

# National Trends in Airline Flight Delays and Cancellations, and the Impact on Passengers



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# Outline

- Simple Statistics
  - Don't tell the whole story
- Trends
  - Distribution of flight delays
    - Delay = Actual arrival time - scheduled arrival time
    - Impact of load factors
    - Impact of connecting passengers
  - Rate of flight cancellations
    - Cancellations at hubs
  - Scheduled versus actual block times
- Passenger delays
  - Correlation to aircraft delays and cancellations
  - Impact of load factors
- Summary

# Research Objectives

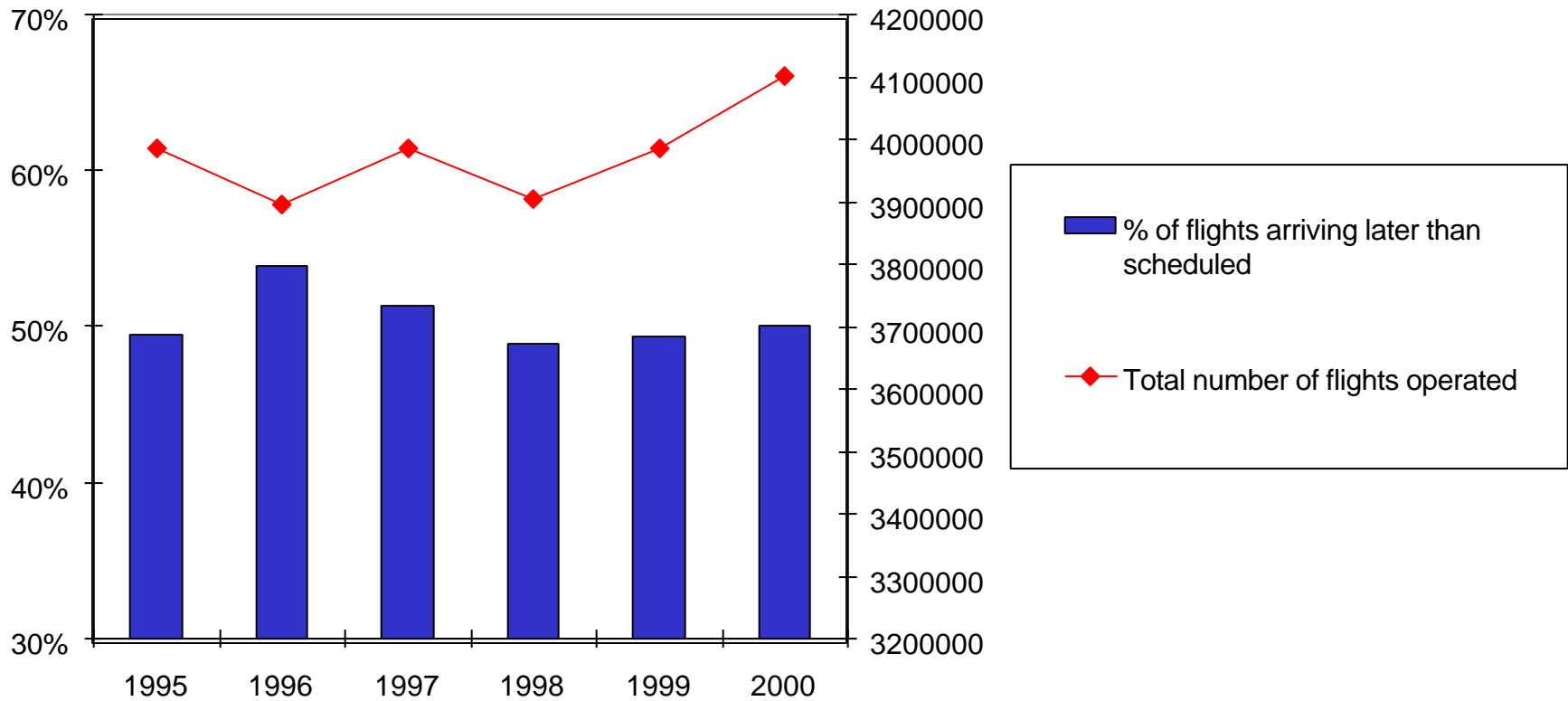
- Quantify trends in airline flight delays and cancellations
- Investigate the impact of flight delays, cancellations, passenger connections and load factors on passenger delays

