Formação de Preços em Transporte Aéreo: Modelos e Discussões Regulatórias

Módulo II
Modelos de Negócio e Contestabilidade

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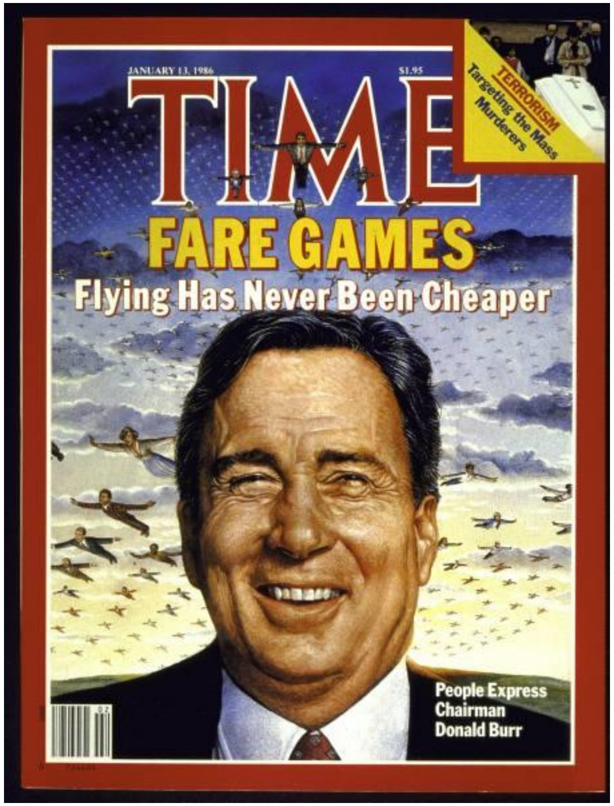
Congresso Nacional de Ensino e Pesquisa em Transporte - ANPET

Prêmios de *Hub* e *Low Costs*

- O estudo de Borenstein (1989) ficou clássico ao demonstrar empiricamente que os *hubs* podem gerar poder de mercado
  - tb: Berry (1990) *Airport Presence as Product Differentiation*

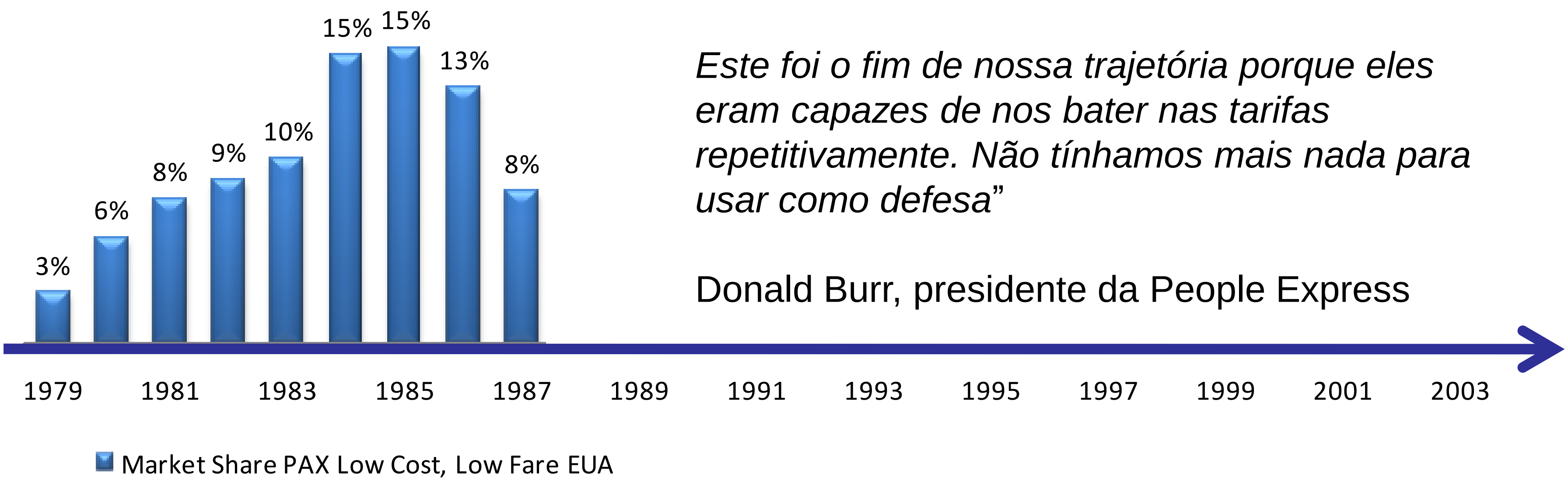
- Na década de 1990, contudo, observou-se o crescimento fantástico da Southwest Airlines
  - e uma onda de empresas *Low Cost Carriers* (LCC)

Primeira Onda LCC: *No-Frills* – Anos 80



Market Share das Companhias *Low Cost* dos Estados Unidos: darinlee.net

Primeira Onda LCC: *No-Frills* – Anos 80



"*Nós éramos vibrantes, uma empresa lucrativa entre 1981 e 1985 e daí começamos a perder $50 milhões por mês.*

