

# What is it worth?

**Aircraft Interiors  
EXPO ASIA  
Hong Kong  
27 September 2006**

**Klaus Brauer  
Director, Passenger Satisfaction & Revenue  
Boeing Commercial Airplanes**



# The “PaxRev” Passenger Revenue Model

## **Objective:**

**Estimate revenue differences in single markets  
resulting from different passenger products  
in a relatively simple and transparent manner**

# PaxRev does NOT ...

PaxRev does NOT:

- Deal with price elasticity
- Deal with network effects
- Estimate absolute revenues
- Evaluate or optimize schedules

# Principles

**No model predicts perfectly**

**Acknowledge the model's limitations**

**Note the direction of errors created by the model's limitations  
(e.g. not treating price elasticity and network effects both lead to understating differences)**

**“Conservative” is just another word for a wrong answer  
(Profitable concepts can be rejected because the revenue was “conservatively” underestimated)**

**Elements of the analysis are sometimes known  
Provide opportunities to override modules in the model**

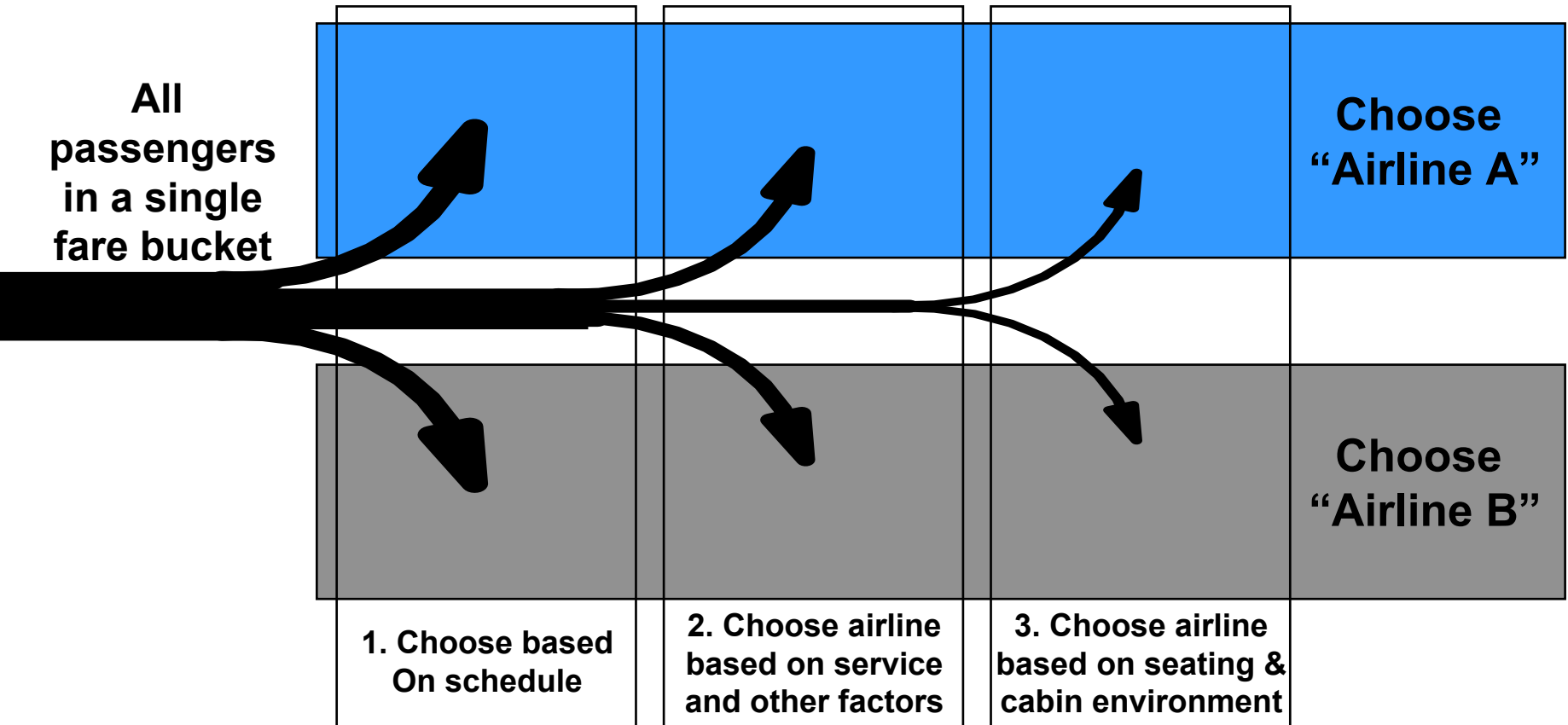
# The PaxRev Passenger Choice Paradigm

**Within each fare bucket:**

- 1. How many passengers does the schedule allow to make a choice between airlines?**
- 2. How important is the seating and cabin environment to passengers making a choice?**
- 3. How many more passengers making a choice will choose the study airline as a result of a given difference in cabin and seating environment?**

**What changes in load and yield result from the increase in demand in each fare bucket?**

# The PaxRev Passenger Choice Paradigm



# A typical study

**10-hour flights in which both the study airline and its competitor have one flight daily**

**Three different configurations for the study airline:**

- 1. A 9-abreast 787**
- 2. An 8-abreast (3-2-3) 787**
- 3. A 9-abreast 787 is which more space-efficient seats provide the equivalent of one inch of additional pitch**

# The PaxRev Passenger Choice Paradigm

**Within each fare bucket:**

**1. How many passengers does the schedule allow to make a choice between airlines?**

**2. How important is the seating and cabin environment to passengers making a choice?**

**3. How many more passengers making a choice will choose the study airline as a result of a given difference in cabin and seating environment?**