# Data Sources

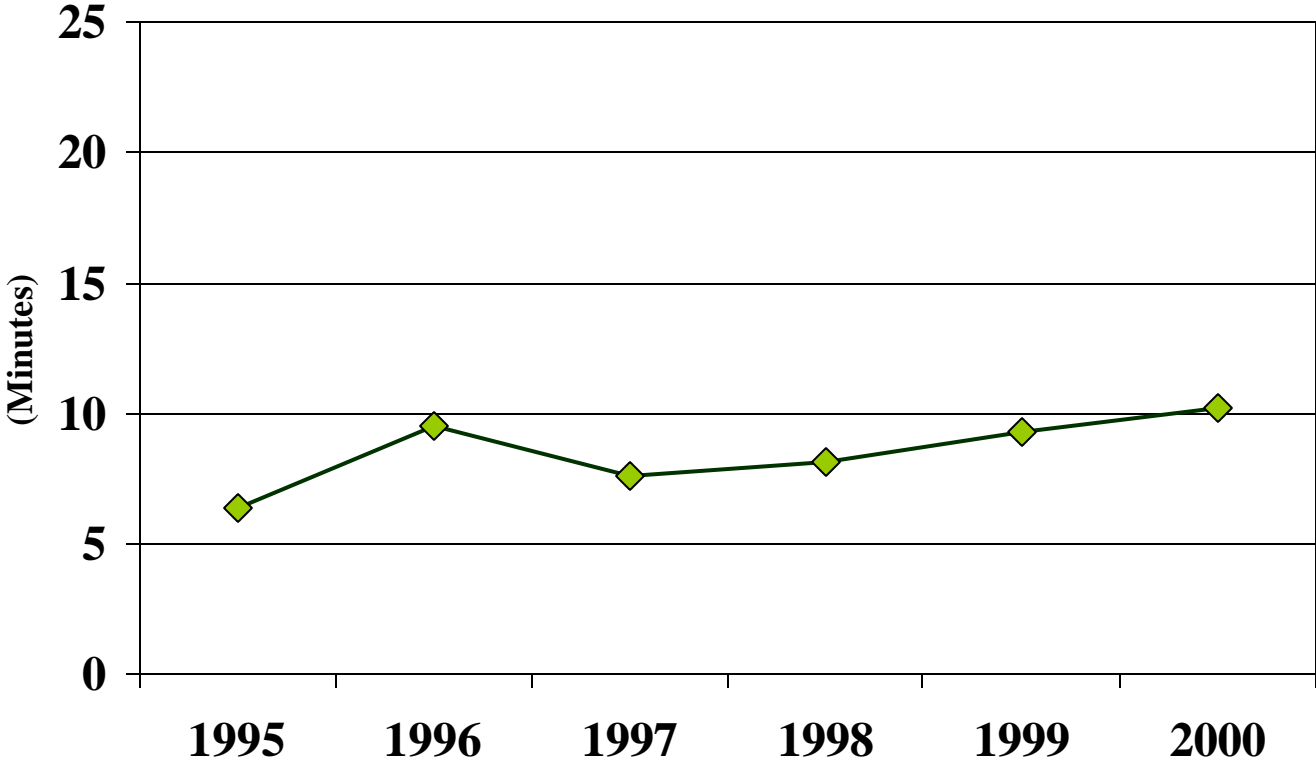
- Airline Service Quality Performance (ASQP)
  - US airlines earning revenues of \$1 billion or more annually in scheduled service
  - U.S. domestic flights only
  - Jet aircraft operations only
  - January through September only
- Planned Itinerary Demands and Passenger Flows
  - From a major U.S. airline
  - Covering 1000 flights and 11000 itineraries over a 1 month time period

# Some Simple Statistics ...

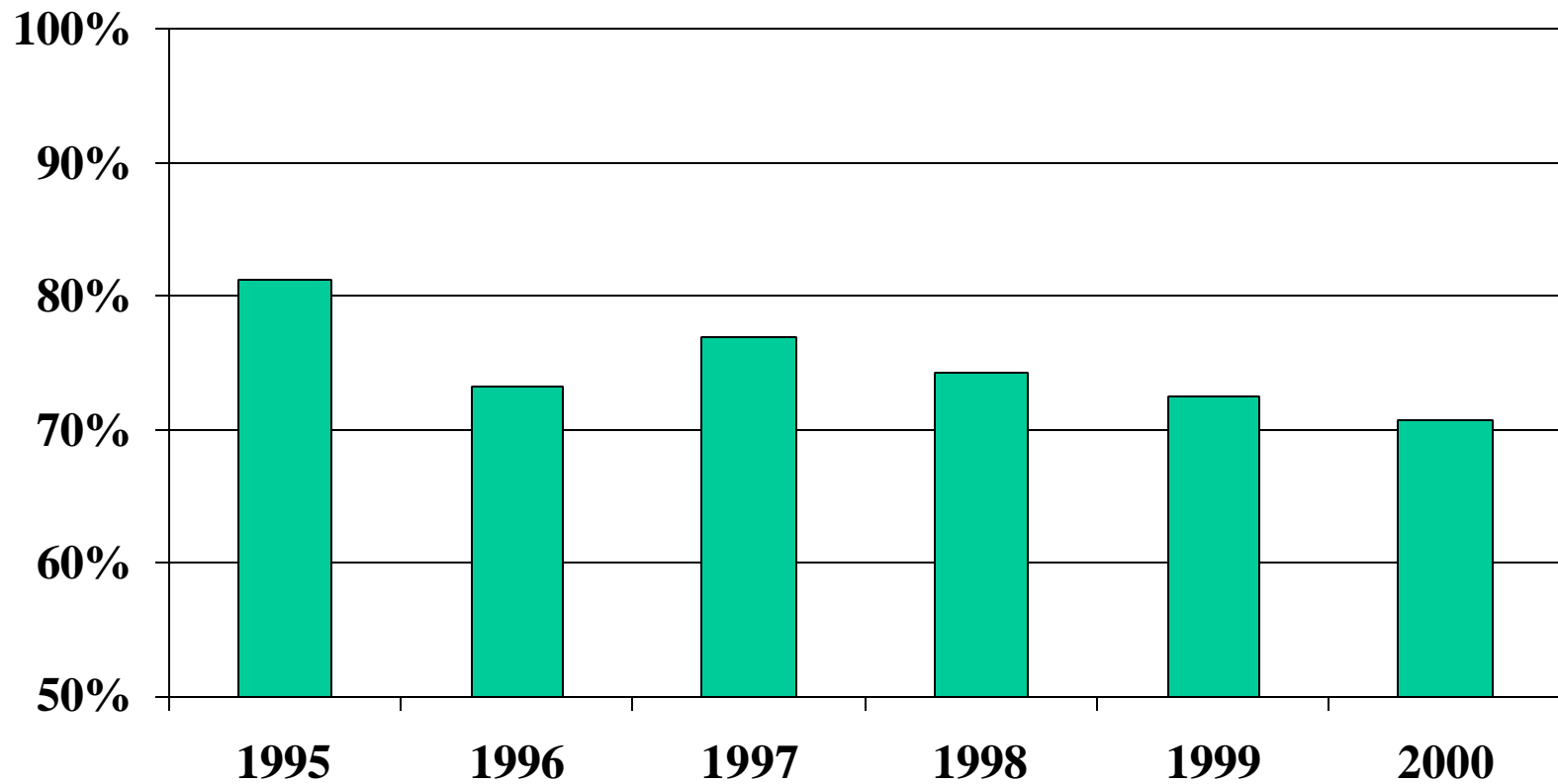
# Number and Percentage of Delayed Flights



