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Competitive Innovation in the U.S. Airline Industry

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ABSTRACT

Innovation in the U.S. airline industry offers lessons in the role that the interplay of competitive forces can play in economic progress. The quarter-century following deregulation saw many attempts at innovation, some of which were adopted for a time and then replaced by other innovations. After two decades of upheaval and evolution the airline industry has been reshaped along the lines of lower prices, more choices, and better service. This paper looks at these patterns of competitive evolution in terms of how they played out over time and against one another on the part of incumbents and new entrants. What emerges is a rich interplay of technological innovations, institutional changes, and new business practices that can be understood in terms of their joint contribution to economic progress.

INTRODUCTION

The quarter-century following deregulation saw many attempts at innovation, some of which were adopted for a time, proved successful, and then were replaced by refinements and subsequent innovations. Evolutionary forces were driven by technological innovation, innovative business practices, and by changes in institutional policies toward air travel. There were a number of experiments with new business models, innovations that improved efficiency, and practices that led to the reshaping of market segments. The period saw business strategies designed to increase monopoly power (gate control), then other strategies that brought on competition and ultimately, undermined monopoly power. There was gradual change in some markets and disruptive change in others, and when seen as a mosaic of competitive evolution, few industries have undergone more change in less time.

Looking back, it is possible to see these changes as phases, characterized by experiments with new business models, where the learning gained in one phase created conditions that brought on subsequent experiments and later change. For illustrative purposes, we group these phases into the initial deregulatory stage that led to the emergence of hub control, the deregulatory phase that saw the appearance of different approaches to low-cost service and the evolution of quality as a standard, and, finally, the erosion of hub control that placed previously-dominant legacy carriers in a precarious position, at the mercy of smaller, later entrants. Seen this way, the changes in airline industry offer generalizable insights into competitive evolution and industry development. What follows is at how the search for evolving advantage on the part of individual companies can contribute to innovation and economic progress.

DEREGULATORY PHASE

Before deregulation airlines fell into two categories. Trunk carriers were responsible for carrying the major north-south, east-west, and international traffic. They generally flew an average of 1,000 miles per flight, though Pan American World Airways' international route structure gave them an above-average of 2,000 miles per flight. Local carriers were responsible for shorter flights within regions of the country. These airlines averaged between 300 and 400 miles per trip, except for Alaska Airlines, whose sparsely-populated territory saw an average flight of 550 miles.[1]

Following deregulation one or more trunk carriers combined with one or more local carriers to become full-service carriers, offering connections among nearly all city pairs within the continental United States.[2] Among the legacy class of carriers, all but Alaska were either former trunks or large regionals that had merged to form trunks. American Airlines, United Airlines, Delta Air Lines, Northwest Airlines, and Continental Airlines were trunk carriers. USAir, later renamed US Airways, was formed through the expansion of Allegheny, a regional.

At the same time several new carriers formed around new business models with the goals of achieving greater efficiencies and offering lower fares to their customers. People Express and New York Air were early examples of this class of low fare airline. Many of these new airlines grew quickly but were unable to scale effectively. Eventually, all but America West Airlines were folded into the legacy carriers.

As the first phase of airline deregulation drew to a close by the late 1980s, trunk and regional airlines had merged to form a market of national carriers, each with one or more hubs.[3] Numerous regional carriers (other than Southwest and Alaska) had been absorbed

into the operations of USAir, PanAm, Delta, TWA, American, Northwest, or Continental, leaving the market to eight national airlines (these seven, plus Eastern Airlines). America West was growing to become a ninth nationwide carrier. For nationwide routes that did not begin or end at a hub competition was characterized by a focus on economies of scale, a full-service approach to customers, limit pricing to discourage entry, and the pursuit of brand loyalty.

Deregulation also had been marked by the unexpected emergence of hub control, whereby a single carrier acquired the majority of gates at a mid- to large-sized airport and with it, various degrees of monopoly power. For traffic originating or terminating at hubs, entry barriers created less incentive to improve productivity and economies of scale. Thus, in the decade following deregulation, the airline industry was characterized by competitive pricing on some routes, and monopolistic pricing on other routes, even for the same carrier. The resulting higher prices and lower quality than expected at the time of deregulation had led Alfred Kahn, the father of deregulation, to label deregulation “a mess.”

LOW-COST BUSINESS MODELS EMERGE

The first change that reshaped the industry was the emergence of low-cost business models on the part of new entrants. Prior to deregulation some states had sufficient competition to encourage innovation. California and Texas remained most competitive, with enough population in cities sufficiently distant to support intrastate airline competition. Air California (AirCal) and Pacific Southwest Airlines (PSA) fought for market share in California. In Texas, Southwest and Texas Air (later named Texas International) fought Braniff and American for market share. Although AirCal, PSA,

Southwest, and Texas International all focused on surviving by having lower costs than their big competitors, they used different methods in pursuit of this goal.