**What changes in load and yield result from the increase in demand in each fare bucket?**

# How many passengers does the schedule allow to make a choice?

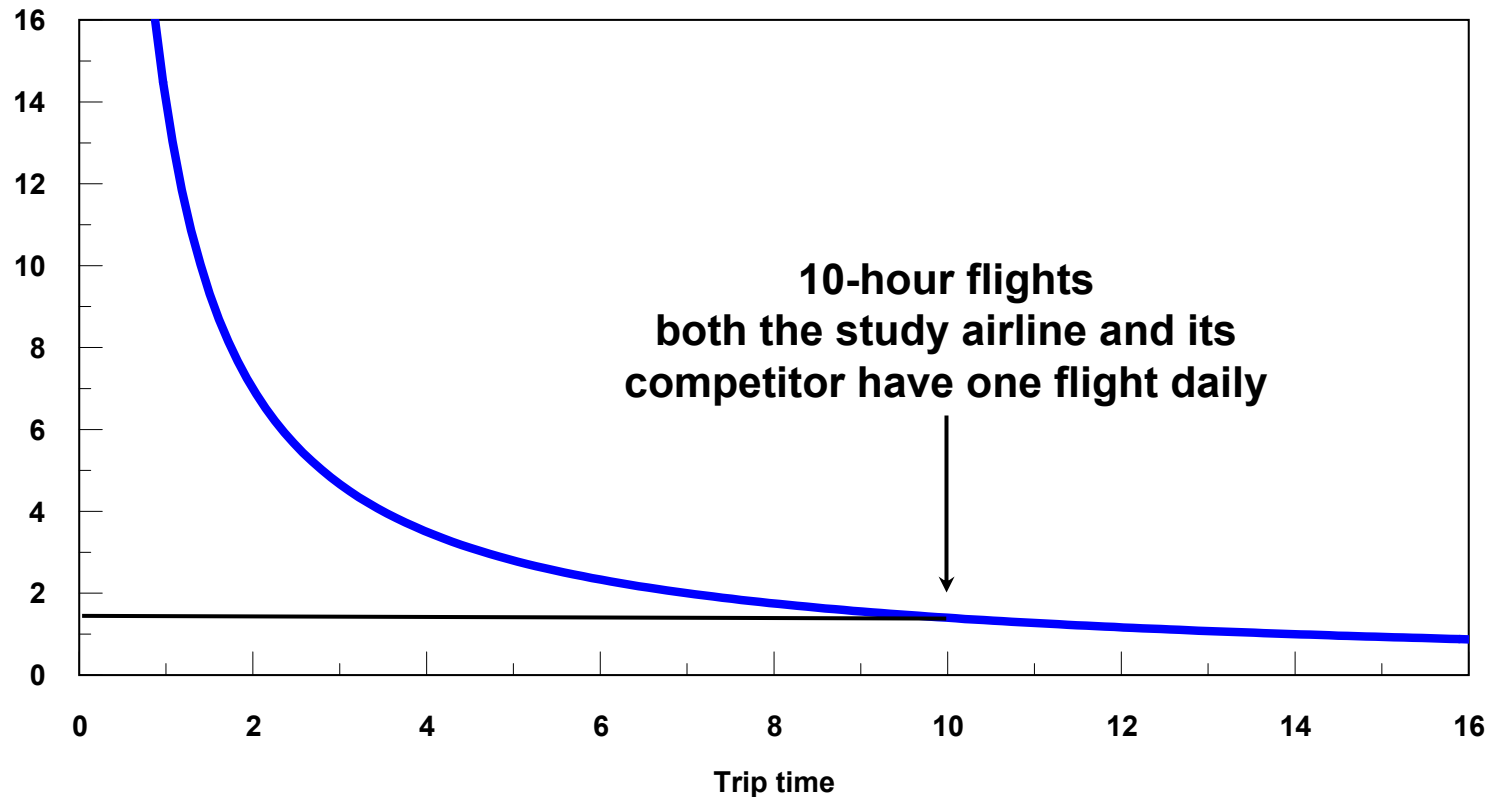
**You can ask them:**

- 1. Was this flight the only flight that met your schedule requirements or were there convenient alternatives?**
  - This was the only flight that met my schedule requirements**
  - There were other flights that met my schedule requirements**

# A simple coverage model can provide insight into the portion of passengers faced with a choice

The frequency required to provide a comprehensive schedule is a function of trip time

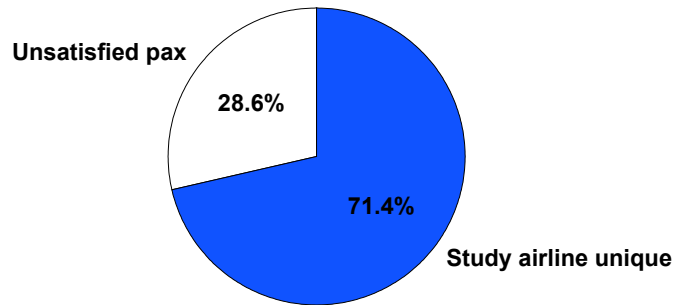
Daily frequencies required to provide convenient service for most passengers



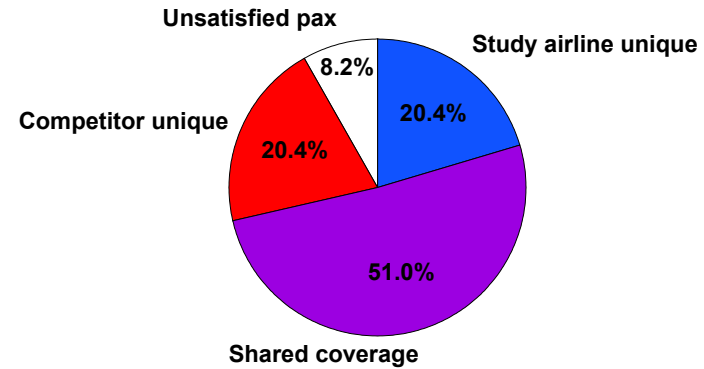
$$y = 14x^{-1}$$

# A simple coverage model can provide insight into the portion of passengers faced with a choice

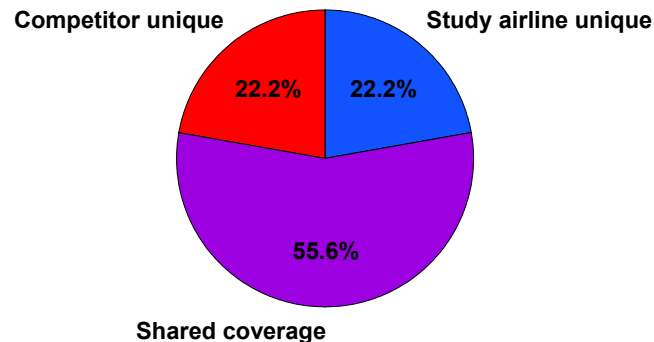
**Study airline viewed alone**



**All airlines viewed together**



**Normalized (unsatisfied pax replanned)**



# The PaxRev Passenger Choice Paradigm

**Within each fare bucket:**

**1. How many passengers does the schedule allow to make a choice between airlines?**

**2. How important is the seating and cabin environment to passengers making a choice?**

**3. How many more passengers making a choice will choose the study airline as a result of a given difference in cabin and seating environment?**