# Average Delay Duration of Operated Flights



# 15-minute On-Time Performance





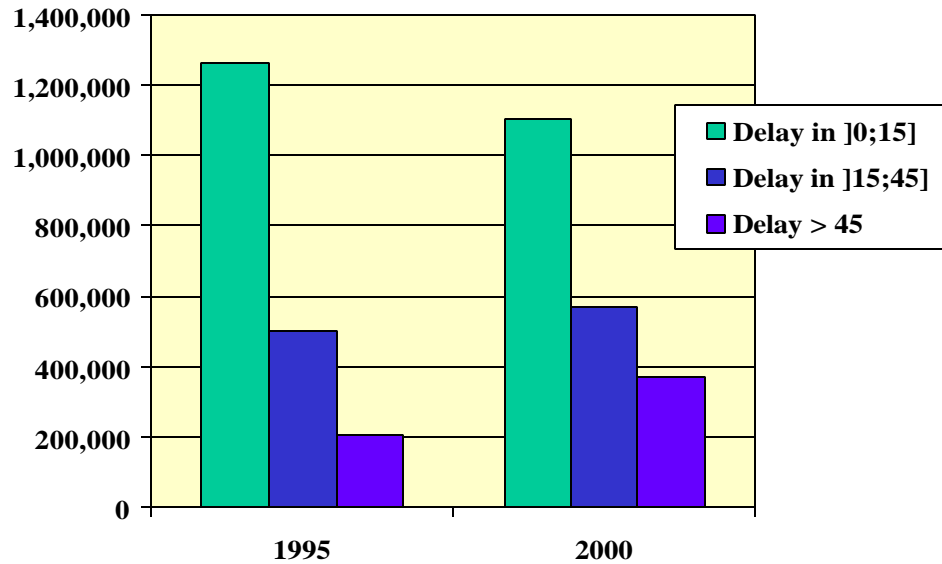
# Why are Airline Passengers so Disgruntled?

*Simple statistics are  
misleading...*

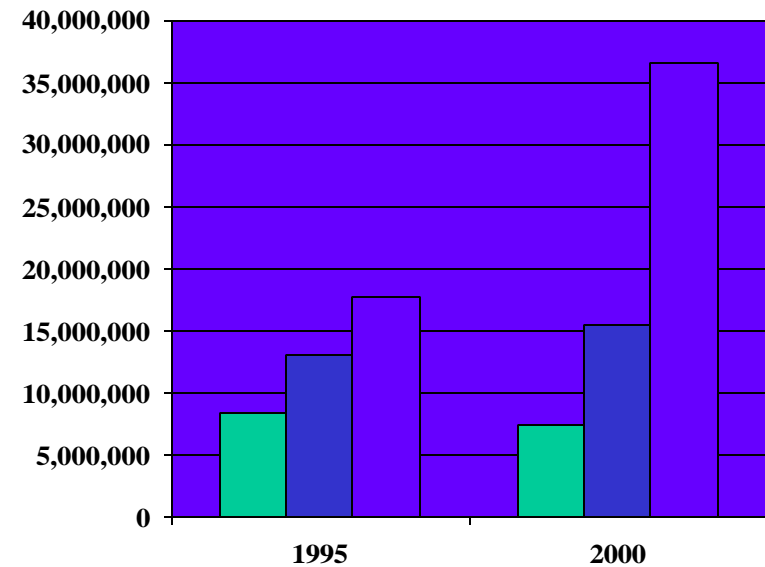
# Important Factors Not Accounted For in Simple Statistics

- Distribution of flight delays
- Percentage of passengers with connections
- Load factor
- Flight cancellation rate