Southwest focused on providing reliable, consistent service to second- and third-tier airports (within Southwest criteria of two hours' driving time from large cities). The Southwest model offered only one type of aircraft, simplified check in and seating, and service only to uncongested airports near major cities.[4] This strategy pushed American Airlines out of its hub in San Jose, California, which American had acquired when it absorbed AirCal in 1987, and, later, forced US Airways almost completely out of California. Hubs that lacked feasible third-tier airports in close proximity managed to weather this strategy for a time (Pittsburgh, Denver, Minneapolis, and Detroit).

Southwest had pioneered new labor practices, such as having flight attendants clean the lavatories during aircraft turns, and making baggage handlers responsible for aircraft pushback. Even though Southwest employees had among the highest hourly wages in the industry by 2003, these costs were offset by higher labor productivity.

In 1995, Western Pacific Airlines acquired new Boeing 737s with financing assistance from Boeing to serve Colorado Springs as an alternate airport to Denver. As an experiment to gain additional revenue, Western airline painted their aircraft with paid advertising. However, the near-simultaneous emergence of Frontier, a new low cost carrier operating out of Denver International, resulted in an inability of Western Pacific to draw sufficient passengers from Denver and the airline ceased operations in 1998.

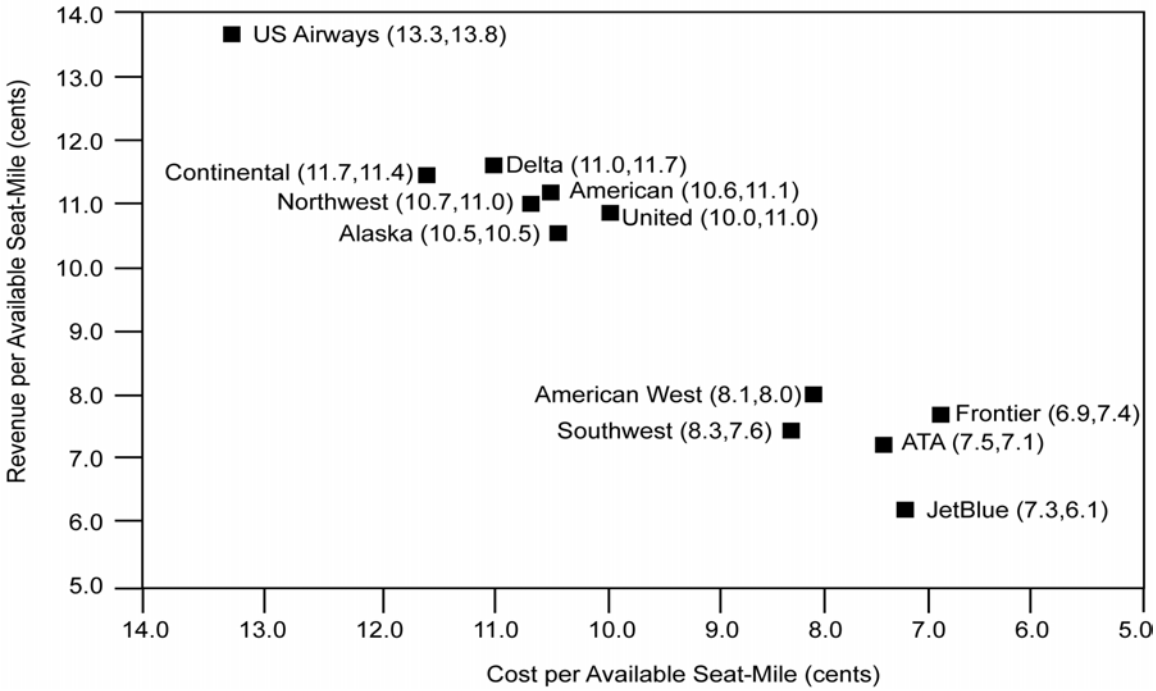
National, for its part, acquired new Boeing 757 with the goal of serving Las Vegas in 1999 at the lowest per-seat cost. However, National's cost advantage was nullified due to insufficient volume arising from competition on the part of Southwest. National also filed

for bankruptcy in 2001, and in 2002, after suffering even more sharply reduced demand as a result of 9/11, ceased operations altogether.

Other new entrants began offering, in addition to Southwest's consistency and friendliness, assigned seating and service to both primary and secondary airports. Carriers ATA, America West, and AirTran were first to offer two classes of service. JetBlue provided passengers with live satellite television, later imitated by Delta's Song and Frontier. For the newer entrants lower costs had been achieved through differing combinations of flexible labor contracts, efficient scheduling, and, in some cases as noted, newer technology.

The pattern of industry segmentation in 2002 achieved by legacy and low-cost carriers is shown in Figure 1. Legacy carriers averaged costs per available seat-mile (CASM) and revenue per available seat-mile (RASM) of 10¢ or more while the low-cost carriers had CASM and RASM on the order of 8¢ or less. In many cases however, as the figure illustrates, few carriers had been able to sustain attractive operating margins.

