates flights on behalf of the major carrier, who markets and tickets these flights under its own two-letter flight designator code. Typically, no tickets are sold under the regional's own code. In addition to using the major's code, the regional's flights also share the major's brand. For example, the regional's planes are painted in the major's color schemes, the regional's flight attendants wear the uniforms of the major, passengers traveling on the regional earn the major's frequent flyer points, and the regional uses the logos, trademarks and even the name of the major (for example, regional airline Comair operates for Delta under the name Delta Connection).<sup>4</sup> To facilitate passenger connections between the regional and the major, the schedules of the regional and its partner are coordinated, and often the regional carrier's schedule is dictated by the major carrier. Check-in and baggage handling are also coordinated so that passengers need only check-in and check their luggage once, at the start of their trip.

Majors subcontract service to regional airlines because regionals have a cost advantage on the types of routes that they serve. Table 1 compares several characteristics of routes (under 1500 miles) served by majors themselves with characteristics of routes (under 1500 miles) served by majors via their regional partners. As the data in the table suggest, majors tend to use regionals to serve routes that involve at least one very small endpoint, measured either by the number of flights the major operates from the endpoint or by the population of that endpoint. In addition, majors tend to use regionals on low-density routes. Indeed, the average number of passengers flying a regional's route in a quarter is about one-fifth of the average number flying a major's route. Finally, even limiting the sample to routes less than 1500 miles, we see that routes served by regionals are less than half the distance of routes served by majors themselves.

Thus, the routes that majors subcontract to regionals are typically short, low-density routes which are most efficiently served by a small number of daily flights on a small aircraft. Regionals' trip cost advantage in serving these types of routes results primarily from the lower salaries paid to regional airline employees, relative to the major's own employees, and the

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<sup>3</sup> In 2003, 99% of regional airline passengers traveled on flights that were codeshared with a major carrier.

<sup>4</sup> Note that this is different from the type of codeshare arrangement typically negotiated between two major carriers, such as United Airlines and Lufthansa. Under that type of agreement, both carriers will sell tickets under their own codes for a given flight and the flight carries the identity of the operating carrier.

regional employees' more flexible work rules.<sup>5</sup> As we explain in Section III, regional airlines' lower labor costs can be traced to their origins as non-unionized and non-regulated operators of small aircraft. Like majors, many regionals now have unionized workforces; nonetheless, this labor cost differential has persisted.<sup>6</sup>

In this capacity, regional airlines have come to play a vital role in the U.S. commercial airline industry, providing the sole means of scheduled air transportation at more than two-thirds of all North American airports served by U.S. carriers. Table 2 provides some descriptive data about the activity of U.S. regional airlines in 2004. In that year, there were 74 regional airlines in operation. These regionals served a total of 655 U.S. airports, 479 of which were served exclusively by regional airlines. Regionals completed over 14,000 daily departures and carried a total of 134.7 million passengers (or approximately 1 in 5 domestic passengers). Regional carriers combined to operate 2,757 aircraft, 59 percent of which were regional jets (RJs). The average seating capacity of one of these aircraft was 40.

The high level of regional airline service suggested by these statistics reflects the substantial growth that the regional airline industry has recently experienced. Table 3 provides some evidence of the growth that has taken place in this industry over the past decade. The number of passengers flying on regional airlines more than doubled over this period, increasing from 57 million to almost 135 million. During the same time, the average trip length for a regional airline passenger also doubled from 210 miles to 417 miles. The combination of increased passengers and increased trip length has resulted in a 367 percent increase in revenue passenger miles over this 10 year period. Much of the increase in average trip length can be attributed to the introduction and diffusion of regional jets which have a longer range than the turbo-prop planes traditionally flown by regional airlines.<sup>7</sup> In addition to having longer ranges, regional jets also tend to be larger and faster than turbo-prop planes. As the fourth and fifth rows of Table 3 show, this has resulted in an increase in the average seating capacity of regional aircraft from 23.7 seats in 1994 to 39.9 seats in 2004 and an increase in available seat miles on regionals from 23.7 billion to 82.6 billion, an increase of almost 250 percent.

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<sup>5</sup> Salaries are not directly comparable because major airlines fly larger aircraft than regional carriers, but hourly pilot salaries for the smallest equipment flown by major airlines are about twice as high as hourly pilot salaries for the largest equipment flown by regional carriers, controlling for the years of experience that the pilot has.

<sup>6</sup> In addition to the advantage provided by regionals' lower labor costs, there may be gains (in the form of lower maintenance and training costs) to having the major and the regional each specialize their fleet to include only a small number of different aircraft types.

<sup>7</sup> We discuss the role of regional jets in greater detail in Section V.