**What changes in load and yield result from the increase in demand in each fare bucket?**

# How important is the seating and cabin environment to passengers making a choice?

**You can ask them:**

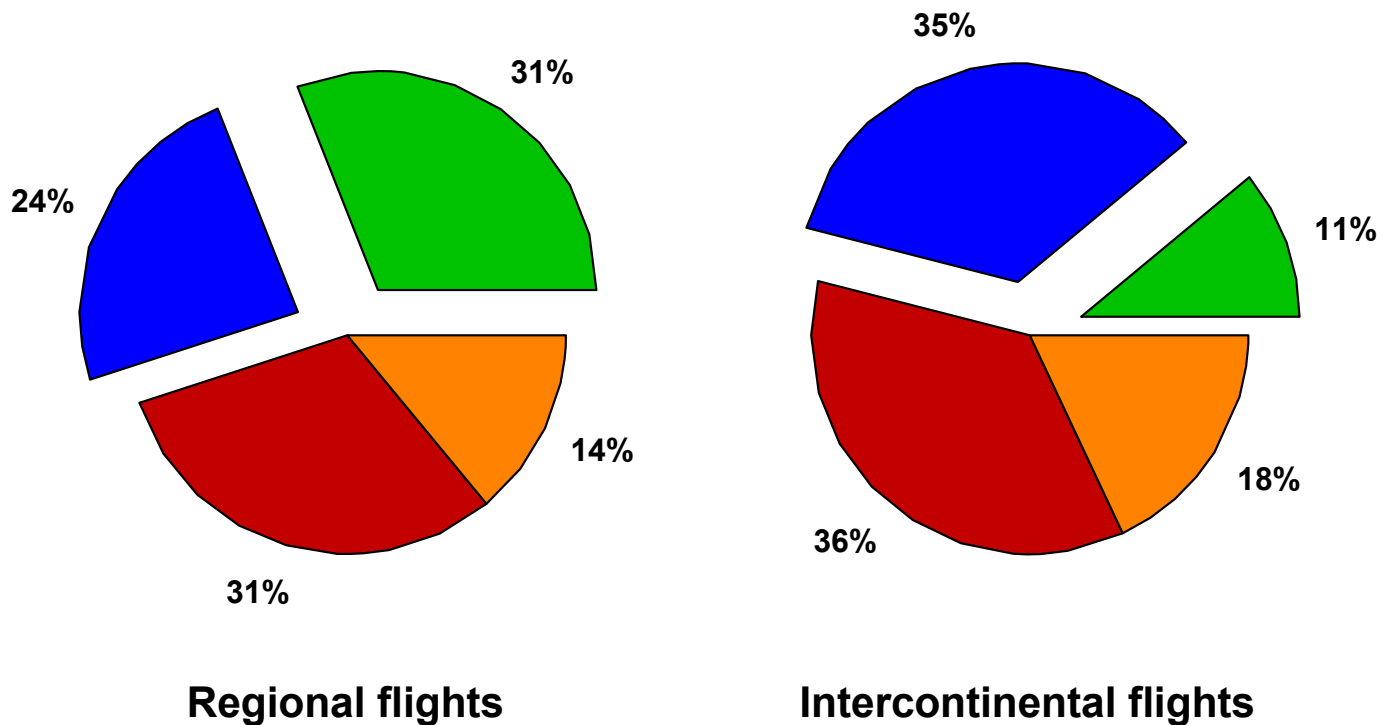
**2. What was the most important factor in your selection of this flight?**

- This airline's reputation for schedule reliability**
- The seating and cabin environment I expected**
- Frequent flyer or other marketing programs**
- The service level I expected**

# Seating and cabin environment are critically important on long flights

What is most important to the passenger depends upon the length of the flight

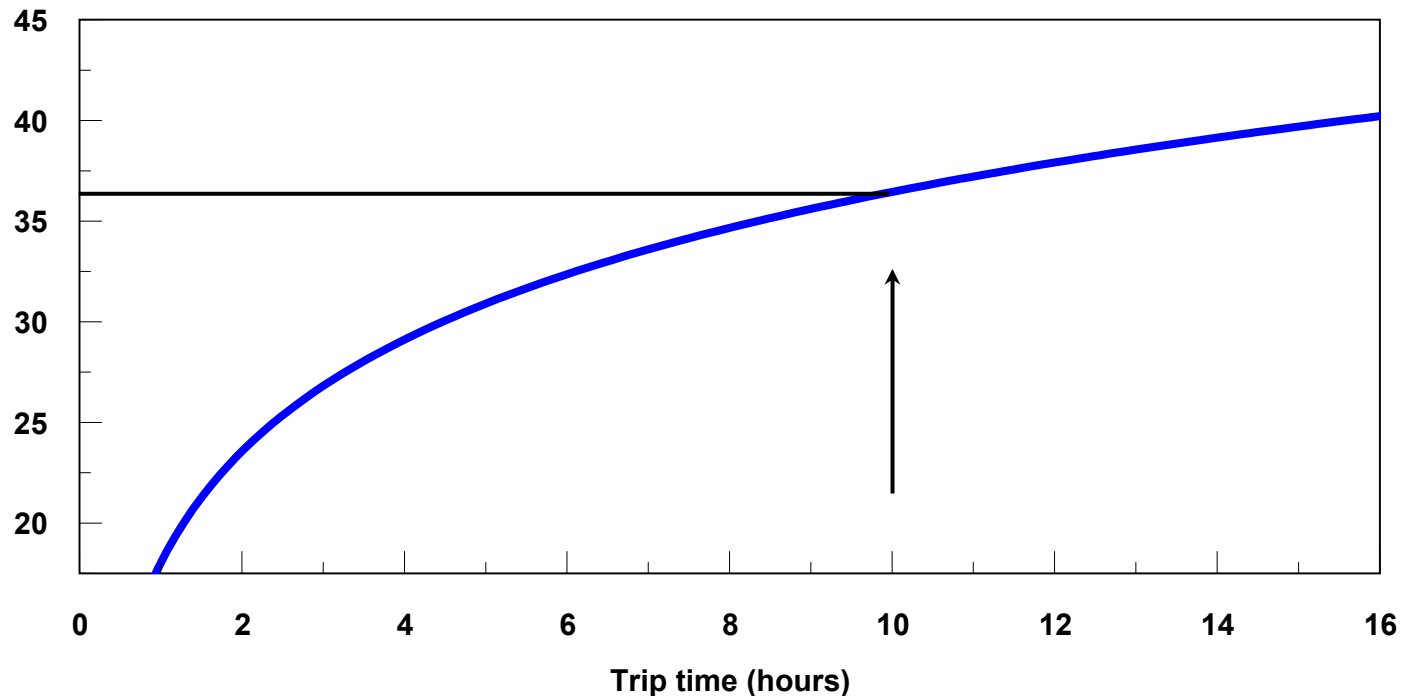
■ Schedule ■ Seating & Cabin ■ Service ■ Marketing Programs