FIGURE 1: Cost and Revenue Patterns following Deregulation (2002-2003)[5]



As carriers responded to Southwest's success some sought to differentiate themselves from Southwest's by offering additional facilities and services. JetBlue provided more spacious coach seating and incorporated live satellite television at every seat, a feature later copied by Frontier and Song, at prices similar to Southwest. Alaska added personal DVD player rentals that allowed them to add movies to longer flights without incurring costs and additional weight of retrofitting their aircraft. Carriers AirTran, ATA, and Alaska began offering first class seats at prices below the traditional airlines' business coach fares after witnessing the success of a similar program at America West. Continental was a pioneer in developing electronic check-in kiosks, later duplicated by all major carriers, as a means to reduce the number of employees necessary to handle peak passenger loads. Alaska was the first to implement web-based check-in, also later matched by all major carriers, and this

reduced costs by minimizing the capital and maintenance expenditures associated with kiosks.

STANDARDS OF QUALITY EVOLVE

Another force that began to reshape the industry was the emergence of new standards of quality that, in turn, favored new entrants. Initially under deregulation, quality was associated with flight amenities and preferential ticketing. However, as the complexity of carrier operations increased, the standard for quality changed, as Southwest promised customers few amenities in return for low prices and simplified operations. Less complex ticketing rules meant less cost associated with building and managing reservations systems, training agents, and addressing customers' misunderstandings, but, more importantly, simplicity meant less opportunity for unpleasant surprises and unmet customer expectations. (Southwest, in effect, employed the Wal-Mart strategy of promising little, but always delivering on the promise.) Southwest customers responded with high levels of loyalty.

As passengers became frustrated with unpredictability, consistency increasingly replaced amenities as the definition of quality. US Airways, in contrast, continued to provide traditional levels of service, yet customer satisfaction declined (to 13 out of 20 in customer complaints).[6] Although US Airways promised assigned seats, free upgrades, meal service, and in-flight entertainment, customers were disappointed when they lost assigned seats, could not receive upgrades, were charged money for food, or found that the movie player was not working. As legacy carriers saw their monopoly power at hubs diminish, penalties for inconsistency based on this low-price standard became widespread.[7]

Before the universal acceptance of the Southwest model the unreliability of budget carrier service had inhibited development of a loyal low-price customer base. At the time, other low budget carriers such as Vanguard flew older, used aircraft, focused attention on price to the exclusion of quality, and managed to be successful only to the extent they could avoid direct competition with legacy carriers. Competitive retaliation on the part of legacy carriers exacerbated this problem, as the legacies would match lower airfares where they had excess capacity, or increase frequency on highly contested routes.

It is illustrative to note how carriers like America West, in responding to Southwest's standard of quality, helped to eliminate the industry's historical segmentation between business and leisure fares. In 2002, America West reduced the price differential between its leisure and business fares as part of their restructuring, but the impact on America West's RASM was minimal (see Table 1). In fact, America West's RASM actually decreased by a smaller percentage than both the industry average and the legacy airline class. (In 2003, a growth year, America West also improved less than the legacy class average.) Overall, in both good and bad years, low-fare carrier revenue variation had become less than the legacy carriers, conferring to them the advantage of being better able to weather both price competition and economic downturns in the industry.

Table 1: America West Revenue per Available Seat Mile and Year-to-Year Change

	2001		2002		2003	
America West	7.8	(10.1%)	7.6	(2.5%)	8.1	6.8%
US Average	9.7	(5.4%)	9.1	(5.8%)	9.6	5.2%
Legacy Average	10.7	(8.4%)	10.3	(3.6%)	11.2	9.0%

As other competitors reacted to the initiatives of Southwest, Alaska Air was also forced to restructure. The carrier simplified their fleet from six types of aircraft to two, improving efficiency through the use of fewer mechanics, less training, fewer parts, and fewer pilots per seat-mile. In addition to implementation of a de-peaked hub strategy in Seattle, Alaska instituted a streamlined program called TANGO [8]. Modeled after Southwest's innovative turnaround policies, Alaska developed a highly-choreographed process involving ground employees for each flight assigned specific tasks to perform at specific times. The result of TANGO was a 30% reduction in the amount of time an airplane must remain at a gate; this, in turn, translated into a 30% reduction in the staffing cost of a turn, as well as an increase in the productivity of flight crews.

