Passenger Trip Delays: 2008 Statistics

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CENTER FOR AIR TRANSPORTATION SYSTEMS RESEARCH

Education, Analysis and Research for the Next Frontier

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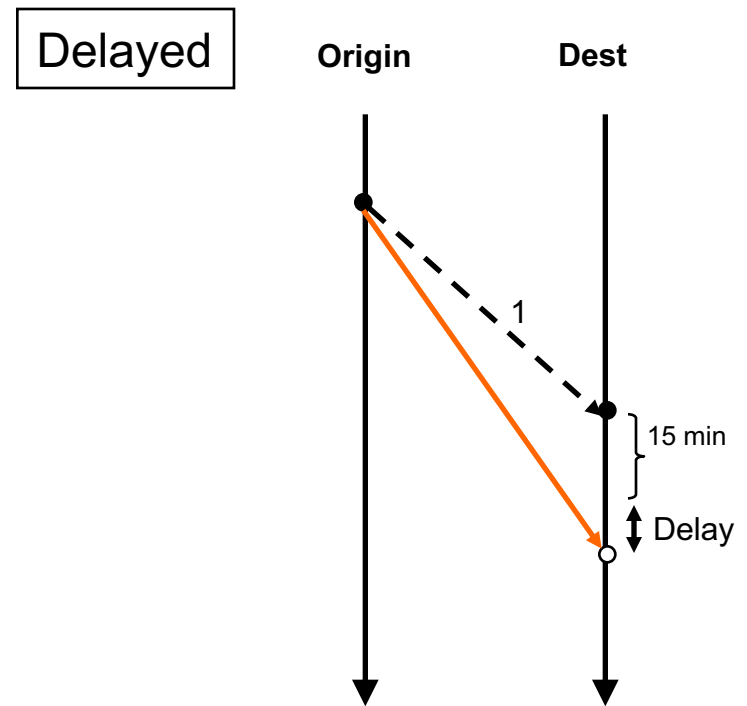
Transportation Metrics

- *Raison d'etre* of the air transportation system is to <u>haul passengers and cargo</u>

- Passenger Trip Delays should be the top level metric
  - Not flight delays
- Bratu & Barnhart (2005), Wang & Sherry (2006) showed Flights delays =/= Passenger Delays

Passenger Trip Experience

Origin **Dest** | On-time | | Delayed | **Origin** **Dest**

1

15 min
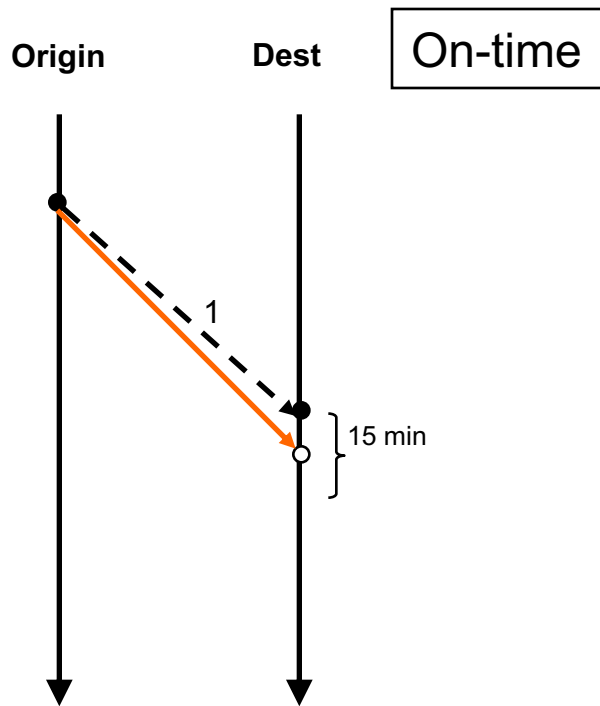
Total Pax Delay1 = 0
(i.e. On-Time)

1

1

15 min

Delay

Total Pax Delay1 =
(# Pax) x (Flight Delay1)

2

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Passenger Trip Experience

Diverted
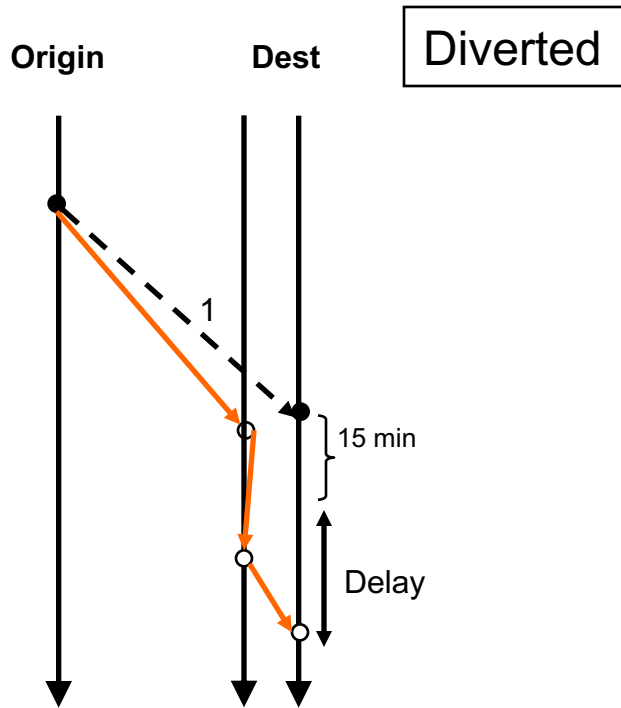
Total Pax Delay1 =
(# Pax) x (Flight Delay1 + TurnAround1-2+
Flight Time2)

