

Airline Research Challenges

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Revenue Management
American Airlines

Challenges to Consider

A Few Examples – Matching Supply and Demand

Understanding Passenger Preferences

- Knowing when and where the passenger wants to travel and what they are willing to pay
- Understanding demand (better forecasting and understanding click-stream data and passenger elasticity)
- Offering services that match the passengers needs (schedule, availability and price)
- Evaluation of market risk

Integration of Business Processes

- Better integration of the various processes will result in a more profitable schedule and operation
- Some examples: Revenue Management and Scheduling, Crew with Equipment, and Maintenance Routing

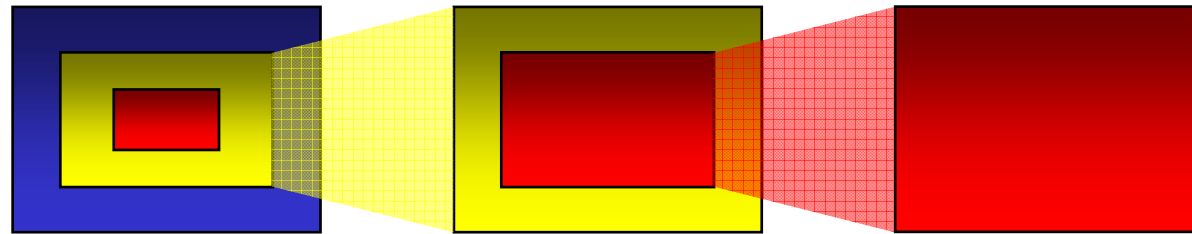
New Business Models

- LCC and Traditional Carriers use much different business models
- Many passengers treat air travel as a commodity – can we prevent this?
- Are there better business models available?
- What will airlines and the distribution channels look like in the future?