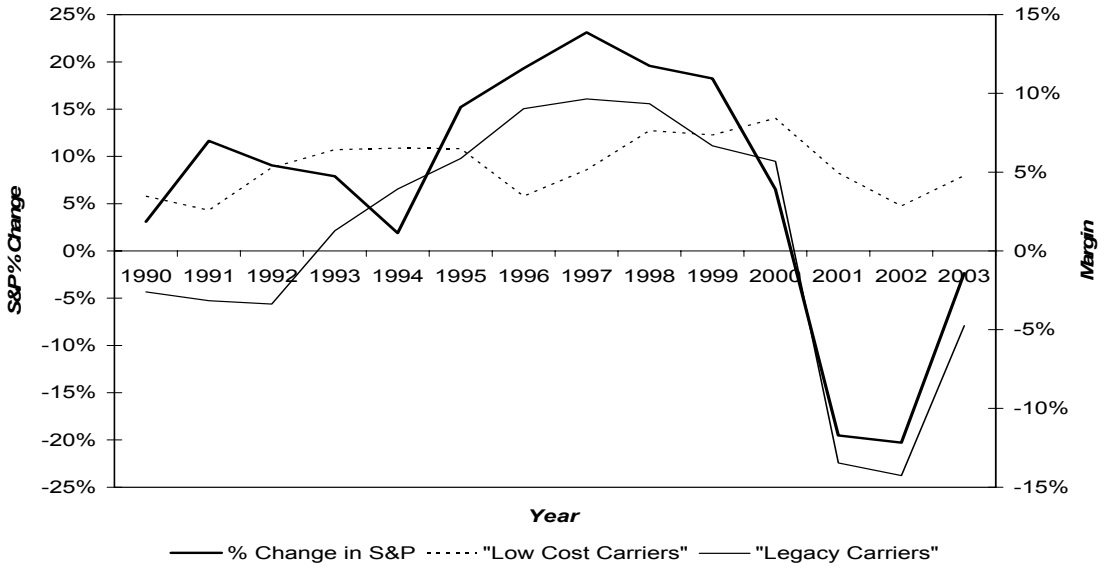
Continental, for its part, began its restructuring in 1994, however, the strategy of fleet simplification was less applicable to larger airlines like Continental because they served longer routes than the short-haul 737s could serve at the time. Continental did seek a simplified fleet of Boeing aircraft with the intent to have only three types of airliners. FAA regulations prohibited pilots from qualifying on more than two types of aircraft so Continental divided its fleet training in half, with one set of pilots trained on MD80/737s and the other half trained on 757/767/777s.

Northwest, another legacy carrier, took a less capital-intensive approach. Rather than purchase a new fleet of fuel efficient aircraft, Northwest opted to maintain an older, less fuel efficient fleet but one that was fully depreciated. Aircraft interiors were updated but otherwise the aircraft was the same as they had acquired during the 1980s (mostly manufactured between 1965 and 1975), and their fleet was further expanded with purchases of additional used aircraft of the same type. By offsetting greater complexity and

lower fuel efficiency with lower financing costs, despite having the highest fuel-based CASM among legacy carriers in 2003, Northwest generated the third best profits that year, behind Continental and Alaska. However, beginning in 2004, in response to large fuel price increases, Northwest began replacing their DC-10s with new fuel efficient A330s.

Another effect these various restructuring efforts had over time was to change the industry's sensitivity to economic downturns. Customarily, high-price businesses are less sensitive to downturns in the economy. In the airline industry however, as restructuring forces played out, it became apparent that this pattern had been reversed; it was now the legacy airlines that were less able to sustain price and volume in an economic downturn. The sensitivity differences by which the legacy carriers became more susceptible to economic cycles than their low-cost brethren are illustrated in Figure 2.[9]

FIGURE 2: Air carrier sensitivity to economic cycles



HUB CONTROL ERODES

Although the 1990s had seen trends toward efficiency and competitive pricing that put pressure on high-priced carriers, structural changes were also at work that would ultimately erode the most important advantage of the legacy carriers; the hub-and-spoke business model. Primary among these structural changes was the policy followed in many regions of the U.S. in the 1990s to expand airport capacity. When airport size (and, most importantly, the number of available gates) began to grow and the number of carriers began to shrink, any given airline found it more difficult to saturate a given airport's capacity. The result was that gates at previously-protected airports became available to competitors, and, as this took place, legacy carriers' high-cost operations became vulnerable.

Hartsfield in Atlanta, for example, was expanded to serve as a hub for both Eastern and Delta, creating too much gate capacity for a single airline to saturate. Worse for Delta, as Eastern ceased operations in 1991, low-cost ValuJet (since renamed AirTran) moved in to fill that gap, placing Delta's high cost operations at a severe disadvantage. For its part, Southwest's growth had begun at a time when major airports were capacity controlled by inadequate infrastructure, too few gates, or by insufficient runway capacity.[10] As these constraints were removed, Southwest in the late 1990s began to serve primary airports such as Detroit,

Other cities replaced smaller airports with larger airports. Denver International replaced Stapleton in 1994. Stapleton had been a hub to both United and Continental, but as with Hartsfield in Atlanta, Denver International's capacity was too high to allow a single airline to dominate. After Continental restructured its business in 1994, shutting down its

Denver hub, only United made the move to the expanded Denver. As Continental departed, the sudden surplus in capacity enabled lower-cost Frontier to begin flying from Denver.

