

## Air Transportation and Urban-Economic Restructuring: Competitive Advantage in the U.S. Carolinas

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### **Abstract:**

The theoretical agenda of this paper is to bring airports and airline operations more squarely into the mainstream of the urban and regional development literature. The paper examines the spatial and temporal patterns of air passenger flows by airport in the US Carolinas. An emphasis is placed on articulating the linkages that exist between airport operations at the local level, the structural composition of the regional economy, and the competitive strategies of the airline industry. Particular attention was paid to administrative and auxiliary employment levels because it is a knowledge-based producer service that tends to seek out markets that offer high levels of air service connectivity to other places. A major finding in this paper is that those US Carolina airports that experienced significant gains in air passenger volume (e.g., Charlotte and Raleigh-Durham) tended to experience comparable gains in the employment levels of administrative and auxiliary workers, particularly in the manufacturing sector.

**Keywords:** air passenger volume | administrative and auxiliary workers | competitive advantage | transportation management

### **Article:**

#### 1. Introduction

During the post-deregulation era, air transportation research has focused on a wide range of issues including competitive strategy, pricing, service, safety and industry structure, although the geographic aspects inherent to these issues have been frequently ignored or underemphasized (Goetz, 1997; Debbage, 1993; Sorenson, 1991). Yet the dramatic changes in the spatial structure of airline route networks can radically alter the competitive and locational advantage of specific places particularly as airlines can now more freely enter and exit the marketplace. Exploring such issues are of critical importance if we are to better understand the role that passenger air transportation plays in shaping the economic geography of places, particularly in the context of

the national and regional space-economy. Although economists and geographers have traditionally appreciated the potential role of transportation in shaping regional economies, this paper attempts to improve our understanding of how air transportation can influence local economies by stressing the interconnectedness of airport operations at the local level, the structural composition of the metropolitan economy, and the broader consequences of competitive airline strategies at the regional and national level. More specifically, this paper examines the spatial and temporal patterns of air passenger flows by airport for a particularly dynamic and fast-growing region of the United States — the mid-Atlantic region of North and South Carolina. The mid-Atlantic or Carolinas region is an area that has experienced radical changes in airline and airport operations since deregulation (Goetz, 1993), and the regional economy is one of the most dynamic and rapidly changing in the nation. Essentially, two important questions are posed: (1) what role have the competitive strategies of the airline industry played in shaping the spatial and temporal distribution of passenger enplanements in the Carolinas from 1973 to 1995? and (2) how connected are these changes in air passenger volume to the underlying processes of economic restructuring in the urban core counties of the Carolinas that are most impacted by airport-related development?

## 2. Air transportation and economic development: a literature review

A growing body of work is beginning to address the important linkages between air transportation and the economic development of regions. Jemiolo and Oster (1987) examined regional changes in small community air service since deregulation while Fleming and Ghobrial (1994) analyzed the determinants of regional air travel demand in the southeastern US by assessing the effect of certain economic activities on regional air travel.

Others have attempted to link air traffic patterns and employment in cities, especially Goetz (1992) who found that prior growth in the population and employment levels of a metropolitan area partly explained subsequently higher levels of air passengers per capita. However, Goetz (1992) provided empirical evidence to suggest that the strength of this relationship has diminished over time. He suggested that any argument for adding airport capacity solely to stimulate regional growth may be flawed unless the region is a strategic hub location and/or has a history of strong passenger demand from within the region.

However, Chou (1993) appears to partially contradict these findings when he suggests that spatial changes in the nodal accessibility of airline service by city may be due more to national trends in economic and demographic growth than to the advent of hub and spoke operations since deregulation. Irwin and Kasarda (1991, p. 524) assessed the effects of changes in an airline network on metropolitan employment growth rates in manufacturing and producer services and found that changes in an airline network were “a cause rather than a consequence of this

employment growth”. Supporting evidence is provided by Button et al. (1999, p. 59) in a study of hi-tech employment in hub airport markets who found that “hubs create employment rather than airlines selecting cities as hubs simply because they are already dynamic”.

In other research, Ivy et al. (1995) found that changes in air service connectivity by metropolitan area significantly influenced employment levels in central administration offices and auxiliary establishments, such as research laboratories and financial services. For example, nonstandardized and highly innovative activity commonly associated with a manufacturing firms research and development and corporate functions have tended to remain in urban core regions where the labor pool tends to be more highly skilled (Malecki, 1986; Massey, 1984). These sorts of higher-order functions are facilitated by high levels of interaction with a wide variety of suppliers and services with a premium placed on face-to-face interaction, especially in agglomerative urban economies where a major airport can provide direct access to a wide variety of destinations. Some empirical support for this argument is provided by Ivy et al. (1995) who determined that positive changes in air service connectivity lead to increases in administrative and auxiliary employment levels for many US cities from 1978 to 1988.