# Factor #1: Shift to Longer Flight Delays



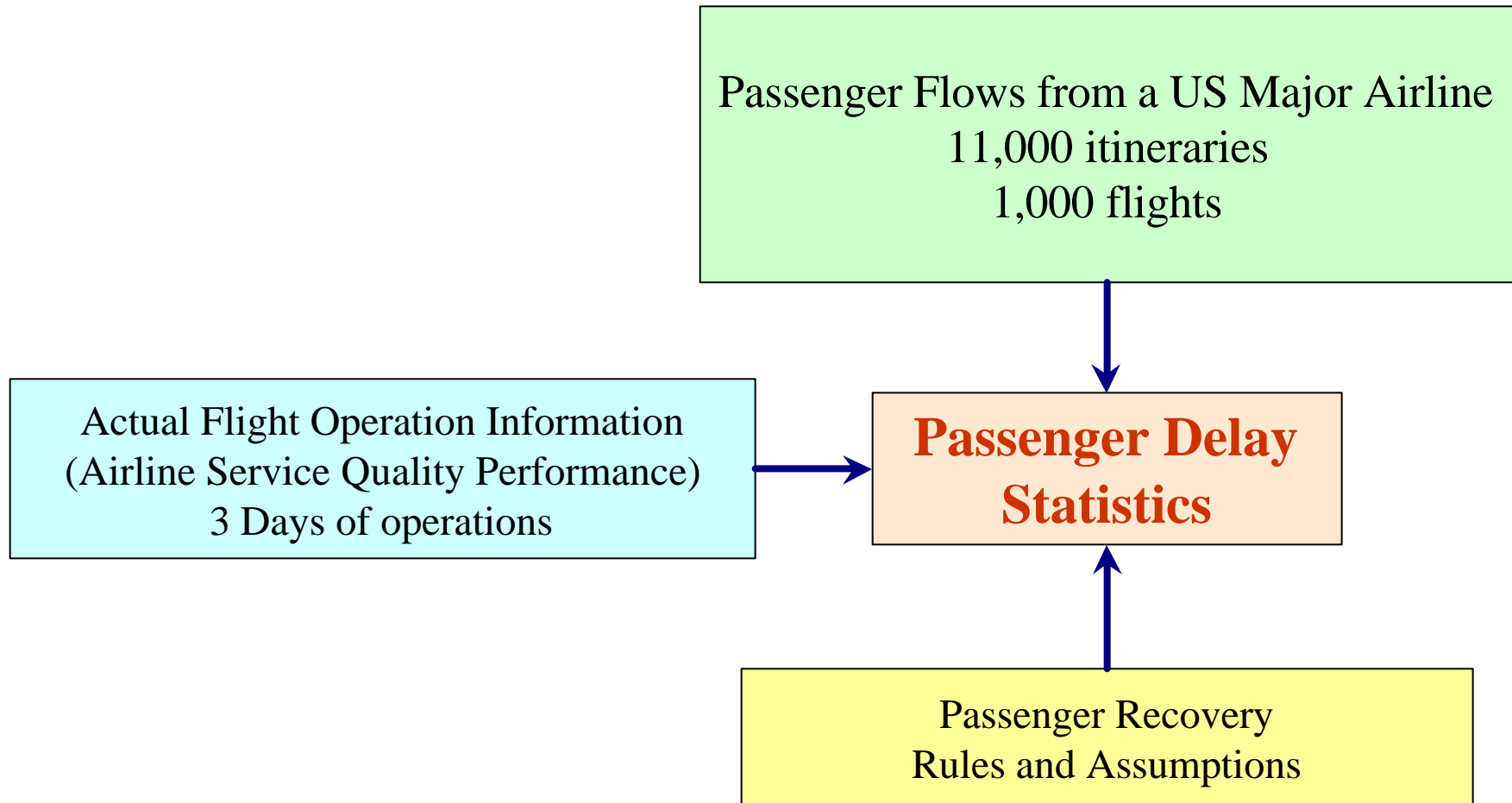
Number of Delayed Flights



Total Delay Minutes

▶ The delay distribution has shifted from short to long delays

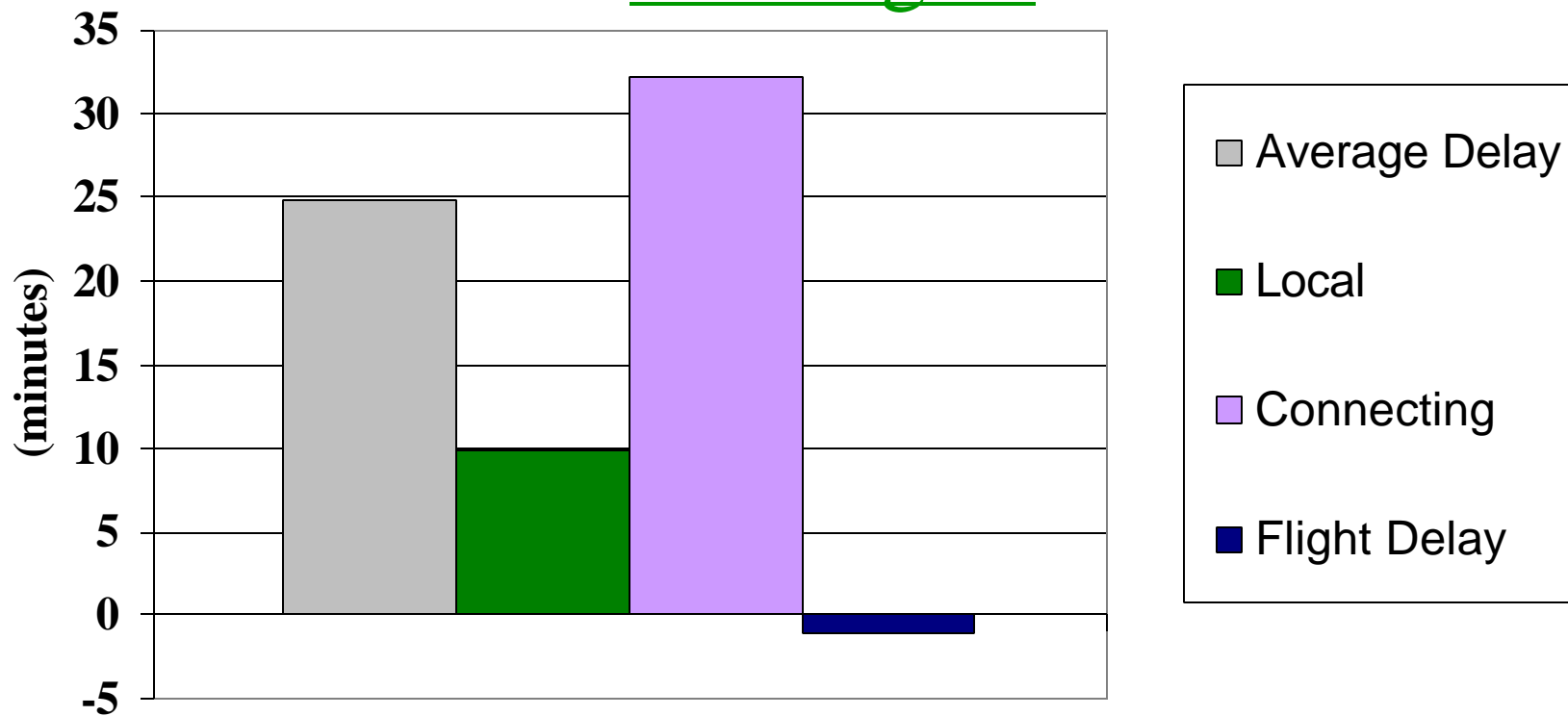
# Case Study: Passenger Delays



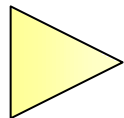
# Flight Statistics

Scenario	Low	Airline July 2000
15OTP	89.30%	80%
% of flight w/ Delay > 45 min	2.91%	9.4%
Nb. of canceled flights	9	24
% of canceled flights	0.84%	2.2%
Average Delay of flights	-1.02	8.6