3
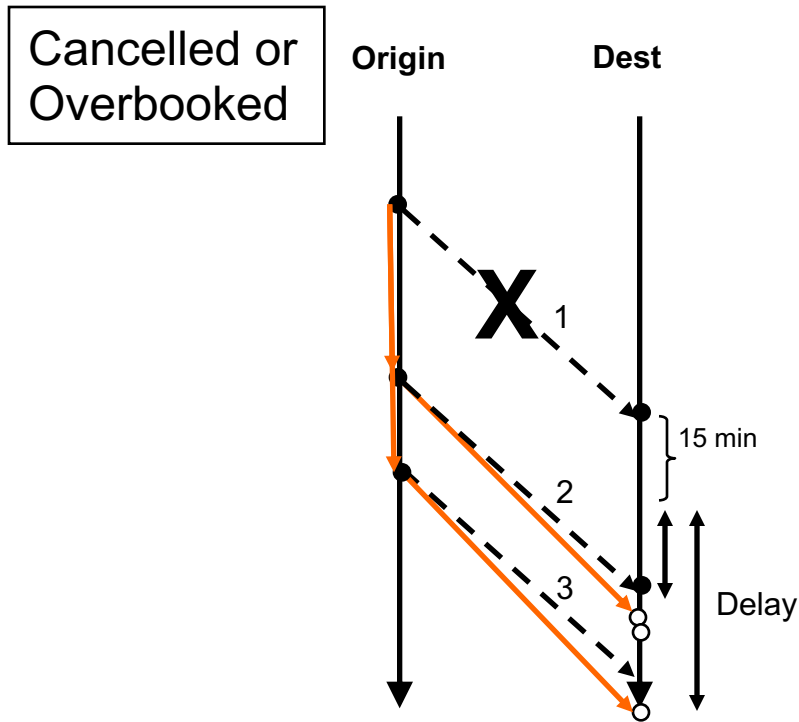
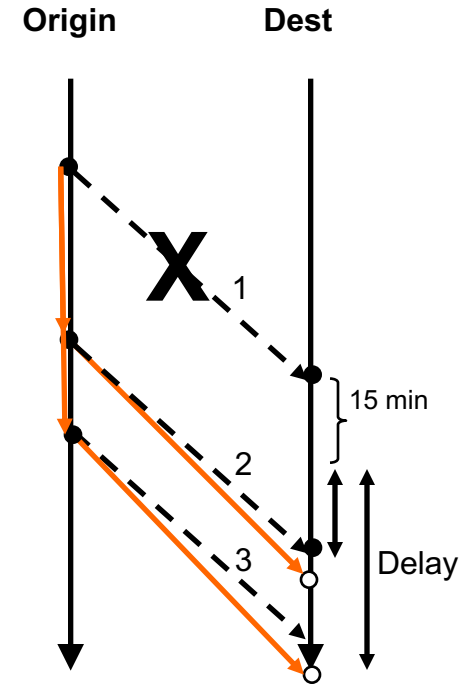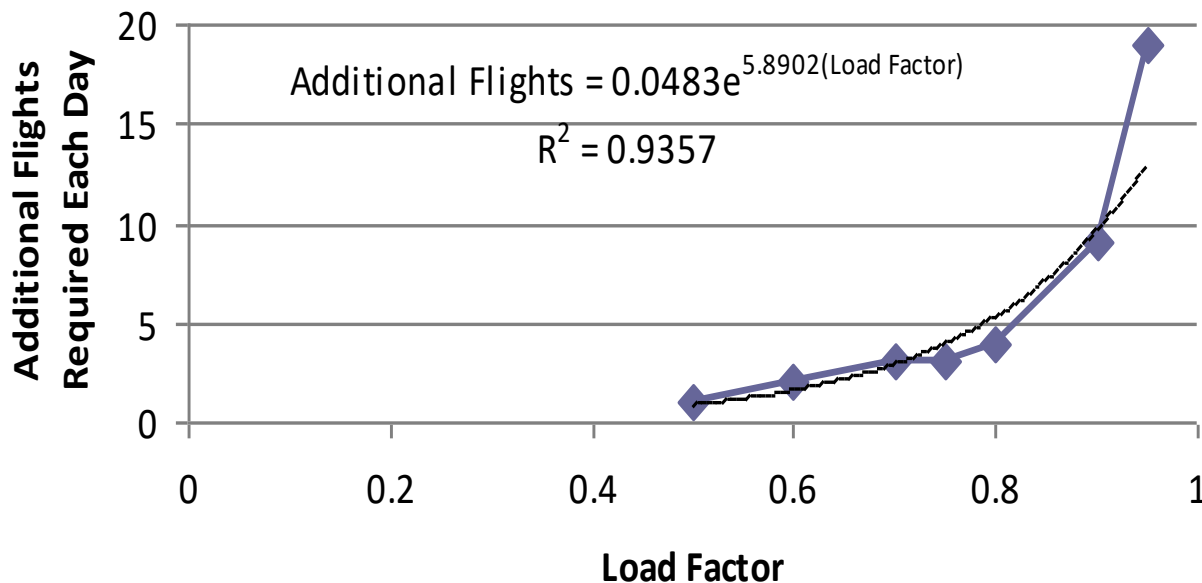**Cancelled or Overbooked**

Total Pax Delay1 =
(# Pax2) x (Scheduled Arrival Flight1 -
Flight Arrival2) +
(#Pax3) x (Scheduled Arrival Flight1 - Flight
Arrival3)

Note: Same airline u... hours delay

4

Rebooked Passengers Require "Reserve Capacity"

Additional Flights Required each Day to Deal with a Cancelled Flights as Load Factor Increases

Additional Flights $= 0.0483e^{5.8902(\text{Load Factor})}$

$R^2 = 0.9357$

Y-axis: **Additional Flights Required Each Day** (0, 5, 10, 15, 20)

X-axis: **Load Factor** (0, 0.2, 0.4, 0.6, 0.8, 1)

Origin   **Dest**

X 1

15 min

2

3

Delay

Total Pax Delay1 = (# Pax2) x (Scheduled Arrival Flight1 - Flight Arrival2) + (#Pax3) x (Scheduled Arrival Flight1 - Flight Arrival3)