As the national and regional economy continue to experience major structural changes, it is expected that air transportation networks will continue to be thoroughly intertwined with other processes of regional economic development (Huddleston and Pangotra, 1990; Caves, 1994). Passenger air transportation investments can fundamentally affect the regional economy in at least two significant ways. First, the airport itself can inject additional income into the regional economy by way of direct investment in facility construction and on-site employment generation. Indirect and induced expenditures associated with the multiplier effect of such a large fixed capital investment can also trigger a chain reaction through the regional economy as a complex web of off-site suppliers (e.g., wholesale goods, caterers, ground transportation operators) stimulate additional employment and investment opportunities. Second, the air transportation route network operated by the airlines can fundamentally alter the economic linkages a region has with other regions and countries through the movement of goods and people. Well-connected nodes or gateways are expected to offer competitive advantages for that region vis-à-vis less accessible regions. Markusen et al. (1986) identified airport access and high-quality air service as a critical ingredient in high-tech industry location decisions. Recent surveys conducted by KPMG Peat Marwick, 1987 and KPMG Peat Marwick, 1994 of foreign-based companies with US headquarters in North Carolina indicate that access to air transportation is an extremely important locational consideration for many businesses.

Macrostructural shifts in the US economy and the rise of the service sector have also significantly altered the demand for transportation services and, therefore, the competitive advantage of places. Bell and Feitelson (1991) identified several structural transformations that have critically impacted the provision of transportation services. First, changes in intrafirm production processes and the introduction of computer-integrated flexible manufacturing systems mean that plants can indulge in the small batch production of a wide range of differentiated products. According to Bell and Feitelson (1991, p. 520), “such a transformation in economic geography will place greater emphasis on distribution networks”. Furthermore, the increased emphasis on just-in-time inventory and the shift toward the rapid transportation of small quantities of high-value goods suggests that those regional economies that are well served by efficient air transportation nodes (relative to water and rail services that have traditionally favored the shipment of low-value, bulky goods) will maintain a competitive advantage over other places. Additionally, the rapid employment growth in the knowledge-based producer services (e.g., insurance, banking, legal services) and the increasing importance of face-to-face interaction, especially at the professional and executive level, suggests that the propensity to fly may be highest in those region's that specialize in these key sectors. For regions with a proliferation of headquarter and R & D functions, the importance of unimpeded access to a major hub airport may be of even greater strategic value (Bell and Feitelson, 1991).

Another useful contribution is provided by Ashford (1994), who suggested that airport operations should be placed in the broader context of the changing economic climate. He argued that traffic volume at an airport is highly volatile because of the significant freedoms permitted the airline industry under deregulation and the intensely competitive strategies of the major carriers. “Not only are airlines at liberty to move operations into an airport, they are also free to move them out” (Ashford, 1994, p. 59). Ashford, (1994, p. 61) recommends that “airport managers keep a close watch on the operations of competing airports to ensure that their own marketing strategy to the airlines is effective”. It is not uncommon for an airport to experience a substantial air traffic diversion if a neighboring airport within reasonable driving distance by car becomes a major point of operation for a low-fare carrier. When several major airports are in close proximity to one another as occurs along the I-85 urban corridor in the US Carolinas, the geography of this form of traffic diversion can radically alter over time as first one, and then another airport, plays host to a transient low-fare carrier. In 1995, the low-fare Continental hub at the Greensboro NC airport attracted additional traffic from nearby Charlotte and Raleigh-Durham, but the tables had turned by the late-1990s as both Midway and Southwest Airlines entered the Raleigh-Durham market and Continental shut down the Greensboro hub operation.

### 3. Research agenda, data, and definitions

The principal research questions under consideration in this paper all focus on clarifying the fundamental interconnections in the US Carolinas between the following factors over time:

- the competitive strategies of the major air carriers,
- air passenger volume by airport, and,
- the economic restructuring of the US Carolinas regional economy.

In order to address these interconnections adequately, some articulation of the thorny issue of causality between these variables is necessary. Although activities at any airport are closely connected to the complex web of urban and regional economic activity surrounding the airport region, it is more difficult to generalize on causality. Transportation investment does tend to concentrate economic activity to specific agglomeration economies, but “there is no consistent relationship between the provision of air services and the location of industry in developed economies” (Caves, 1994, p. 8). Consequently, in this paper transportation is conceptualized as playing a largely permissive and passive role in local economic development processes. Transportation systems are viewed as a necessary ingredient in “successful” regional economic development, but not a sufficient condition to guarantee growth.

The competitive strategies of the airline industry are classified based on Porter's (1980, 1985) competitive advantage framework. By classifying each major carrier using Porter's typology, it becomes possible to position each Carolina airport in the context of the overall competitive strategies of the dominant carrier(s) at each airport.

Air passenger volume data and employment data were collected for the 10 largest airports in the Carolinas for each of the three study years — 1973, 1983, and 1995. These years were chosen to assess the structural change in the airline industry for the 10 year period centered on the 1978 Airline Deregulation Act and for the most recent year at the time of writing.

Air passenger data for each city were obtained from the annual reports on Airport Activity Statistics of the Certified Route Carriers published by the Federal Aviation Administration, 1973, Federal Aviation Administration, 1983 and Federal Aviation Administration, 1995. Employment data were collected from County Business Patterns published annually by the US Department of Commerce, 1973, US Department of Commerce, 1983 and US Department of Commerce, 1995 for the urban core counties that hosted the three largest airports in the Carolinas in terms of passenger volume. These airports included: the Charlotte Douglas International Airport (Mecklenburg County), the Raleigh-Durham International Airport (Wake-Durham Counties or Triangle area), and the Piedmont Triad International Airport (Guilford-Forsyth Counties or the Triad area). Data extracted from County Business Patterns included the number of employees,

annual payroll, and the number of establishments for select sectors of the economy in each county.

