Hubs and Routes Since Deregulation: How Did We Get from There to Here?

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The current debate about airline competition, fortress hubs, and the barriers to new entry centers around a small group of large airlines which control a large share of traffic at major hub airports.

To understand the current market structure of the industry, it helps to focus on similarities and differences in the structure of routes and hubs today in contrast with 1978, the last year before airline deregulation.

- Slaying the myth that deregulation created the hub-and-spoke route structure.

- Are the hub airports the same as in 1978? Is every large metro area "in the middle" a hub? Which hubs are unusually large and small in relation to population and geography?

- Why does a particular airline dominate a particular airport?

- Is this all just "deja vu"? Are the dominant carriers today the same carriers that were the largest at a given hub airport in 1978?

    - If so, what dimension of "bigness" matters? Which large carriers survived and why?

    - Today's dominant carriers in the context of the 1934 post office route awards

- But it's not all the same: what are the surprises?

    - What did experts predict in 1978 would be the outcome of deregulation? New entry, the PSA/Southwest intrastate model

    - What happened to Braniff, Pan Am, TWA, Eastern?

    - New names on the list of major carriers:
      US Airways, Southwest, America West, Alaska

    - What the experts missed

Introducing the Cast of Characters . . .

- **Who Rose, Fell, Appeared, and Disappeared**
- **Is the Industry More Concentrated?**

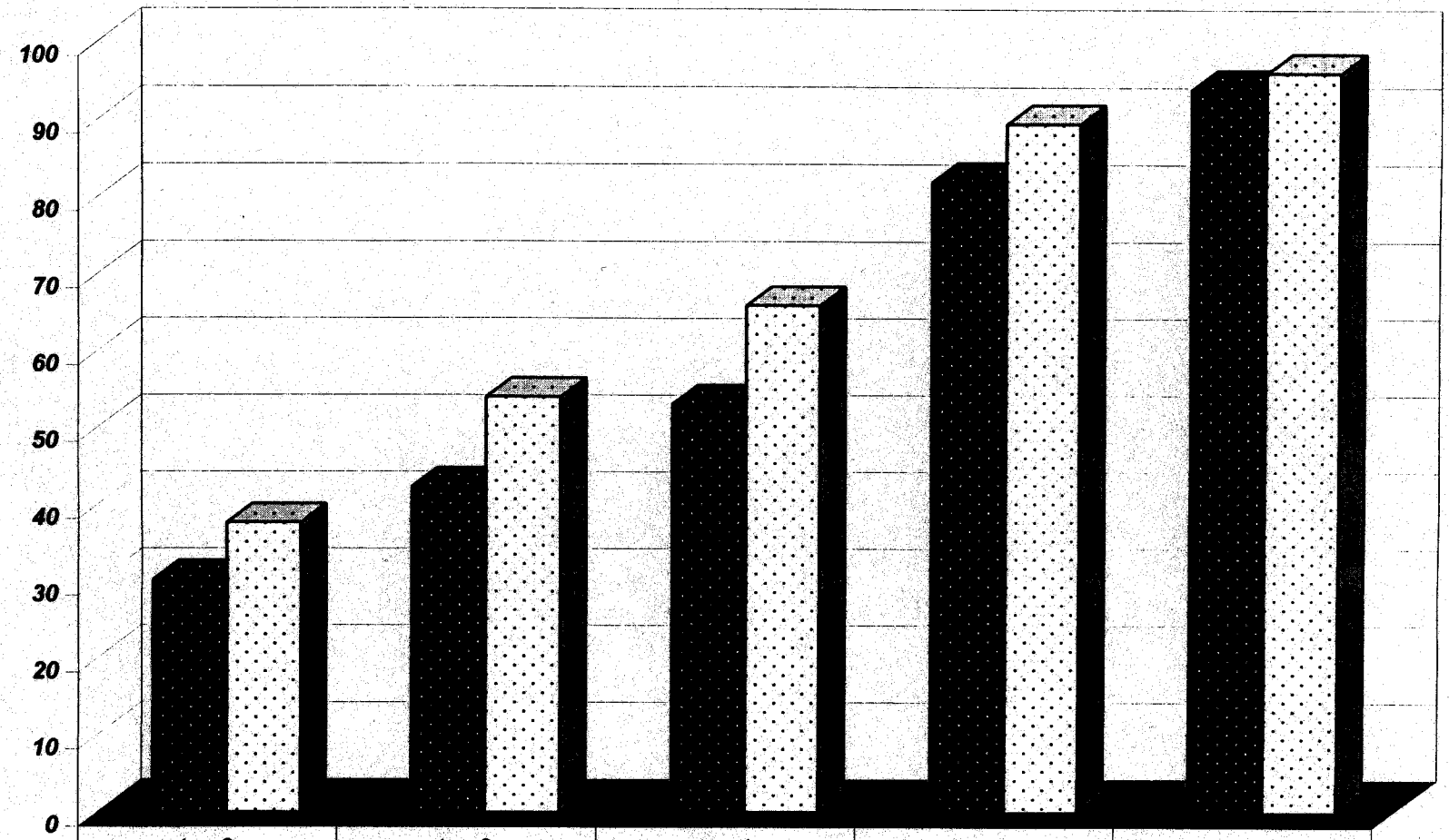
  Yes, but Make One Adjustment (allocate PA to UA and DL)

  and the answer is no!

1978 Airlines	RPM	MS	CMS	1997 Airlines	RPM	MS	CMS
United	41.4	17.7	17.7	United	121.3	20.0	20.0
American	29.4	12.6	30.3	American	107.0	17.7	37.7
TWA	28.3	12.1	42.4	Delta	99.7	16.5	54.1
Eastern	25.3	10.8	53.2	Northwest	72.0	11.9	66.0
Pan American	23.8	10.2	63.4	Continental	47.9	7.9	73.9
Delta	23.5	10.1	73.5	US Airways	41.6	6.9	80.8
Western	10.7	4.6	78.1	Southwest	28.4	4.7	85.5
Braniff	9.4	4.0	82.1	TWA	25.1	4.1	89.6
Continental	8.8	3.8	85.9	America West	16.2	2.7	92.3
National	7.8	3.3	89.2	Alaska	10.3	1.7	94.0
Northwest*	7.2	3.1	92.3	ATA	9.0	1.5	95.5
Allegheny	4.2	1.8	94.1	Hawaiian	4.2	0.7	96.2
Air West	2.7	1.2	95.2	Tower	3.6	0.6	96.8
Frontier	2.4	1.0	96.3	Reno	3.1	0.5	97.3
North Central	1.9	0.8	97.1	AirTran	2.4	0.4	97.7
Texas Intl	1.7	0.7	97.8	Western Pacific	2.0	0.3	98.0
Ozark	1.6	0.7	98.5	Comair	1.8	0.3	98.3
Piedmont	1.5	0.6	99.1	Mesa	1.4	0.2	98.5
Alaska	0.8	0.3	99.5	Simmons	1.3	0.2	98.7
Hawaiian	0.5	0.2	99.7	Frontier	1.0	0.2	98.9
Aloha	0.4	0.2	99.8	ASA	0.9	0.1	99.1
Wien Alaska	0.2	0.1	99.9	Horizon	0.9	0.1	99.2
Reeve Aleutian	0.1	0.0	100.0	Vanguard	0.8	0.1	99.3
				Sky West	0.7	0.1	99.4
				Mesa	0.7	0.1	99.6
				Air Wisconsin	0.6	0.1	99.7
				Flagship	0.6	0.1	99.8
				ACA	0.4	0.1	99.8
				Wings West	0.4	0.1	99.8
				Executive	0.2	0.0	99.9
				Great Lakes	0.2	0.0	99.9
				CC Air	0.1	0.0	100.0