Note: Same airline
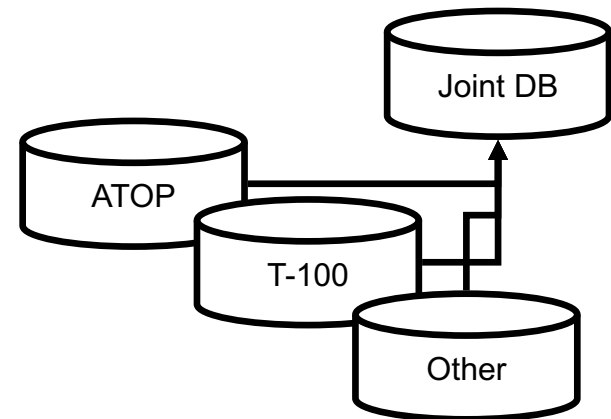
6
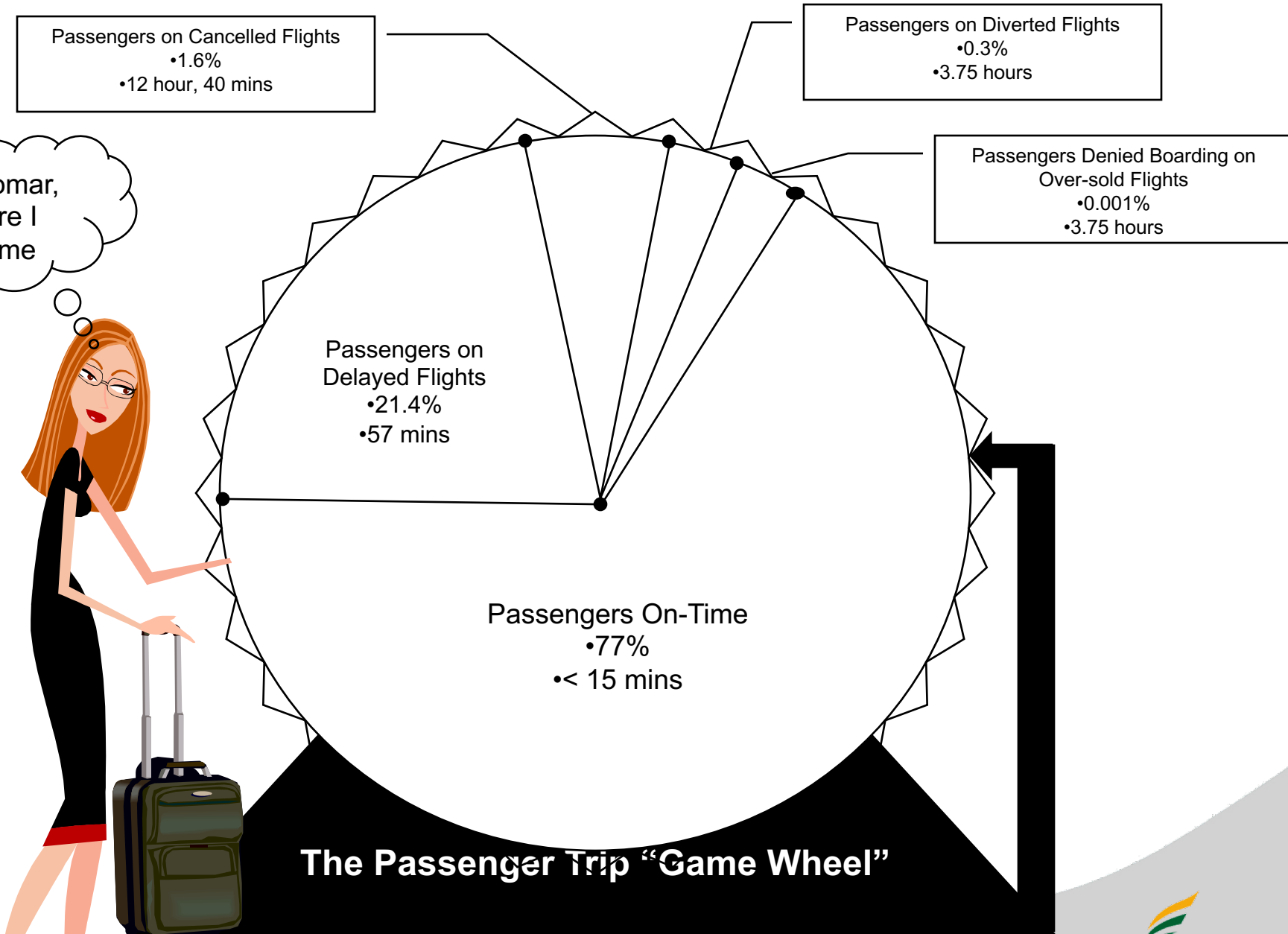
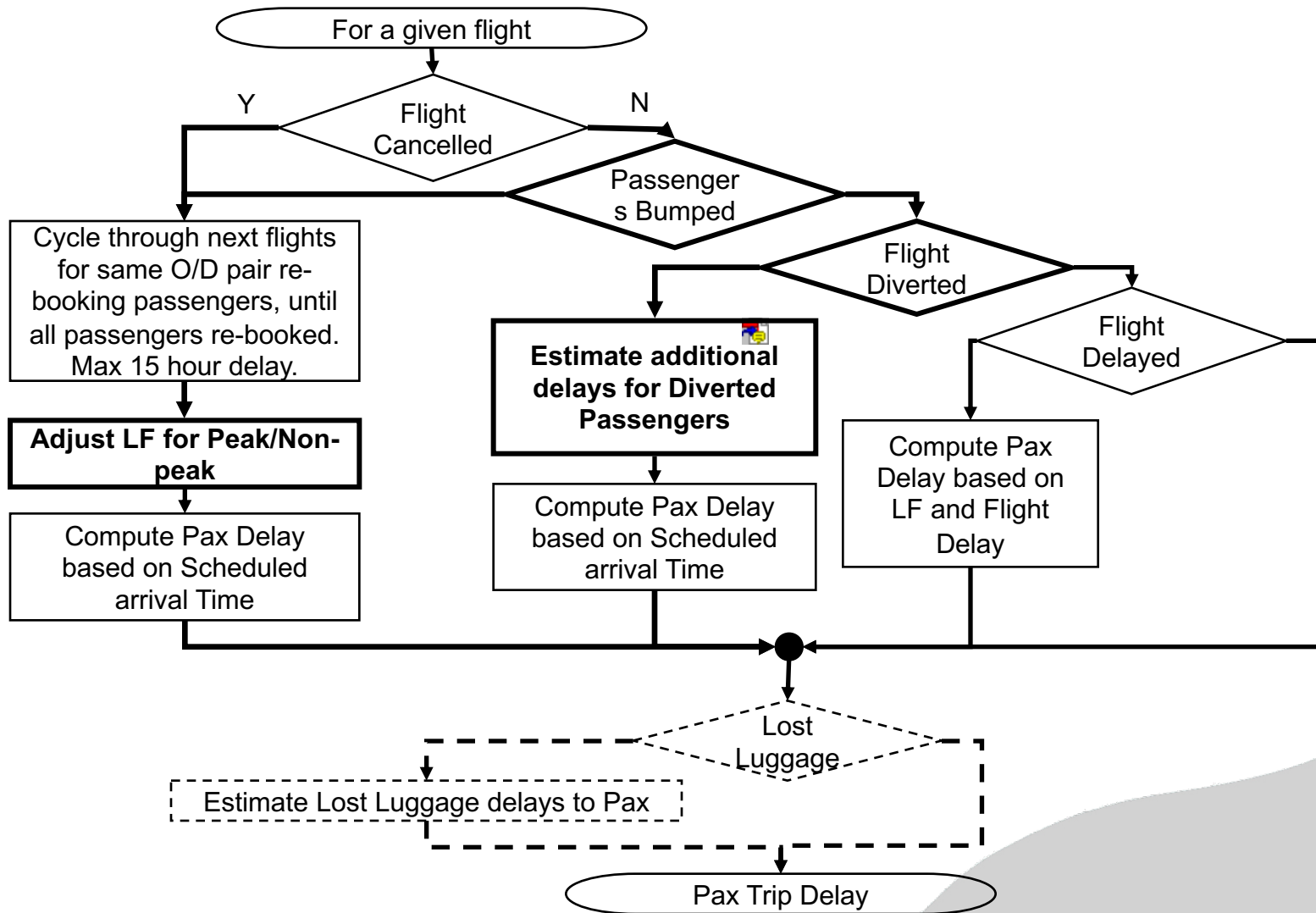# What is the likelihood of a trip delay ?

What is the impact of a trip delay?

Data Source

- Bureau of Transportation Statistics
  - Airline Data
    - ATOP, T-100
- Secondary sources
- Merge data-bases
  - Data integrity checks

- Scope
  - ~4500 routes between 260+ airports

Algorithm

For a given flight

Flight Cancelled — Y / N

Passengers Bumped

Flight Diverted

Flight Delayed

Cycle through next flights for same O/D pair re-booking passengers, until all passengers re-booked. Max 15 hour delay.

Adjust LF for Peak/Non-peak

Compute Pax Delay based on Scheduled arrival Time

Estimate additional delays for Diverted Passengers

Compute Pax Delay based on Scheduled arrival Time

Compute Pax Delay based on LF and Flight Delay

Lost Luggage

Estimate Lost Luggage delays to Pax

Pax Trip Delay

Limitations

- Load Factors from T-100
  - Aggregated monthly Load Factors for O/D
  - Algorithm accounts for day-of-week and time-of-day effects
- Single Segment Flights
  - No missed-connections in these results
    - Missed connections ~ +10% of Total Pax Trip Delay
- Rebooking
  - Same airline and direct flights
  - Rebooking on connecting flights reduces Total Pax Trip Delay

Passenger Trip Delays: 2008 Statistics
(Jan – Dec)

Flight Statistics

	2007	2008	% Change
TOTAL PASSENGERS			
Passenger Trips	642,719,733	610,236,061	-5.1%
Flights	7,453,156	7,007,835	-6.0%
Airports Served	267	264	-0.9%
Routes Connecting Airports	4,302	4,299	-0.1%

Pax Trip Delay Statistics

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Airports Served	267	264	-0.9%
Routes Connecting Airports	4,302	4,299	-0.1%
Total Passenger Trip Delay (Years)	38,152	34,154	-10.5%
Total Passenger Trip Delay (Hours)	334,211,814	299,190,734	-10.5%
Average Passenger Trip Delay (Minutes)	31	29	-6.3%

Disrupted Pax Trip Delay Statistics

DISRUPTED PASSENGERS (DELAYED + CANCELLED + DIVERTED)			
	2007	2008	Change
% Passengers	25.8%	23.3%	-9.9%
Total Passengers	166,418,248	127,147,461	-23.6%
Average Disrupted Passenger Trip Delay (Minutes)	112	117	+5.1%