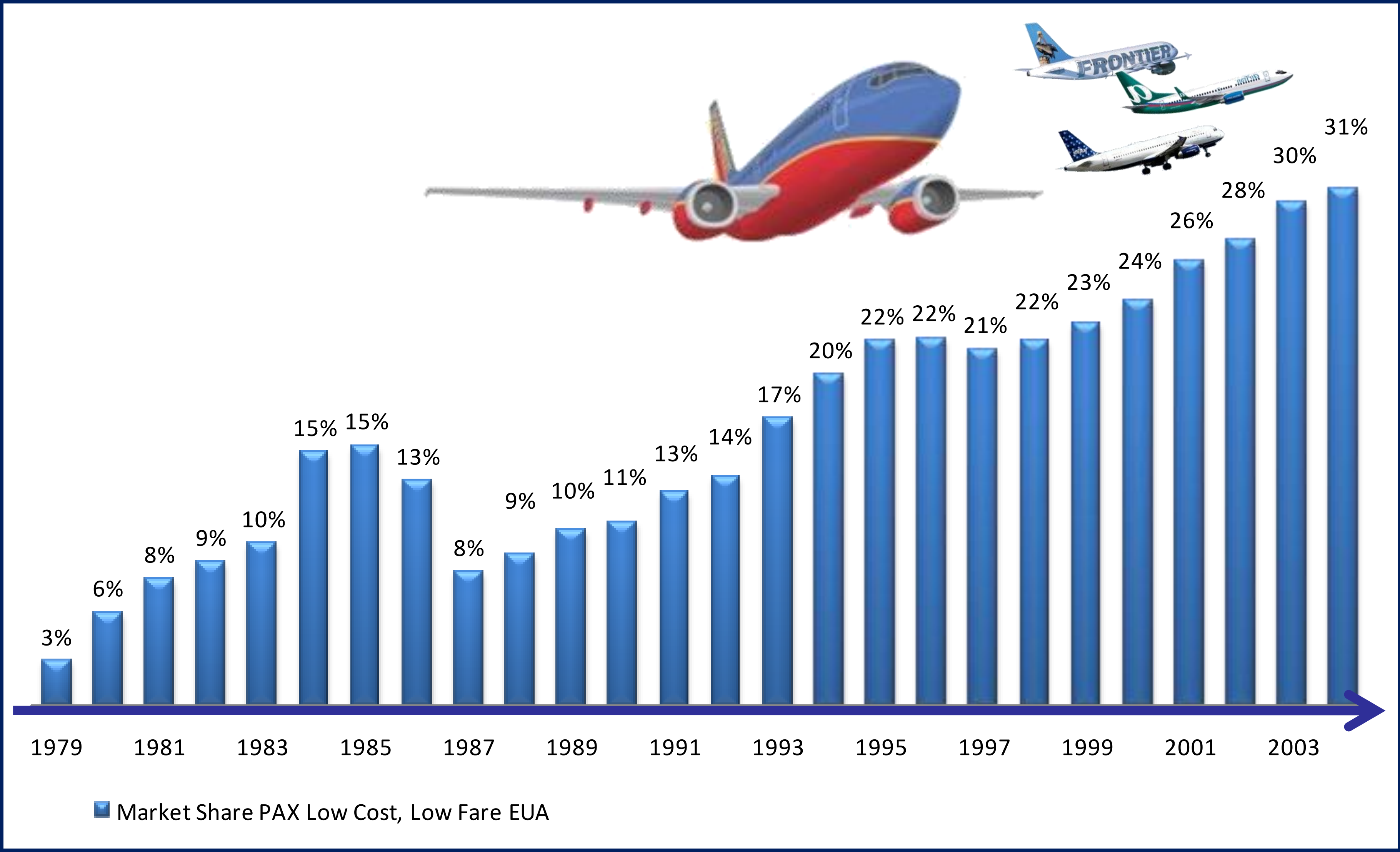
Nós estávamos sendo lucrativos até o dia em que a American veio até nós com uma tarifa super econômica.

Este foi o fim de nossa trajetória porque eles eram capazes de nos bater nas tarifas repetitivamente. Não tínhamos mais nada para usar como defesa"

Donald Burr, presidente da People Express

Market Share das Companhias *Low Cost* dos Estados Unidos: darinlee.net

Segunda Onda: LCC vira *Business Model*



Market Share das Companhias *Low Cost* dos Estados Unidos: darinlee.net

Caminho de Expansão da Southwest

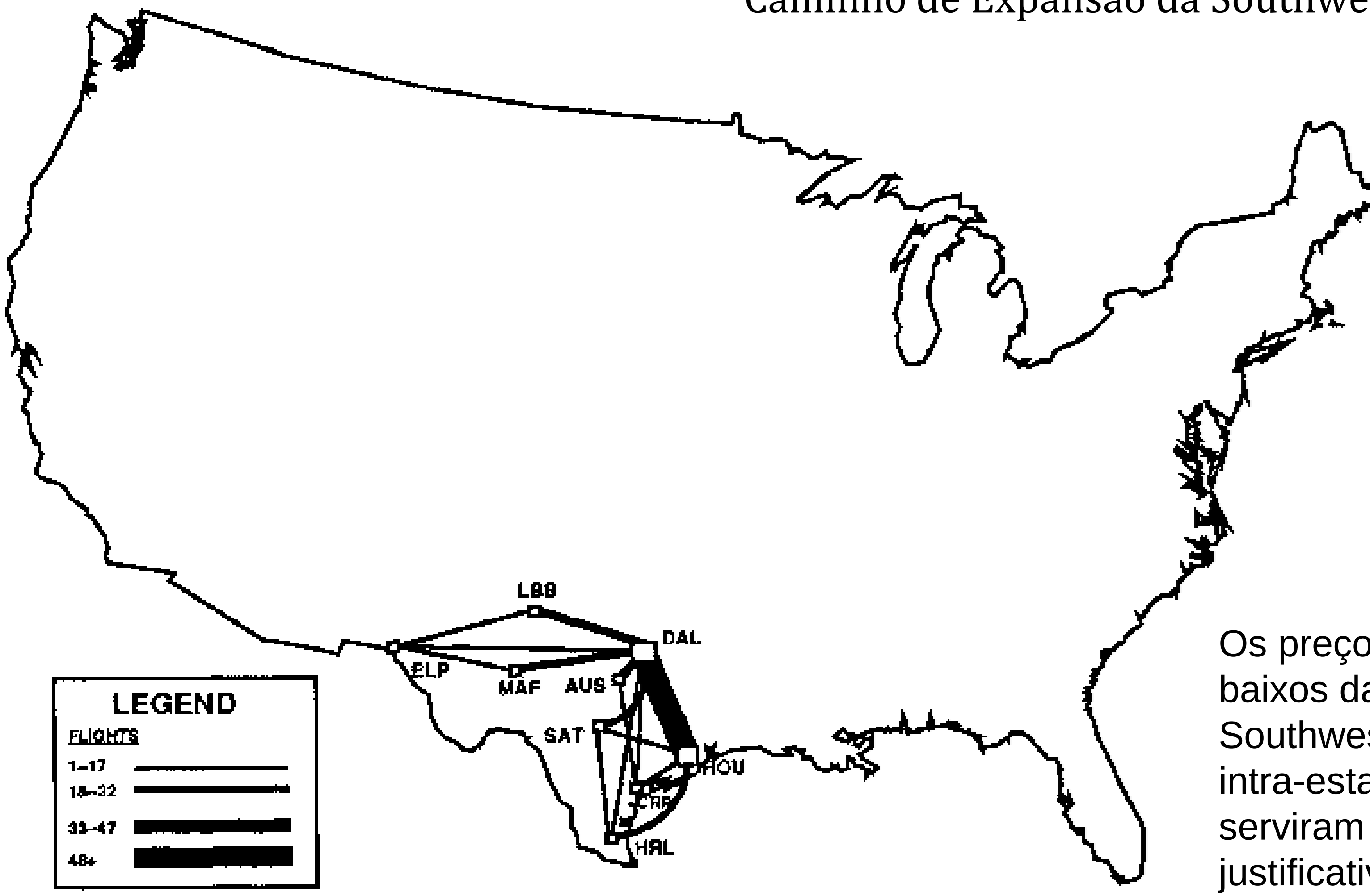


Fig. 2. Southwest Airlines: 1978 network. Source: OAG.