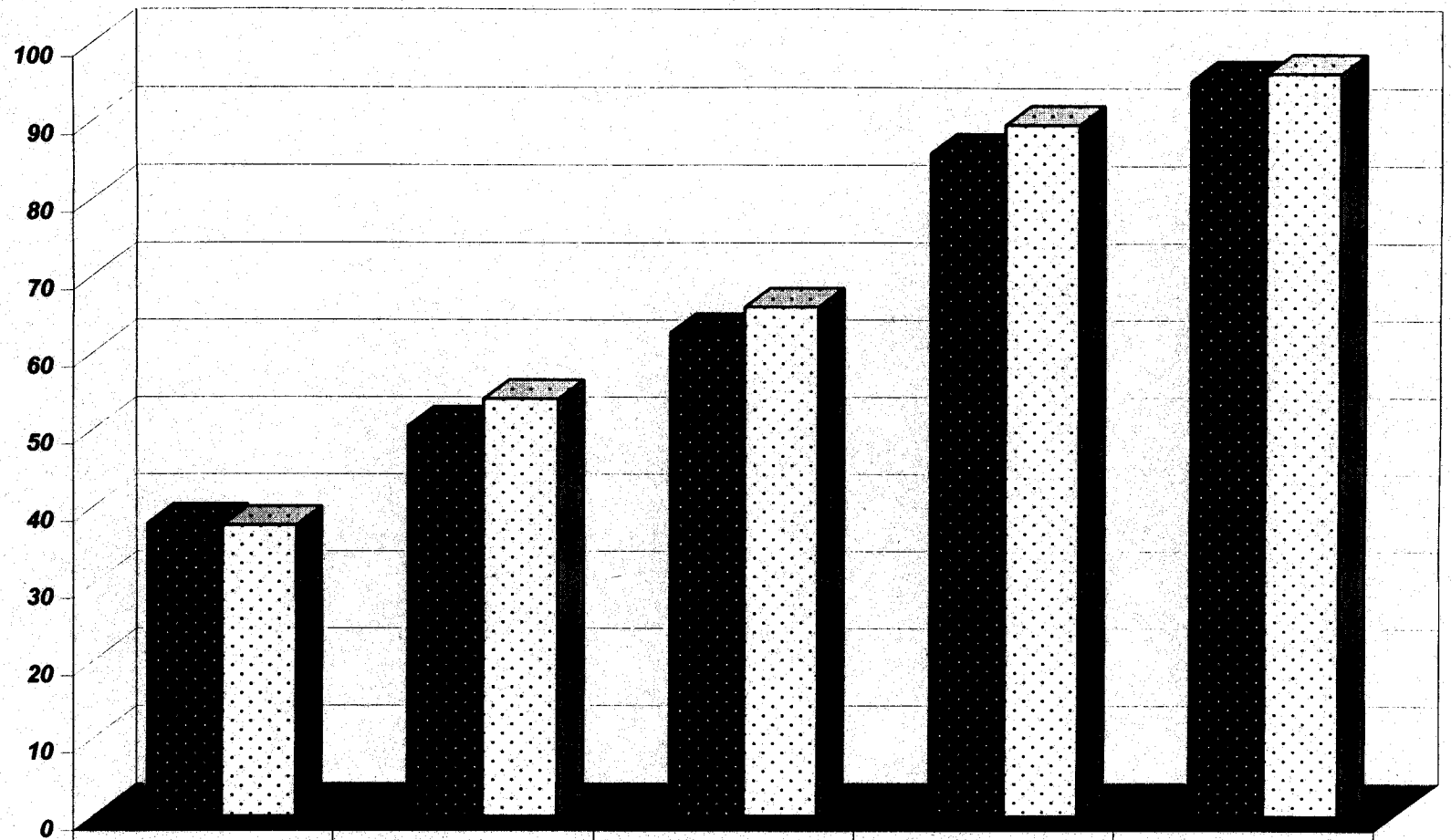
*Note: Traffic of Northwest Airlines was severely affected by a prolonged 1978 strike and fell 30 percent from the 1977 level

Market Shares: 1978 vs 1998



	top 2	top 3	top 4	top 8	top 12
Market Share 1978	30.3	42.4	53.2	82.1	94.1
Market Share 1998	37.7	54.1	66	89.6	96.2

Market Shares: 1978 vs 1998 (PanAm adjustment)



	top 2	top 3	top 4	top 8	top 12
Market Share 1978	38	50.6	62.7	85.9	95.3
Market Share 1998	37.7	54.1	66	89.6	96.2

Slaying the Deregulation Myth . . .

- **The Myth: Deregulation replaced linear nonstop routes by a hub and spoke system with**
  - **Dominance by One Carrier**
  - **Many More Passengers Forced to Connect**
  - **Circuitous Routings mean Longer Travel Times**
  - **Many Small Towns have Worse Service**

- Slaying the Myth

  - There were at least nine interior hubs in 1978, of which seven had one airline with at least 100 departures daily

  - These dominant carriers had hubs with missing spokes, due to regulation

  - Deregulation allowed the missing spokes to be filled in quickly, within five years

  - On a route-by-route basis (origin-destination) the number of effective competitors has risen

  - Many More Nonstop Routes Have Been Added than Dropped

  - New Hubs: People Actually Live There

  - Southwest has added many new point-to-point routes

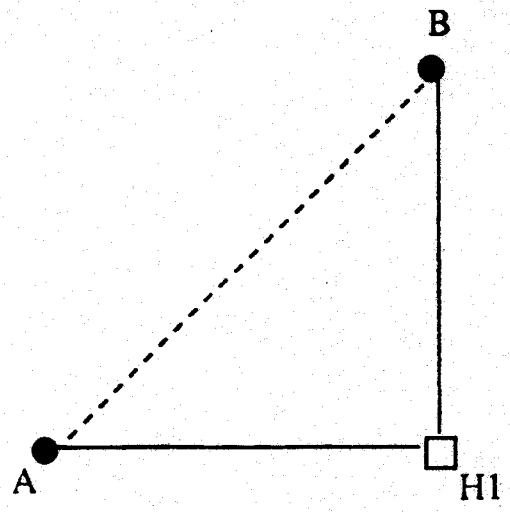
  - Small Towns Have Much Better, More Frequent Service