As other legacy carriers abandoned their hubs other low-cost carriers moved in. Frontier Airlines began service from Denver, taking advantage of Continental's 1994 decommissioning of its Denver hub. Frontier's CASM advantage allowed it to sell seats at a lower price than United, and still make a profit, while United would lose money on the same route. After American purchased TWA, American's service to St. Louis, the former TWA hub, was reduced significantly. Southwest moved to fill that vacuum. As Delta reduced its presence at Dallas/Ft. Worth, AirTran increased service from that airport.

Southwest's innovative business practices had arisen out of necessity, given its early days as a low volume, low-price carrier with limited capital. However, as the airline grew, a new opportunity emerged; to mimic the legacy carriers' hub and spoke systems. Each new city, by offering connections on both ends, could serve routes with marginal origination and destination (O&D) traffic (passengers beginning or ending their trips at that airport). Unlike legacy carriers however, Southwest's model produced more of a web than a hub, because between any two cities, there could be several routes. The result was to provide the benefits of a hub and spoke system (economies of scope, offering service on more routes) without the costs of a hub (complicated and inefficient operations).

In the early 1990s, Southwest's entry to the West Coast market included an assault on America West at its Phoenix and Las Vegas hubs. America West attempted to defend itself by differentiation, but the carrier was unable to support premium fares, and market share shifted to Southwest. In response, America West focused on reducing costs. The carrier's weak Columbus hub was closed and the focus of operations returned to Phoenix and Las

Vegas. Daytime flights were concentrated in Phoenix, while night flights were routed through the perpetually-awake city of Las Vegas. This served to increase all-important load factors (percent of capacity generating revenue) to levels even above Southwest whose aircraft rarely flew at night. Wages and benefits were also cut, as were passenger amenities. By the mid 1990s, America West became the first airline to achieve a competitive standoff against a direct attack by Southwest.

As an attempt to counter this trend, USAir demanded a guarantee of the same percentage of gates (85%) at Pittsburgh's new airport terminal as they had held at the old terminal. As this non-competitive provision was written into the airport bond covenant, for a time the Justice Department took an interest in the agreement, although, ultimately, no action was taken. Until 2003, when other competitive forces overtook US Airways, the carrier benefited from overwhelming gate control at Pittsburgh, even as some of the airlines' gates went unused. Northwest attempted to do the same thing in Detroit to counter Southwest's entry, but was unsuccessful, as the old terminals, which Northwest wanted demolished in order to reduce gate supply, remained in use

In 1993, the threshold an airline used to determine the viability of nonstop service was about 219,000 passengers per year.[11] By this measure, only about 20% of all domestic passengers could be served nonstop at the time.[12] By 2003, increases in air traffic resulted in an additional 76 markets that could support nonstop service without requiring a hub at one or both ends. Many of these new markets contained previously under-used second-tier airports (in cities like Baltimore; Providence, Rhode Island; Chicago's Midway; and Long Beach, a suburb of Los Angeles) that could now be used to offer non-stop service.[13]

Technological change also worked against hub control as improved jet engine technology allowed smaller aircraft to enter the long-haul market by reducing the cost barrier between long and short flights. The 124-seat Airbus A-319 and the 126-seat Boeing 737-700 introduced in the late 1990s were both capable of flying 4,000 miles and thus could serve any two cities in the continental United States nonstop,[14] reducing by 38% the threshold necessary to serve a long-haul market. Together, the combination of more efficient technology and increased capacity increased by 99 the number of markets that could support nonstop service (above and beyond the 76 markets added by overall demand increases). Twenty-eight of these markets were in non-hub airports, thus reducing the relative advantage of hub and spoke operations.

The "bursty" nature of traditional hub and spoke operations carried an inherent inefficiency that became apparent as competitive alternatives became available. To maximize hub and spoke economies, flights were routed through a single hub, and so a large number of flights needed to arrive and depart at nearly the same time. Although a traditional hub required sufficient staff and equipment to handle peak activity, on average staff and equipment would spend about 30% of time idle. This "built-in" excess capacity and associated higher costs could not be avoided. [15]

As a compromise between efficiency and economies of scope, an alternative to the traditional hub and spoke approach emerged. It sought localized scale economies through de-peaking, or "rolling" hubs in which flights were handled at a more constant rate throughout the day. De-peaked hubs made more efficient use of airport staff, aircraft crews, and aircraft as the ground time at a hub was reduced. The drawback of this approach, however, was that it increased layover time on the part of customers, an effect that was

particularly unattractive to the profitable business market. Because of this, a rolling hub strategy was effective only at airports with significant traffic.