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Disrupted Pax Trip Delay Statistics

	2007	2008	Δ
PASSENGERS ON DELAYED FLIGHTS			
% Passengers	23.8%	21.4%	-10.0%
Total Passengers	153,334,863	131,540,319	-14.2%
Average Disrupted Passenger Trip Delay (Minutes)	56	57	0.9%
PASSENGERS ON CANCELLED FLIGHTS			
% Passengers	1.82%	1.63%	-10.6%
Total Passengers	11,565,381	9,906,400	-14.3%
Average Disrupted Passenger Trip Delay (Hours)	13.7	15.0	9.5%
PASSENGERS ON DIVERTED FLIGHTS			
% Passengers	0.23%	0.25%	8.3%
Total Passengers	1,518,004	1,551,141	2.2%
Total Disrupted Passenger Trip Delay (Minutes)	546,481,440	558,410,760	2.2%

Pax Trips (-5.1%)

 # Passenger Trips by Month

- **No change in seasonal travel patterns**
- **Travel tapers off as 2008 progresses**
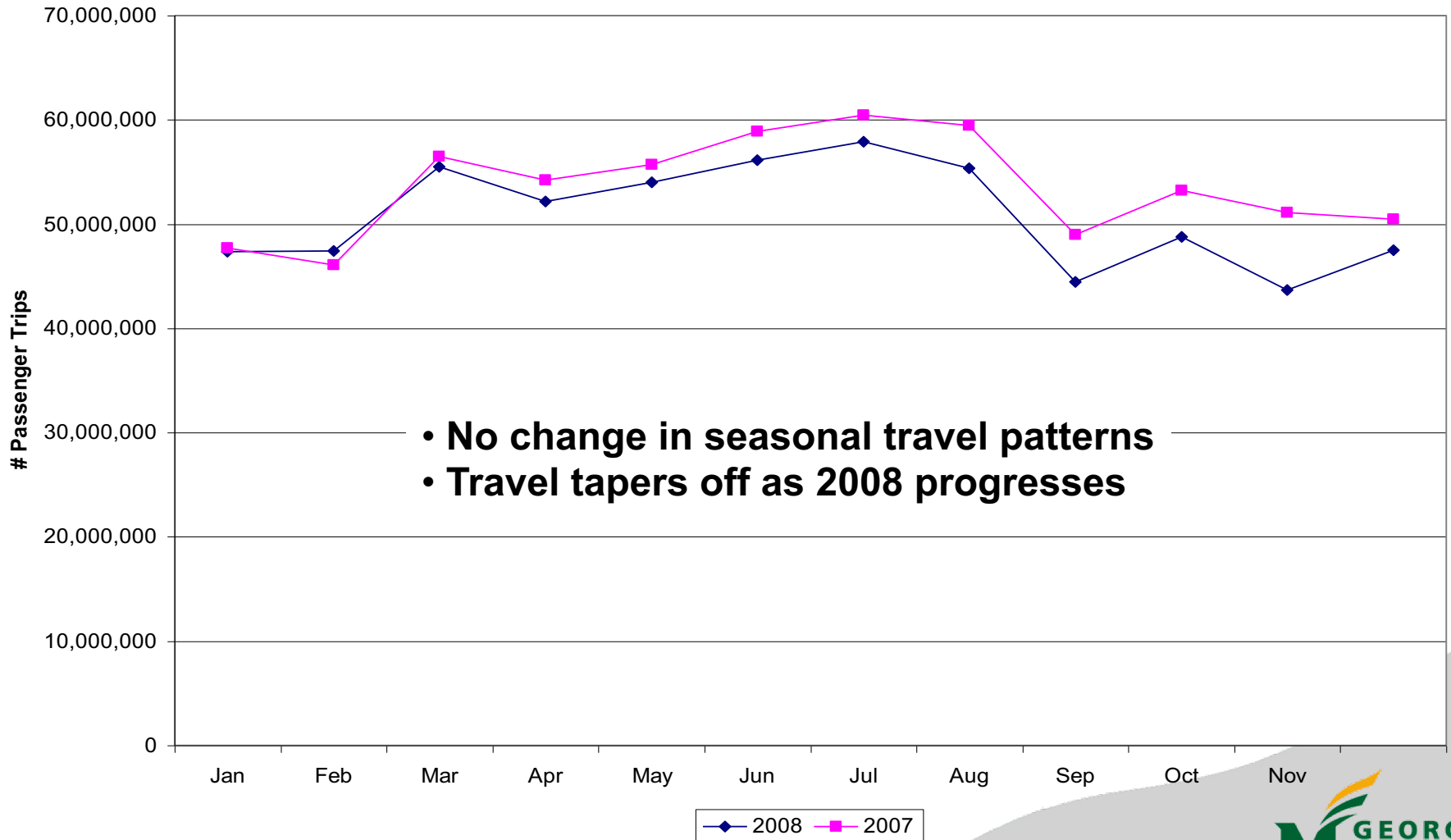
Flights (-6%)