Interestingly, as the final row of the table indicates, the number of departures by regionals grew only modestly over the decade, from 4.6 million to 5.25 million. This suggests that much of the expansion in service over this period seems to come from changes in the type (and therefore size and distance) of aircraft flown, from turbo-props to regional jets.

### **III. History**

The role of regional airlines as providers of air service to small communities can be traced back to the regulated era.<sup>8,9</sup> In 1926, the Air Commerce Act charged the Secretary of Commerce with the task of promoting air commerce and empowered him to issue and enforce air traffic rules, license pilots, certify the airworthiness of aircraft, establish airways, and operate various aids to air navigation. The Civil Aeronautics Act of 1938 added economic authority to this operational and safety authority, thus establishing the Federal Government as the economic regulator of the air transportation industry. The Act created the Civil Aeronautics Board (CAB) and required every air carrier to obtain a certificate from the CAB that authorized it to serve a particular point or route. The 16 carriers in operation when the CAB was formed were given certificates to continue the service they were already providing. These 16 carriers became known as the “trunk carriers”. In keeping with its objectives to both grow commercial air service while, at the same time, protect the economic stability of the trunk carriers, the CAB often granted trunk carriers exclusive access to newly authorized routes and, at least initially, refused to issue operating certificates to any new airlines.

Much of this changed, however, following World War II. The war affected the early commercial aviation industry in two important ways. First, the war accelerated the advancement of aviation technology, expanding both the number and size of available aircraft. Second, the war accelerated the expansion of air service by increasing the demand for air service from individuals living in smaller communities. In response to this increase in demand for service, in 1944, the CAB created a new category of experimental “feeder airlines”. The CAB recognized that air service to small communities would likely require subsidization since many small communities could not generate sufficient traffic to cover costs. Reluctant to jeopardize the trunk carriers’ evolution towards financial self-sufficiency, the CAB chose to

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<sup>8</sup> See Borenstein and Rose (2005) for a thorough account of regulatory reform in the U.S. airline industry.

<sup>9</sup> This section draws heavily on “Air Service to Small Communities” (available at <http://www.wws.princeton.edu/ota/disk3/1982/8201/8201.PDF>) and Levine (1987).

create a new category of airlines to serve small communities, rather than allocate these additional routes to the trunk carriers. Between 1944 and 1950, the CAB awarded temporary operating certificates to 17 new or existing interstate carriers. In 1955, these temporary certificates were made permanent and these carriers became the “local service” airlines. The local service airlines were given authority to operate only on low-density routes serving smaller communities or on heavier routes on which they were required to make intermediate stops at smaller cities. These requirements were explicitly for the purpose of keeping the local service airlines from competing directly with the trunk carriers.

Coinciding with the emergence of the local service airlines, a third category of commercial air service was beginning to take shape. This category included fixed-base on-demand air taxi service. In 1949, the CAB recognized this third category of airlines and created another experimental class of airlines for “non-certified irregular route” carriers. This category was confirmed in 1952. Unlike the trunk and local service airlines, this new class of carriers - known as scheduled air taxis and eventually as “commuter airlines” - did not require operating certificates from CAB. Regulations did, however, prevent them from operating aircraft of more than 12,500 lb takeoff gross weight and from offering scheduled service between certified points. The weight limitation and the exclusion from certified points were specifically imposed to prevent the commuters from competing directly with the trunk and, especially, with the local service carriers.

During the early 1960s, the subsidies required to support the local service airlines increased dramatically. While most of the trunk carriers were, at this time, financially self-sufficient (due largely to them being allowed to terminate service to 211 small communities in favor of local service carriers), the total subsidy required by the local service airlines was almost \$67 million in 1962. Anxious to reduce this high level of subsidization, the CAB began to allow the local service carriers to modify their route structures. Specifically, the CAB allowed them to replace the trunk carriers at some points, relaxed the requirement that the locals stop at every intermediate certified point on every flight and allowed locals to drop service to places that generated less than 5 passengers per day on average. These route modifications did improve the financial performance of the locals (total subsidy payments fell to \$34 million by 1970); however, they also resulted in the elimination of 108 small communities from the local service route map. Service to small communities was further

reduced as both the trunk and local service airlines transitioned to faster, larger aircraft. Between 1968 and 1978, an additional 125 cities were removed from the local service route map. Once again, there was a major gap in air service to small communities. This role was eventually filled by the commuter airlines.

Regulatory and economic changes allowed for significant growth of the commuter airlines in the 1960s and 1970s. In 1965, the CAB amended its regulations to allow commuter airlines to carry mail and to provide service between certified points, often replacing trunk or local service airlines. In 1964, American Airlines contracted for Apache Airlines to replace it in serving Douglas, Arizona - this was the first “air taxi replacement agreement”. In 1967, Allegheny Airlines (which eventually became US Airways) established the Allegheny Commuter program, contracting unprofitable destinations to 12 independent commuter airlines operating under the name Allegheny Commuter. This arrangement marked the first codeshare relationship between a major carrier and a commuter. These types of codesharing agreements increased throughout the 1970s, contributing to commuter airlines’ growth over this period. By 1978, 26 commuter airlines were providing replacement service for trunk and local service airlines at 50 points, mostly without government subsidization.