Os preços baixos da Southwest no intra-estadual serviram de justificativa pró-ADA (1978)

Início das operações: 18 de Junho de 1971, com 3 B737.

Intra-Texas: Houston, Dallas e San Antonio. Base em Love Field, Dallas.

Caminho de Expansão da Southwest

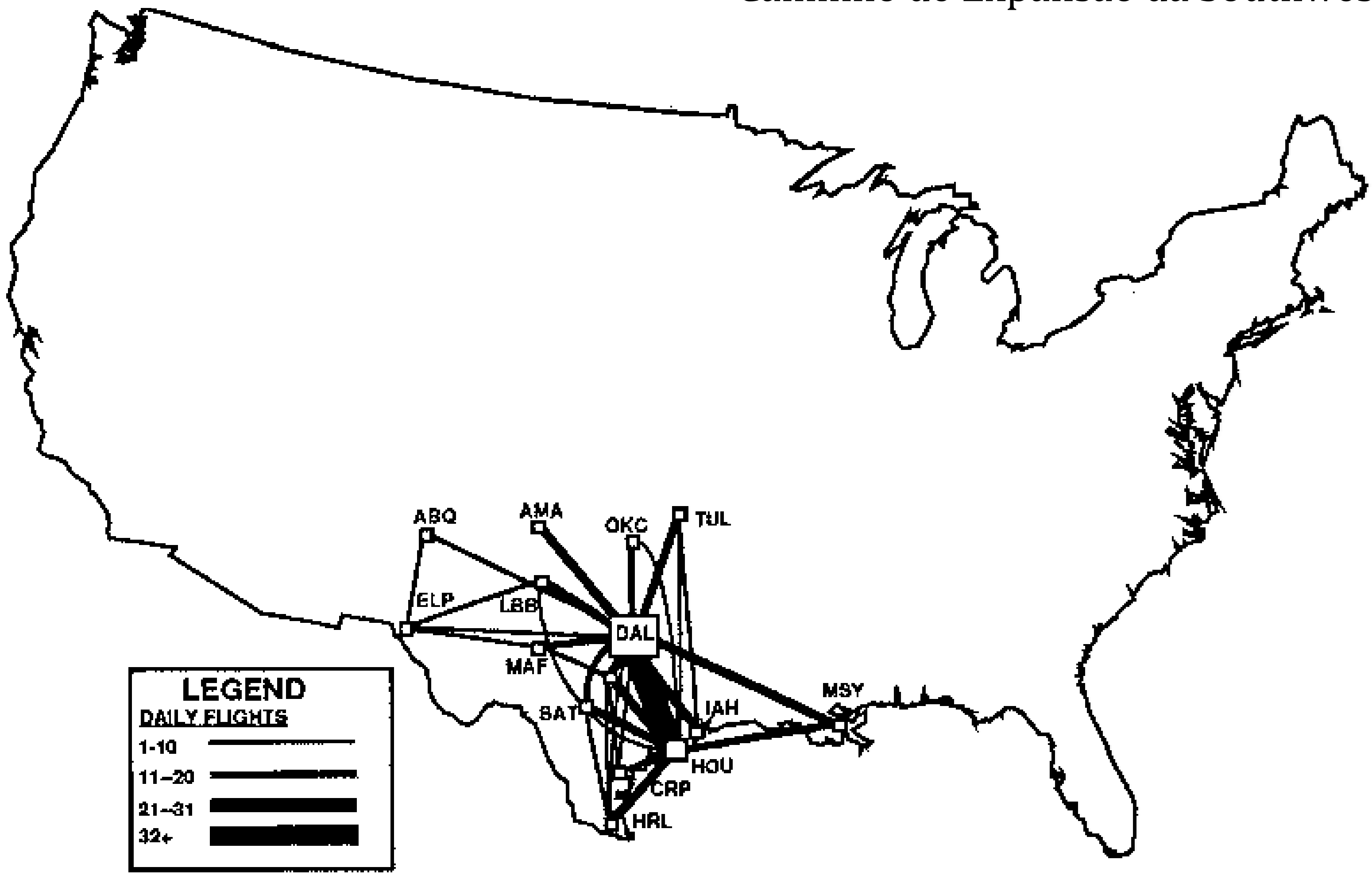


Fig. 7. Southwest Airlines: 1980 network. Source: OAG.