Airline Business Integration

Objectives, Decisions and Constraints

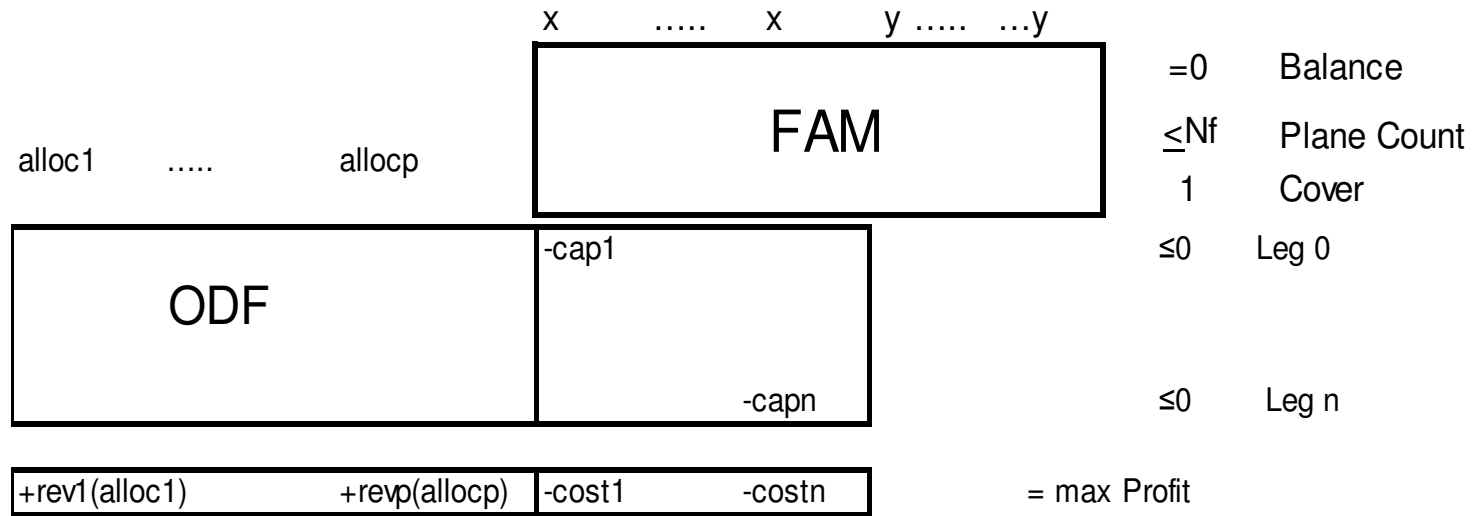


Time Horizon	<ul style="list-style-type: none"> • 18 Months + 	<ul style="list-style-type: none"> • 18 Months – 1 Months 	<ul style="list-style-type: none"> • 3 months – Departure
Objective	<ul style="list-style-type: none"> • Maximize NPV of Future Profits 	<ul style="list-style-type: none"> • Maximize NPV of Future Profits 	<ul style="list-style-type: none"> • Maximize NPV of Future Profits
Decisions	<ul style="list-style-type: none"> • Route Structure • Fleet • Maintenance Bases • Crew Bases • Facilities 	<ul style="list-style-type: none"> • Schedule • Pricing Policies 	<ul style="list-style-type: none"> • Price • Restrictions • Availability
Constraints	<ul style="list-style-type: none"> • Financial Resources • Regulation 	<ul style="list-style-type: none"> • Route Structure • Fleet • Maintenance • Crew Bases • Facilities 	<ul style="list-style-type: none"> • Schedule • Pricing Policies