Deregulation in 1978 more firmly established the role of commuter airlines in the commercial aviation industry. The Deregulation Act of 1978 provided a means for commuter airlines to replace trunk and local service carriers at certain points of their networks by mandating the pro-ration of fares for connecting service. In addition, the Act allowed commuters to offer scheduled service of up to 30 seats, with this limit subsequently being raised to 50 seats. After deregulation, commuters (like larger carriers) were required to obtain operating certifications (now from the Federal Aviation Administration) and were required to comply with more stringent operating and reporting restrictions. Finally, deregulation established the Essential Air Service program which provided subsidies to airlines providing “essential air service” to small communities.

The emergence of hub-and-spoke systems shortly after deregulation further increased the extent of codesharing between large carriers and commuter airlines. Large airlines operating hub-and-spoke systems realized that passengers traveling to or from small communities on commuter airlines were usually flying those short-haul trips as part of a longer itinerary (which typically involved travel on a major carrier). As such, these passengers could

provide an important source of feeder traffic for airlines at their hubs. The airlines further realized that, since there was typically little competition for short-haul portion of the flight and since passengers preferred easy connections to the long-haul portion, coordinating their flights with the commuter airline's flights could help them capture these passengers on the longer leg of their trip. This left the large airlines with two options: serve the short-haul routes themselves or establish arrangements with the existing commuter carriers. Even with the improved efficiency brought by deregulation, the larger airlines' costs of serving these small towns were still well above those of the specialized commuter airlines. Partnerships between majors and commuters (eventually renamed regionals) flourished.

#### **IV. Relationships between Majors and Regionals**

The codeshare partnerships between major carriers and their regionals are governed by one of two types of organizational forms. A regional may be wholly-owned by the major with which it partners. Or, a regional may be independently owned and contract with one or more major carriers.<sup>10</sup>

In the case of an independent regional, the contract between the major and the regional will generally take one of two forms. Historically, most contracts have been revenue-sharing agreements (also known in the industry as pro-rate agreements). Under these agreements, the regional agrees to serve a set of routes on behalf of the major and to coordinate its schedule on (and allocation of aircraft to) those routes with the major's own schedule. In exchange, the major permits the regional to use its service marks and logos and lists the regional's flights in computer reservation systems under its two-letter designator code. The regional receives an allocated portion of the revenue from each passenger that flies the regional as part of an itinerary that connects with one of the major's flights. Fares are set by the major and marketing and ticketing are carried out by the major.

More recently, the industry has shifted towards fixed-fee or capacity-purchase agreements. Under these types of contracts, the regional receives a fixed payment (usually based on block hours flown) for each departure that it operates on behalf of the major. This fixed payment is calculated to cover the regional's operating costs and to guarantee a

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<sup>10</sup> In some cases, a major will take a minority equity position in its regional partner. Unfortunately, we do not have systematic data identifying these cases.



reasonable rate of profit. In addition, the regional may receive incentive payments based on operational performance, such as on-time performance and baggage handling. Under a capacity purchase-agreement, the major retains all revenue from flights operated by its regional. Our conversations with industry participants and examination of the trade presses suggest that the switch to fixed-fee contracts was motivated by two factors. First, these contracts eliminate almost all of the risk faced by the regional. The fixed fee payment with a guaranteed profit margin insulates the regional from both demand risk (since its revenue is independent of the number of passengers onboard) and cost risk (since most costs, including fuel, are passed on to the major).<sup>11</sup> Second, fixed fee contracts provide the major with a greater level of control over the regional, in particular over its schedule. The switch to fixed fee contracts began in the late 1990s and, interestingly, largely coincides with regionals' adoption of RJs.

Table 4 lists the major-regional partnerships that were in place in 2000 and in 2005 for the largest U.S. network carriers. Regional carriers that appear in bold are ones that are fully owned by their major partner. As the table clearly indicates, there is heterogeneity both across and within majors in the extent to which regional partners are owned. As well, there have clearly been changes over time in a given major's use of owned and independent regionals. In 2000, Continental, Delta, Northwest and US Airways each used a mixture of owned and independent regionals, while American used only owned regionals and United used only independent regionals. By 2005, Continental and Northwest had each sold the regional partners that they owned, leaving them (as well as United) using independent regionals exclusively. Delta and US Airways continued to use a mixture of owned and independent regionals, while American supplemented the service provided by its owned regionals with contract service provided by several independent regionals. Overall, while we continue to see variation both across and within majors in their use of owned and independent regionals, the data does suggest a trend over time towards greater use of independent regionals.<sup>12</sup>

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<sup>11</sup> However, even these contracts do not protect the regionals from financial risks when the major carrier is in Chapter 11 bankruptcy. Under those conditions, the major can reject the prior contract and renegotiate a new contract with substantially lower fixed fee payments to the regional.