Caminho de Expansão da Southwest

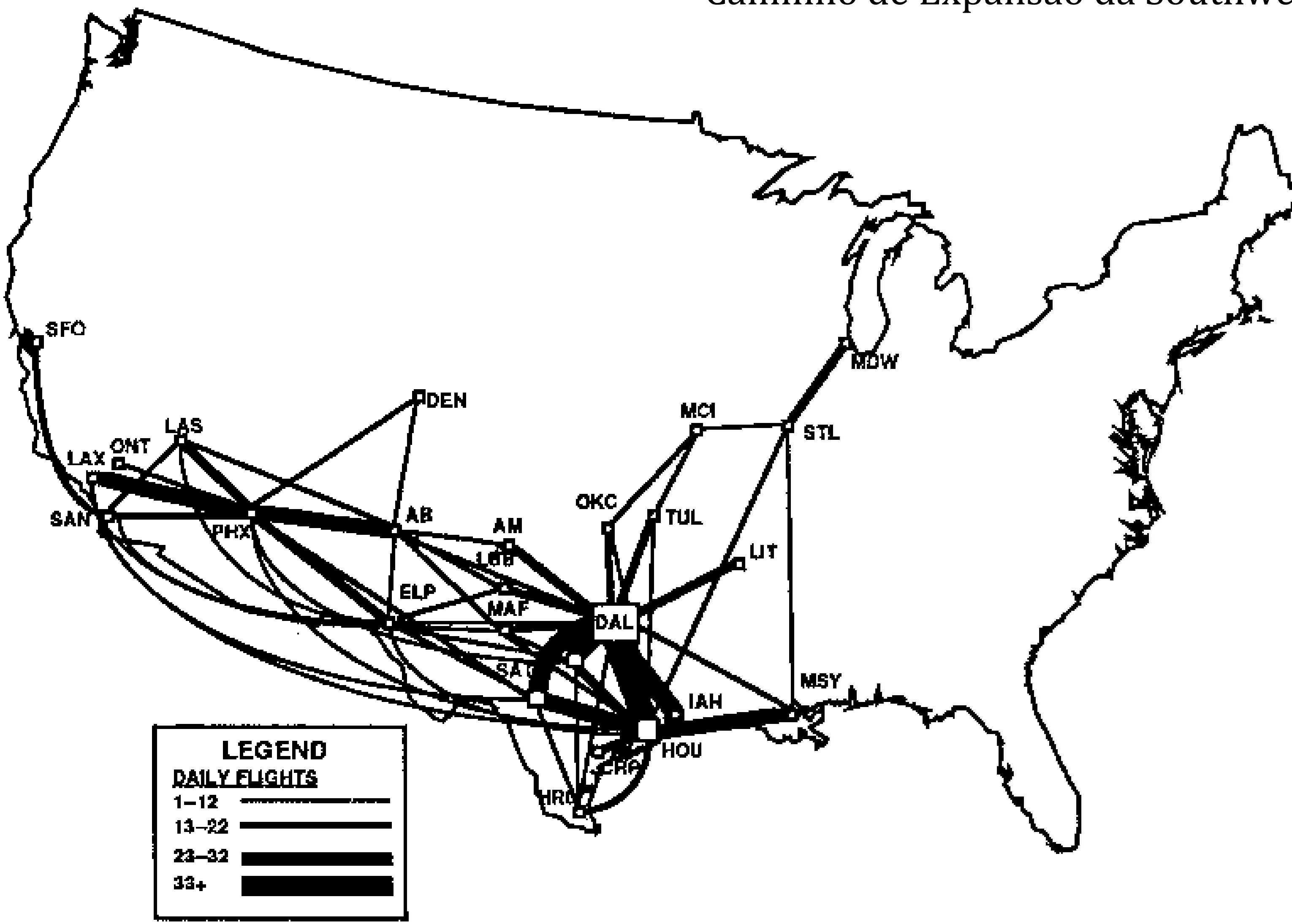


Fig. 8. Southwest Airlines: 1985 network. Source: OAG.

Caminho de Expansão da Southwest

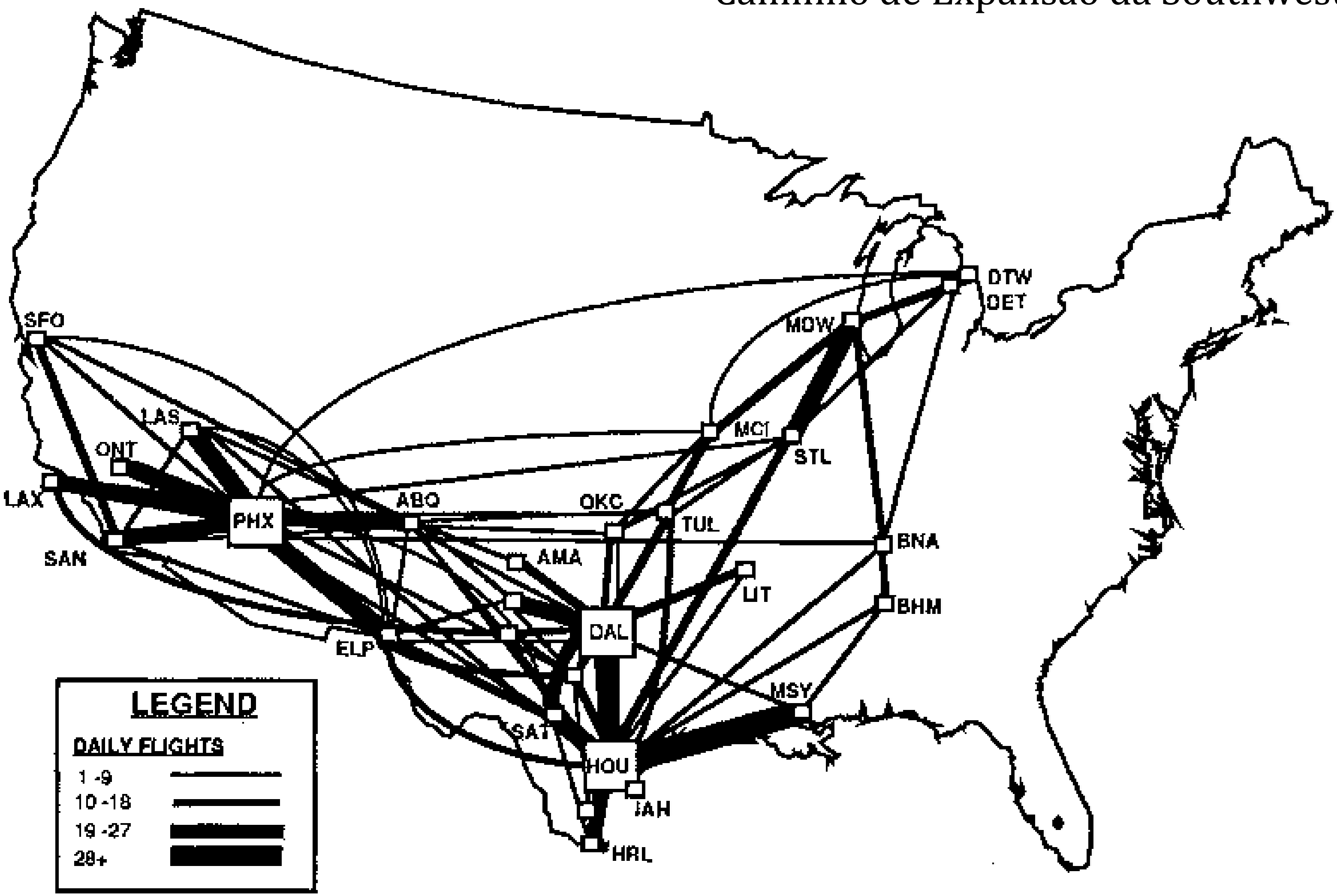
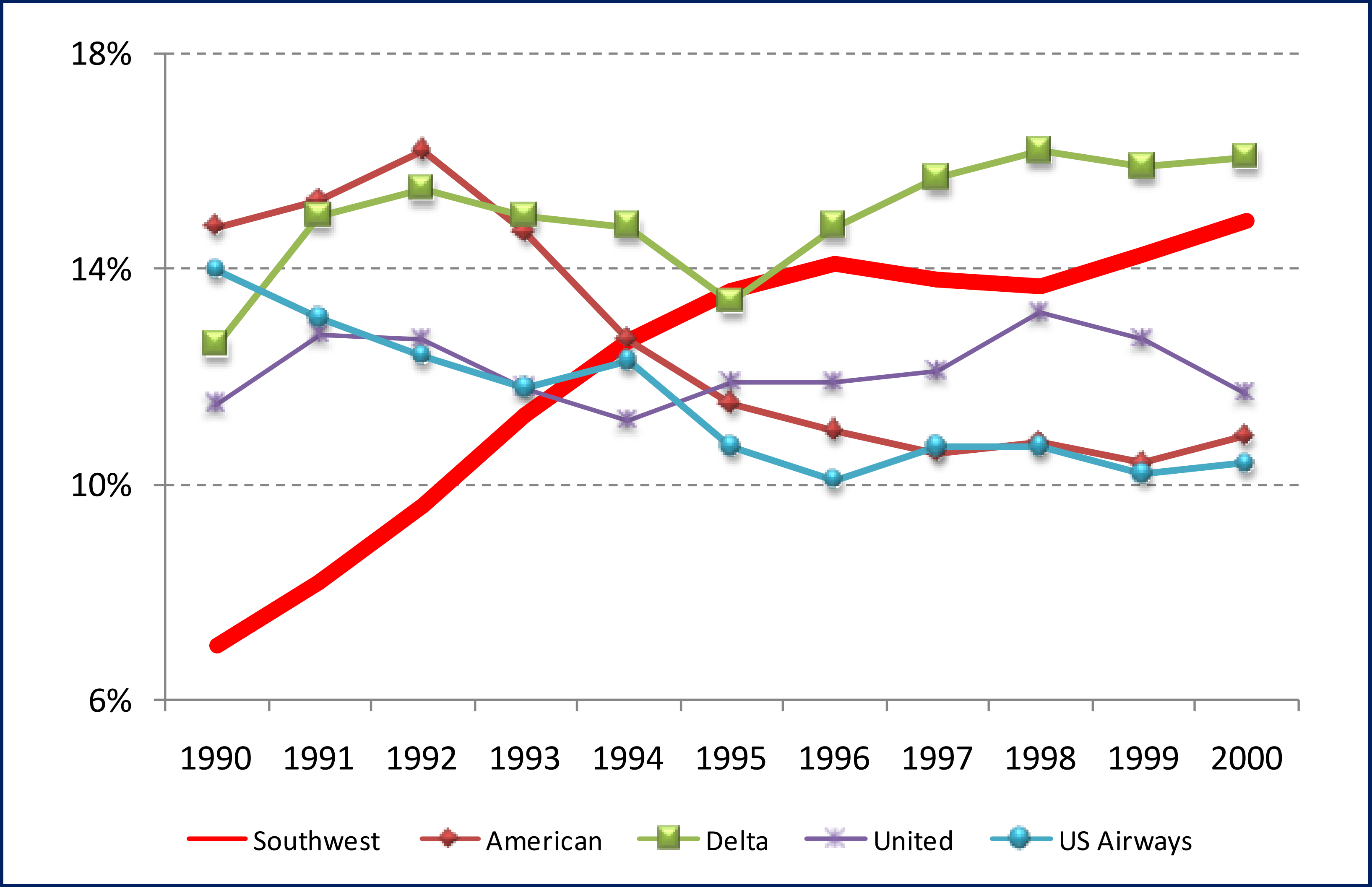