# Seating and cabin environment are critically important on long flights

**The importance of seating and cabin environment factors grows as flights become longer**

Percent of passengers naming cabin environment factors as the most important factors in their choice of an airline



$$y = 18 + 8(\ln x)$$

# The PaxRev Passenger Choice Paradigm

**Within each fare bucket:**

- 1. How many passengers does the schedule allow to make a choice between airlines?**
- 2. How important is the seating and cabin environment to passengers making a choice?**
- 3. How many more passengers making a choice will choose the study airline as a result of a given difference in cabin and seating environment?**

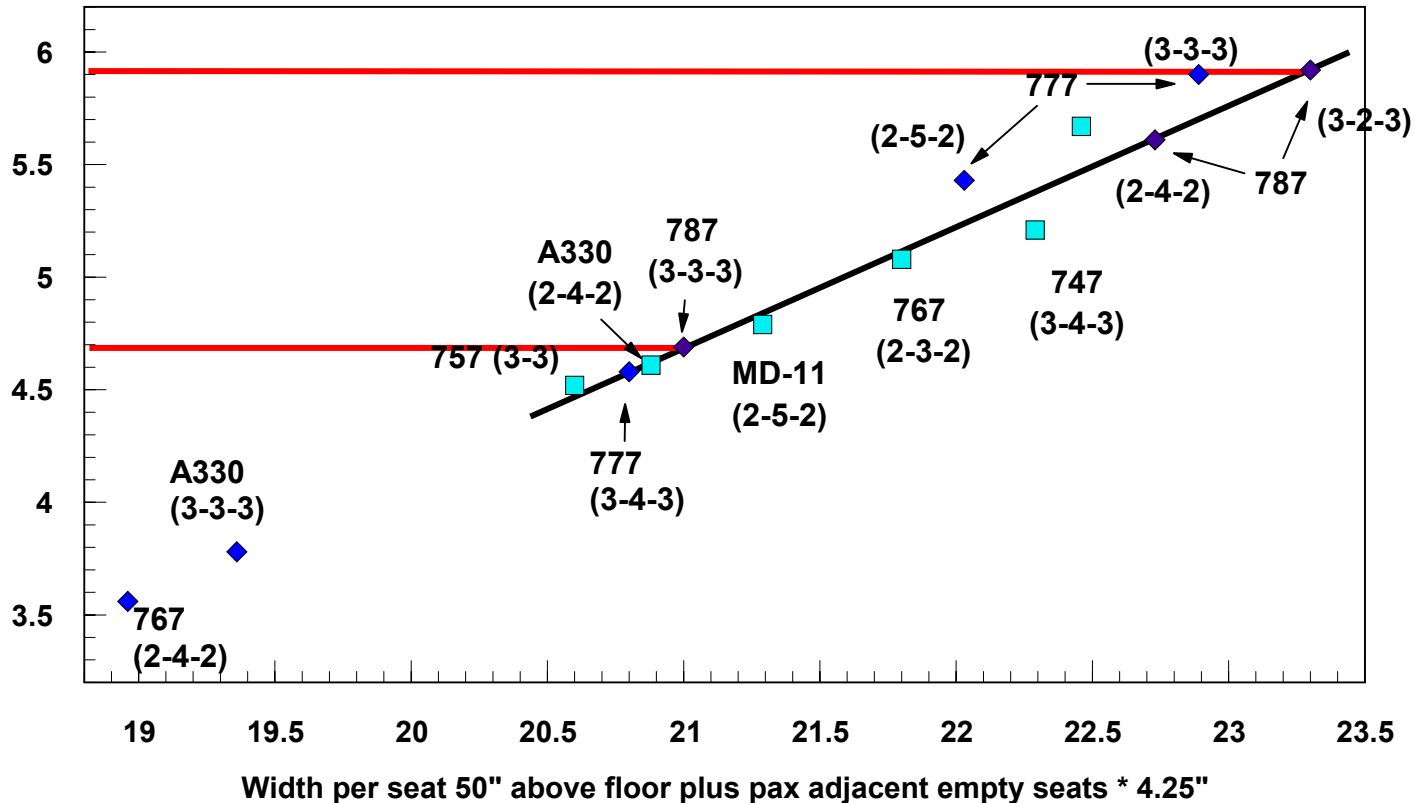
**What changes in load and yield result from the increase in demand in each fare bucket?**