<sup>12</sup> This may partly reflect the current economic climate in the industry which has forced many majors to sell whatever assets they could, including their owned regional partners, but it is likely also due to the lower costs of many independent regionals.

While both owned and independent regionals operate as subcontractors for majors, our research suggests that there are a number of important differences between the two types of regionals. First, independent regionals usually own or lease their own aircraft and hire, fire and manage their own employees. Wholly-owned regionals - though operating as a separate entity within the major - ultimately have their aircraft and employees included as part of the major's own fleet and workforce. As such, independent regionals retain residual rights of control over their aircraft and workforce while, for wholly-owned regionals, these rights ultimately rest with the major. In addition, ownership of a regional carrier allows the major airline to select and replace the regional's management while contracting with an independent regional does not. The implication of this is that the managers of a wholly-owned regional are ultimately accountable to the major.

Second, ownership affects the way in which majors and regionals respond to unanticipated schedule disruptions. These disruptions occur most frequently in adverse weather conditions, but may also result from air-traffic control problems or airline mechanical problems. When an airport experiences adverse weather, the Federal Aviation Administration (FAA) will determine - several hours in advance - the number of flights which will be allowed to land during each hour. When weather necessitates a reduction in flights relative to the original schedule, each airline will receive a number of take-off and landing slots in proportion to its original share of scheduled flights. The airline then decides which of its flights to delay or cancel. When a regional is owned by a major, the major and the regional receive a *common* allocation of slots and the major carrier decides which of its own and which of the regional's flights to delay or cancel. In fact, the rescheduling decisions for wholly-owned regionals are done by the major carrier's Airline Operational Control Center (AOCC). In contrast, when a regional is independent, it receives its own slot allocation and makes its own decision (in its own AOCC) about delays and cancellations, possibly in coordination with the major carrier for which it operates.

Third, there may be operating cost differences between owned and independent regionals.<sup>13</sup> The lower salaries paid to regional airline employees have led these employees to seek compensation that is closer to that earned by their counterparts at the mainline. Regional employees' demands for higher wages may be harder for management to resist when a regional

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<sup>13</sup> Both types still have a substantial cost advantage over majors.

is wholly-owned by a major airline.<sup>14</sup> In addition to the difference in wages, phone conversations with industry executives and analysts have suggested that owning a regional may lead to costs associated with managing two distinct labor forces, such as more frequent labor disputes.

The fact that there are differences between owned and independent regionals – combined with the fact that we observe the same major using different types of regionals on different routes - suggests that majors appear to be making explicit decisions about what type of regional to use and when. Indeed, this decision between using an owned or independent regional has the flavor of a classic “make-versus-buy” decision where a firm (in this case, an airline) must decide whether to carry out a given transaction in-house (“make”) or through the market (“buy”).<sup>15</sup> In Forbes and Lederman (2005), we explore this question of why majors may choose to vertically integrate with some or all of their regional partners. Building on the growing body of empirical work in the organizational economics literature, we analyze a major’s decision whether to use an owned or independent regional on a particular route. We develop a simple framework that illustrates the costs and benefits of using an owned - versus independent - regional and we test that framework using data on flights served by regional carriers operating for the seven largest U.S network carriers on city pairs between the 300 largest U.S. airports in the spring of 2000.

Our framework illustrates how the benefits and costs of owning a regional result from operational and institutional characteristics of the airline industry. Specifically, we argue that majors interact with their regionals during two types of operational decisions - *ex ante* scheduling decisions and real-time adjustments to schedule disruptions. Contracts between majors and regionals generally cover the first set of decisions; however, they do not - and likely could not - cover the second set of decisions. Thus, there is an incentive problem between majors and their regionals which results from the incompleteness of contracts with respect to real-time schedule adjustments. When unanticipated disruptions (such as adverse weather or mechanical problems) create the need for adjustments to the major’s planned flight schedule, the major and its regional may disagree on what adjustments should be made. In

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<sup>14</sup> For example, after Delta acquired the previously independent regional carrier Comair, pilots at Comair demanded higher salaries and went on strike. The pilots used the now common ownership of Delta and Comair as the main argument for a salary increase.

<sup>15</sup> Williamson (1971) and (1985).

particular, while the major will attempt to internalize the impact of the disruption on its *entire network*, the regional, who is compensated only based on the routes it serves for the major, will not. Ownership of a regional mitigates this incentive problem by giving the major residual rights of control over how the regional's physical assets and labor force are used. This, we argue, is the primary benefit of owning a regional.