Fig. 9. Southwest Airlines: 1988 network. Source: OAG.

Caminho de Expansão Anos 1990

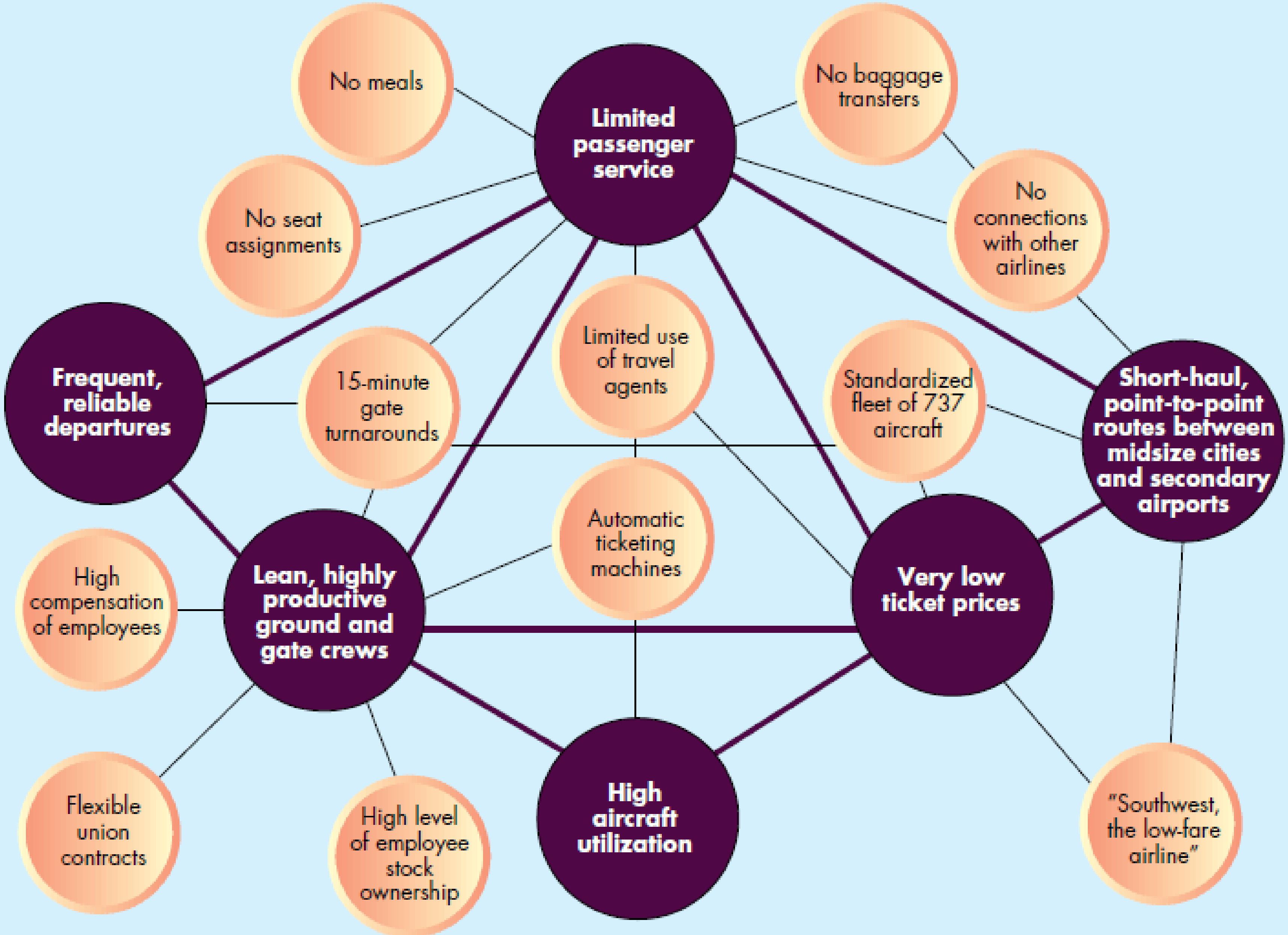


Crescimento do *Market Share* Da Southwest Airlines ao longo da Década de 1990

Southwest Airlines

- A grande referência mundial do modelo LCC
  - Empresa em 2009
    - 67 cidades servidas
    - 74 bilhões de RPK
    - 71% aproveitamento
    - 11 bilhões de dólares de receita
    - 30 mil funcionários
    - Mais de 3300 voos por dia (> dos EUA)
    - 102 milhões de passageiros (> dos EUA)
    - décadas de lucratividade
    - Menores índices de reclamação de pax

Southwest Airlines' Activity System



Michael Porter (2000) What is strategy?