 # Flights by Month

- **Airlines respond by reducing flights as year progresses…**

Legend: 2008, 2007
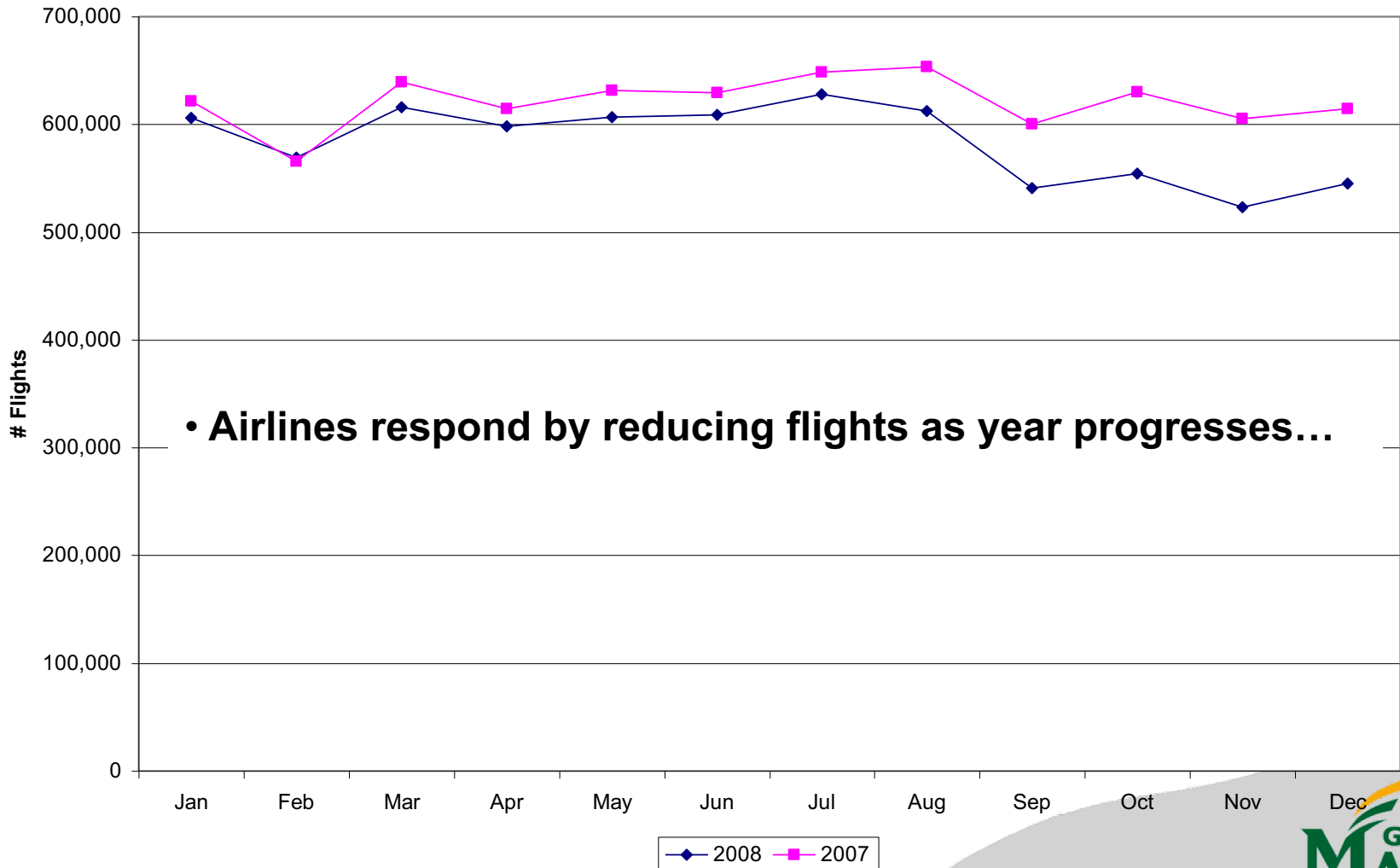
Pax per Flight

Average # Pax per Flight by Month

… but maintain # seats per flight

2008   2007

19
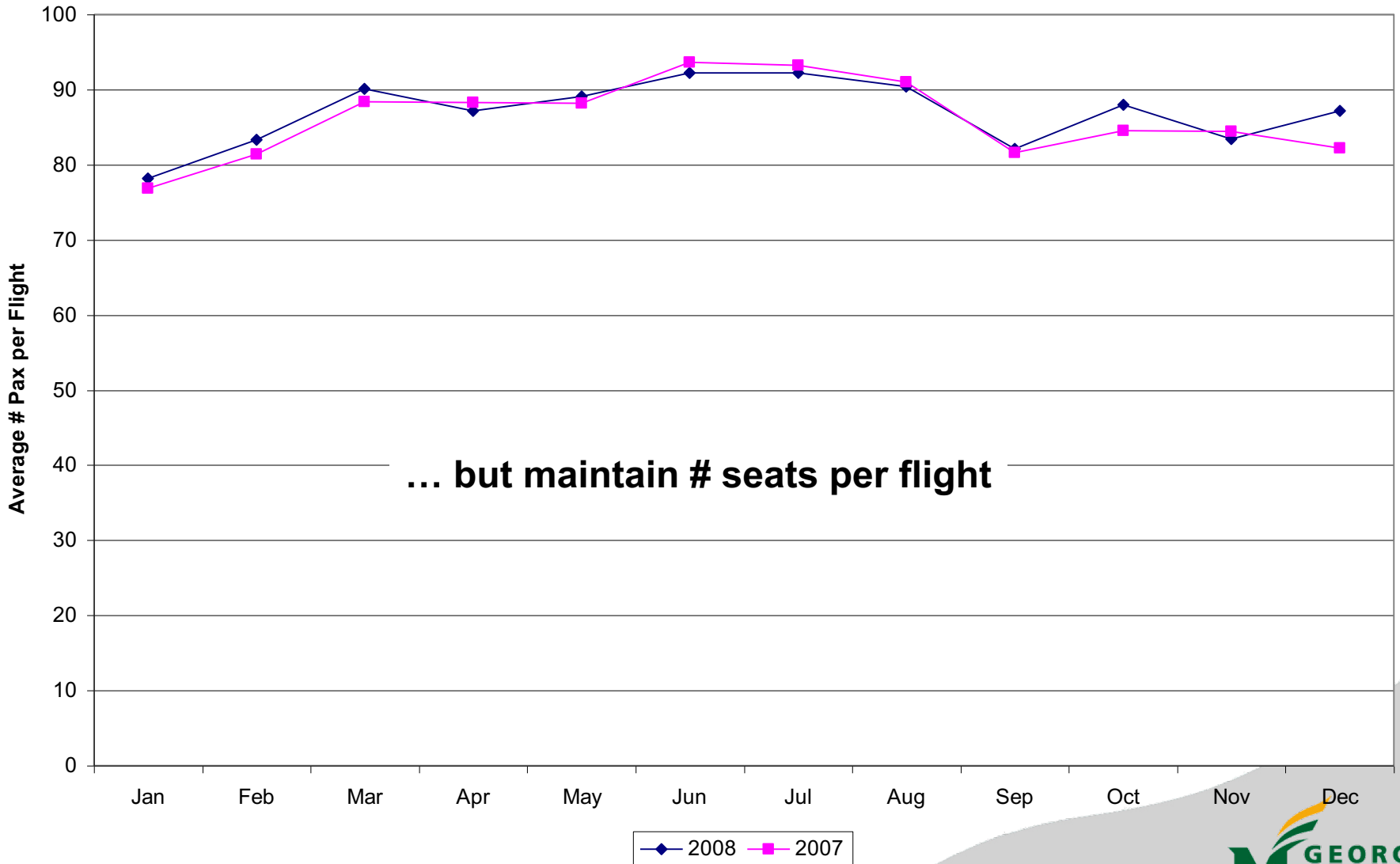
Total Pax Trip Delay (-10.5%)

Total Monthly Pax Trip Delay (Hours)

- **Seasonal patterns persist**
- **2008 reductions from peak 2007 months (Feb, June, July, Aug)**
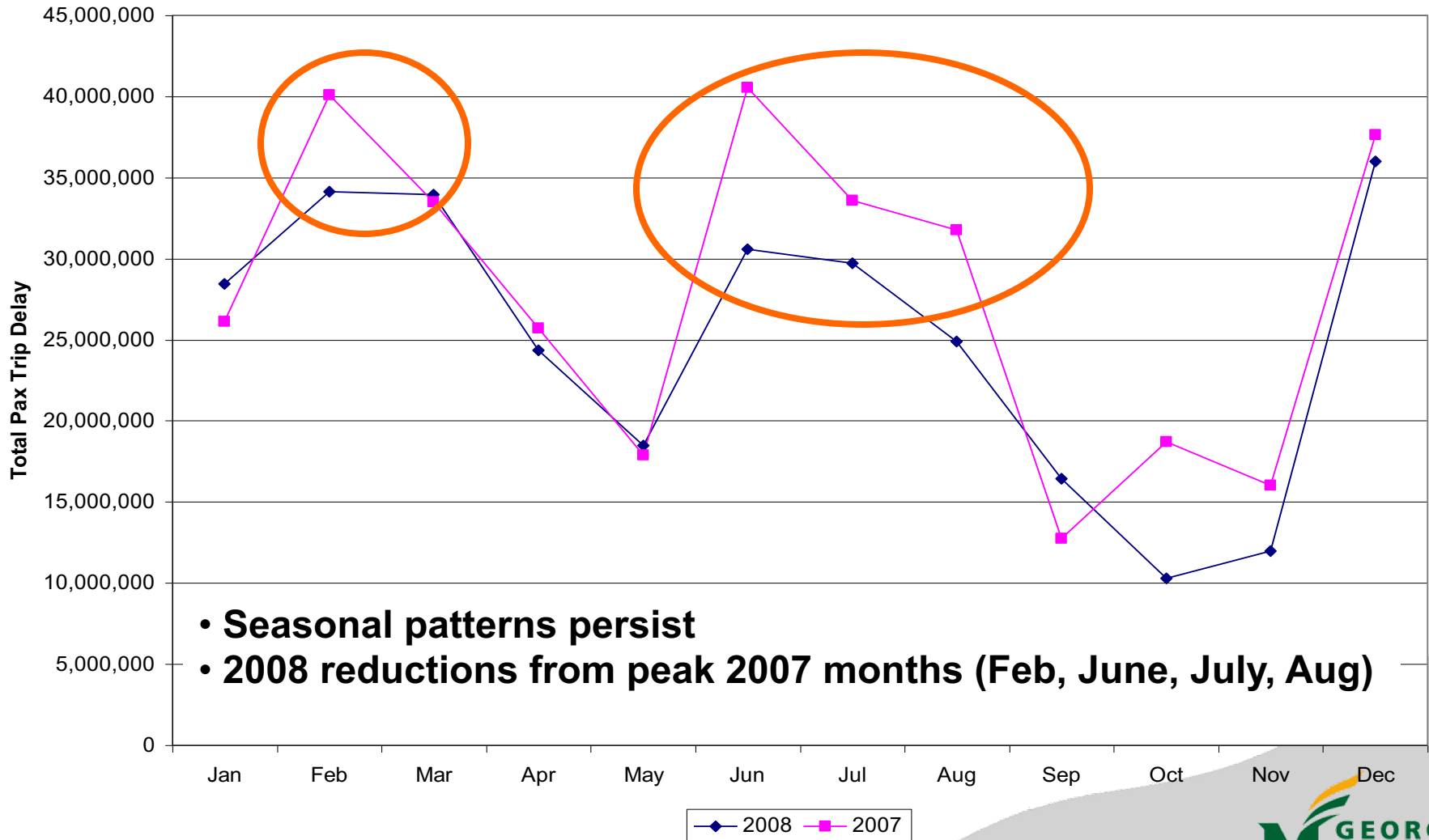
Disrupted Pax