However, as described above, there are also costs associated with ownership of a regional. Majors subcontract service to regional airlines because regionals have a cost advantage that results primarily from the lower salaries paid to regional airline employees, relative to the major's own employees. Ownership of a regional has the potential to erode this labor cost savings that regionals afford majors. The lower salaries paid to regional airline employees have led these employees to seek compensation that is closer to that earned by their counterparts at the mainline.

Thus, the framework developed in Forbes and Lederman (2005) predicts that a major's optimal choice of organizational form will reflect the tradeoff between its incentive to exercise control over its regional and its incentive to maximize the labor cost savings that its regional provides. To test this framework, we develop two propositions that relate an airline's likelihood of using an owned regional on a city pair to airline-specific characteristics of that city pair which proxy for the magnitude of the incentive problem. Our first proposition relates to the extent to which a regional's flight is integrated into the major's network. The more integrated a regional's flight, the more likely it is to experience disruptions and the more costly it will be for the major to have these disruptions resolved by its regional who will not internalize the impact of its decision on the major's network. Our second proposition relates to the frequency of unforeseen schedule disruptions that result from adverse weather. Adverse weather increases the amount of time that is needed in between consecutive takeoffs or landings, thus forcing airlines to delay or cancel flights. As a result, adverse weather forces majors and regionals to make more frequent adaptation decisions. We therefore expect that wholly-owned regionals are more likely to be used on city pairs that are more integrated into the major's network and on city pairs that are more likely to be affected by adverse weather. We test these two propositions and find strong empirical support for both.

## **V. The Introduction of the Regional Jet**

As alluded to in Section II, one of the most important recent developments in the regional airline industry has been the introduction of the regional jet (RJ). The RJ is a small jet-powered aircraft that holds between 30 and - in the most recent models - 100 passengers. RJs were first introduced in Europe at the end of 1992 by Lufthansa Cityline and in the U.S. in early 1993 by Comair, a regional partner of Delta Air Lines. The introduction turned out to be a commercial success for both airlines, and these and other airlines followed in adopting the RJ for many of their routes over the following years. Figure 1 provides some evidence of the extent of RJ adoption between 1996-2000. The figure plots the total number of RJ flights operated in a quarter by the largest six U.S. network carriers. As the figure suggests, the number of RJ flights increased from slightly less than 500 at the beginning of 1996 to over 2,800 by the end of 2000. Moreover, the figure shows that, over the same period, there is no overall increase in the number of jet flights operated by these carriers and there is a decrease in the number of turboprop flights. This suggests that the dramatic increase in RJ flights is not simply reflecting an overall trend in increased service and, furthermore, that RJ flights are, at least partially, replacing turboprop flights.<sup>16</sup>

The technological appeal of the RJ results from the fact that it combines the “best” features of a turboprop with the “best” features of a jet. In particular, RJs have the capacity of a turboprop but the range, speed and comfort of a jet. To see this in the context of an actual airline’s fleet, in Table 5, we compare the capacity, range and cruising speed of two full-size jets, two RJs, and two turboprop planes which were in use in Delta’s mainline fleet as of October 2006. As the table indicates, while the capacities of the RJs in Delta’s mainline fleet are similar to or slightly larger than the capacities of the turboprops in its fleet, the range and, in particular, the cruising speed of the RJs are similar to that of the 100 and 100-plus seat jets in Delta’s mainline fleet.

From an economic perspective, RJs do not necessarily have lower costs per available seat miles (CASMs) than larger jets and in most cases may actually have higher costs per available seat mile. Rather, the benefit of the RJ is that, on thinly traveled routes, the revenue generated from the small number of passengers flying the route could actually cover the costs of a RJ but would be unlikely to cover the costs of a full-sized plane. Put another way, while the costs per available seat mile may be higher on a RJ, the revenue per available seat mile is like to be

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<sup>16</sup> We discuss the various uses of RJs over this period in greater detail below.

substantially higher on a RJ relative to a full-sized jet since the number of available seat miles is so much lower. This means that airlines may be able to profitably serve thinly traveled routes with RJs but not with full-sized jets.<sup>17</sup>

Given these technological and economic advantages of the RJ, it is clear that airlines can benefit from the adoption of RJs in several different ways. In particular, our research suggests that there are four distinct motives that airlines can have for introducing RJs onto specific routes. First, airlines may use RJs to replace larger jets in an effort to reduce over-capacity and improve load factors. Second, airlines can use RJs to supplement existing jet (or turbo-prop) service in order to increase flight frequency during off-peak times of the day and adjust the airline's capacity on the route. Third, RJ's can be used to replace existing turbo-prop service if airlines want to offer higher quality jet service and, potentially, a slightly larger seating capacity. Finally, RJ's can be used to introduce new service on routes that would not be profitable for airlines to serve with the other types of aircraft available to them. We suspect that the impact of RJ introduction on consumer welfare will depend on which of these motives drive the RJ adoption decision. For example, RJs used for new or supplemental service would likely lead to higher consumer surplus, as may the replacement of existing turbo-prop service with higher-quality aircraft. On the other hand, RJs used to reduce existing capacity on a route previously served by a larger jet aircraft could lead to lower consumer surplus. Of course, consumer surplus would also depend on how, in equilibrium, other airlines respond to a carrier's RJ introduction (in terms of changes to their own schedule, capacity and aircraft mix).