Depeaking by legacy carriers indeed did take place, as American, United, and Continental implemented the approach at their Dallas/Fort Worth, O'Hare, and Houston hubs. Alaska followed with a depeaking strategy at its Seattle/Tacoma hub. For Alaska, de-peaking yielded an increase in aircraft utilization equivalent to the introduction to the fleet of three additional aircraft.[16] In this way Alaska offered new service to Chicago without cannibalizing its other routes or purchasing additional aircraft. Still for the legacy carriers benefits of de-peaking continued to be offset by a decrease in customer satisfaction associated with increased layovers.[17]

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Monopoly power remained on some routes for carriers that continued to serve thin markets (US Airways, for example, was the only airline servicing Altoona, Pennsylvania). However, as low cost carriers expanded to serve more cities near these markets, profits available to the traditional carriers before a nearby city became an effective substitute

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declined. In just two years, 28 markets that became, in effect, “too thin for service” lost air service altogether.

Table 2: Airports with Discontinued Service, 2000–2002

Benton Harbor, MI	Mountain Home, AR
Wiley Ford, MD	Marathon, FL
Corvallis, OR	Mattoon, IL
Eastsound, WA	Oak Harbor, WA
Fort Huachuca/Sierra Vista, AZ	Newport, OR
Friday Harbor, WA	Ottumwa, IA
Goodland, KS	Poughkeepsie, NY
Gallup, NM	Rocky Mount/Wilson, NC
Hickory, NC	Southern Pines, NC
Huron, SD	Spencer, IA
Greensboro/Winston Salem, NC	Santa Rosa, CA
Kingston, NC	Utica, NY
Lamar, CO	Yankton, SD
Las Cruces, NM	Youngstown/Warren, OH

On the whole, the increase in airport capacities, the diseconomies associated with the traditional hub and spoke approach, and the improved technology that allowed direct flights between regional cities jointly worked against hub control. Further, as business fares declined due to the “Southwest effect” on prices and quality redefinition, the structural disadvantages of the legacy carriers higher costs and inconsistent service were exposed, further placing the legacy carriers at an increasing disadvantage.

LEGACY CARRIERS FACE EXIT BARRIERS

As limits to the original concept of the hub-and-spoke approach became apparent legacy carriers faced other barriers to change due to long-standing work rules and labor

contracts. Legacy carriers had employees with more years in service commanding higher wages, and unions resisted work rule changes needed to improve efficiency. All legacy carriers faced these disadvantages to varying degrees, which, because labor practices took a long time to change, persisted long after this problem became apparent. In case after case, new management was called in, as the CEOs of United, American, US Airways, and Delta changed several times over the period, but none were able to bring about the changes needed.

The legacy carriers' structural problems were masked in the 1990s by strong economic growth and steady increases in demand. Legacies initially increased supply more slowly than demand as they had come to recognize the cyclical nature of the industry and were attempting to hedge against future downturns. (Against this background, however, Southwest took advantage of the supply shortages and expanded more rapidly than the legacy carriers.) Still, overall, increases in supply were not keeping up with increases in demand, and the resulting higher prices supported the legacy carriers' higher costs until demand fell off in late 2000.

To compete with the low-cost carriers, legacy carriers experimented with the concept of "airlines within airlines." Examples were US Airways' MetroJet, Continental Lite, United Shuttle, Delta's Song, and United's Ted. However, as events unfolded several factors prevented the hoped-for economies from occurring. For the legacy carriers, airlines within airlines became a substitute, rather than a complement, to revenues. Overall volume remained unchanged. Also, compared to the low-cost carriers that were capital constrained, relatively little effort was put into process improvements as, most often, airlines within airlines were subject to the same high costs that stemmed from legacy carrier policies

tuned to earlier hub and spoke strategies. Costs remained higher than competitors' (US Airways' CASM in 2003 was 13.8¢ compared to Southwest's 7.6¢). In short, airlines within airlines experienced many of the costs of legacy carriers with few additional benefits.

The combined effects of new low-cost business models, new standards of quality, erosion of hub control, and structural exit barriers on the part of legacy carriers became clear after 9/11. In August, 2002, US Airways filed for bankruptcy, emerged, and filed again in September, 2004. While still in bankruptcy US Airways agreed in May, 2005, to merge with America West. In December, 2002, United filed for bankruptcy, which persisted through 2005. In the three months ending in 2004, Delta declared an industry-record loss of $2.2 billion, and approached bankruptcy. Even low-cost carriers suffered. ATA filed for bankruptcy in October, 2004. Many of its routes were sold to Southwest with which ATA had began codesharing partnerships after filing Chapter 11. Frontier lost $23M in 2002 as losses continued through 2005, fueled in part by their slim 11% margin.[21] All in all, no ongoing industry in the history of American enterprise experienced such widespread disruption in such a short time.

CONCLUSIONS

A mix of competitive forces continue to shape airline industry evolution. An increasing number of routes in the U.S. should see non-stop service as demand grows and as technology such as the 787 allow smaller aircraft to fly longer distances. Streamlining of processes continue in pursuit of greater productivity and more effective use of employees. Attempts to create new market segments continue. RyanAir, based in Dublin, Ireland, is removing the window shades from their aircraft to reduce weight and maintenance and

they have the tightest seating allowed by law at 29 inches per row (two inches less than most domestic carriers, and four inches less than JetBlue). To meet emergency procedure regulations, RyanAir is stitching the safety information card to the back of each seat and eliminating seatback pockets in order to reduce weight and the amount of cleaning necessary. They are eliminating galleys altogether and keeping the legal minimum of one lavatory on board. It remains to be seen how many amenities customers are willing to give up in pursuit of low prices.