# The relation between effective seat width and preference enables the prediction of preference ratings

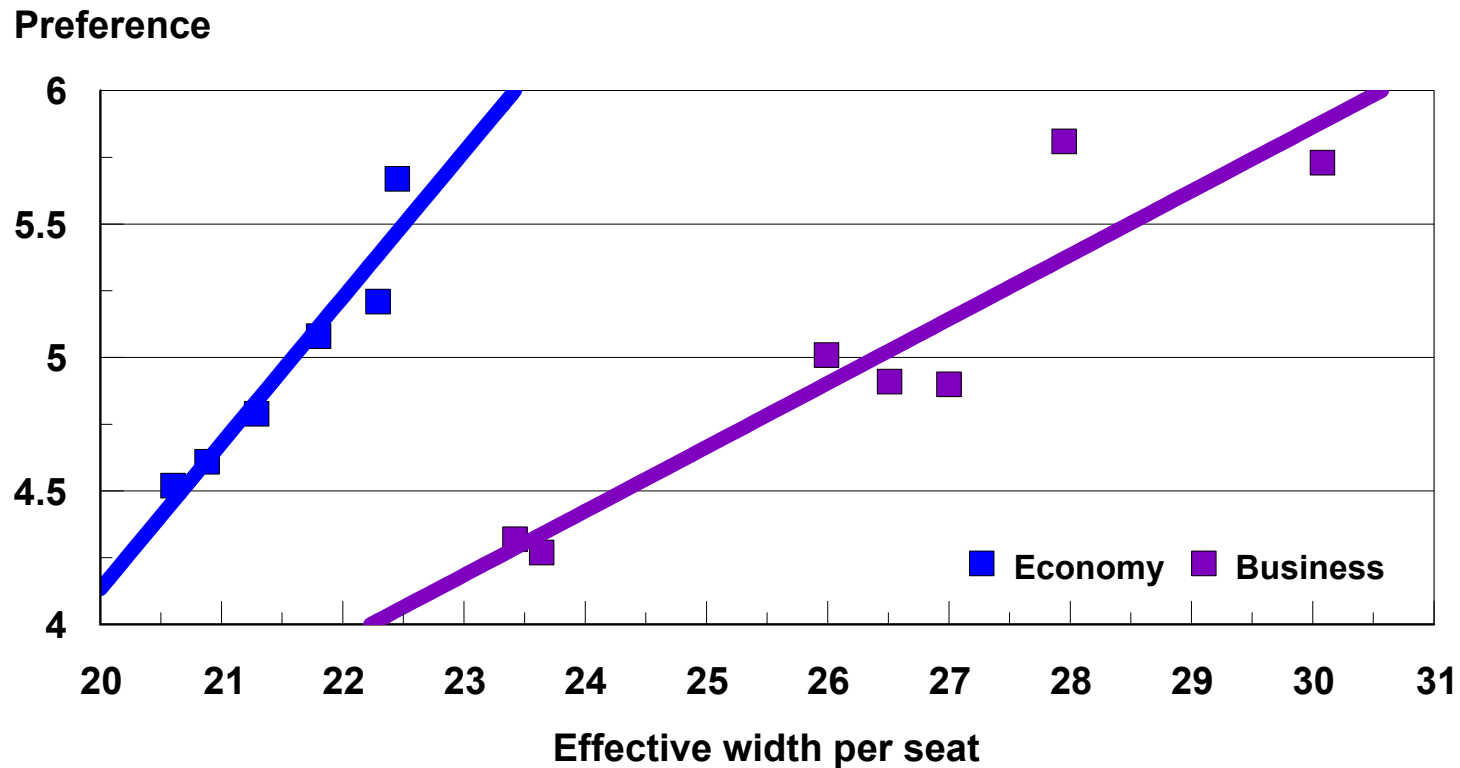
Effective width per seat can be used to estimate the preference for additional configurations

Preference for model on intercontinental flights



# The relation between effective seat width and preference enables the prediction of preference ratings

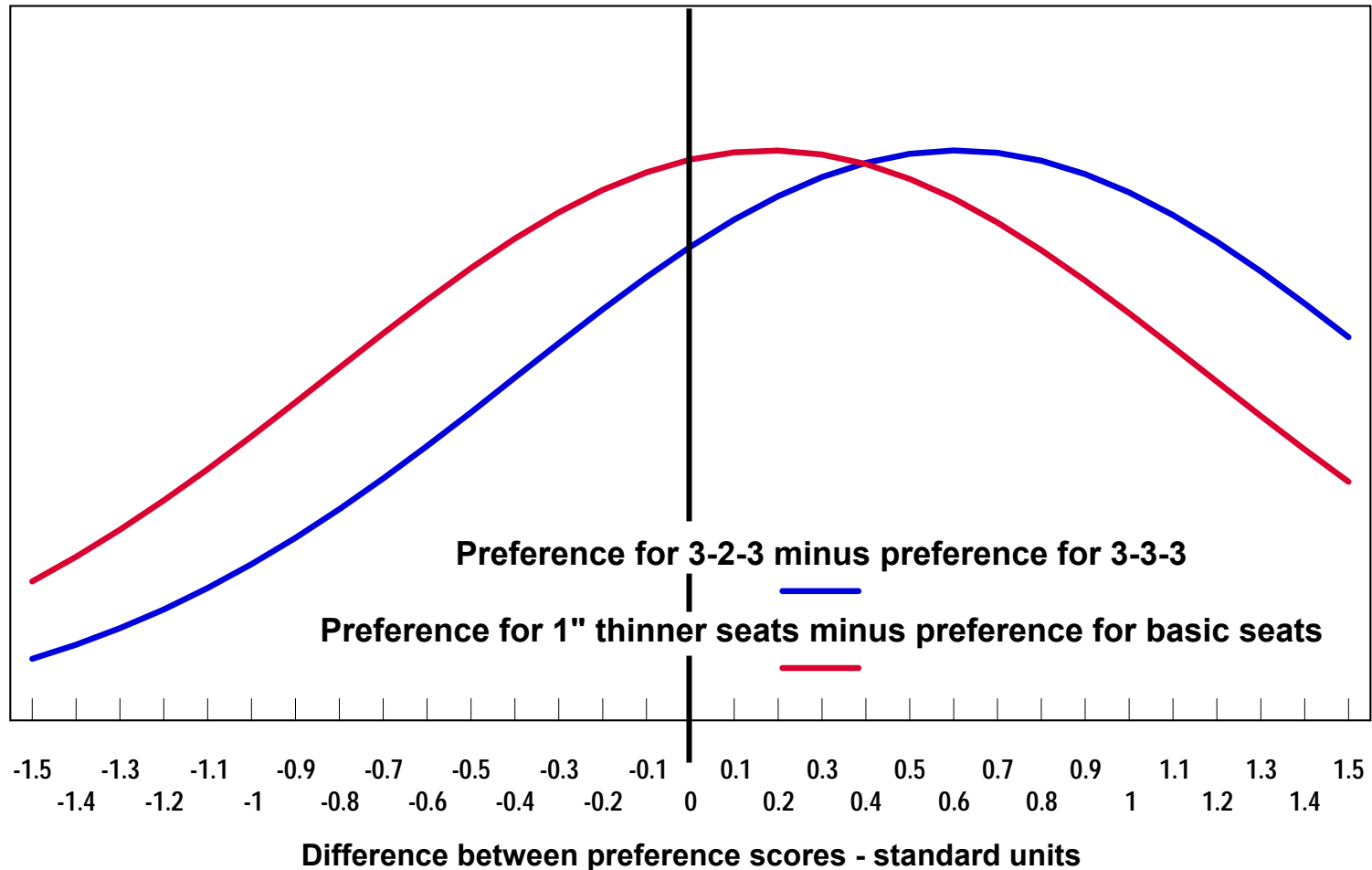
Effective width per seat has only half the impact on preference in business class as in economy