Particular attention was paid to the administrative and auxiliary sector because it is an excellent example of the sorts of knowledge-based producer services that tend to generate high propensities to fly and often seek out metropolitan markets and labor pools that offer high levels of connectivity to other places. Some examples of activities commonly performed by administrative and auxiliary workers include research and development laboratories, financial services, accounting, data processing, legal services, marketing, and public relations. Analyzing administrative and auxiliary workers can provide a broad measure of overall professional employment levels although the category also includes some non-professional labor (e.g., warehouse and distribution employees). Studying the changing composition of administrative and auxiliary workers in the largest Carolina air transportation markets provides an opportunity to extend the work of Ivy et al. (1995) who found that changes in air service connectivity significantly influenced employment levels in administrative and auxiliary establishments.

This research focuses on the 10 largest airports in the Carolinas (in terms of scheduled jet service by a major carrier) and so does not include those airports that attract primarily charter and/or commuter air service (e.g., Greenville NC and Hickory NC). Commuter air carriers (e.g., US Air Express) and small feeder airports are critically important to the areas they serve but they are not the central focus of this paper.

We now turn our attention to the various competitive strategies employed by the airline industry that affected the competitive advantage of both air carriers and places.

#### 4. Porter's competitive advantage in the airline industry: theory and practice

##### 4.1. The value of defining and categorizing competitive strategies in the airline industry

While the work of Goetz, 1992, Goetz, 1993 and Goetz, 1997 and others (Bell and Feitelson, 1991; Caves, 1994; Ivy et al., 1995) enhance our understanding of the complex connections between air transportation and economic development, they tend to underplay the significant role that the competitive strategies of the airlines themselves can play in determining the success or failure of both airport operations and regional economies. According to Kling et al. (1991), a competitive strategy requires significant investments and a long-term plan against which specific goals and objectives can be measured. While strategic decisions should be explicitly

distinguished from short-term tactical decisions that relate to routine business decisions this can be difficult to do in an industry as complex and innovative as the airline industry. However, identifying broad competitive trends can help us better understand how volatility in air passenger flows at specific airports can affect regional and local development processes. “It is easier psychologically to understand the competitive dynamics of an industry if we can identify three or four similar groups rather than having to characterize each firm separately” (Kling and Smith, 1995, p. 26).

#### 4.2. Porter's competitive advantage

Porter, 1980 and Porter, 1985 has provided a suitable framework by identifying three generic strategies that can be applied to the air transportation industry: differentiation, focus, and cost leadership. In a 'differentiation strategy', an airline might attempt to be unique by offering a set of attributes that are widely valued by consumers. Carriers can differentiate the product by offering convenient schedules, an expanded seating capacity in business class, extensive frequent flyer programs, superior gate locations at an airport, and improved overall service (e.g., ticketing, boarding, and in-flight service). Kling and Smith (1995) identified American, Delta, and United as carriers pursuing differentiation strategies based on significant amenities beyond basic flight services and an image founded on the 'we fly anywhere you want to go' model.

In a “focus strategy”, the air carrier typically identifies a geographic segment of the industry and seeks to achieve a competitive advantage in the target segment. During the 1980s, this approach was widely used by some air carriers by developing fortress hub operations at strategically located airports where competitive forces were kept to a minimum. By building market share at an airport, the dominant carrier was able to construct effective barriers to new entrants by controlling a large number of the landing rights and gates. At fortress hubs like Charlotte (US Air) and Atlanta (Delta), this has translated into extensive flight service but it also makes such communities very vulnerable to the competitive strategies of the dominant carrier.

In a 'cost-leadership strategy', an air carrier attempts to become the low-cost producer in the industry by improving efficiencies in the production process through scale economies and by lowering the costs of production. The cost leader through the 1980s and mid-1990s was Southwest Airlines. Southwest has consistently emphasized a low-fare, low-cost corporate philosophy by offering a short-haul, rapid turnaround, point-to-point route network in markets that minimized airport-to-airport competition and without the high costs of operating a hub-and-spoke system.

Porter, 1980 and Porter, 1985 considered any air carrier that failed to develop a coherent competitive strategy as 'stuck-in-the-middle' and thus unable to maintain a sustainable competitive advantage. Typically, such a carrier had not successfully lowered costs or differentiated the product sufficiently or developed a coherent market niche. Often times it is these sorts of firms that are the first to exit during a recessionary-based shake-out of the industry. According to Kling and Smith (1995), TWA, Northwest, US Airways, and Continental Airlines are all carriers that fit Porters 'stuck-in-the-middle' conceptualization with high costs and below average quality ratings. For the major airport operations in the Carolinas, this is an alarming finding given the significance of both US Airways and, to a lesser extent, Continental Airlines to the regional and local economy.