A Questão dos “*Fortress Hubs*”

- As LCC incrementaram a competitividade do setor
  - ampliam a contestabilidade a muitos mercados antes tidos como protegidos da competição
- Um choque de “modelos de negócios”
  - H&S v. LCC
  - Maiores possibilidades de consumo, preços caem, maior popularização do transporte aéreo
- Os defensores do ADA e de seus benefícios para a economia norte-americana ganham força
  - Por outro lado, o “hub” continua sendo uma “fortaleza”: predação/competição da AA em Fort Worth, por ex.
- A literatura teve que incorporar essa dinâmica competitiva

Hofer, Windle & Dresner (2008)

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Price premiums and low cost carrier competition

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- É o primeiro a redirecionar a terminologia para "*price premiums*"
- É o mesmo que o "*pricing advantage*" do E&K e o "*market power*" do Borenstein
- Dados: 1992, 1997 e 2002.

Hofer, Windle & Dresner (2008)

- Modelagem econométrica de tráfego e preços

$$
\begin{aligned}
\ln \text{Fare} = {} & \beta_0 + \beta_1 \ln \text{AirlinePass(fitted)} + \beta_2 \ln \text{Distance} + \beta_3 \text{TouristRoute} \\
& + \beta_4 \text{SlotRoute} + \beta_5 \ln \text{RouteHHI} + \beta_6 \ln \text{MaxAirportHHI} \\
& + \beta_7 \text{RouteShare} + \beta_8 \text{MaxAirportShare} + \beta_9 \text{LCCCompForHCC} \\
& + \beta_{10} \text{LCCCompForLCC} + \beta_{11} \text{AltRouteLCC1M} + \beta_{12} \ln \text{Circuity} + \beta_{13} \text{ZScore} \\
& + \beta_{14} \text{LoadFactor} + \beta_{15} \ln \text{AirlineCost} + \Sigma \beta_i (\text{time})_i + \Sigma \beta_k (\text{carrier})_k
\end{aligned} \qquad (2)
$$

Hofer, Windle & Dresner (2008)

$$\begin{aligned}\ln \text{Fare} = {} & \beta_0 + \beta_1 \ln \text{AirlinePass(fitted)} + \beta_2 \ln \text{Distance} + \beta_3 \text{TouristRoute} \\ & + \beta_4 \text{SlotRoute} + \beta_5 \ln \text{RouteHHI} + \beta_6 \ln \text{MaxAirportHHI} \\ & + \beta_7 \text{RouteShare} + \beta_8 \text{MaxAirportShare} + \beta_9 \text{LCCCompForHCC} \\ & + \beta_{10} \text{LCCCompForLCC} + \beta_{11} \text{AltRouteLCC1M} + \beta_{12} \ln \text{Circuity} + \beta_{13} \text{ZScore} \\ & + \beta_{14} \text{LoadFactor} + \beta_{15} \ln \text{AirlineCost} + \Sigma\beta_i(\text{time})_i + \Sigma\beta_k(\text{carrier})_k \end{aligned} \tag{2}$$

- Fare_{kij} is the average price carrier k charges on the route between airports i and j, and is a dependent variable in the model (note that all fares are one-way fares based on round-trip purchases and are reported in real 1992 dollars).

Hofer, Windle & Dresner (2008)

$$\begin{aligned}\ln \text{Fare} = {} & \beta_0 + \beta_1 \ln \text{AirlinePass(fitted)} + \beta_2 \ln \text{Distance} + \beta_3 \text{TouristRoute} \\ & + \beta_4 \text{SlotRoute} + \beta_5 \ln \text{RouteHHI} + \beta_6 \ln \text{MaxAirportHHI} \\ & + \beta_7 \text{RouteShare} + \beta_8 \text{MaxAirportShare} + \beta_9 \text{LCCCompForHCC} \\ & + \beta_{10} \text{LCCCompForLCC} + \beta_{11} \text{AltRouteLCC1M} + \beta_{12} \ln \text{Circuity} + \beta_{13} \text{ZScore} \\ & + \beta_{14} \text{LoadFactor} + \beta_{15} \ln \text{AirlineCost} + \Sigma\beta_i(\text{time})_i + \Sigma\beta_k(\text{carrier})_k \end{aligned} \tag{2}$$

- RouteHHI_{ij} is a measure of route market concentration. It is based on the Herfindahl–Hirschman index, which is the sum of the squared (route) market shares of all airlines operating in the (route) market: $\text{RouteHHI}_{ij} = \sum_{k=1}^{N} (\text{RouteShare}_{kij})^2$ (note that the route HHI is computed on an airport-to-airport basis rather than on a city-to-city basis). RouteHHI is one of the price premium drivers; i.e., fares are expected to increase as the degree of route concentration increases.

Hofer, Windle & Dresner (2008)

$$\ln \text{Fare} = \beta_0 + \beta_1 \ln \text{AirlinePass(fitted)} + \beta_2 \ln \text{Distance} + \beta_3 \text{TouristRoute} + \beta_4 \text{SlotRoute} + \beta_5 \ln \text{RouteHHI} + \beta_6 \ln \text{MaxAirportHHI} + \beta_7 \text{RouteShare} + \beta_8 \text{MaxAirportShare} + \beta_9 \text{LCCCompForHCC} + \beta_{10} \text{LCCCompForLCC} + \beta_{11} \text{AltRouteLCC1M} + \beta_{12} \ln \text{Circuity} + \beta_{13} \text{ZScore} + \beta_{14} \text{LoadFactor} + \beta_{15} \ln \text{AirlineCost} + \Sigma\beta_i(\text{time})_i + \Sigma\beta_k(\text{carrier})_k \quad (2)$$

- $\text{MaxAirportHHI}_{ij}$ is the second price premium driver and indicates the degree of concentration of an airport market. Rather than including two values for both airports i and j, only the higher HHI value is retained in this analysis. The rationale for this approach is that the more concentrated airport is more likely to be the "bottleneck", and fares on routes involving this airport may be expected to be higher than fares on routes connecting "unconcentrated" airports.