## Factor 2: Percentage of Connecting Passengers

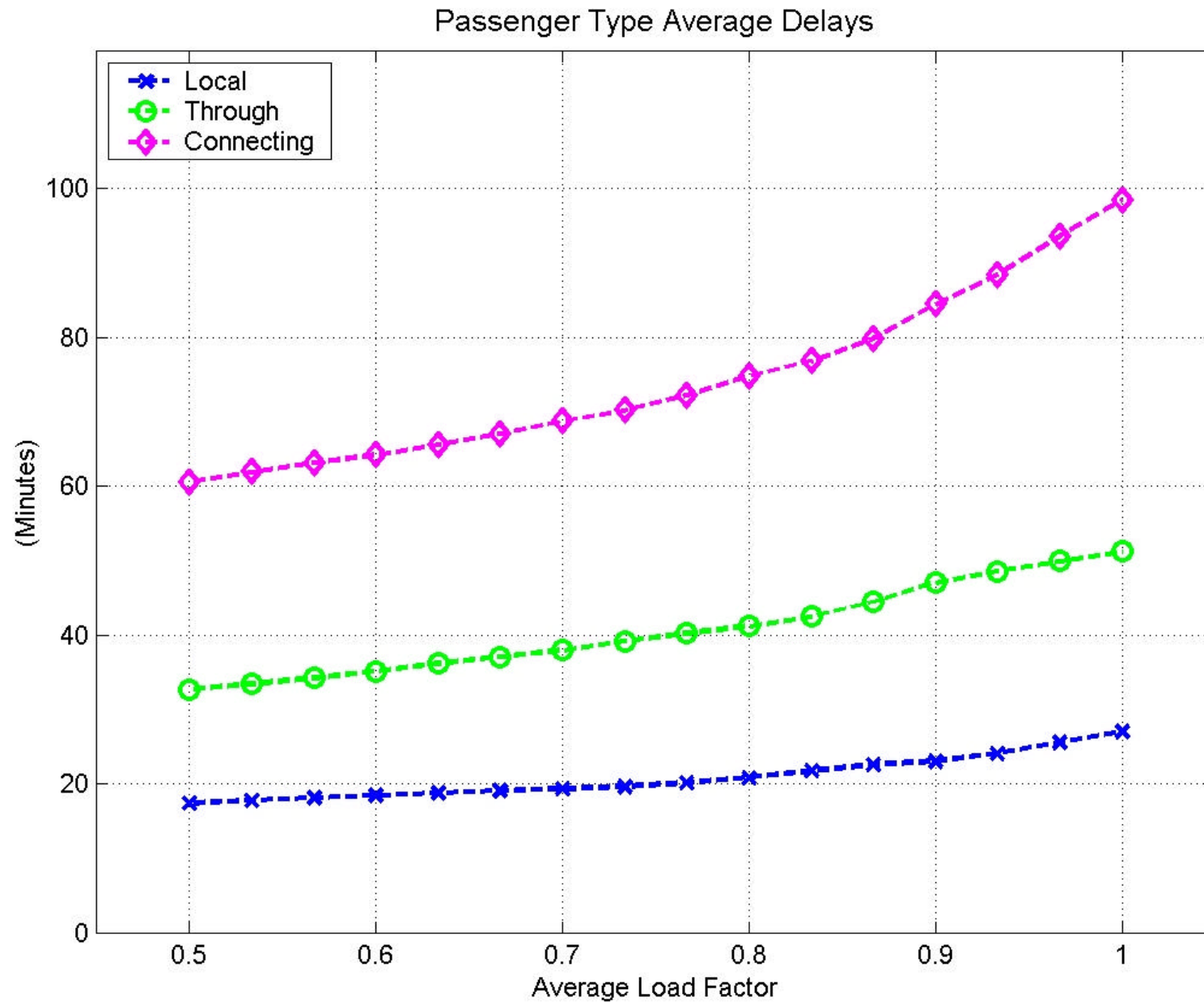


Average Passenger and Flight Delays

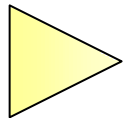
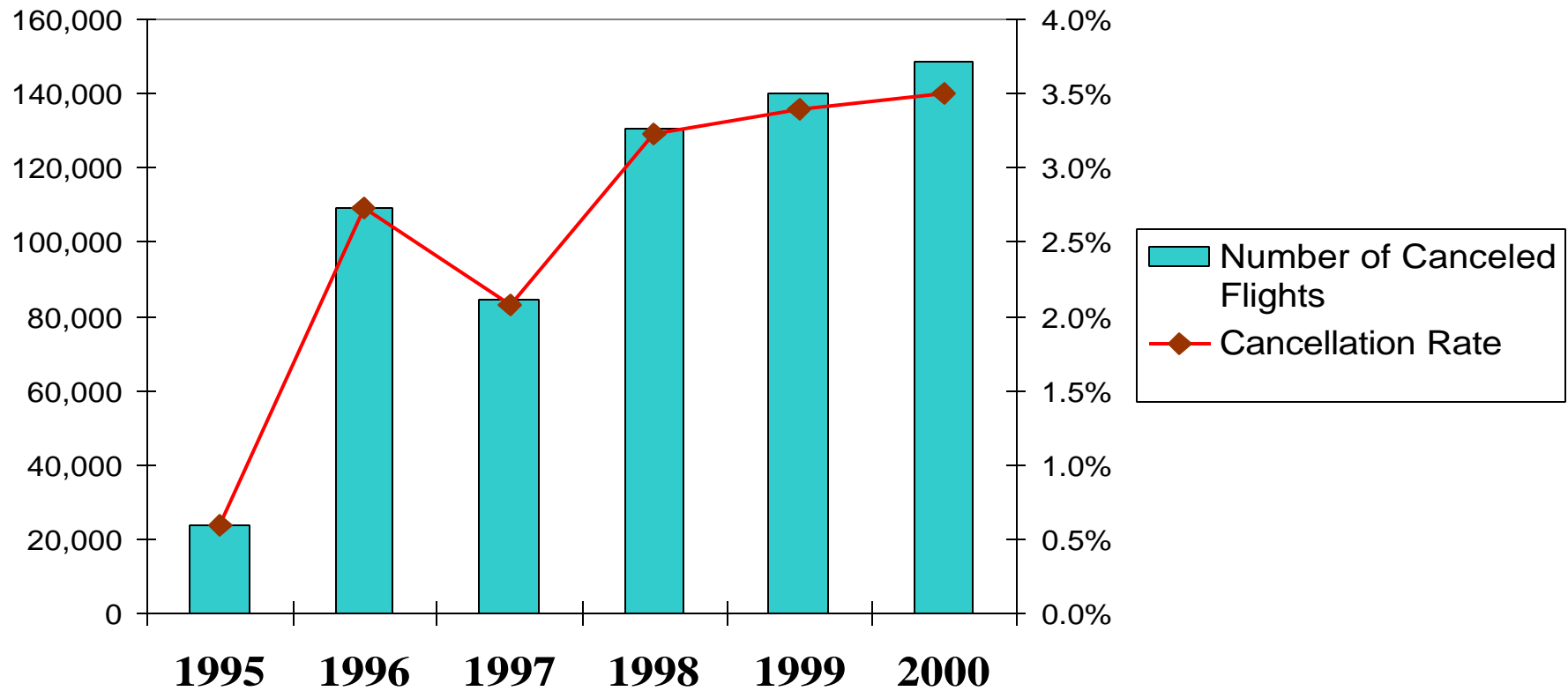