## 5. Competitive advantage and urban-economic restructuring in the US Carolinas

Many of the competitive shifts outlined by Porter, 1980 and Porter, 1985 have played out in the booming Carolinas' sunbelt economy through the past two decades. The ten largest airports in the Carolinas all experienced rapid increases in passenger boardings during the post-deregulation era with total passenger volume increasing from 3.5 million in 1973 to 16.7 million in 1995 (Table 1). The most significant beneficiaries of this rapid growth in the air transportation market in the Carolinas included the largest urban core counties of North Carolina in places like Mecklenburg County (Charlotte), Wake-Durham County (Raleigh-Durham), and Guilford-Forsyth County (Greensboro-Winston Salem). These three urban regions played host to the three largest airports in the Carolinas and they accounted for almost 84% of all air passengers in 1995 compared to just 62.2% in 1973. Part of the explanation for the increased spatial concentration of air passengers in the Carolinas lies with the on-going development of the US Airways 'fortress hub' operation at Charlotte Douglas International Airport, the less permanent American Airlines hub operation at Raleigh-Durham Airport during the early 1990s, and the short-lived low-fare Continental Airlines/CALite hub of the mid-1990s at the Piedmont Triad Airport in Greensboro NC.

Table 1. Air passenger volume at North and South Carolina Airports, 1973-1995

Airport location	Total number of enplaned passenger boardings		
	1973 (%)	1983 (%)	1995 (%)
Charlotte NC	1,105,278 (31.4)	3,763,812 (52.3)	9,588,900 (57.5)
Raleigh-Durham NC	602,869 (17.1)	1,122,732 (15.6)	2,791,046 (16.7)

Greensboro Winston-Salem High Point NC	482,443 (13.7)	727,301 (10.1)	1,615,987 (9.7)
Charleston SC	325,521 (9.2)	407,015 (5.7)	666,365 (4.0)
Greenville-Spartanburg SC	233,641 (6.6)	299,759 (4.2)	551,982 (3.3)
Columbia SC	351,962 (10.0)	377,295 (5.2)	522,875 (3.1)
Myrtle Beach SC	38,126 (1.1)	111,566 (1.5)	379,585 (2.3)
Asheville NC	147,538 (4.2)	138,077 (1.9)	226,178 (1.3)
Wilmington NC	76,045 (2.2)	106,623 (1.5)	174,046 (1.0)
Fayetteville NC	154,451 (4.4)	139,848 (1.9)	155,587 (0.9)
Total	3,517,874	7,194,028	16,672,551
Note: Table includes only those North Carolina airports with more than 100,000 enplanements in 1995.			
Source: Federal Aviation Administration 1973, 1983, 1995.			

Additionally, as the regional economy in the US Carolinas evolved away from its traditional blue-collar manufacturing roots in tobacco, textiles, and furniture to a more diversified economy rooted in hi-tech, financial and medical services, the propensity to fly tended to rise across the board, especially for business travellers. Furthermore, the increased levels of connectivity offered by the major hub operations in the Carolinas significantly affected professional employment levels in these markets. For example, from 1973 to 1995, total employment levels for administrative and auxiliary workers in Mecklenburg, Wake-Durham, and Guilford-Forsyth counties increased from 22,928 to 67,735. More noticeably, as the airline hub operations were fully developed in the Carolinas, these five urban core counties substantially increased their share of professional employment relative to the state as a whole (Table 2). By 1995, the five counties accounted for over two-thirds of all the administrative and auxiliary employees in the state, three-quarters of total payroll, and well over one-half of all administrative and auxiliary establishments. By comparison to 1973 or 1983 levels these were all significant increases in market share over time.

Table 2. Aggregate administrative and auxiliary workers

	1973 (%)	1983 (%)	1995 (%)
<i>A. Mecklenburg, Wake-Durham, and Guilford-Forsyth county totals</i>			

Employees	22,928 (60.2)	47,366 (67.3)	67,325 (69.9)
Payroll (\$1,000)	272,500 (65.2)	656,885 (37.5) <sup>a</sup>	3,158,652 (75.2)
Establishments	206 (39.2)	471 (53.2)	789 (56.4)
<i>B. North Carolina totals</i>			
Employees	38,100	70,369	96,270
Payroll (\$1,000)	417,864	1,753,238	4,199,999
Establishments	526	886	1398

<sup>a</sup> Due to disclosure problems, no payroll figures were published for Forsyth and Durham county.

While the processes of spatial concentration may not have been as dramatic as they were for air passenger volume, it appears that an on-going agglomerative process is at play whereby administrative and auxiliary-related firms are seeking out locations that, amongst other things, offers high levels of air service connectivity. Three sectors in particular appear to be significantly influenced by the logic of agglomeration and these include: manufacturing, services and finance, insurance and real estate (FIRE).