Economy: R-sq=0.92,  $y = -6.79 + 0.55x$

Business: R-sq=0.86,  $y = -1.33 + 0.24x$

# The difference between preference ratings reveals the portion of pax who prefer one alternative to another



# Estimating the demand impact of the cabin and seating environment

**We have useful calibration data for:**

**Economy class effective width per seat**

**Business class effective width per seat**

**Economy class effective pitch**

**Selected architecture differences  
(e.g. 767 Signature Interior vs 767 Classic)**

# The PaxRev Passenger Choice Paradigm

**Within each fare bucket:**

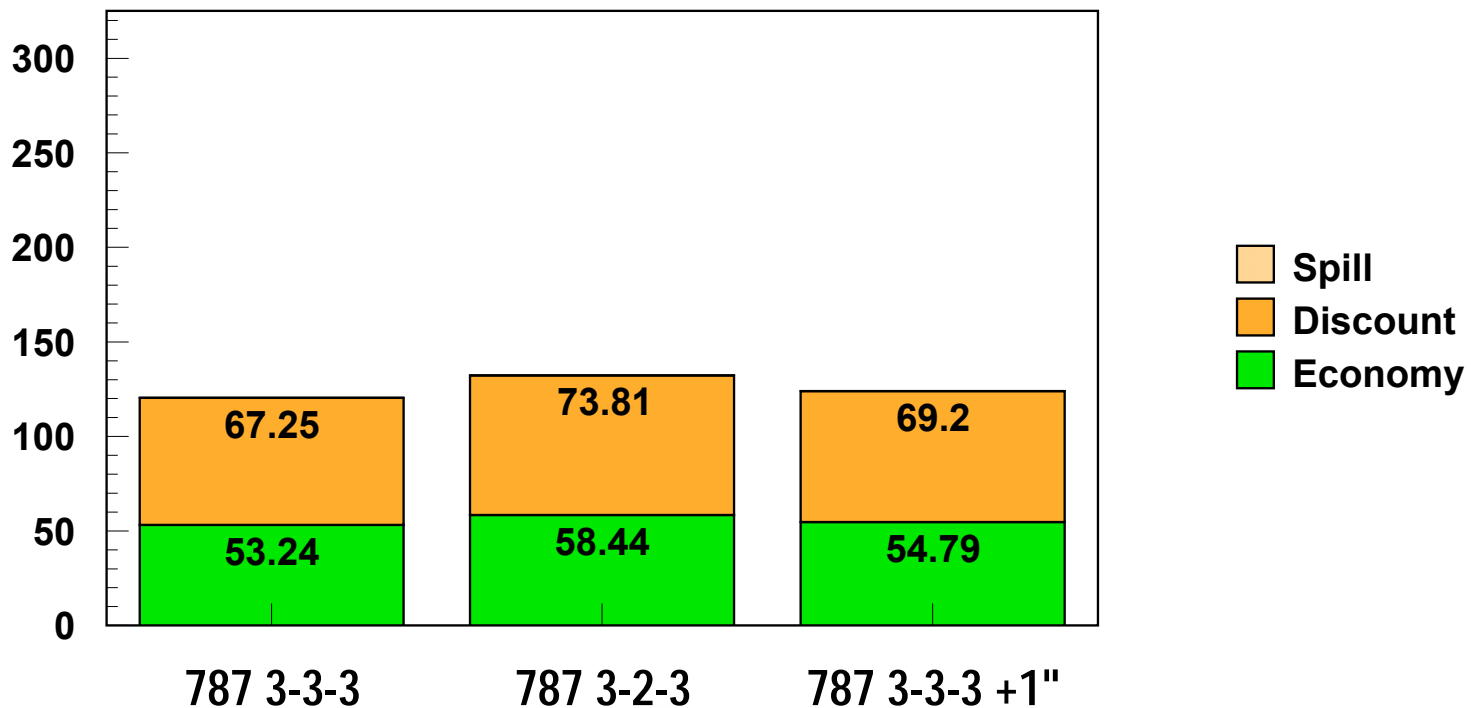
- 1. How many passengers does the schedule allow to make a choice between airlines?**
- 2. How important is the seating and cabin environment to passengers making a choice?**
- 3. How many more passengers making a choice will choose the study airline as a result of a given difference in cabin and seating environment?**