Hofer, Windle & Dresner (2008)

$$\begin{aligned}\ln \text{Fare} = {} & \beta_0 + \beta_1 \ln \text{AirlinePass(fitted)} + \beta_2 \ln \text{Distance} + \beta_3 \text{TouristRoute} \\ & + \beta_4 \text{SlotRoute} + \beta_5 \ln \text{RouteHHI} + \beta_6 \ln \text{MaxAirportHHI} \\ & + \beta_7 \text{RouteShare} + \beta_8 \text{MaxAirportShare} + \beta_9 \text{LCCCompForHCC} \\ & + \beta_{10} \text{LCCCompForLCC} + \beta_{11} \text{AltRouteLCC1M} + \beta_{12} \ln \text{Circuity} + \beta_{13} \text{ZScore} \\ & + \beta_{14} \text{LoadFactor} + \beta_{15} \ln \text{AirlineCost} + \Sigma\beta_i(\text{time})_i + \Sigma\beta_k(\text{carrier})_k \end{aligned} \tag{2}$$

- RouteShare_{kij} is the third price premium driver and measures an airline's market power (dominance) on a route market (based on its share of route passengers). Higher route market shares may be expected to be associated with higher price premiums.

Hofer, Windle & Dresner (2008)

$$\begin{aligned}\ln \text{Fare} = {} & \beta_0 + \beta_1 \ln \text{AirlinePass(fitted)} + \beta_2 \ln \text{Distance} + \beta_3 \text{TouristRoute} \\ & + \beta_4 \text{SlotRoute} + \beta_5 \ln \text{RouteHHI} + \beta_6 \ln \text{MaxAirportHHI} \\ & + \beta_7 \text{RouteShare} + \beta_8 \text{MaxAirportShare} + \beta_9 \text{LCCCompForHCC} \\ & + \beta_{10} \text{LCCCompForLCC} + \beta_{11} \text{AltRouteLCC1M} + \beta_{12} \ln \text{Circuity} + \beta_{13} \text{ZScore} \\ & + \beta_{14} \text{LoadFactor} + \beta_{15} \ln \text{AirlineCost} + \Sigma\beta_i(\text{time})_i + \Sigma\beta_k(\text{carrier})_k \end{aligned} \quad (2)$$

- $\text{MaxAirportShare}_{kij}$, the fourth and final price premium driver, indicates an airline's market power (dominance) in the airport market i or j (applying the same logic discussed in the context of MaxAirportHHI, only the maximum value is retained). Higher airport market shares likely translate into higher fares.

Hofer, Windle & Dresner (2008)

$$\begin{aligned}\ln \text{Fare} = {} & \beta_0 + \beta_1 \ln \text{AirlinePass(fitted)} + \beta_2 \ln \text{Distance} + \beta_3 \text{TouristRoute} \\ & + \beta_4 \text{SlotRoute} + \beta_5 \ln \text{RouteHHI} + \beta_6 \ln \text{MaxAirportHHI} \\ & + \beta_7 \text{RouteShare} + \beta_8 \text{MaxAirportShare} + \beta_9 \text{LCCCompForHCC} \\ & + \beta_{10} \text{LCCCompForLCC} + \beta_{11} \text{AltRouteLCCIM} + \beta_{12} \ln \text{Circuity} + \beta_{13} \text{ZScore} \\ & + \beta_{14} \text{LoadFactor} + \beta_{15} \ln \text{AirlineCost} + \Sigma\beta_i(\text{time})_i + \Sigma\beta_k(\text{carrier})_k\end{aligned} \qquad (2)$$

- $\text{LCCCompForHCC}_{ij}$ is a binary variable. It takes on the value "1" when the carrier in the observation is a high cost carrier and faces route competition by a low cost carrier. See Appendix B for a definition of low cost carriers.

Hofer, Windle & Dresner (2008)

$$
\begin{aligned}
\ln \text{Fare} = {} & \beta_0 + \beta_1 \ln \text{AirlinePass(fitted)} + \beta_2 \ln \text{Distance} + \beta_3 \text{TouristRoute} \\
& + \beta_4 \text{SlotRoute} + \beta_5 \ln \text{RouteHHI} + \beta_6 \ln \text{MaxAirportHHI} \\
& + \beta_7 \text{RouteShare} + \beta_8 \text{MaxAirportShare} + \beta_9 \text{LCCCompForHCC} \\
& + \beta_{10} \text{LCCCompForLCC} + \beta_{11} \text{AltRouteLCC1M} + \beta_{12} \ln \text{Circuity} + \beta_{13} \text{ZScore} \\
& + \beta_{14} \text{LoadFactor} + \beta_{15} \ln \text{AirlineCost} + \Sigma\beta_i(\text{time})_i + \Sigma\beta_k(\text{carrier})_k
\end{aligned} \qquad (2)
$$

- $\text{LCCCompForLCC}_{ij}$ is a binary variable which equals "1" when the carrier in the observation is a low cost carrier and competes with another low cost carrier in the route market. $\text{LCCCompForHCC}_{ij}$ and $\text{LCCCompForLCC}_{ij}$ specify the presence and nature of low cost carrier competition. The distinction between LCC competition for high cost carriers and for low cost carriers allows for differential price impacts.

Hofer, Windle & Dresner (2008)