  - Interline Connections have Disappeared

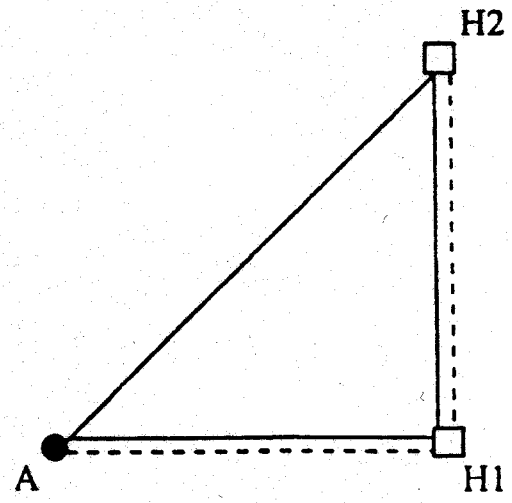
  - Many Connections are Voluntary

    - Secondary Airports (OAK, SJC, BUR, ONT, SNA, HPN, ISP, SWF) instead of everyone flying JFK-SFO/LAX

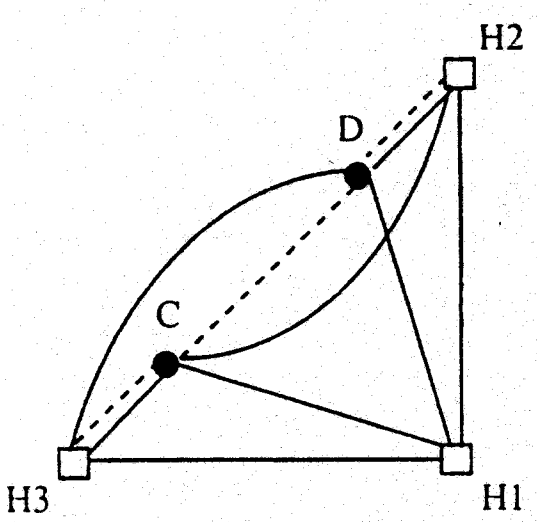
    - Frequent Flyer Loyalty



Standard Model



New Model: Large Cities



New Model: Small Cities

KEY:

--------- Pre-deregulation

———— Post-deregulation

Table 10.7 **Effect of Deregulation on Nonstop Domestic Air Service, Top 500 Origin-Destination Markets, August 1978 and August 1989**

	1978		1989	
	Routes	Flights	Routes	Flights
Flown both years:				
Hub to hub[a]	71	. . .	116	. . .
Hub to nonhub	187	. . .	171	. . .
Nonhub to nonhub	71	. . .	42	. . .
Total	329	. . .	329	. . .
Flown one year, not the other:				
Hub to hub	1	1	6	16
Hub to nonhub	11	19	47	123
Nonhub to nonhub	5	6	8	16
Total	17	26	61	155
Flown neither year:	93	. . .	93	. . .

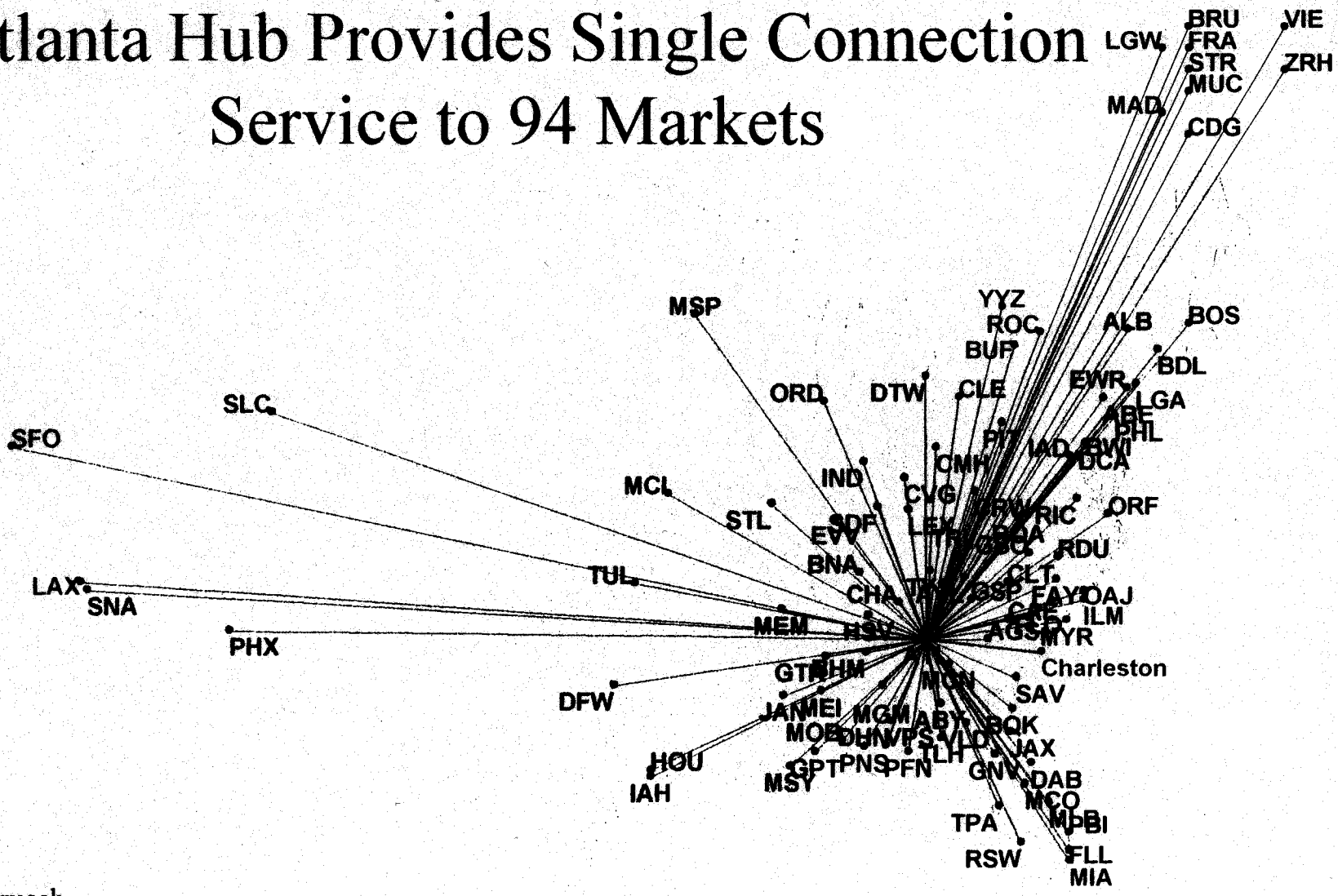
Source: Official Airline Guide, North American Edition, August 1, 1978, and August 1, 1989.

Note: The 500 top markets are ranked by revenue passenger miles, from Department of Transportation origin and destination survey, table 7, for the 12 months ending December 30, 1986.

[a]The hub airports include both the original hubs and new hubs. See the listing of hubs in the notes to table 10.8.