Hub control that dominated the first 15 years of airline deregulation no longer appears viable. Large destinations like Chicago O'Hare and Dallas/Ft. Worth have sufficient capacity to support two airline hubs, and both cities have secondary airports that can serve as substitutes.[22] Reduction in hub service in Dallas (Delta dropped out), coupled with continued airport expansion, has rendered that airport ready for a new entrant, as has expansion of the Detroit/Wayne County facility. Cities like Kansas City and St. Louis have insufficient traffic to sustain a hub. Pittsburgh, historically among the strongest of hubs, saw US Airways reduce its traffic there in 2002 from 89% of gates to 63% in 2004. Only Cincinnati and Minneapolis continued to fit the traditional profile of mid-continent hub monopolies, while Charlotte under US Airways served as the one remaining north-south traditional hub.

Overseas, countries continue to restrict service from foreign carriers. No low cost carriers fly international transoceanic routes from the United States.[23] Only two airlines from the U.S. are permitted to fly to the desirable Heathrow International Airport in London. Because of this, United and American continue to price above their competitors, which are reduced to flying to the less desirable Gatwick airport. Legislative barriers to

entry in international markets are falling but because international flights are significantly longer than domestic flights, equipment and service expectations differ, precluding an airline such as Southwest from using the same equipment for domestic and transoceanic international markets (however, one might expect Southwest to offer service to Canadian and Mexican cities). In this sense, the future for the global airline industry may mimic the deregulation years in the U.S. experience, where short-haul (within country) domestic carriers feed long-haul international carriers through codesharing.[24]

INSIGHTS

Looking back, the quarter-century following deregulation saw many attempts at innovation, some of which were adopted for a time and then replaced by other innovations. After two decades of upheaval and evolution, the U.S. airline industry has been reshaped along the lines of lower prices, more choices, and better service. Thus, after a quarter century, Alfred Kahn's original vision for a competitive industry has been realized, but not by more legislation; by competitive evolution. At the center of these advancements were and will be actions on the part of companies that seek to best leverage each company's distinctive assets in concert with technological and institutional change. Against this background the U.S. airline industry provides robust lessons in role that competitive evolution plays in economic progress.

Endnotes

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[1] *Airline Industry Historical Data Book*, Merrill-Lynch, 1985.

[2] Southwest Airlines and Alaska Airlines were the only two surviving airlines to eschew industry consolidation; neither merged with any trunk or significant local carriers after deregulation.

[3] Bailey, Elizabeth E., and Williams, Jeffrey R., "Sources of Economic Rent in the Deregulated Airline Industry," *J. Law & Econ* 31 (1988)

[4] Southwest would not begin service to an airport unless they could obtain at least two gates, with each of those gates servicing at least six daily flights. Thus, an airport with demand insufficient to fill a dozen 737s (about 1,500 people) per day would not be serviced by Southwest. It is worth noting that Southwest began by serving the Texas Triangle, and all expansions into new regions except the hub city of Chicago were built on these original route categories. By 2005 the only major routes unserved by Southwest were Hawaii Interisland, New York/Boston to Florida/Caribbean, and Los Angeles to New York. JetBlue served New York/Boston to Florida/Caribbean, and Los Angeles to New York, making it unlikely that Southwest would enter those markets in the near future.

[5] This is aggregated for Q4, 2002 through Q3, 2003; a range was chosen in order to compensate for seasonal effects.

[6] *Air Travel Consumer Report*, United States Department of Transportation (April, 2004)

[7] It is interesting to examine past battles between US Airways and Southwest in this context. US Airways had a dominant position in the California intrastate market, a market US Airways acquired by purchasing Pacific Southwest Airlines (PSA) in 1986. By 1991, just before Southwest entered that market, about three-quarters of all passengers flying between Burbank and Oakland did so on US Airways. Within 18 months of Southwest's entry, US Airways abandoned Burbank altogether, and Southwest captured an astonishing 99% of the Burbank-Oakland market (the remaining 1% belonged to Alaska, which has since made a comeback in this market). A virtually identical result occurred in Baltimore a few years later. Most recently, Southwest initiated service to Philadelphia, US Airways' largest hub, in 2004; and Pittsburgh, once the center of US Airways' operations, in 2005.

[8] TANGO is an acronym for "Turn Around 'N' GO," "turn" being an industry term for the process covering the time between the flight's arrival at the gate and its subsequent departure from the gate

[9] The relationship between airline profits and time can be expressed as:

$m = \beta_0 + \beta_1 s + \varepsilon$,
where

m	=	airline profit margin,
β_0	=	average profit margin,
β_1	=	S&P 500 correlative coefficient,
s	=	S&P 500 percent change over previous year, and
ε	=	error and other effects.