As many manufacturing firms increasingly produce service-related outputs (e.g., financial services, data-processing, accounting, marketing, etc.), the traditional distinctions between goods-producing activities and service-providing activities has tended to blur. These trends are self-evident in North Carolina where nearly one-half of all administrative and auxiliary workers in the state are employed in the manufacturing sector (i.e., 47,046 of 96,270 workers) (Table 3). While many manufacturing firms continue to downsize and relocate routinized manufacturing production processes to lower-wage, peripheral locations, the highly creative and non-standardized higher-order service-related manufacturing activities continue to grow and seek out higher-wage, higher-skill urban labor pools that offer, amongst other things, high levels of air service to a multitude of destinations. For example, for the five urban counties under study in this paper, manufacturing-related administrative and auxiliary workers accounted for over two-thirds of all such workers in the state in 1973. By 1995, these same five counties accounted for 81.2% of all such workers, 87.3% of total payroll, and 61% of all such establishments (up from 37.3% of all establishments in 1973).

Table 3. Manufacturing-related administrative and auxiliary workers

	1973 (%)	1983 (%)	1995 (%)
<i>A. Mecklenburg, Wake-Durham, and Guilford-Forsyth county totals</i>			
Employees	18,070 (69.8)	25,282 (70.4)	38,221 (81.2)
Payroll (\$1,000)	227,284 (74.4)	405,453 (37.3) <sup>a</sup>	2,188,291 (87.3)
Establishments	99 (37.3)	127 (53.8)	235 (61.0)
<i>B. North Carolina totals</i>			
Employees	25,894	35,891	47,046
Payroll (\$1,000)	305,552	1,087,289	2,506,987
Establishments	265	236	385

a Due to disclosure problems, no payroll figures were published for Wake-Durham and Forsyth county.

Similar processes of agglomeration and spatial concentration seem to have played out in the service sector where nearly three-quarters of all service-related administrative and auxiliary workers in the state in 1995 are found in either Mecklenburg, Wake-Durham, or Guilford-Forsyth (Table 4). Since 1973, the proportion of service-related administrative and auxiliary workers in these counties has dramatically increased relative to the state as a whole. Both the proportion of payroll and the number of establishments attributable to this sector of the economy have also experienced comparable changes in market share.

Table 4. Services-related administrative and auxiliary workers

	1973 (%)	1983 (%)	1995 (%)
<i>A. Mecklenburg, Wake-Durham, and Guilford-Forsyth county totals</i>			
Employees	— (—)	2,279 (70.9)	7,974 (73.6)
Payroll (\$1,000)	— (—)	35,636 (63.1)	300,874 (79.7)
Establishments	— (—)	72 (54.0)	160 (71.4)
<i>B. North Carolina totals</i>			
Employees	638	3,215	10,839

Payroll (\$1,000)	4,684	56,461	377,491
Establishments	37	133	224

The strength of the North Carolina banking industry (e.g., the First Union and Bank of America headquarters in Charlotte and the Wachovia Bank and BB & T offices in Winston-Salem) may partly explain the significant geographic concentration of FIRE-related administrative and auxiliary workers. For example, in 1995, Mecklenburg County (Charlotte) alone accounted for 36% of all such jobs in the state, and collectively the five urban core counties under study accounted for approximately 90% of all such workers in the state.

Although many different factors contribute to this sort of urban-economic restructuring over time, it does appear that the changing role of administrative and auxiliary workers in the Carolina economy is working in tandem with the evolving air markets in Charlotte, the Triangle, and the Triad. We now turn to a closer inspection of each of these respective markets.

### 5.1. Charlotte and US airways

One of the primary beneficiaries of the post-deregulation era was Piedmont Airlines/US Airways and the Charlotte-Douglas Airport (Fig. 1). Through much of the 1970s, Charlotte maintained a steady market share of just over 30% of all passenger boardings in the Carolinas. Operations at the Charlotte Airport were radically influenced by the passage of the 1978 Airline Deregulation Act (ADA), such that by 1983, over half of all passenger boardings in the Carolinas occurred at Charlotte. By removing the regulatory constraints on pricing and route allocations, the ADA freed up new entrant Piedmont Airlines to effectively compete and hub out of the Charlotte Airport. Piedmont's airline-specific market share at Charlotte increased in just five years, from 10% (or 141, 089 passengers) in 1978 to a startling 72% market share (or 2.7 million) in 1983. Since 1983, Charlotte has continued to experience rapid absolute growth rates (from 3.8 million in 1983 to 9.6 million in 1995) to the point where Charlotte Douglas Airport accounted for nearly 60% of all Carolina boardings. By 1994, the city of Charlotte was so dependent on US Airways (which acquired Piedmont Airlines in 1988) that nine out of every 10 passengers flying into and out of Charlotte used US Airways. Much of the logic for this type of increased spatial concentration in passenger boardings can be explained by the emergence of the hub and spoke route network that evolved during the post-deregulation era. Under the hub and spoke system, an airline develops a feeder flight system (or spokes) from outlying cities that focus on a central hub. At the hub, passengers are transferred to other flights on the same airline and redirected to their ultimate destination. The hubbing airline then benefits from network-based externalities and

economies of scope, and minimizes the competitive challenge by controlling most of the landing slots and gates.