Using detailed flight schedule data from the Official Airlines Guide from 1996 to 2000, we analyze airlines' motives for RJ adoption between 1996 and 2000. During this five year period, we observe 537 introductions of RJs by the six largest U.S. carriers on city pairs on which they did not previously use RJs. To operationalize the motives described above, we classify RJ introductions into four categories: (1) **Capacity Reduction** - which we define as capacity on the route falling with frequency staying the same or falling or capacity on the route falling by more than 20% with frequency increasing; (2) **Frequency Supplement** - which we define as frequency increasing with capacity falling less than 20%; (3) **Turboprop Replacement** - which we define capacity increasing and the airline's number of turboprop

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<sup>17</sup> Most travelers prefer RJs over turbo-props because of their greater travel comfort. With low fuel prices, RJs were also more cost-efficient than turbo-props on many routes, but more recently, with rising fuel prices, some carriers are considering to increase their use of the more fuel-efficient turbo-props again.

flights on the city pair decreasing; and (4) **New Service** - which we define as RJ service on a route on which the airline did not previously offer service. We find that, between 1996-2000, 23% of introductions were capacity reduction, 23% were frequency supplement, 22% were turboprop replacement, and 32% were new service.<sup>18</sup> We also find that the motive for RJ introduction varied with route characteristics, in a fairly intuitive way. For example, on very small spoke routes, over 40% of RJ introductions replaced turboprop service. In contrast, on large spoke routes, almost half of RJ introductions were for the purpose of supplementing frequency on the route. Finally, on point-to-point routes, 56% of introductions were new service.

While the continued production and adoption of larger and more sophisticated RJs suggests that the benefits to airlines of RJ adoption continue to be substantial, it is important to note that the diffusion of the RJ has not come without costs. In particular, the emergence of the RJ has exacerbated existing tensions between management and pilot unions at the major carriers. Because of their longer range and greater appeal to business travelers, RJs are much more substitutable with mainline jets than are turboprops. This raises the concern among mainline pilots that management will be tempted to “outsource” an increasingly large number of mainline routes to regional partners to serve with RJs. In order to limit the extent to which management can replace mainline service with lower-cost regional service, mainline pilot unions have negotiated so-called “scope clauses” into their labor agreements. These clauses restrict the number of small planes (regional jets or turbo-props) that may be operated for the major airline by regional partners, either placing an absolute limit on the number of small planes and/or tying the number of allowed small planes to increases in mainline jet flying. In the late 1990s, scope clauses became a major source of conflict between management and pilots at all major carriers. After 9/11, however, with most major carriers in or near bankruptcy, the scope clauses have been substantially renegotiated and relaxed. While scope clauses still impose some constraints on majors today, they do so to a much lesser degree than before 9/11.

## **VI. Looking Forward**

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<sup>18</sup> 13 of the 537 RJ introductions do not fall into any of these four categories.

Looking forward, we suspect that regionals will continue to play a large and important role in the commercial aviation industry. However, we also suspect that this segment of the industry will continue to face a number of challenges. First, as RJs increase in size, the distinction between the types of aircraft flown by majors and the types flown by their regional partner will further blur. Both Embraer and Bombardier, the two main producers of RJs, have already introduced 70 seat RJs, which are in use in several airlines' fleets. As well, both have developed RJs in the 100 seat range and have received orders for these from several airlines. It will be interesting to observe how majors and their pilots address the issue of whether 100 seat RJs should be flown by mainline pilots or regional pilots. Indeed, the close substitutability between the 100 seat RJ and a traditional wide body aircraft is exemplified by the fact that, to date, the largest customer of the 100-seat Embraer jet is not even a regional (or a major on behalf of its regional), but rather JetBlue Airlines, a low-cost carrier.

Second, as majors continue to evolve in the face of low-cost competition, they are increasingly using regionals to serve routes on which they compete with low-cost carriers. This is a very different role for regionals than their traditional role of providing feeder service to and from a major's hub airports. Again, it will be interesting to observe how relationships between majors and regionals change as regionals increasingly take on this role. Interestingly, competition from low-cost carriers may ultimately lead to a reduction in the cost advantages that regionals provide. As majors continue to feel pressure to lower their own costs, they will continue to renegotiate labor contracts with their unions. As they do so, the labor cost advantage that regionals possess may eventually shrink, once again causing a change in the role played by these carriers.