% Passenger Disrupted (by Delayed, Cancelled or Diverted Flights)

• **Seasonal patterns persist**
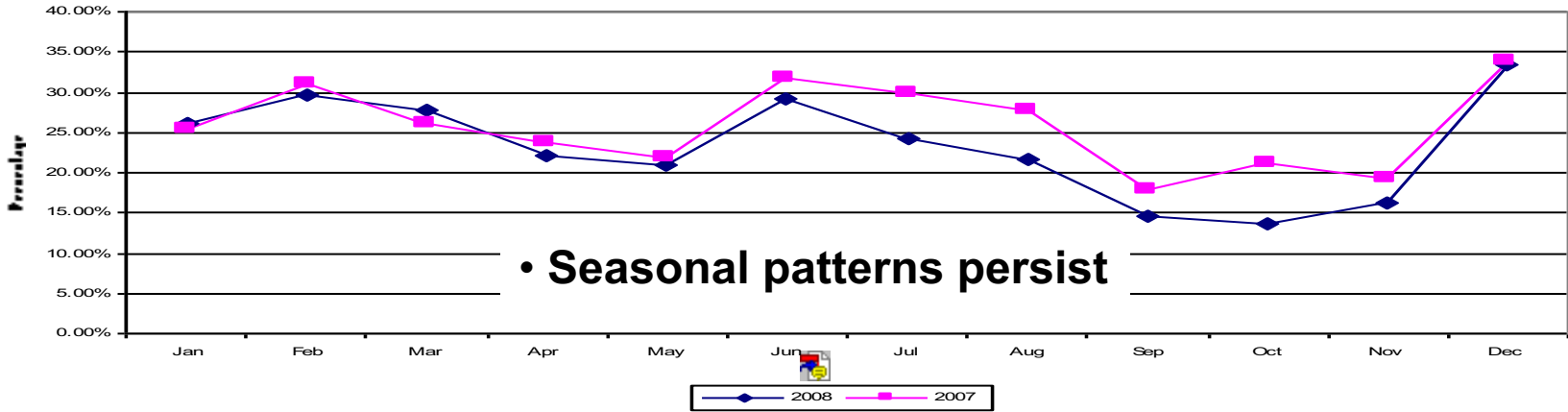
Average Disrupted Pax Trip Delay by Month
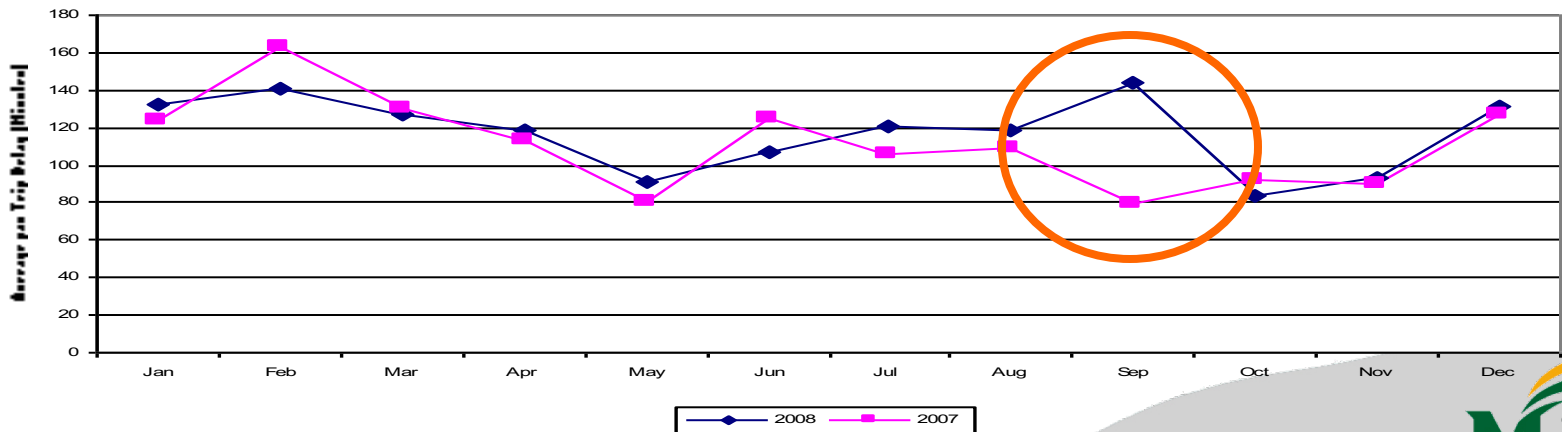
Delayed Pax