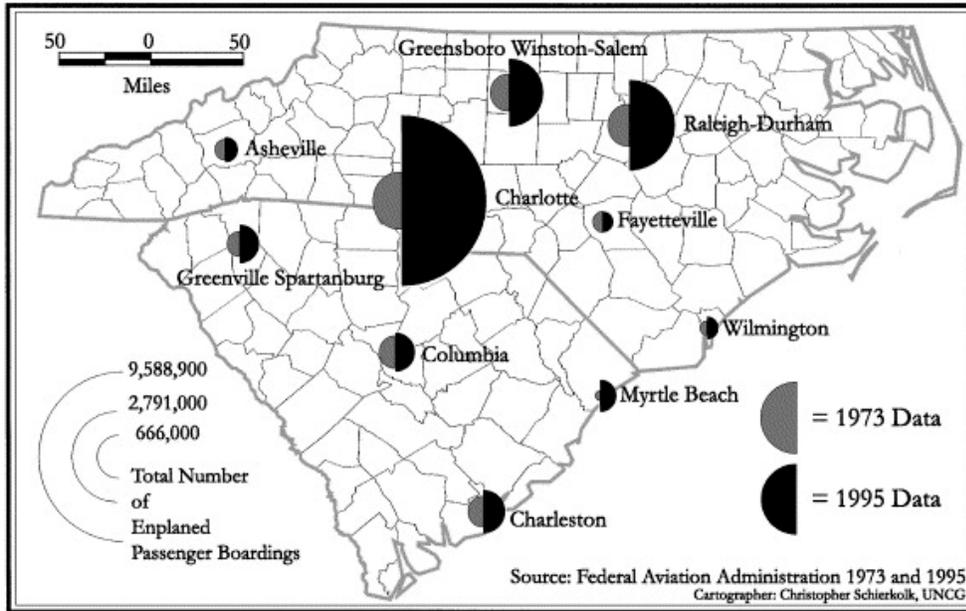


Fig. 1. Spatial variation in enplaned passenger boardings in the US Carolinas: 1973–1995.

In studying administrative and auxiliary workers by metropolitan area, Ivy et al. (1995, p. 173) found that “Charlotte experienced phenomenal growth in professional employment, air service connectivity and passenger enplanements” from 1978 to 1988. However, manufacturing-related administrative and auxiliary employment in Mecklenburg County actually declined from 1973 to 1983 from 3461 to 2869 workers even though air passenger volume at Charlotte Airport almost quadrupled and Piedmont Airlines went from serving 141,089 passengers to 2.7 million. By contrast, employment in manufacturing-related administrative and auxiliary establishments almost doubled to 5360 workers from 1983 to 1995 during the period when US Airways developed its fortress hub operation at Charlotte Douglas Airport. Air passenger volume during this time period increased from 3.8 million to 9.6 million passengers.

It is clear from these contradictory findings that the development of a major hub airport operation is not always a panacea in terms of its affect on employment levels. In Charlotte this may be particularly true since the level of airline connectivity is not always an accurate indicator of community needs. Only around 20% of all traffic through the Charlotte hub originates in Charlotte because approximately 80% of all passengers use Charlotte merely as a connecting point to other destinations. Consequently, it remains unclear if increases in air service connectivity can fully explain the cycles of growth and decline in manufacturing-related administrative and auxiliary employment levels.

These findings are significant given the recent happenings at Charlotte Douglas Airport. Although US Airways offers an extensive network of almost 500 daily departures to over 100 cities from Charlotte and is widely considered to be a major asset in attracting new producer service companies to the metro area, recent studies have indicated that significant barriers to entry exist at the airport (US General Accounting Office, 1996 and US General Accounting Office, 1999). The US GAO (1996) argued that the long-term, exclusive-use gate leases at Charlotte are a major barrier to entry because US Airways controlled 34 of the 48 jet gates. Additionally, the GAO indicated that Charlotte passengers pay 88% more in air fares than passengers in a sample group of 33 major airports. High fares and an inability to attract competitive new entrants may ultimately hinder Charlotte's ability to attract higher-wage professional employment over the next few years.

Another troubling sign for Charlotte is that the merger of Piedmont with US Airways in 1988 has not been completely successful. US Airways had annual earnings losses totalling over \$3 billion from 1988 to 1994, during which time the airline did not make a quarterly profit (excluding one-time gains). US Airways also has some of the highest cost structures in the industry and is generally considered to fit Porter's 'stuck-in-the-middle' conceptualization implying that the airline has struggled to develop a corporate strategy that would allow the carrier to maintain a sustainable competitive advantage. One way US Airways has sought to sustain a competitive edge has been to construct a fortress hub at Charlotte (i.e., Porter's geographic focus strategy), but that has, in effect, provided the carrier with a geographic monopoly power that is inherently anti-competitive. The implications for the Charlotte economy are profound given the heavy dependence on the US Airways route network at Charlotte-Douglas Airport.

## 5.2. Raleigh-Durham and American airlines

In the late 1980s, the most profound structural changes in the Carolina air industry seemed to be focused on events at the Raleigh-Durham Airport (RDU) as American Airlines attempted to establish what became an "ill-fated" mini-hub to supplement and complement the air carrier's major hub operation at Dallas-Fort Worth. The new RDU hub was established to channel north-south traffic along the eastern seaboard. Through the late 1980s, RDU had been a highly competitive airport with no clear product leader, but by 1988, American controlled 70% of the passenger market. American opened its hub at RDU in 1987, and rapidly increased daily jet departures to over 100 flights by the early 1990s. As a consequence of this sort of competitive restructuring, RDU increased its share of Carolina boardings from 15.6% (or 1.1 million passengers) in 1983 to 28.1% (or 4.4 million) in 1992. By 1992, American controlled 82% of the passenger market at RDU.