Delta Air Lines

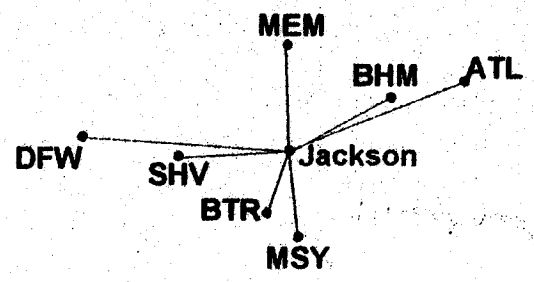
Leaving at 4:00PM from Charleston, the Atlanta Hub Provides Single Connection Service to 94 Markets



Mark Drusch
Marketing Development

Delta Air Lines

Jackson Non-Stop Service 1981



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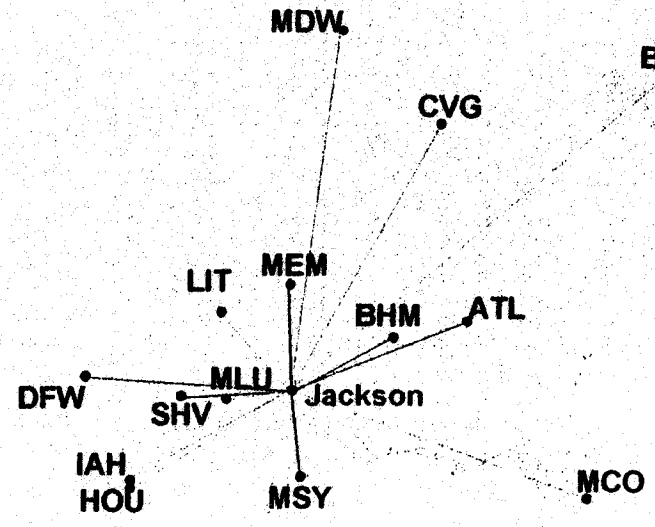
Marketing Development