Flight delays underestimate passenger delays  
Key explanation lies in the connecting passengers

# Factor 3: Impact of Load Factors



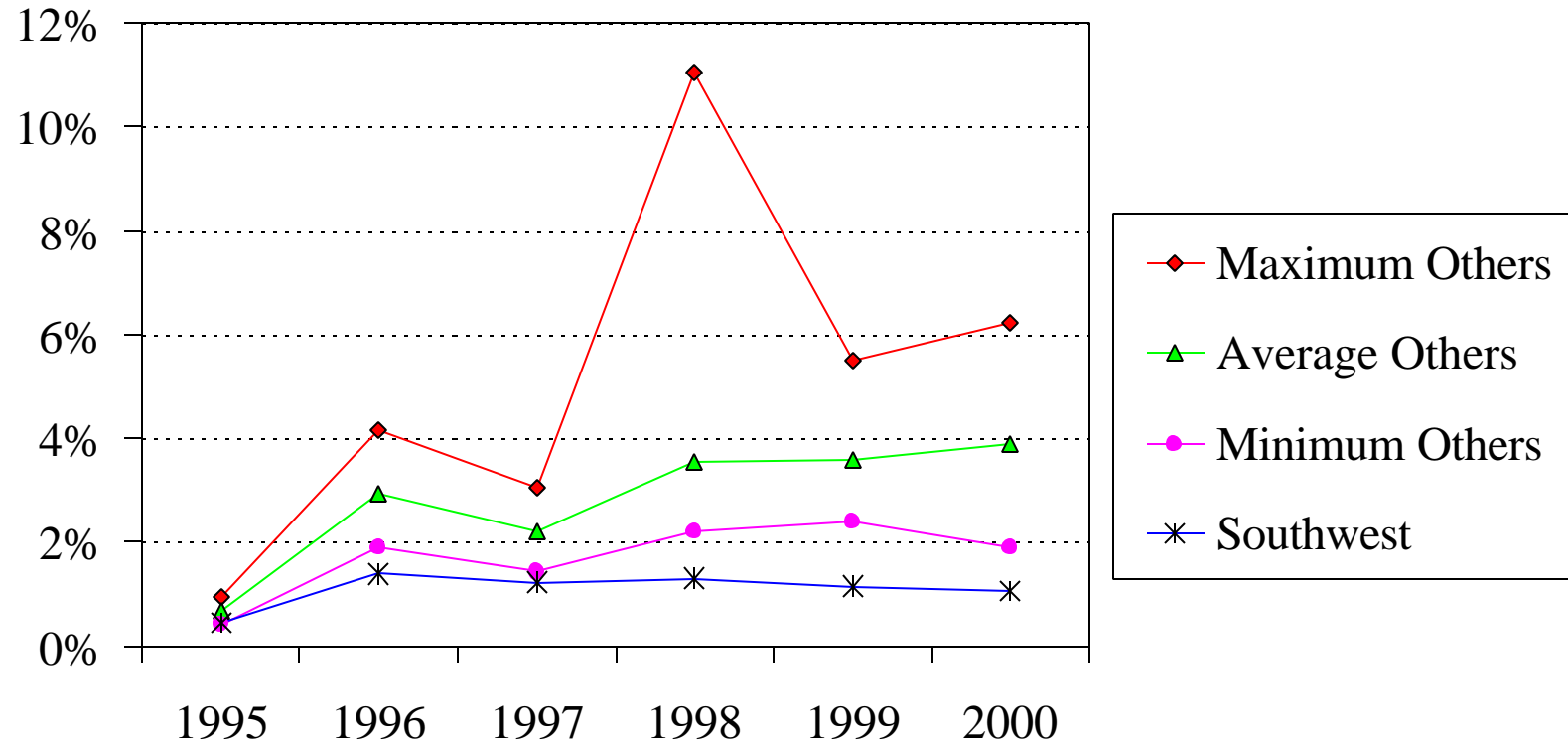
## Factor 4: Number of Canceled Flights and Cancellation Rates