%Pax on Delayed Flights
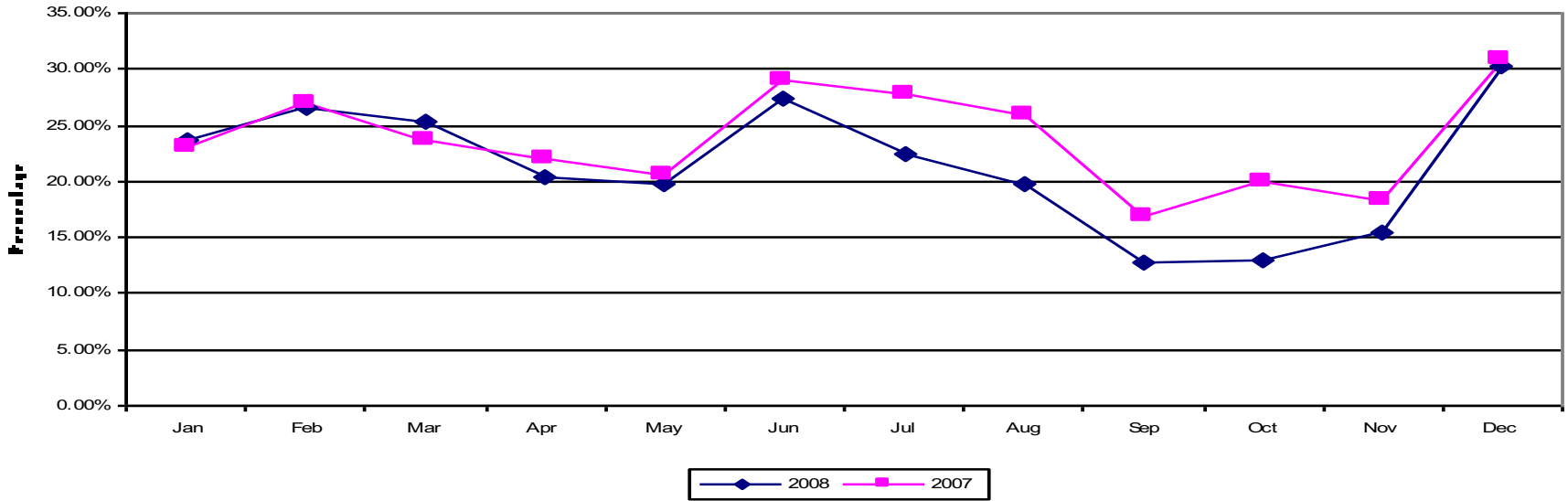
Average Pax Delay for Pax on Delayed Flights
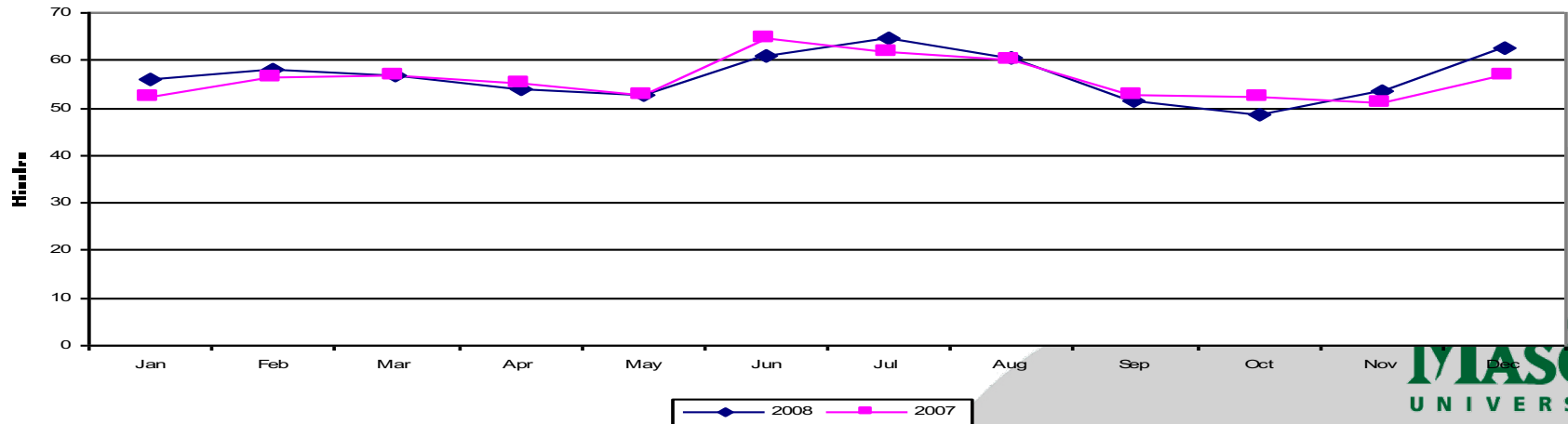
Cancelled Pax (-10.6%)

%Pax on Cancelled Flights (%Cancelled Flights)

Cancel more *low* load factor flights

Equal chance for cancelled flight

Legend: 2008 - %Pax | 2007 - %Pax | 2008 - %Flts | 2007 - %Flts

23
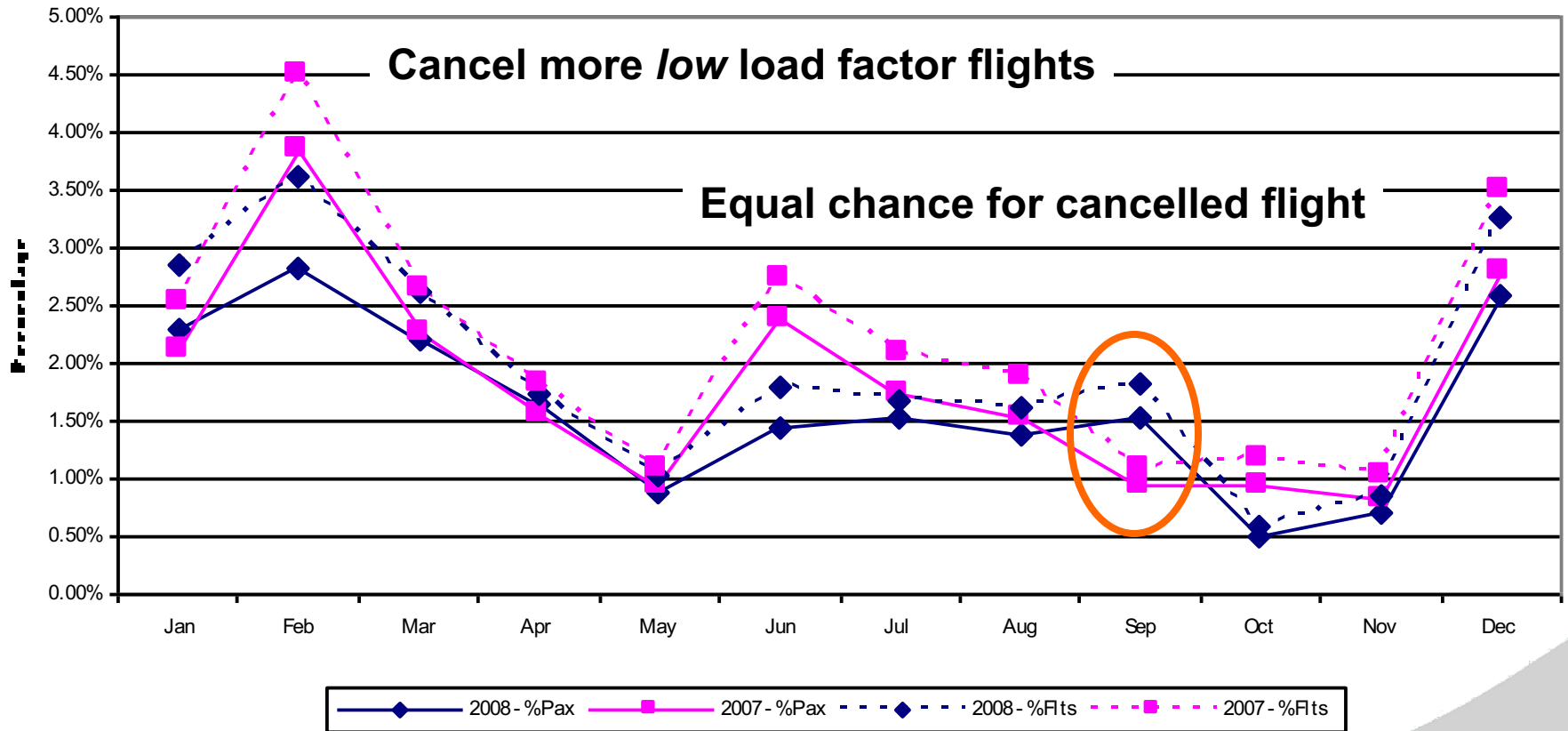
Airline Ranking (2008)