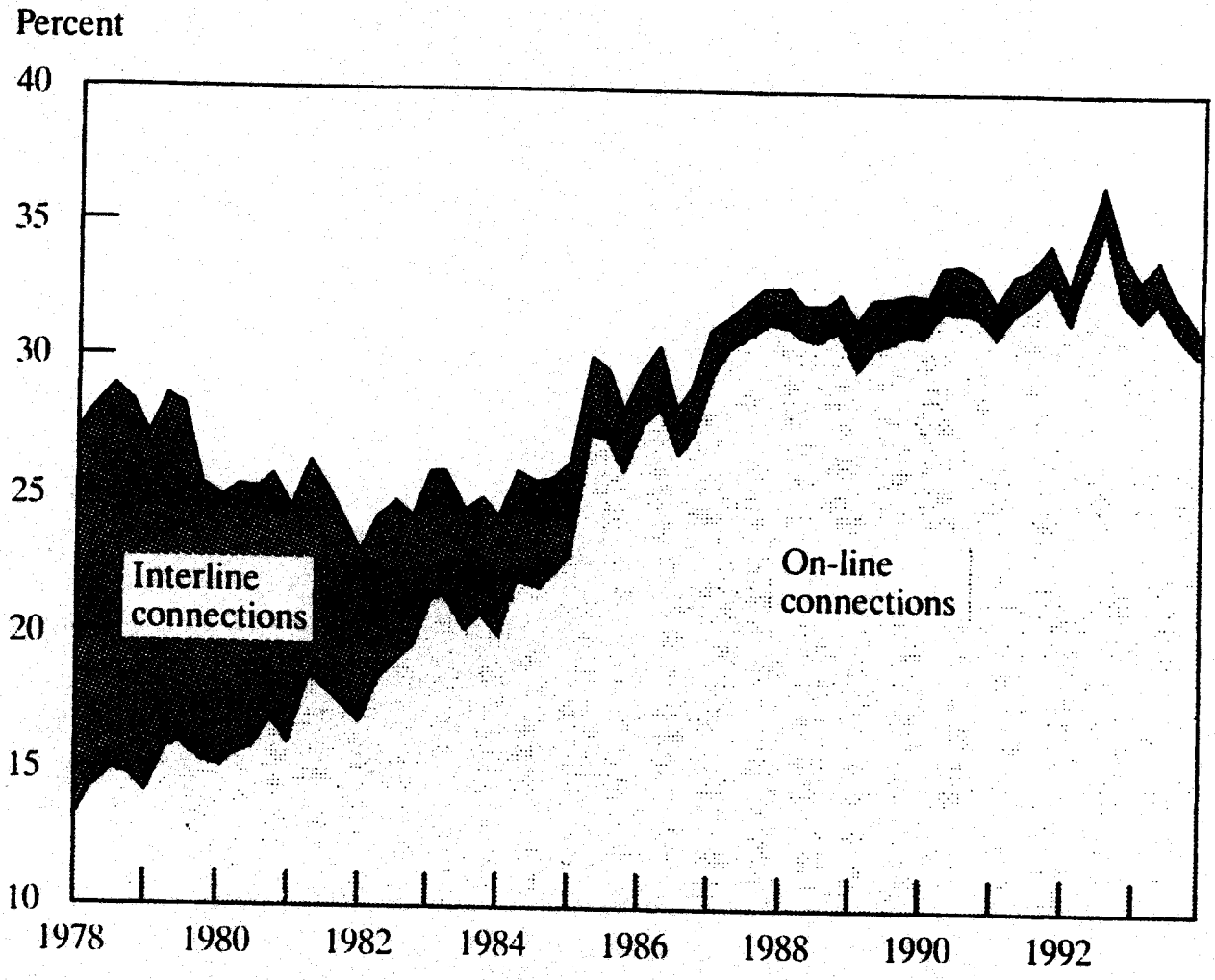
Delta Air Lines

Jackson Non-Stop Service 1998



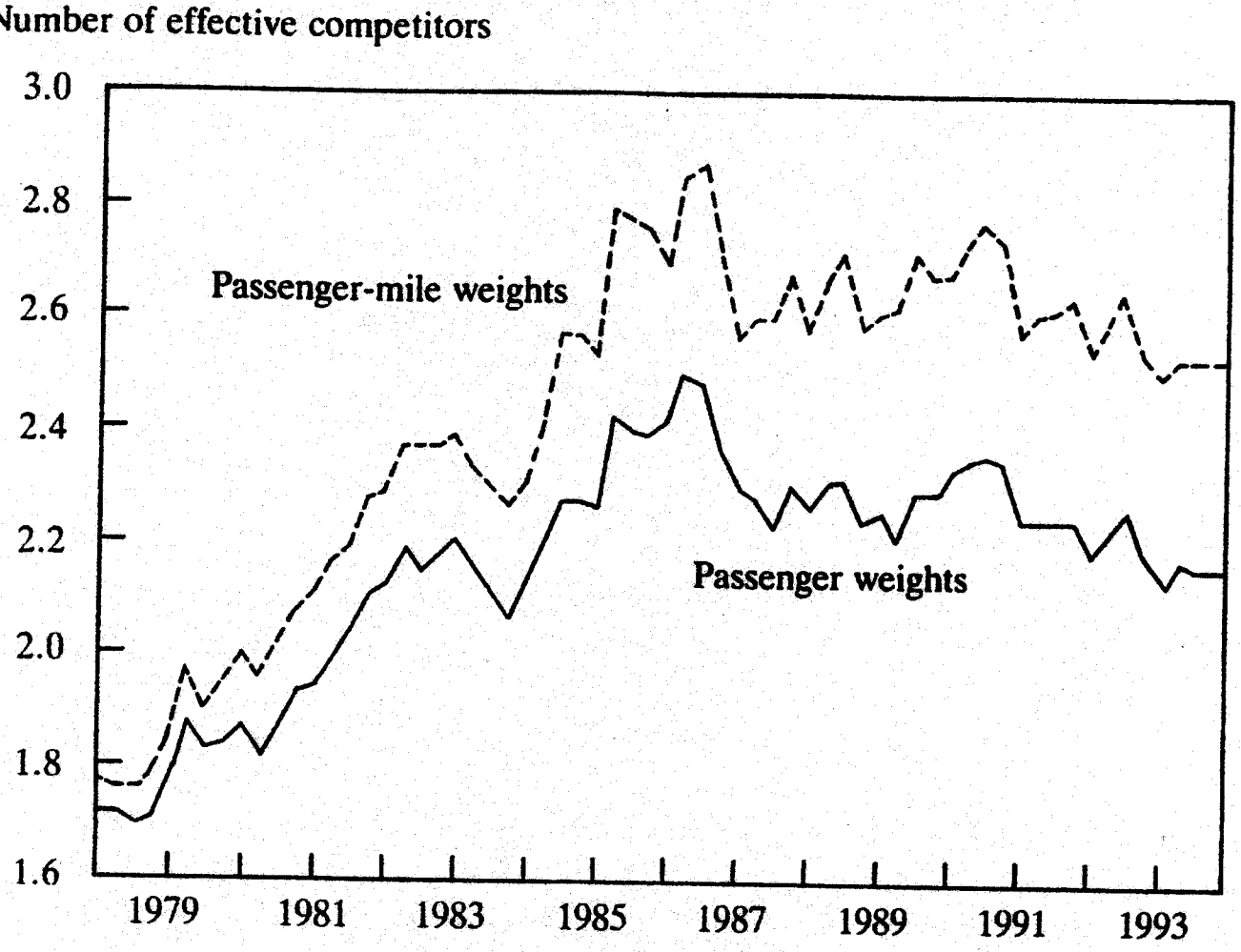
Mark Drusch
Marketing Development

Figure 2-9. *Share of All Passengers on Domestic Flights Who Needed to Make Connecting Flights, 1978–93*



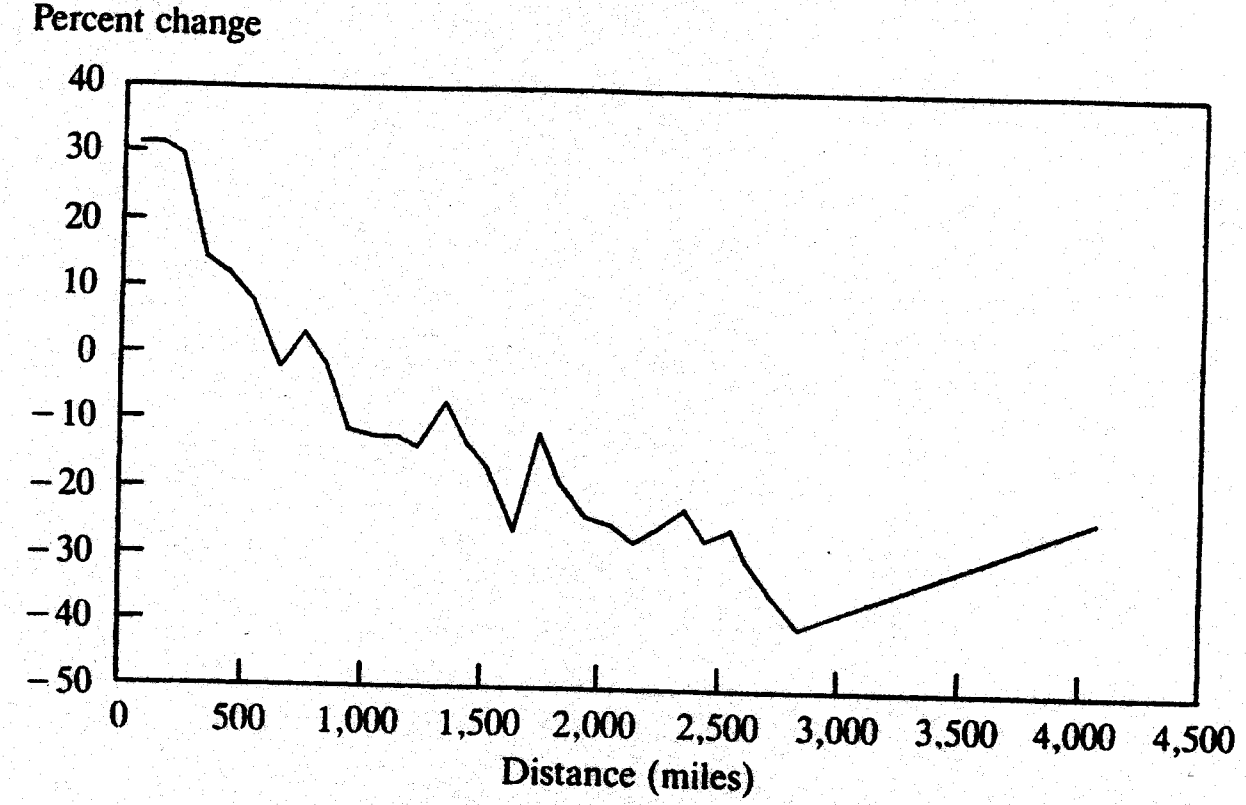
Sources: Percentage and composition of connecting passengers was calculated from a subsample of domestic trips in the Department of Transportation's 10 percent sample of airline tickets (Data Bank 1A). This subsample consisted of one-way tickets with two or fewer segments and round-trip tickets with two or fewer segments on the outbound and return legs.