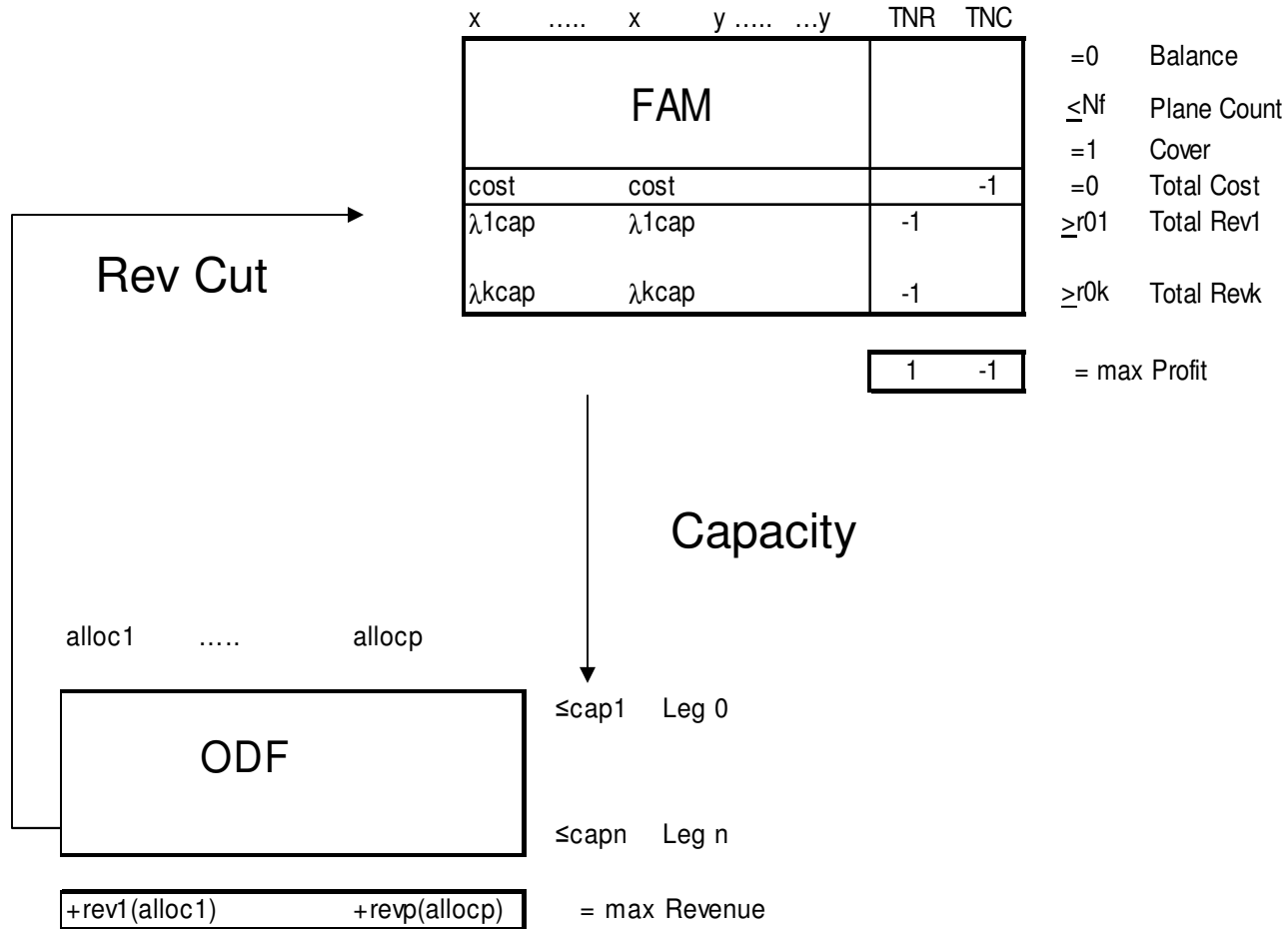
Integrating Scheduling and RM

O&D FAM



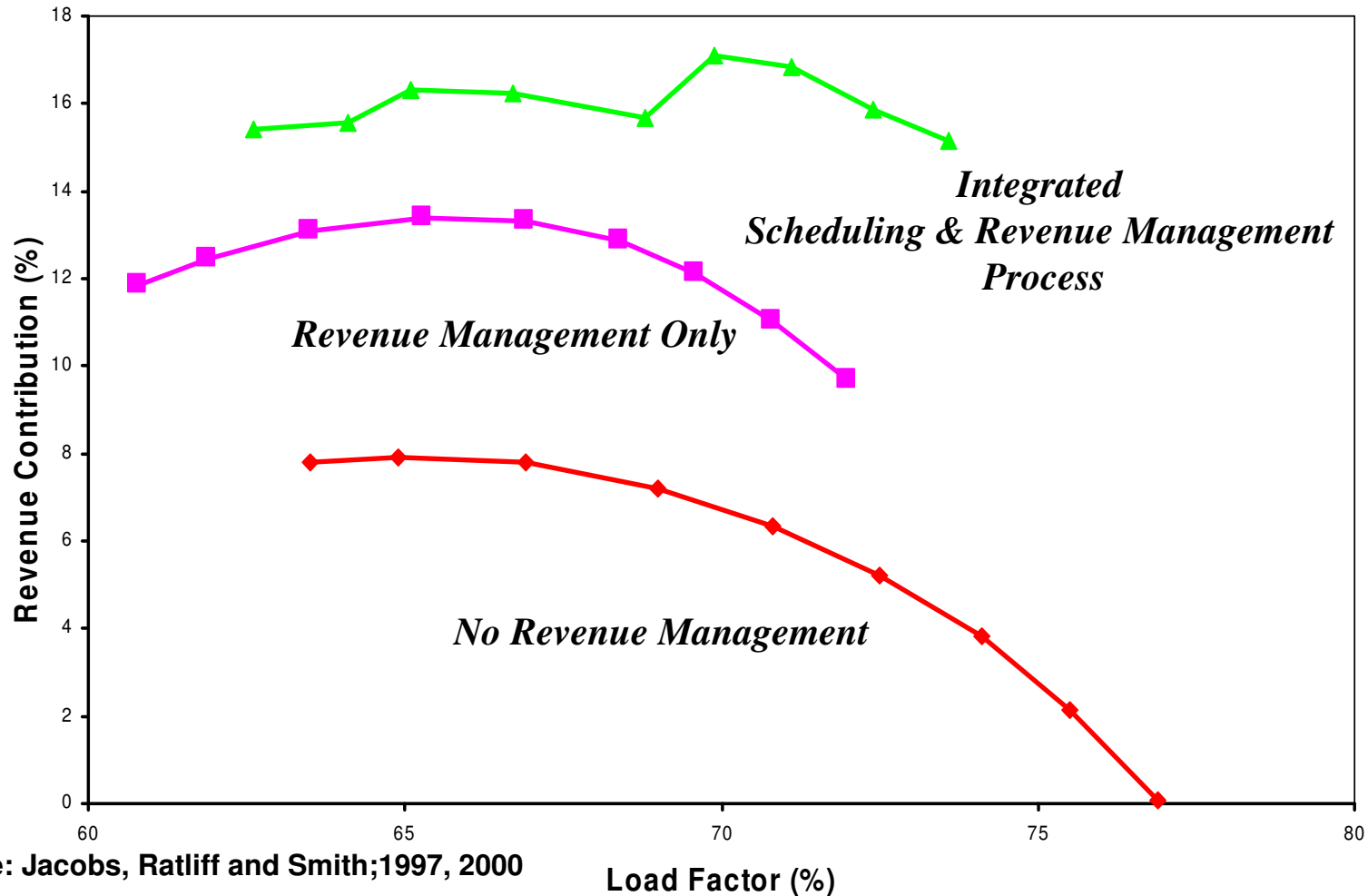
Integrating Scheduling and RM

Decomposition Approach



Integrating Scheduling and RM

Consistent Scheduling and RM Benefits



Reference: Jacobs, Ratliff and Smith;1997, 2000

American Airlines

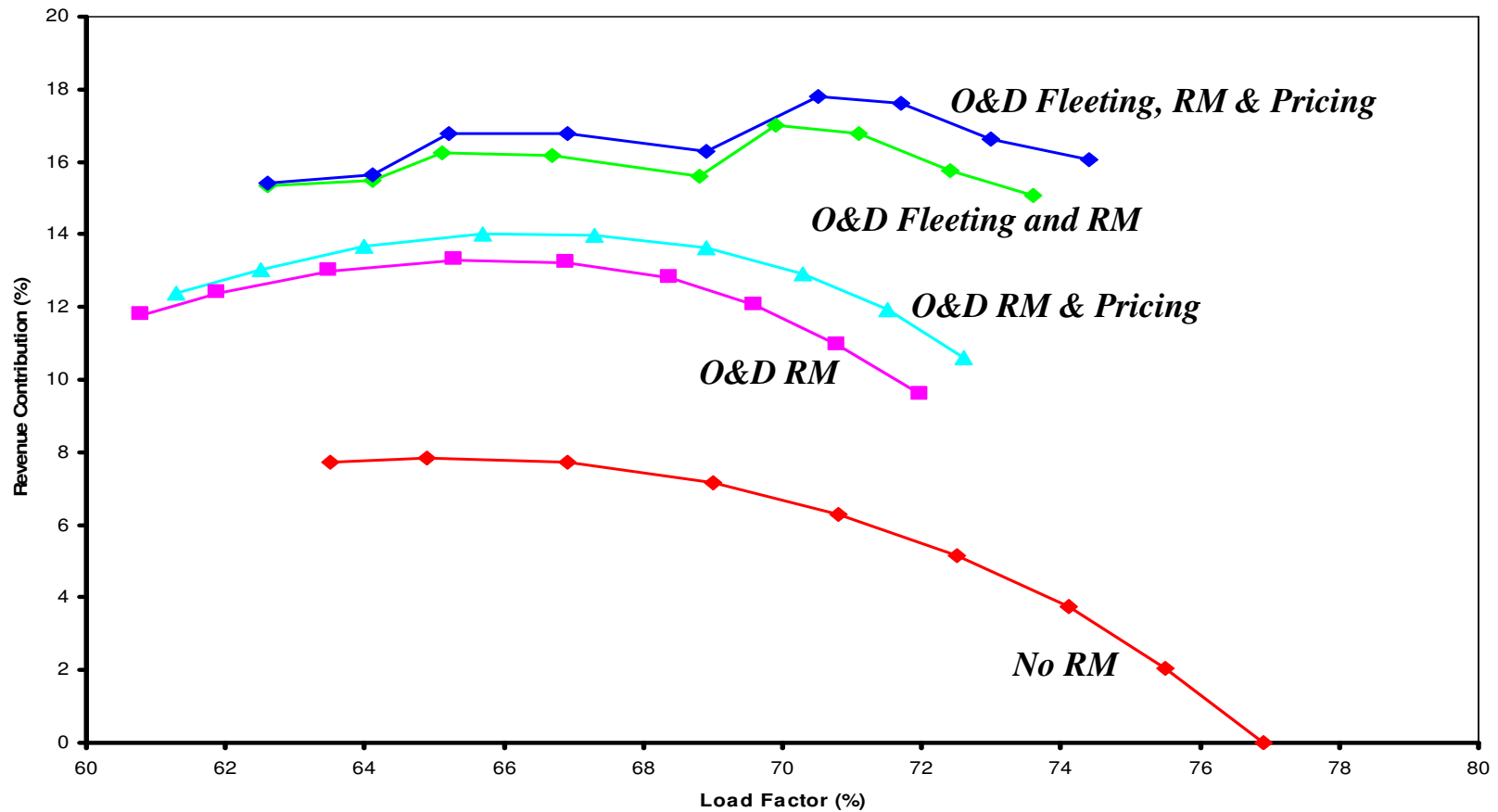
Load Factor (%)
6

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Integrating Fleeting and RM

Extension to Consider Pricing Effects



Reference: Jacobs, Ratliff and Smith;1997, 2000



Integrating Fleeting and RM

Application to a large network

O&D Fleeting Benchmark Details

- 4,000 or more flight legs
- 12 sub-fleets
- 600+ aircraft
- 150,000 total O&D markets (Including International Markets).
- One fare-class per O&D service
- No Jet-Prop Swaps
- International Fleeting Maintained
- Switching Mode (no flights dropped)

Results

Scenario	Daily Operations	Change in Passenger Traffic (%)	Change in Revenue (%)	Change in Cost (%)	Change in Profit (%)
Fall	4,034	(3.65)	(1.80)	(2.40)	1.21
Spring	4,434	0.10	0.71	(1.20)	7.20

Reference: Jacobs, Smith and Johnson, 2007



Thank you!

Questions?