• Delay duration statistics do not consider cancellations

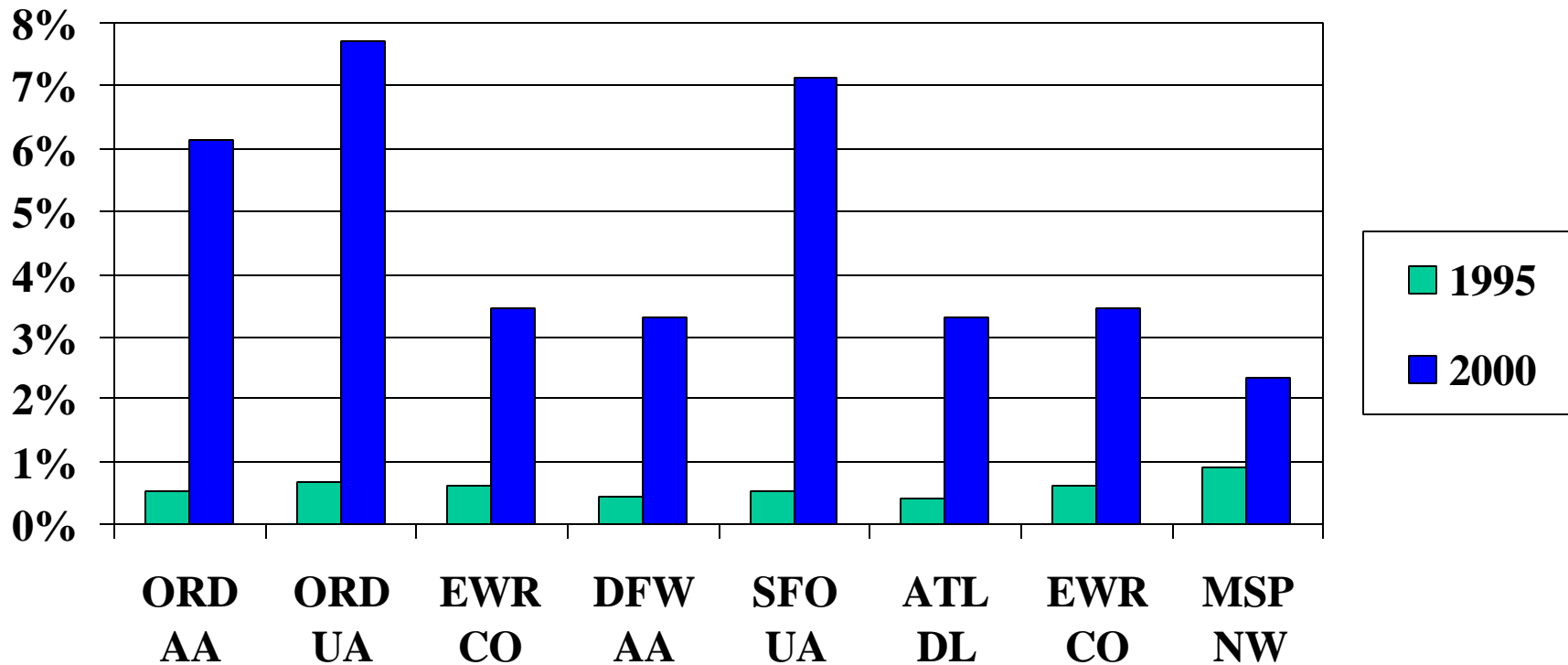


## Cancellation Rate: Southwest and the Other Majors Airlines



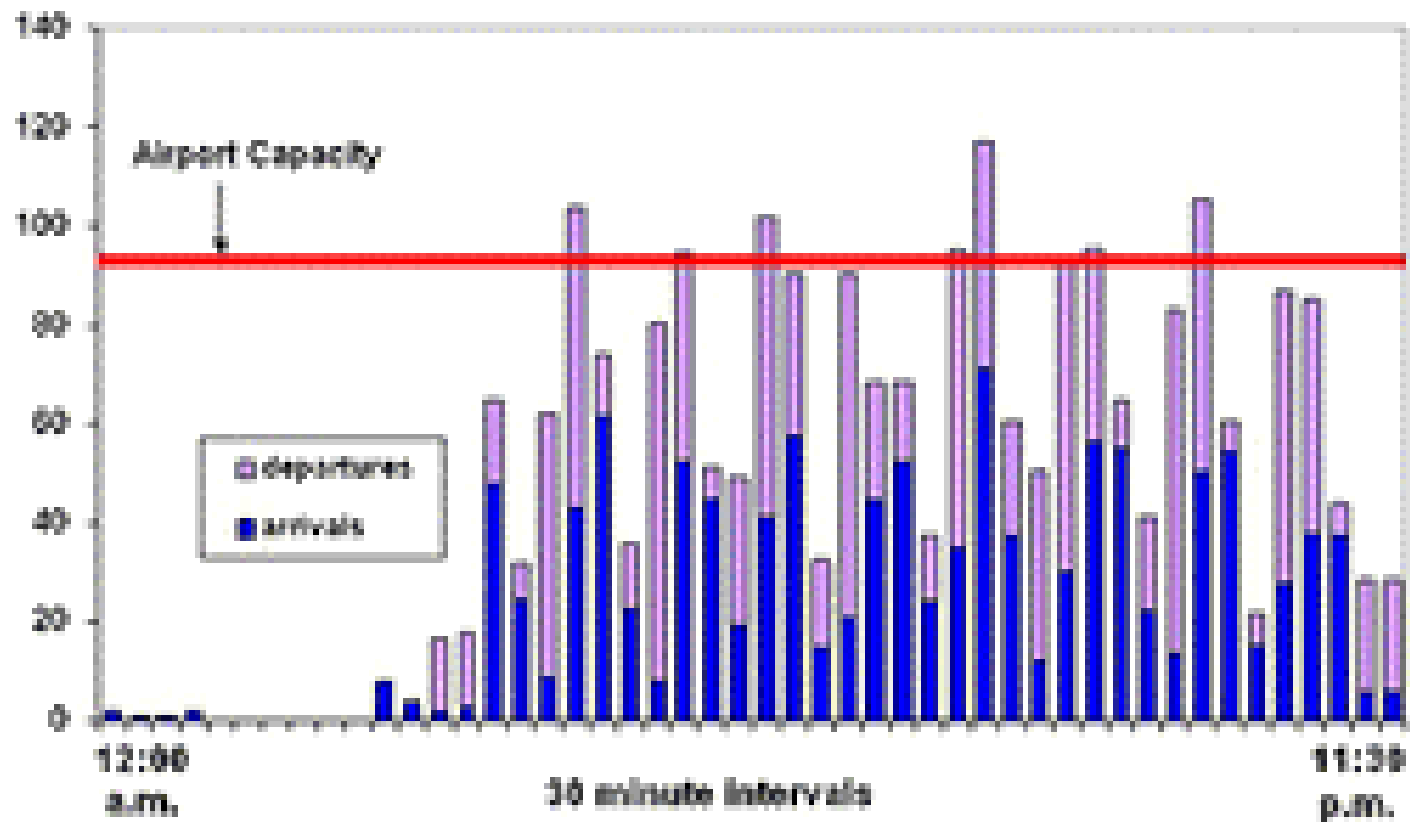
- Southwest has a lower cancellation rate than any other Major from 1995 to 2000 due in part to increases in cancellation rates at some congested hubs