Figure 2-2. *Airline Industry Effective Competitors, Route Level, 1978–93*



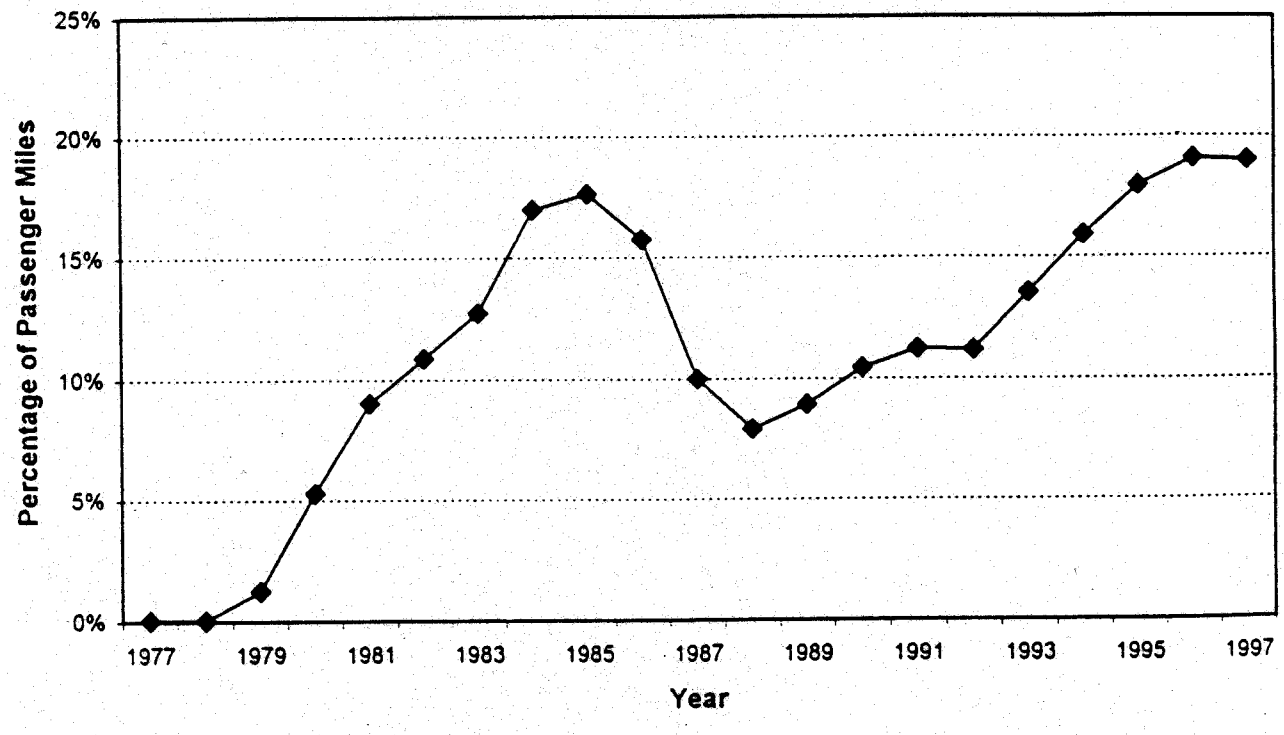
Sources: Authors' calculations using Department of Transportation Data Bank 1A. Each airline's share of passengers on each domestic route was calculated from a subsample of one-way tickets with two or fewer segments and round-trip tickets with two or fewer segments on the outbound and return legs. These route-level measures were aggregated across routes based on the percentage of sampled passengers and passenger miles on each route.

Figure 2-7. *Change in Domestic Air Fares, by Route Distance, Fourth Quarter 1978 to Fourth Quarter 1993*



Sources: Yield in each period (for 100-mile bands) was calculated from a subsample of the Department of Transportation's 10 percent sample of airline tickets (Data Bank 1A). This subsample was all domestic round-trip tickets with two or fewer segments outbound and two or fewer segments return. To correct for possible coding errors in the data airlines submitted, a fare screen was used to screen out tickets with fares that seemed unreasonably high or low. Fares were adjusted for inflation using the consumer price index.

Figure 1
Percentage of Domestic Passenger Miles
Provided by Post-Deregulation New Entrants



Source: Author's calculations using data in U.S. Department of Transportation, Data Bank 1A. (Data for 1997 are from 1996:4-1997:3.)

Which Airlines Became Dominant in the Hubs and Why?

- The post-1934 route structure
  - Transcontinental:

    Northwest went north to Seattle through Detroit and Minneapolis

    United went straight to SFO through Chicago and Denver

    TWA went southwest to LAX through St. Louis and Kansas City

    American went further southwest to LAX through Dallas

  - The East

    Delta went SW from Boston to Texas and SE from Chicago to Florida, all converging on Atlanta

    Eastern largely overlapped Delta, also converging on Atlanta

    By 1978 Allegheny had built a dense network around Pittsburgh

  - The West

    United flew from Vancouver to San Diego, stopping at every Podunk junction along the way, with San Francisco in the middle

- This simple 1934-based story explains the dominant carrier in each of the "original hubs"

The starting line for deregulation: today's hubs back then

Airport	Passengers		Largest Carrier (Daily Departures)		Passenger Growth (%)
	1978	1998	1978	1998	1978-98
Original Hubs					
Chicago O'Hare	24.6	30.4	UA(232)	UA(405)	24
Atlanta	20.1	34.2	DL(279)	DL(605)	71
San Francisco	11.5	16.2	UA(124)	UA(242)	41
Dallas-Ft. Worth	10.0	27.4	BN(160)	AA(498)	175
Denver	9.5	16.6	UA(103)	UA(285)	76
Detroit	5.0	14.6	NC(64)	NW(322)	191
Pittsburgh	4.8	9.8	US(145)	US(271)	102
Minneapolis	4.4	13.4	NW(72)	NW(300)	206
St. Louis	4.1	13.8	TW(114)	TW(336)	234
New Hubs					
Houston	4.9	13.4	BN(34)	CO(318)	174
Philadelphia	4.8	10.8	US(51)	US(222)	127
Newark	4.3	13.8	EA(57)	CO(227)	218
Phoenix	3.0	14.8	TW(31)	HP(192)	401
Memphis	2.9	4.7	SO(63)	NW(107)	64
Salt Lake City	2.1	9.3	WA(30)	DL(163)	344
Charlotte	1.5	11.1	EA(58)	US(307)	641

The starting line for deregulation: today's non-hubs back then

	Passengers		Largest Carrier (Daily Departures)		Passenger Growth (%)
Airport	1978	1998	1978	1998	1978-98
Coastal Gateways					
Los Angeles	16.5	22.3	UA(110)	UA(169)	24
NY Kennedy	12.5	9.6	TW(38)	AA(53)	-24
Miami	8.3	13.2	EA(102)	AA(182)	61
Boston	6.8	10.9	DL(59)	US(83)	61
Seattle	4.7	11.1	UA(55)	AS(115)	76
Destinations					
NY Laguardia	8.7	10.6	AA(91)	US(99)	22
DC National	7.5	7.5	EA(63)	US(99)	5
Las Vegas	4.6	12.1	RW(51)	WN(141)	167
Tampa	3.5	6.8	EA(56)	DL(32)	93
San Diego	3.1	6.6	PS(33)	WN(77)	116
Orlando	2.6	12.2	EA(47)	DL(94)	373

Notes to Airport Table:

1. 1978 and 1998 figures include international enplanements by U.S. carriers. 1998 figures are for January-June doubled.

2. 1978 carrier departures are counted from original timetables or the September, 1978, Pocket OAG and are not adjusted for weekend exceptions. 1998 carrier departures are actual DoT data for the second quarter and thus take account both of flight cancellations and weekend exceptions.

Who Rose, Who Fell, and Why?

- The "Hinterland" Theory

  The Carrier that controls the short-hauls to small and medium towns around a potential hubs will wind up dominating that hub

  Prime examples: Pittsburgh and later Philadelphia where AL/US pushed out TWA

  Charlotte where PI pushed out EA

  Memphis where SO/NW pushed out DL

  Salt Lake City where WA had long served the small towns

- Mergers

  North Central, later Republic, controlled the hinterland around DTW and MSP, so NW bought them

  US bought Piedmont

  DL bought Western

  TW bought Ozark

- Losers with no hinterland

  TWA forced out of Chicago

  Pan Am's purchase of National was doomed

- The Exception Proves the Rule

  The Sad Story of Braniff

- New Entrants

  America West at Phoenix

  Southwest all over the place

The Remaining Transitions that Explain the Non-hubs

- **Bad Management**

  Braniff

  Eastern

- **Voluntary Withdrawal**

  AA's short-haul LGA operation

  USAir stepped into the AA/EA Northeast Vacuum

  Alaska in Seattle: Hinterland and Aggressive Expansion

- **International**

  Inland hubs previously dominated by foreign carriers (ORD's international terminal in 1978)

  Inland hub expansion doomed airlines dependent on coastal gateways (Pan Am and TWA)

Other Steps from Then to Now

- **Abandoning the inheritance from a merger**

  UA dropped virtually every route inherited from the 1961 Capital merger

  US dropped virtually every route inherited from the 1987 PSA merger

  AA dropped virtually every route inherited from the 1987 Air California merger

- **Slow vs. Fast Airport Growth**

  Slow: the four slot-controlled airports (ORD, JFK, LGA, DCA)

  coastal gateways

  Fast: the smaller old hubs and the new hubs (ex-Memphis)

  Sunbelt fun: Orlando and Las Vegas

Let's Grade Gordon's 1976 predictions

ally selling planes and routes, until finally it is absorbed by another carrier. The period of red ink will be survived by the strong carriers like United, and the traumatic transition period will have a healthy impact on their managerial efficiency and unit costs.