One of the consequences of this rapid growth in airline service at Raleigh-Durham Airport has been the elevated significance of the manufacturing-related administrative and auxiliary sector in the Triangle metro economy. For Wake-Durham counties, overall employment levels for this sector increased from 1242 (or 4.8% of such workers statewide) in 1973 to 3925 (10.5%) in 1983 and 11,121 (23.6%) workers in 1995. The hi-tech industry and the related companies of the Research Triangle Park area of Raleigh-Durham also appear to have matured in tandem with growth at the airport. From 1983 to 1995, the computer/data processing industry (SIC 737) in Wake County alone increased employment levels from 1416 to 5417 while payroll increased from \$26 million to \$272 million, and the number of establishments increased from 70 to 384 firms.

Part of the explanation for much of the economic restructuring in the Raleigh-Durham market lay with the attractiveness of American Airlines to producer service firms that required high levels of connectivity to other places in order to remain competitive. Under Porter's (1980, 1985) competitive advantage framework, American Airlines had developed a differentiation strategy founded on the 'we fly anywhere you want to go' model where the carrier attempted to provide significant amenities beyond basic flight service. The development of the Raleigh-Durham 'mini-hub' complemented this competitive strategy and elevated Raleigh-Durham in the hierarchy of places where corporations could effectively compete for business. The construction of the \$60 million, 26 gate American Airlines terminal building at RDU Airport in 1987 solidified these locational advantages.

However, the hub operation was never profitable. The recession of the early 1990s, plus the advent of low-fare competition on the eastern seaboard, reduced forecasted passenger traffic levels resulting in company-wide losses of nearly \$1 billion for American. These losses occurred just as American was beginning to develop the RDU hub. By early 1995, American had closed all commuter flight service and reduced daily departures to just 35 at RDU as part of a company-wide cost-savings scheme. By the end of 1995, RDU accounted for only 16.7% of all Carolina boardings and generated only 2.8 million enplanements (compared to 28.1% and 4.4 million enplanements in 1992).

However, in part, because of the significant changes in the Raleigh-Durham economy, it was only a matter of time before a competitor filled the vacuum left by American Airlines. In 1995, Midway Airlines relocated its head offices from Chicago to Raleigh and began offering 65 daily departures out of Raleigh-Durham Airport. Midway Airlines had already sought bankruptcy

protection twice in the 1990s, and the long-term financial prognosis for the carrier remained unclear. Despite this, by 1999, the Raleigh-Durham Airport had fully rebounded from the loss of the American Airlines hub offering a total of 244 daily departures, one more than the previous peak in 1992, when American Airlines was dominant. Newer airlines in the RDU market included Delta, United, Continental, Northwest, US Airways Metrojet and Southwest Airlines which began offering 12 daily departures in mid-1999.

### 5.3. Greensboro, Winston-Salem and Continental airlines

The Piedmont Triad Airport near Greensboro languished throughout the study period, and was largely eclipsed by the major hub operations in Charlotte and Raleigh-Durham. From 1973 to 1992, the Piedmont Triad Airport's market share of total passenger boardings in the Carolinas declined precipitously from 13.7% (482,443 passengers) to a mere 5.4% (or 848,948 passengers) of the market even though the absolute number of passengers served doubled.

By the mid-1990s, however, it seemed to be the Triad Airport's turn to be a focal point of competitive turbulence in the Carolinas to the point that Aviation Systems Research Corporation (1994) predicted that the Piedmont Triad Airport would emerge as the fastest growing airport in the country from 1993 to 1998. In 1994, air traffic totalled almost 2 million boardings which was more than double the previous year's total. By the end of 1995, the airport generated 1.6 million enplanements or 9.7% of all Carolina boardings (up from 5.4% in 1992).

During the 1980s, the dominant carrier at the airport was Piedmont/US Airways, but much of the mid-1990s growth can be attributed to the rapid development of Continental Airlines so-called CALite system. CALite was modeled on the low-fare, quick-turnaround, short-hop service offered by Southwest Airlines, the country's only consistently profitable carrier. The CALite experiment was an attempt by Continental Airlines to develop a 'carrier within a carrier' strategy focused on Porter's (1980, 1985) cost leadership strategy approach where an emphasis was placed on being the lowest-cost producer in the industry.

However, the CALite system was not entirely successful. In 1995, Continental discontinued the CALite experiment and transformed its Triad operations into a more traditional major hub operation with more than 100 daily jet departures primarily transferring passengers between the Northeast and Florida. Despite all the growth at the Piedmont Triad Airport, Continental announced plans to further cutback the workforce in late 1995 as the airline struggled to return to

profitability after emerging from its second bankruptcy in 1993. By 1996, Continental Airlines had abandoned the Greensboro hub and air traffic at the Triad Airport dropped-off substantially.