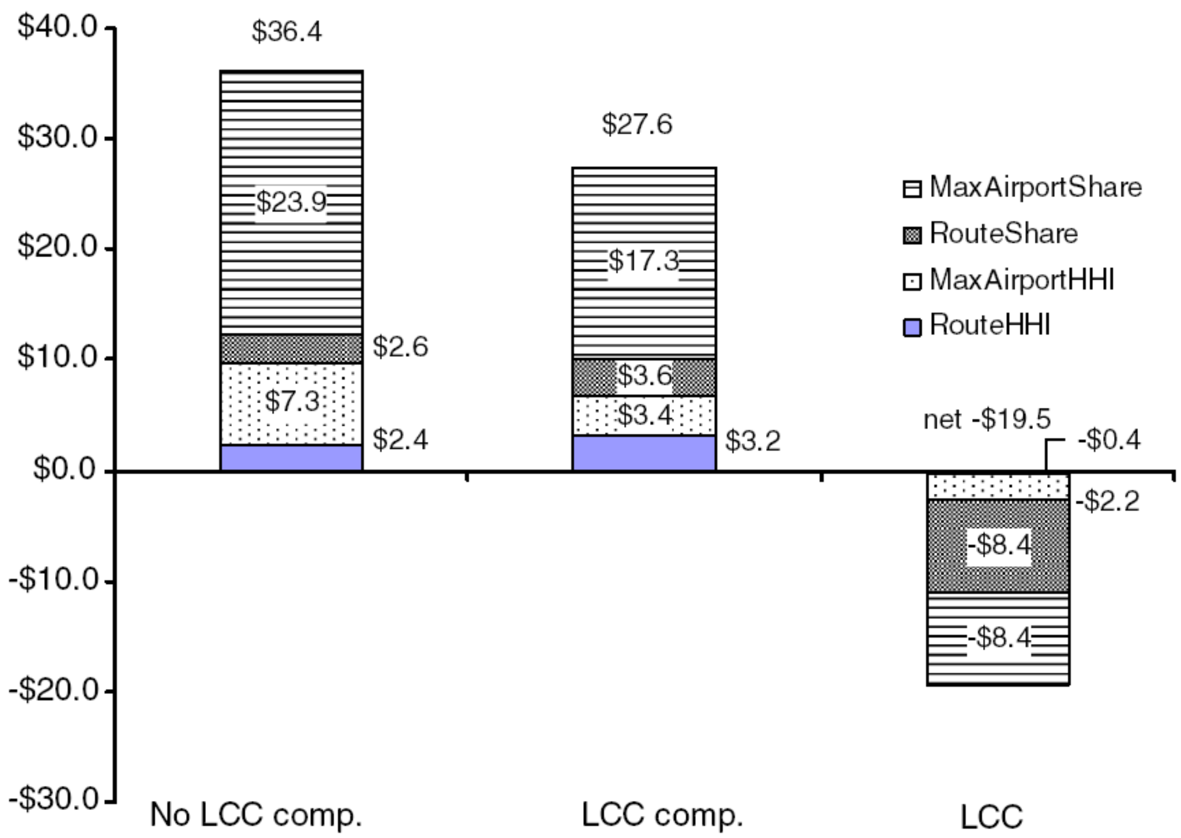

Fig. 3. Price premium estimates – 2002.

Hofer, Windle & Dresner (2008)

- Concluem que os valores absolutos de *price premiums* se mantiveram constantes entre 1992-2002
  - Ou seja, as rendas de monopólio ainda são um problema
  - mas a proporção de pax sujeitos a ele caiu devido à expansão do tráfego LCC
- Principais fatores de *price premiums*
  - vêm de *market share* e concentração de aeroporto
- Efeito da competição com cias LCC
  - LCCs não praticam *price premium*
  - sua presença reduz o *price premium* das *majors*

Outros estudos recentes

- A literatura continua trabalhando o tema
  - dada a disponibilidade cada vez maior de dados para o mercado americano (US DOT)

- fusões, incorporações, alianças e acordos *codeshare*
  - na geração de artigos de precificação e poder de mercado

Airline Code-share Alliances and their Competitive Effects

Philip G. Gayle*
Kansas State University

September 8, 2006

Forthcoming in *Journal of Law and Economics*

Abstract

Code-share alliances have become a prominent feature in the competitive landscape of the airline industry. However, policy makers are extremely hesitant to approve proposed code-share alliances when the potential partners' route networks have significant overlap. The main concern is that the alliance may facilitate price collusion on partners' overlapping routes. The main contribution of this paper is to show how policy makers can use a structural econometric framework developed by Nevo (2000b) to quantify the competitive effects of *proposed* code-share alliances, where potential alliance partners compete on overlapping routes in the pre-alliance industry. As an example, I apply the econometric model to the recently implemented Delta/Continental/Northwest alliance. This proposed alliance was initially greeted with skepticism by the U.S. Department of Transportation due to the potential partners' unprecedented level of route network overlap. For the markets considered in my analyses, it appears as though the ultimate approval of the alliance by policy makers was justified.

Limited Access to Airport Facilities and Market Power in the Airline Industry *

Federico Ciliberto†
University of Virginia

Jonathan W. Williams‡
University of Georgia

FIRST VERSION: March 2007
THIS VERSION: February 2009

Abstract

We investigate the role of limited access to airport facilities as a determinant of the hub premium in the US airline industry. We use original data from competition plans that airports are required to submit to the Department of Transportation in compliance with the Aviation Investment and Reform Act for the 21st Century. We collect information on the availability and control of airport gates, leasing arrangements, and other restrictions limiting the expansion of airport facilities.

We find that the hub premium is increasing in the ticket fare. We find that control of gates is a crucial determinant of this premium. Limits on the fees that airlines can charge for subleasing their gates lower the prices charged by airlines. Finally, control of gates and restrictions on sublease fees explain high fares only when there is a scarcity of gates relative to the number of departures out of an airport.

Outros Estudos Recentes

Are Frequent-Flyer Programs a Cause of the "Hub Premium"?

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This paper estimates the relationship between frequent-flyer programs (FFPs) and fares at hub airports. I exploit the formation of partnerships that allowed members of one airline's FFP to earn that airline's points on flights operated by its partner. If FFPs allow an airline to charge higher fares on routes that depart from its hubs, these partnerships should allow an airline's partner *to charge higher fares on routes that depart from these same airports. I find that offering the FFP points of the dominant carrier at an airport does, indeed, lead to higher fares. Combining these estimates with estimates of the "hub premium" suggests that FFPs may account for at least 25% of the "hub premium."*

Hubs versus Airport Dominance

Volodymyr Bilotkach[1] and Vivek Pai[2]

October 2009

Abstract

We address the issue of the sources of dominant airlines' pricing power by separating premium due to hub operations from that due to airport dominance. Presence of airports serving as hubs for two carriers enables such identification via difference-in-differences. Moving from the left to the right of the price spectrum, the total pricing premium of hub operators (both dominant and non-dominant) increases; while the share of the airport dominance premium diminishes relative to that of the hub premium. Absence of hub premium at the lower end of the price distribution suggests frequent flier programs rather than product differentiation as the source of hub operator's pricing power. Dominant airline's ability to charge higher fares due to either its airport market share or access to scarce airport facilities is confirmed.

Identifying Collusion in the US Airline Industry

Tracy Orcholski* †

November 22, 2010

Abstract

This paper proposes a novel empirical technique to determine the degree of competition in the US airline industry by route. Using a dynamic panel estimator suggested by Arellano and Bond (1991) and the large amount of publicly available data on US airlines, a non-parametric profit function is estimated. First order conditions can be derived from these profit functions, and in turn, the competitive, Cournot and collusive quantities of airline seats can be estimated. The difference between these estimates and the actual seat capacities provides a measure of collusive behavior. Furthermore, conjectural variation parameters can also be estimated to measure the degree of competition, and regressed on market conditions. Results show airlines withholding quantity to keep prices high on some routes, though the introduction of low-cost carriers, the September 11th attacks, and the number of airlines servicing a route reduce the likelihood of collusion. The threat of entry, as measured by potential entrants, does not affect the probability of collusion on a route. Furthermore, there is no evidence that domestic code sharing necessarily leads to collusive behavior.