The most interesting arithmetic involves the long-haul low density routes, the backbone of United's system, presently based on banks of connecting flights at hub cities. To take the example of Milwaukee-Sacramento, today's passenger has the choice of two United flights per day involving Denver on-line connections, for a regular fare of $132 (net of tax) and "freedom fare" of $93. Using the high-density seating in the Boeing study for the Kennedy subcommittee report, at a 60 percent load factor, the regular fare with a Denver connection using 727S's would be $103. United could afford to charge this fare if it had already reconfigured its planes and cut overhead to meet the competition of PSA, Continental, and others on shorter haul high-density routes. Unlike the present situation, where Milwaukee enjoys the same fares as Chicago, in the new world the Milwaukee passenger would have to make the choice whether to drive or fly to Chicago to catch the $89 nonstop to Sacramento or the $75 nonstop to San Francisco. Some would drive to save the $13, but most would not, given the high per-mile air commuter fares and nuisance of parking at O'Hare.

So, to summarize:

1. I predict a market structure with 4-6 of the present trunks surviving, depending on the tightness of merger regulation; perhaps the conversion of two present supplementals into new transcontinental

scheduled carriers, making few stops between the coasts because of the continuing mid-continent advantage of the present Delta's and United's due to higher load factors made possible by their on-line connecting networks; another 3-4 short-haul high density specialists, including PSA and Southwest; and a large number of commuter carriers, graduating slowly into larger planes as route densities permit. Hardly a monopoly result!

2. I predict a fare structure lower than the present average yield including discounts by about 35 percent, accomplished mostly by higher seating densities and reduced service "frills" but also by managerial efficiency forced by necessity upon the present trunks, with their weighty overhead of vice-presidents. The cost economics will allow a continuation of the present system of low-density long hauls served by connecting hubs, leaving the mayors of Butte, Boise, and Beaumont satisfied with continued trunk service at lower fares. Low-density long-hauls will have less of a fare reduction than the major city-pairs, but the differential will be too small to cause much change in current service patterns. Monopoly prices will be prevented by the ease of entry by aggressors. In isolated cases, e.g., Bristol, Visalia, and Merced for United, trunks will hand cities over to commuter lines.

3. Because reduced air fares on short-haul routes generate a greater inter-modal shift from autos and busses than fare reductions on long-hauls, I would not be surprised if the underlying price elasticity turned out to be greater than unity for hauls in the 150-750 mile range, and less than unity in the 1500-and-over range. If this is correct, then the

long-run result of deregulation would be an increase in flight frequency for short haul routes, as has occurred in California and Texas, and a reduction for long-haul routes. Airplane manufacturers well placed in the market for short-haul aircraft, particularly Boeing, will benefit, whereas Lockheed (if still in business then) will be hurt.

4. I predict prosperity ahead for used plane dealers, manufacturers of airline seats, and specialists in painting new insignia on planes.

5. And finally, I predict a new era of discomfort for economists, whose passion for deregulation may force them to endure 6-hour cross-country flights crammed in among 499 other souls on high-density 747's in the no-frills world of the future.

The Biggest Complaint? Pricing. . .

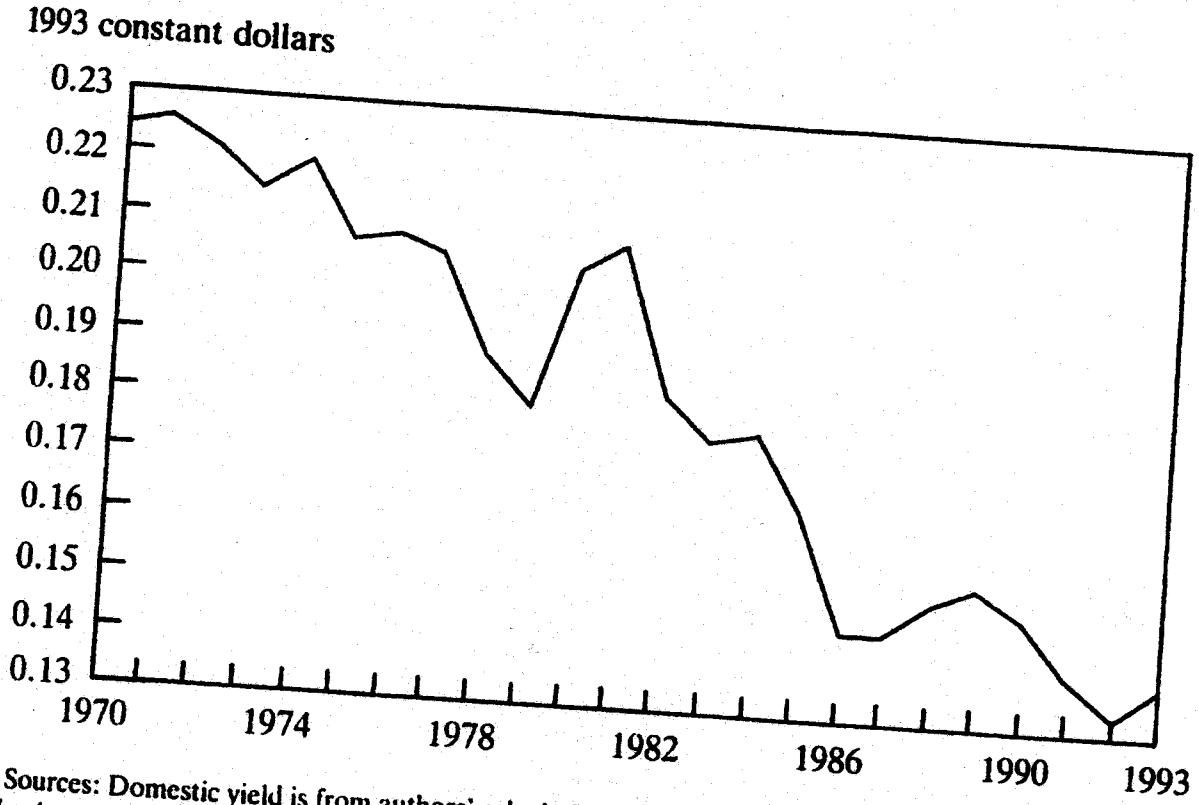
- Why Economists Love Price Discrimination
- The bare facts about prices:

Average passenger yield (domestic trunks or majors)

	1978	1988	1993	1997
Yield	7.9	12.20	13.59	13.68
PCED	48.41	84.32	102.66	112.72
Real Yield	16.32	14.46	13.23	12.13

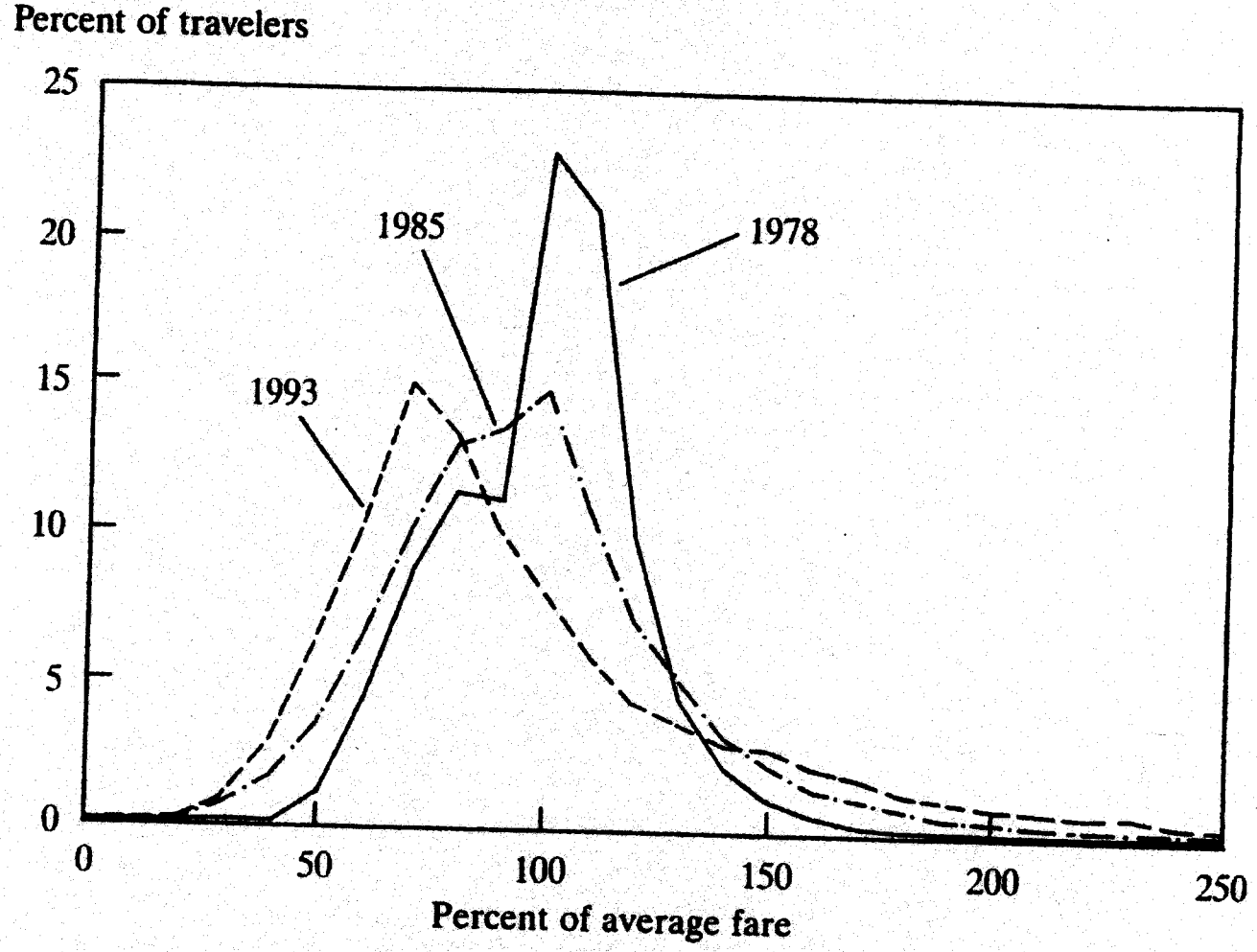
- The "price discrimination curve"

Figure 2-3. *Domestic Airline Average Fare per Passenger Mile (Yield), 1970–93*



Sources: Domestic yield is from authors' calculations using Air Transport Association, *Air Transport: The Annual Report of the U.S. Scheduled Airline Industry*, various issues. Real yield was calculated by adjusting nominal yield using the consumer price index.

Figure 2-5. *Distribution of Fares Travelers Paid Relative to Their Route's Average Fare, Fourth Quarter 1978, 1985, 1993*



Source: Authors' calculations based on a subsample of Department of Transportation Data Bank 1A, a 10 percent sample of airline tickets. Subsample was all domestic round-trip tickets with two or fewer segments outbound and two or fewer segments return. To correct for possible coding errors in the data airlines submitted, tickets with fares that seemed unreasonably high or low were excluded. Thus frequent flier tickets were excluded.

The Poor Beleagered Startups . . .

- What about the final complaint, that large air carriers are "predators" which cut prices to compete with new start-up carriers and then raise prices sky-high when the new carriers are forced to abandon a particular route. Most of these tales involve unrestricted business fares on short point-to-point routes from small cities to major hubs; they fail to reflect the fact that most travelers from those small cities are actually paying discount fares on the larger carrier and in many cases are connecting beyond the hub to distant destinations not served by the start-up.

- They also ignore the fact that major carriers in most markets have failed miserably to meet or beat the competition from Southwest Airlines, which has achieved dominant flight frequencies and market share in almost every city-pair that it serves.

- Valujet, a 1992 start-up, was also successful and made very high profit margins prior to its tragic 1996 crash.

- Another start-up, Reno Air, established a solid niche on the west coast prior to its recent purchase by American.

- Visitors to Chicago's Midway airport may wonder what all the fuss is about, as they gaze over rows of colorfully painted airplane tails not just of Southwest, but also ATA, Vanguard, Frontier, Spirit, and Kiwi.

- Some of the new carriers have failed, just as new business firms fail in every industry.

- Some have underpriced their product, some have not pursued consistent strategies and have changed their mix of routes every month, and some have been poorly managed in other ways.

- The biggest enemy of the startups?

  Not the major airlines

  Their own management (Vanguard started & stopped 29 routes)

  The government: safety regulation and slot controls

- The preference by many customers for the major airlines reflects, in part, two core services that small start-up airlines cannot provide

  namely large service networks offering thousands of origin and destination possibilities, domestic and international alike

  the availability of frequent flier upgrades and free trips.

- The ease and convenience of flying on a single airline virtually anywhere in the world, and the dollar value of frequent flier rewards, are two very large benefits of our present deregulated air transport system that are not taken into account in most historical comparisons of airline prices and were not possible prior to 1978 when every change in routes and price had to be approved by government regulators and were often disapproved.

The Future?

- **Stock market valuation. Assuming the next recession will be as bad for the airlines as 1991-93**

  Will there be a next recession?

  Airlines will perform much better. Why?

- **Low fuel prices but labor will be claiming part of the profit pie**

- **Will RJ supply grow beyond limits of scope clauses?**

  Note industry market share of Comair

  What if there are five new Comairs?

- **The inexorable growth of Southwest, who loses?**