Looking forward from an academic perspective, we hope that this chapter may stimulate research interest in this segment of the airline industry. Indeed, we believe that the regional airline industry provides a very rich area for research by airline economists, as well as industrial organization and industrial relations economists. The ownership and contract relationships between majors and their regionals provide an interesting setting in which to examine a number of important organizational economics questions. The diffusion of the regional jet - a technology that affects airlines' entry and capacity decisions - should affect equilibrium market structure and fares. Most of this is yet to be researched. Finally, unique



institutional history of the regional airline industry and its impact on current labor relations in the industry should be of interest to labor and industrial relations economists.

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**Table 1**  
**Characteristics of Routes (<1500 miles) Served by Majors vs. Regionals**

	Served by Major (N=1017)	Served by Regional (N=994)
Is either endpoint a hub for the major?	81%	70%
# of daily flights the major operates out of the <i>larger</i> endpoint airport	388	204
# of daily flights the major operates out of the <i>smaller</i> endpoint airport	30.3	6.1
Population of the <i>larger</i> endpoint airport	6,790,970	6,744,559
Population of the <i>smaller</i> endpoint airport	1,994,610	1,238,190
# of passengers traveling route per quarter	26,620	5,220
Distance of the route	730	314

Source: Authors' construction using Official Airlines Guide schedule data and Department of Transportation Databank 1A data from the second quarter of 2000. Sample includes flights between top 300 U.S. airports operated by American, Continental, Delta, Northwest, TWA, United and US Airways or their regionals.

**Table 2**  
**Regional Airline Statistics**

	<b>2004</b>
Carriers Operating	74
U.S. Airports Served	655
U.S. Airports Served Exclusively by Regional Airlines	479
Daily Departures	14,400
Passengers Enplaned (millions)	134.7
Passengers Enplaned as % of Total U.S. traffic	20%
Revenue Passenger Miles (billions)	56.21
Total Fleet Size	2,757
Regional Jets as % of Total Fleet	59%

Source: Regional Airline Association ([www.raa.org](http://www.raa.org))

**Table 3**  
**Growth in Regional Airline Service**

<b>Year</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>Growth, 1994 - 2004</b>
Enplaned Passengers (millions)	57.1	57.2	61.9	66.3	71.1	78.1	84.6	82.8	98.4	113.0	134.7	135.9%
Average Passenger Trip Length (miles)	210	223	230	231	245	267	299	311	333	384	417	98.6%
Revenue Passenger Miles (billions)	12.0	12.8	14.2	15.3	17.4	20.8	25.3	25.7	32.8	43.3	56.2	367.6%
Average Seating Capacity (seats per aircraft)	23.7	24.6	25.1	25.9	27.7	29.8	31.7	33.5	35.1	37.7	39.9	68.4%
Available Seat Miles (billions)	23.7	25.5	26.9	27.8	30.4	35.8	42.6	44.2	52.6	66.2	82.6	248.1%
Departures Completed (millions)	4.63	4.69	4.46	4.38	4.33	4.38	4.46	4.20	4.41	4.88	5.25	13.4%

Source: Regional Airline Association ([www.raa.org](http://www.raa.org))

**Table 4**  
**Majors and Regional Partners in 2000 and 2005, regionals in bold are fully owned**

<b>Major</b>	<b>Regional Partners - 2000</b>	<b>Regional Partners - 2005</b>
American Airlines	<b>American Eagle Airlines</b> <b>Business Express</b>	<b>American Eagle Airlines</b> Chautauqua Airlines <b>Executive Airlines</b> Regions Air Trans States Airlines
Continental Airlines	<b>Continental Express</b> Gulfstream International Airlines	Cape Air Colgan Airways Commutair ExpressJet Gulfstream Int'l Airlines
Delta Air Lines	Atlantic Coast Airlines/ACJet <b>Atlantic Southeast Airlines</b> <b>Comair</b> SkyWest Airlines Trans States Airlines	American Eagle Airlines <b>Atlantic Southeast Airlines</b> Chautauqua Airlines <b>Comair</b> Mesa Airlines SkyWest Airlines
Northwest Airlines	<b>Express Airlines, I</b> Mesaba Aviation	American Eagle Airlines Big Sky Airlines Pinnacle Airlines Gulfstream Int'l Airlines Mesaba Airlines
United Airlines	Air Wisconsin Atlantic Coast Airlines Great Lakes Aviation Gulfstream International Airlines SkyWest Airlines	Air Wisconsin Chautauqua Airlines Great Lakes Aviation Gulfstream Int'l Airlines Mesa Airlines Shuttle America SkyWest Airlines Trans States Airlines
USAirways	Mesa Air Group/Air Midwest <b>Allegheny Airlines</b> Mesa Air Group/CCAir Chautauqua Airlines Colgan Airways Commutair Mesa Air Group/Mesa Airlines <b>Piedmont Airlines</b> <b>PSA Airlines</b>	Air Midwest Chautauqua Airlines Caribbean Sun Airlines Colgan Airways Mesa Airlines <b>MidAtlantic Airways</b> <b>PSA Airlines</b> <b>Piedmont Airlines</b> Trans States Airlines