# Hub Cancellation Rates



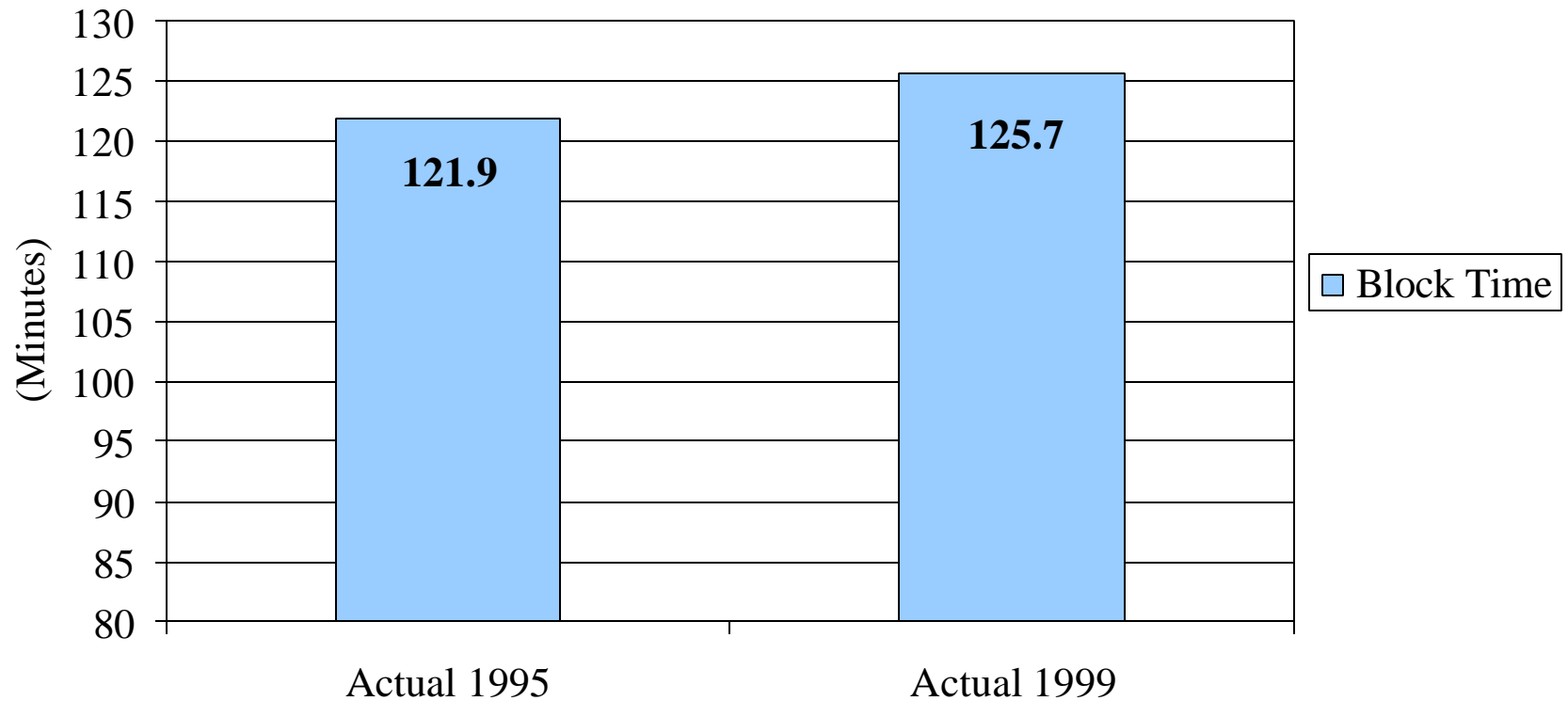
# Atlanta

## Average Daily Arrivals and Departures July 1999



In Fact, Delays are Worse  
than We Know...

# Flight Operations Statistics; 1000 Most Frequent Routes



- Block time = taxi-out+airborne+taxi-in
- If 1995 block times had been scheduled in 1999, delays would have been even worse

## Summary

- Simple statistics measuring aircraft delays are not accurate proxies for passenger delays
- Passenger delays can outpace aircraft delays significantly
  - as the number of connecting passengers increases
  - as cancellation rates increase
  - as load factors increase
  - Managing passenger delays in congested hub-and-spoke networks is especially challenging
- Next steps: further investigate the impacts of various network structures and schedules on aircraft and passenger delays