In comparing the legacy carriers' performance to the S&P 500 from 1990 to 2003, there is a correlation as indicated by the r2 value of 0.83. For the legacy carriers, β_0 is –2.8%, and β_1 is 0.54. On the other hand, the low cost carriers' β_2 value is 0.11, suggesting little in-

fluence of the S&P on low cost carriers' performance, and rendering the above equation unimportant for this class of carrier.

[10] Chicago O'Hare, Washington National, and New York Kennedy and LaGuardia were slot controlled

[11] The 219,000 figure was calculated based on a recognition that:

Coast-to-coast flights have about three time demand peaks and 757-200s and 767-200s were the smallest aircraft capable of serving these routes nonstop

Shorter distance markets have longer, more steady demand, but are also served by smaller aircraft such as the 737-200.

The 219,000 figure is the average of these numbers, regardless of distance.

[12] Of these, 58% of passengers were served by a hub, operating on one or both ends of nonstop routes. The remaining 80% of domestic passengers required the scope economies of hubs. Thirty domestic markets supporting nonstop service in 1993 did not begin or end at a hub. All but one fell into one of six distinct route categories; Hawaii Interisland, Texas Triangle (Dallas, Houston, San Antonio, and Austin) and New Orleans, West Coast, Eastern Seaboard, New York/Boston to Florida/Caribbean, and Los Angeles to New York. Only one route, Los Angeles to Honolulu, fell outside these categories. All of these routes were served by extensive nonstop service

[13] The only new market not served by a low-cost carrier is Los Angeles to Maui. Los Angeles to Orlando is the only one of these new markets not flown nonstop. During this time, JetBlue started providing service from John F. Kennedy International when Southwest stayed out of that market and ValuJet was reconstituted from AirTran, after AirTran

flight 592 crashed in the Florida Everglades in 1996 (AirTran was the name of an airline ValuJet was acquiring at the time).

[14] In 1993, the smallest aircraft capable of flying 4,000 miles was the 200-seat Boeing 757-200.

[15] As oligopolistic markets mature, rivalry is often characterized by a need to balance scale economies (volume growth) with organizational innovation, careful market segmentation, and continual process improvement. *Renewable Advantage: Crafting Strategy through Economic Time*, Jeffrey R. Williams, the Free Press, 1999, pg 56.

[16] The Book of TANGO, Alaska Airlines, 2004, ch 1.

[17] This required that the impact on cost be balanced in such a fashion as to increase overall profitability. In particular, the study suggested that an average of $10 decrease in airfare would compensate for the increased connection times, corresponding to a 0.74¢ decrease in RASM. The increase in staff and aircraft utilization should easily produce more than 1¢ in CASM reduction, and thus increase airline margins. Zhang, Yu; Menendez, Monica; and Hansen, Mark, *Analysis of De-peaking Strategies Implemented by American Airlines: Causes and Effects*, Department of Civil and Environmental Engineering, University of California at Berkeley (2003)

[18] The 219,000 figure was calculated based on a recognition that coast-to-coast flights have about three time demand peaks and 757-200s and 767-200s were the smallest aircraft capable of serving these routes nonstop; shorter distance markets have longer, more steady demand, but are also served by smaller aircraft such as the 737-200; and the 219,000 figure is the average of these numbers, regardless of distance.

[19] Of these, 58% of passengers were served by a hub, operating on one or both ends of nonstop routes. The remaining 80% of domestic passengers required the scope economies of hubs.

[20] The only new market not served by a low-cost carrier is Los Angeles to Maui. Los Angeles to Orlando is the only one of these new markets not flown nonstop. During this time, JetBlue started providing service from John F. Kennedy International when Southwest stayed out of that market and ValuJet was reconstituted from AirTran, after AirTran flight 592 crashed in the Florida Everglades in 1996 (AirTran was the name of an airline ValuJet was acquiring at the time).

[21] Frontier Airlines 2004 Annual Report and 10-Qs

[22] Dallas Love Field is restricted by the Wright and Shelby Amendments, which limit full-sized jet traffic to New Mexico, Oklahoma, Arkansas, Louisiana, Mississippi, and Alabama.

[23] In the early days of deregulation, there were a few instances of low cost carriers flying across the Atlantic (SkyTrain from London, and People Express from Newark), but this service was discontinued. It required the use of 747s or DC-10s, which are among the most expensive to operate.

[24] It is possible to imagine a carrier like Continental gaining monopoly power in international markets. Continental serves more destinations in Europe than any other United States airline, and it has proven to be particularly profitable for them. Northwest has a similar position in the Pacific markets, and the two airlines have a strong code sharing

agreement. The two airlines could use their international monopolies to subsidize their reduced profits available in domestic markets.