Rank 200812	Change in Ranking from 2007 to 2008 (+ Improved)	Airline	Average Trip Delay Experienced by Passengers (Minutes)	Change in Average Trip Delay Experienced by Passengers 2007 to 2008 (+ increased delay)
1	No Change	Hawaiian Airlines Inc.	8.2	+ 3.4
2	+2	Frontier Airlines Inc.	8.6	- 1.3
3	-1	Southwest Airlines Co.	9.3	+ 2.7
4	No Change	Northwest Airlines Inc.	13.8	- 6.9
5	No Change	AirTran Airways Corporation	13.8	+ 1.0
6	+1	US Airways Inc.	15.4	- 2.5
7	+3	Alaska Airlines Inc.	15.7	- 6.4
8	+4	Skywest Airlines Inc.[2]	16.5	- 7.3
9	-3	Continental Air Lines Inc.	16.8	+ 1.6
10	-2	Delta Air Lines Inc.	17.2	- 1.1
11	+5	United Air Lines Inc.	20.1	- 9.0
12	-1	JetBlue Airways	23.8	+ 1.7
13	+5	Pinnacle Airlines Inc.[3]	23.8	- 9.2
14	-1	ExpressJet Airlines Inc.[1]	24.8	No Change
15	-1	Comair Inc.	25.2	- 3.1
16	+1	Mesa Airlines Inc.[4]	29.5	- 1.6
17	-2	American Airlines Inc.[5]	31.1	+ 2.6

Airline Performance
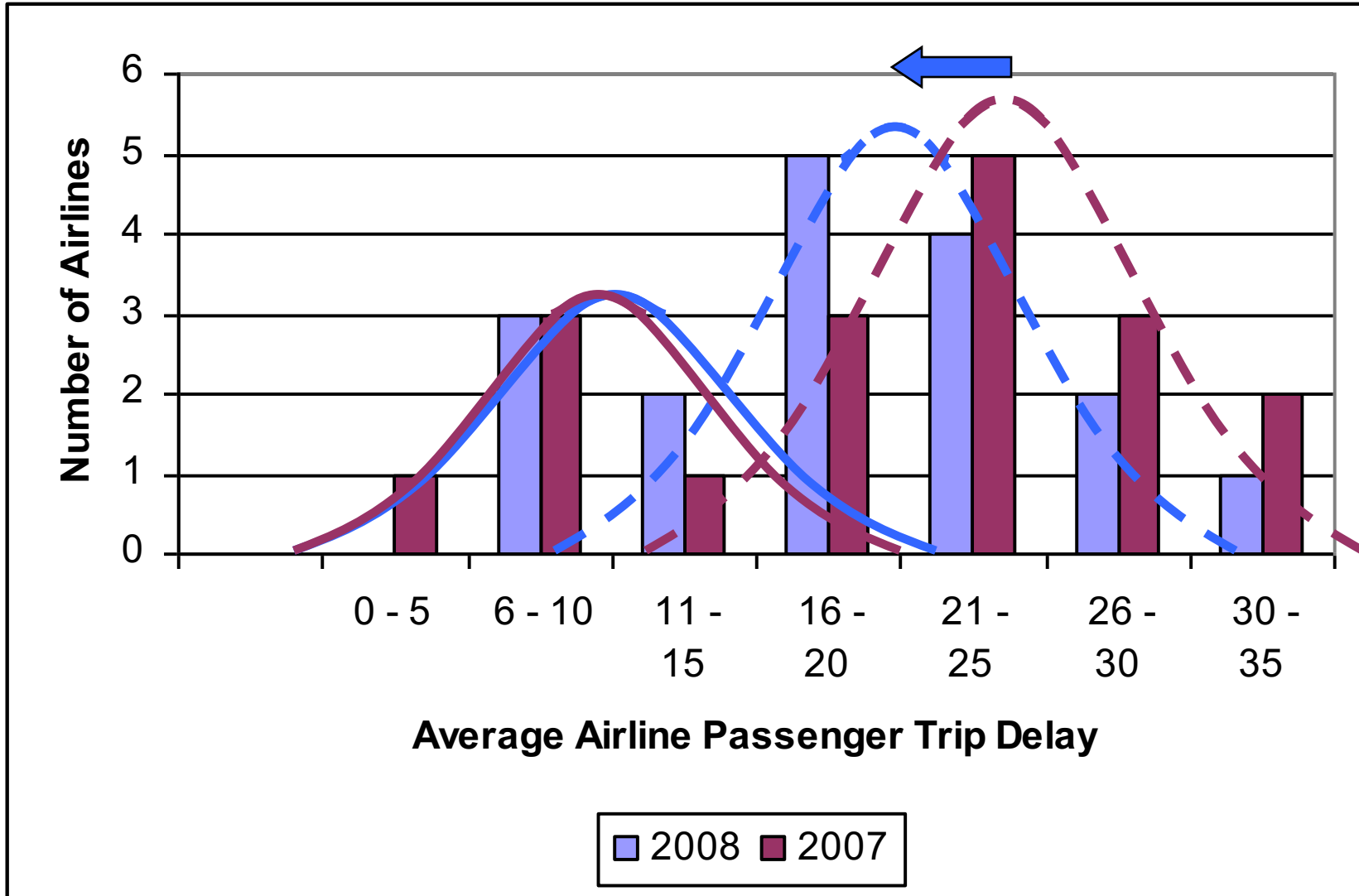
Conclusions

- *Passenger Trip Delays reduced …*
  - Passenger Trips (-5%)
  - Total Passenger Trip Delays (-10%)

- *… but structural issues remain.*
  - % Passengers disrupted (23%)
  - Average Trip Delay (29 minutes)
  - Average Disrupted Passenger Trip Delay (117 mins)
    - Reduced frequency, with high load factors → Pax on Cancelled Flights
    - Peak period flights not cut → Pax on Delayed Flights

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2009 Outlook

- Passenger trips reduced, leads to reduction in Total Pax Trip Delays
- Expect continued reduction in # flights
  - Reduced frequency
  - Start to eliminate service to airports (1Q 2009 ~ -3%)
  - Start to impact peak period scheduling

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Long-term Outlook

- NextGen <u>can</u> reduce Pax Delay due to Delayed Flights (by increase in capacity)
- NextGen <u>cannot</u> impact Pax Delay due to Cancelled flights

Steps to Mitigate <u>Pax Delays</u> (1)

• Honesty in advertising!

Warning: the Secretary of the Department of Transportation (DOT) has determined that you are on a flight that has a high probability of a delay in excess of 45 minutes.

Steps to Mitigate <u>Pax Delays</u> (2)

- Passenger Bill of Rights
  - Emphasis on:
    - Cancelled Flights
      - Protect passengers against high load factors on subsequent flights
    - Diverted Flights
    - Overbooked Flights (already strong)
    - Lost Luggage

  - Less than half of cancelled flights can claim cause of weather

Steps to Mitigate Pax Delays (3)
Give Passengers Information
www.GreenFlights.INFO

Expected Delays for Flight Number/Airline (BOS to ORD)

- Airlines:
  - operate network
  - must maintain schedule integrity
  - "sacrifice" some flights for benefits of network
  - "sacrifices" are systematic
- GreenFlights.INFO enables passengers to leverages knowledge of airline operations

Questions?

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