The episodic growth rates in air passenger volume at the Piedmont Triad Airport are reflected in an economy that has tended to stagnate through the 1980s and 1990s. From 1973 to 1995, the number of manufacturing-related administrative and auxiliary workers in Guilford County has consistently hovered around 10,000 workers (e.g., 1973 — 9947, 1985 — 10,988, 1995 — 9626). By contrast, both the Charlotte and Raleigh-Durham local economies have experienced significant growth rates for the same time period.

However, in 1998, Federal Express announced plans to build a \$300 million air cargo hub that is expected to generate 1500 jobs on-site and offer over 20 daily departures by 2005. The implications for the Triad's regional economy may be profound, particularly if plans to build a major European transshipment point are realized. The Triad may begin to attract additional high value-added revenue industries that focus on the shipment of high-value, low-weight products (e.g., electronics, computer components, pharmaceutical products, medical diagnostics).

#### 5.4. The other Carolina airports

Throughout the Carolinas, the overall trend for the smaller airports was a reduced share of the Carolina air passenger market as the major hubs at Charlotte and RDU attracted a disproportionate level of traffic. In particular, the four South Carolina airports included in this study experienced a substantial decline in air passenger market share declining from 26.9% of all Carolina boardings in 1973 to 13.7% in 1995. Much of this decline can be attributed to the “traffic shadow” cast by the Delta hub in Atlanta and the US Airways hub in Charlotte. Delta Airlines has a substantial history as the lead carrier in Columbia and Charleston, while US Airways replaced the now defunct Eastern as the dominant carrier at Greenville-Spartanburg (although Delta is also a significant competitor). As a result, the South Carolina airports tended to function merely as spoke end-points of Delta's and US Airways's hub and spoke systems.

The concern about poor air service prompted the state of South Carolina to partially fund a new start-up airline in 1994 (i.e., Air South) to jumpstart traffic at Columbia — the state's capital. Air South's principal funding sources included a \$10 million credit line from the state of South Carolina and \$3 million in grants from both Richland and Lexington counties. Within five months of its launch, Air South had exhausted its public funds and passenger load factors averaged between 32 and 36%. With losses averaging \$1 million a month, Air South began to

develop intra-Florida jet service in 1995, leaving the state of South Carolina with a publicly funded airline that operated 60% of its flights in another state. By late 1997, Air South had filed for Chapter 11 bankruptcy protection with at least \$67.4 million in liabilities. The Air South experience highlights the perils of public intervention in a sector of the economy as turbulent and competitive as the airline industry.

One exception to the trend in South Carolina was the Myrtle Beach Airport which experienced substantial increases in the absolute number of boardings (e.g., from a mere 38,126 in 1973 to over one-third million in 1995). As the tourist resort function of the region has become a more vital part of the economy, the Myrtle Beach Airport has succeeded in attracting a larger share of the travel market, and it increased its market share of the Carolina air passenger market from 1.1% of all Carolina boardings in 1973 to 2.3% in 1995. The only other airport that increased market share from 1973 to 1995 was Charlotte Douglas Airport. According to Airports Council International (The Sun News, 1996), Myrtle Beach International Airport was the nation's third-fastest growing airport in 1995. Much of that growth was attributable to Myrtle Beach Jet Express which carried 30% of all passengers in 1995, although US Airways remained the dominant carrier with 47.5% of the market. A recent GAO study (1999) indicated that average air fares at Myrtle Beach Airport have declined 10.5% since 1994, in part, due to its status as a vacation destination with low-fare competition. The GAO report also indicated that fares at the other large South Carolina airports all increased significantly since 1994.

Finally, the smaller airports in North Carolina — Asheville, Fayetteville, and Wilmington — have all essentially functioned as spoke end-points of the US Airways system, and all three airports have been dominated by Piedmont/US Airways throughout the study period. These same airports have all experienced significant declines in market share, much like their counterparts in South Carolina (with the exception of the Myrtle Beach Airport).

## 6. Conclusion

The underlying theoretical agenda of this paper has been to articulate the interconnections between the competitive strategies of the airline industry and airport operations with urban-economic change in the local economy. The local economic structure of the counties that played host to the largest and most competitive airports in the US Carolinas experienced changes in the industrial mix that are consistent with the extant literature on economic development and airport operations. Although it is more difficult to generalize on issues of causality, those places that experienced significant gains in air passenger volume and air service connectivity also

experienced comparable gains in the employment levels of administrative and auxiliary workers, particularly in the manufacturing sector.

Furthermore, the shifts in competitive advantage over time in the US Carolinas also appeared consistent with national trends. The early 1980s saw the emergence of major “fortress hubs” including the Piedmont/US Airways operation at Charlotte. By the late 1980s, the most radical changes included the development of “mini hubs” to supplement traffic including the American operation at RDU. In the 1990s, the airline industry was experimenting with the “airline within an airline” concept, e.g., the CALite experiment at the Piedmont Triad Airport.

Future research questions must include a more detailed investigation of the local economy of regions with comparable airport operations, particularly in markets with significant barriers to entry with respect to landing slots and gates. An improved understanding of the airline-airport-local economy dynamic can provide a valuable perspective, especially for policy-makers contemplating re-regulating select portions of the airline industry and for economic developers looking for locations that offer a significant competitive advantage.

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