**What changes in load and yield result from the increase in demand in each fare bucket?**

# Nested spill routines can emulate the impact of higher demand levels in the Revenue Management System

**Passengers boarded on an 15%ile load flight**  
*Not nested into premium cabins*

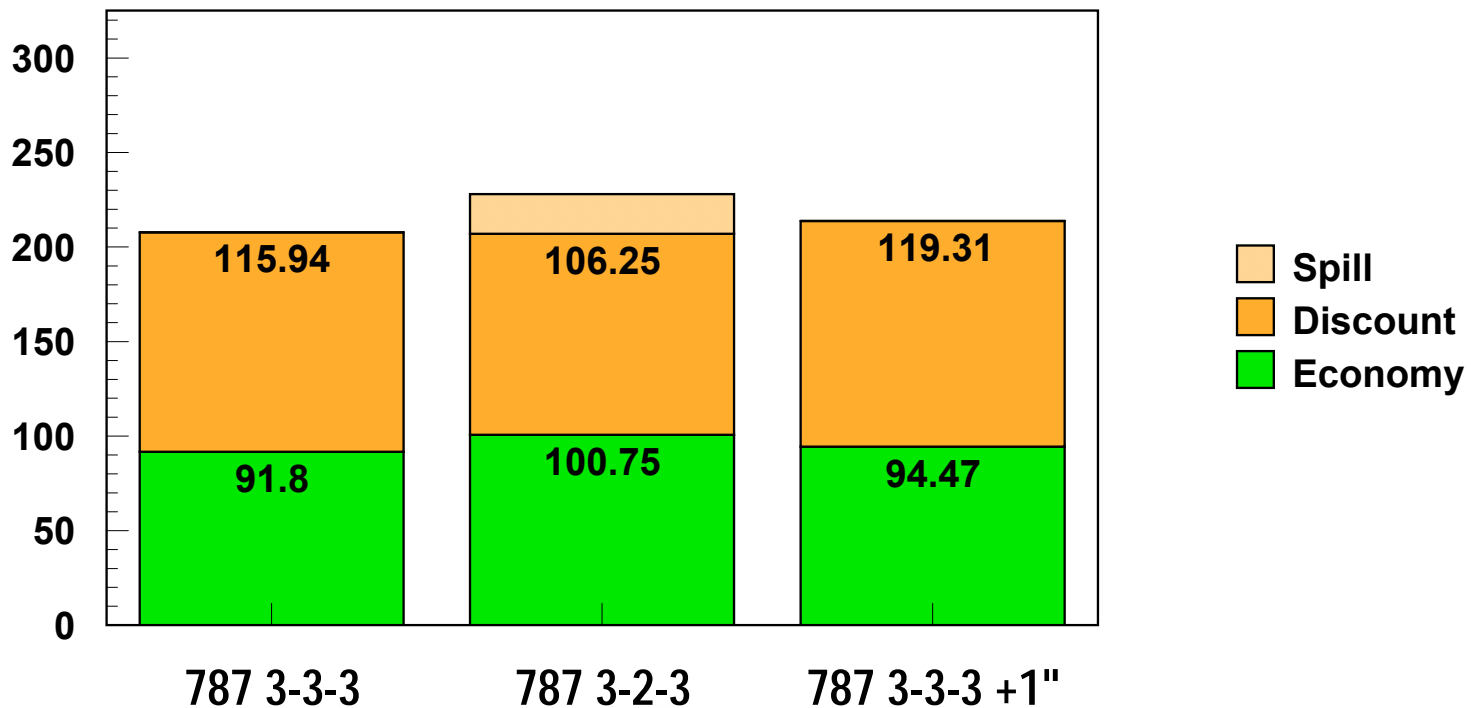
Passengers



# Nested spill routines can emulate the impact of higher demand levels in the Revenue Management System

**Passengers boarded on an 50%ile load flight**  
*Not nested into premium cabins*

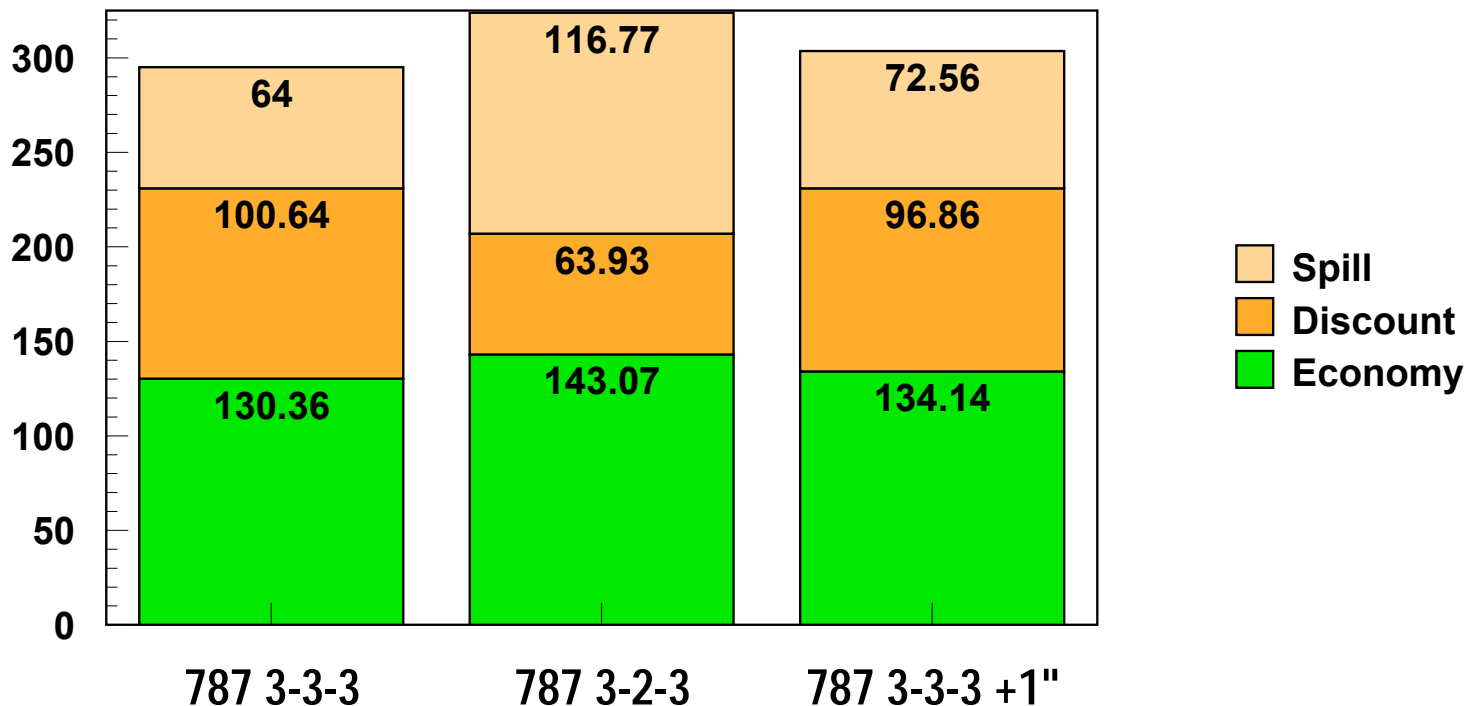
## Passengers



# Nested spill routines can emulate the impact of higher demand levels in the Revenue Management System

**Passengers boarded on an 85%ile load flight**  
*Not nested into premium cabins*

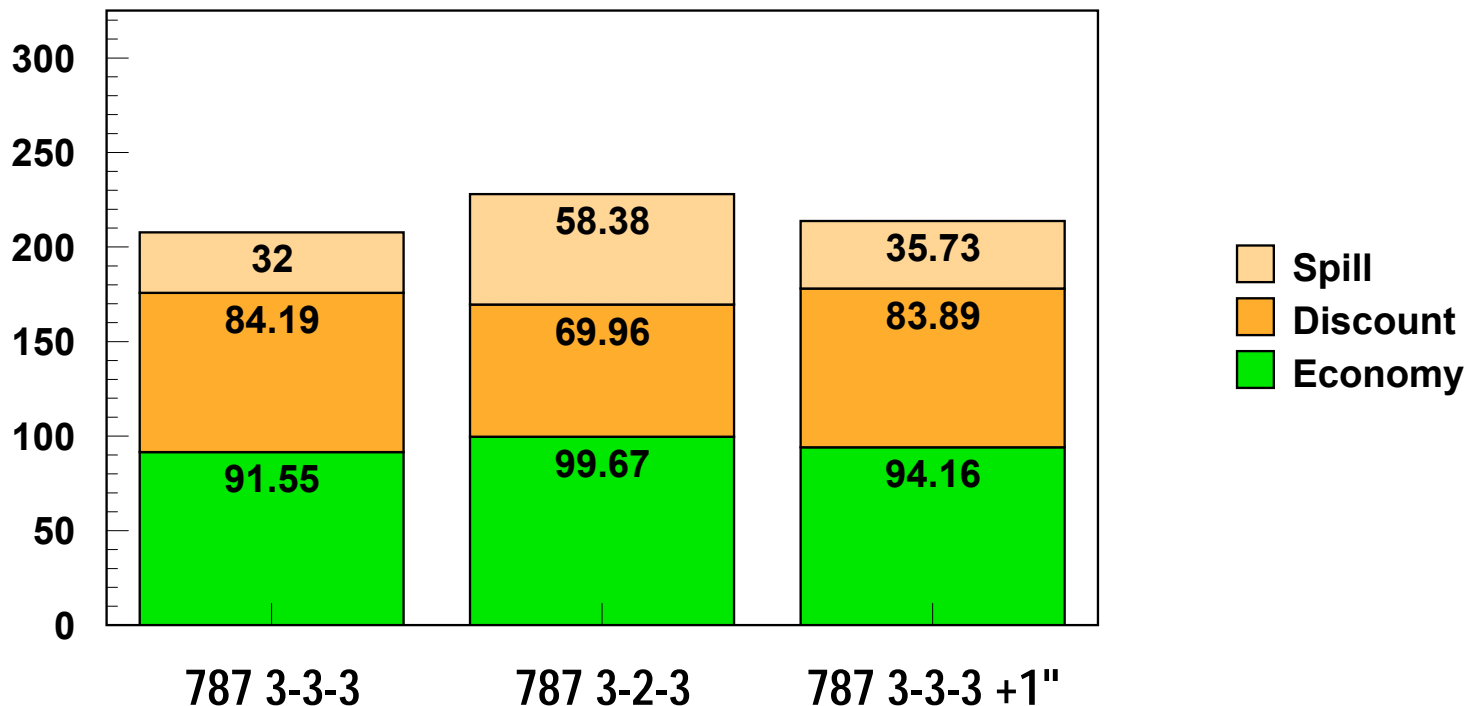