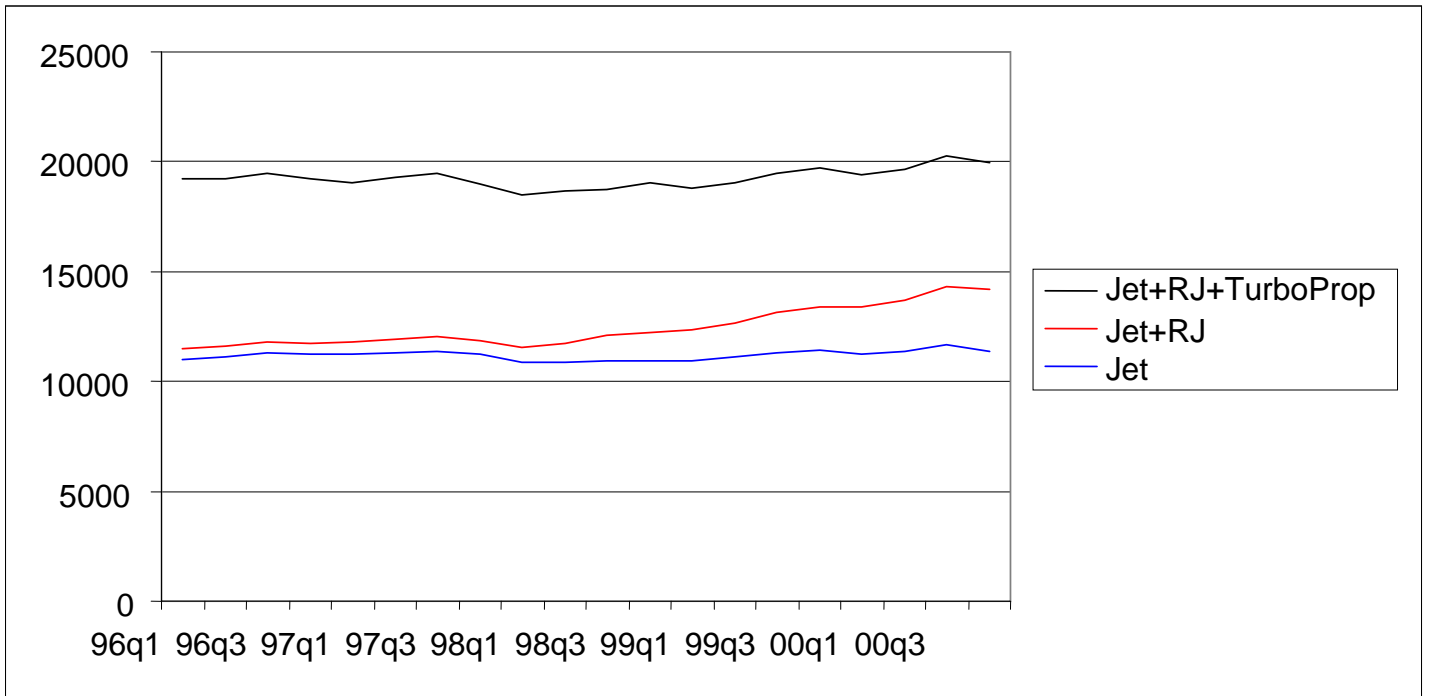
Source: Regional Airline Association ([www.raa.org](http://www.raa.org))

**Table 5**  
**Comparison of RJs to Turboprops and Full-Size Jets, Delta's Current Fleet**

	<b>JETS</b>		<b>RJS</b>		<b>TURBOPROPS</b>	
	<b>B-737-800</b>	<b>MD-88</b>	<b>CRJ-700</b>	<b>CRJ-200</b>	<b>Aerospatiale 72-210</b>	<b>EMB120</b>
<b>Seats</b>	150 (2 classes)	142 (2 classes)	70 (1 class)	40-50 (1 class)	66 (1 class)	30 (1 class)
<b>Range (miles)</b>	2789	1740	1939	1265-1496	1318	945
<b>Cruising Speed (mph)</b>	531	509	544	530	322	292

Source: <http://www.delta.com>

**Figure 1**  
**Aggregate Patterns of RJ Usage, 1996-2000**  
**AA, CO, DL, NW, UA and US**



Source: Authors' calculation using Official Airlines Guide data, 1996-2000