**Passengers**



# Nested spill routines can emulate the impact of higher demand levels in the Revenue Management System

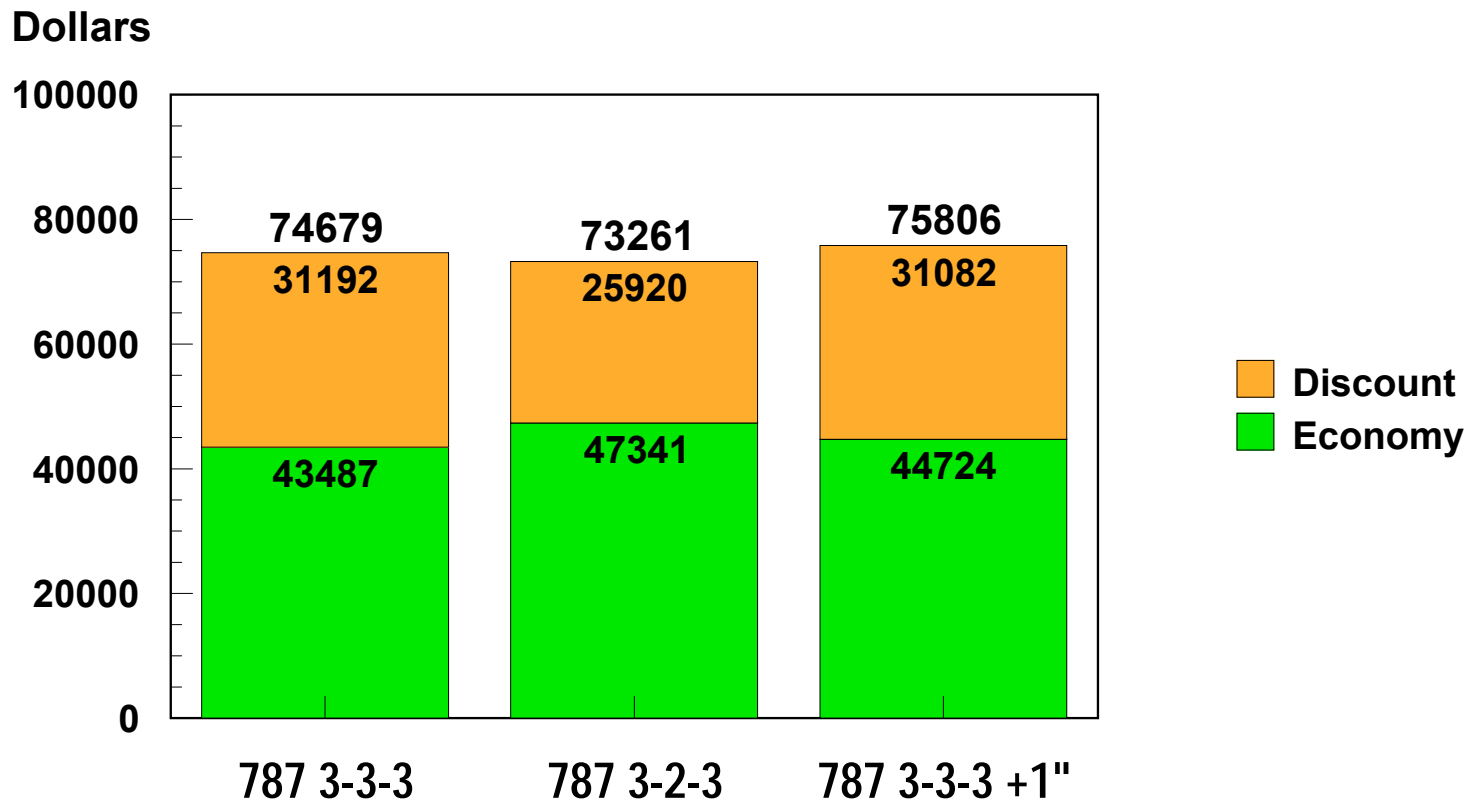
## Average economy passengers per flight *Fully nested*

Passengers



# Nested spill routines can emulate the impact of higher demand levels in the Revenue Management System

## Average economy-class revenue per flight *Fully nested*



# **Different study parameters will lead to different answers**

**More competition will tip the balance toward the greater demand of the 8-abreast configuration**

**Shorter ranges will tip the balance further toward the greater capacity of the 9-abreast configuration**

**Complex combinations of factors will tip the balance in directions not easily predicted**

# Aircraft interior enhancements have tremendous leverage on the airline's bottom line

**In this simple example, the five-year NPV of the increased revenue resulting from better seats is \$2.6 million!**