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Demand and Supply

Istanbul Technical University

Air Transportation Management, M.Sc. Program

Aviation Economics and Financial Analysis

Module 6

12 November 2014

Outline

- **Main characteristics of supply in the airline industry**
  - Perishability (airline seats cannot be inventoried)
  - Excess capacity
  - S-curve effect
- **Main characteristics of demand in the airline industry**
  - Derived demand
  - Determinants of demand
  - Market demand segmentation
    - Different classes/types of passengers
    - Different classes/types of freight
    - Demand elasticities

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Supply



Airline supply

- **Perishability of seats**
  - seats cannot be inventoried for future sale
  - once flight takes off, empty seats cannot be sold
- **Joint production of seats in different fare classes**
  - Airline can provide both full fare and discount seats on same flight
    - Previously, price sensitive leisure travel serviced by charters with business travel on network airlines
- **Chronic overcapacity of seats**
  - Load factors average around 70%
  - 30% of seats are unsold,
    - Load factors are usually lower on short haul and small aircraft routes
      - 777 – 83%
      - RJ – 70%

Excess Capacity

- **Supply commonly exceeds demand in the industry**

- **This is not necessarily an issue**
  - 100% load factors would leave many customers willing to pay for a flight
- **The higher the load factor, the higher the probability that passengers will not be able to book a seat on their preferred flight**
  - This is called ‘spill’

Source: Dempsey and Gesell (2006)

Global load factors

2012 vs. 2011	RPK Growth	ASK Growth	PLF	FTK Growth	AFTK Growth
International	6.0%	4.0%	78.9	-1.9%	0.6%
Domestic	4.0%	3.8%	79.5	1.4%	-1.2%
Total Market	5.3%	3.9%	79.1	-1.5%	0.2%

Source: IATA, Air Transport Market Analysis, December 2012

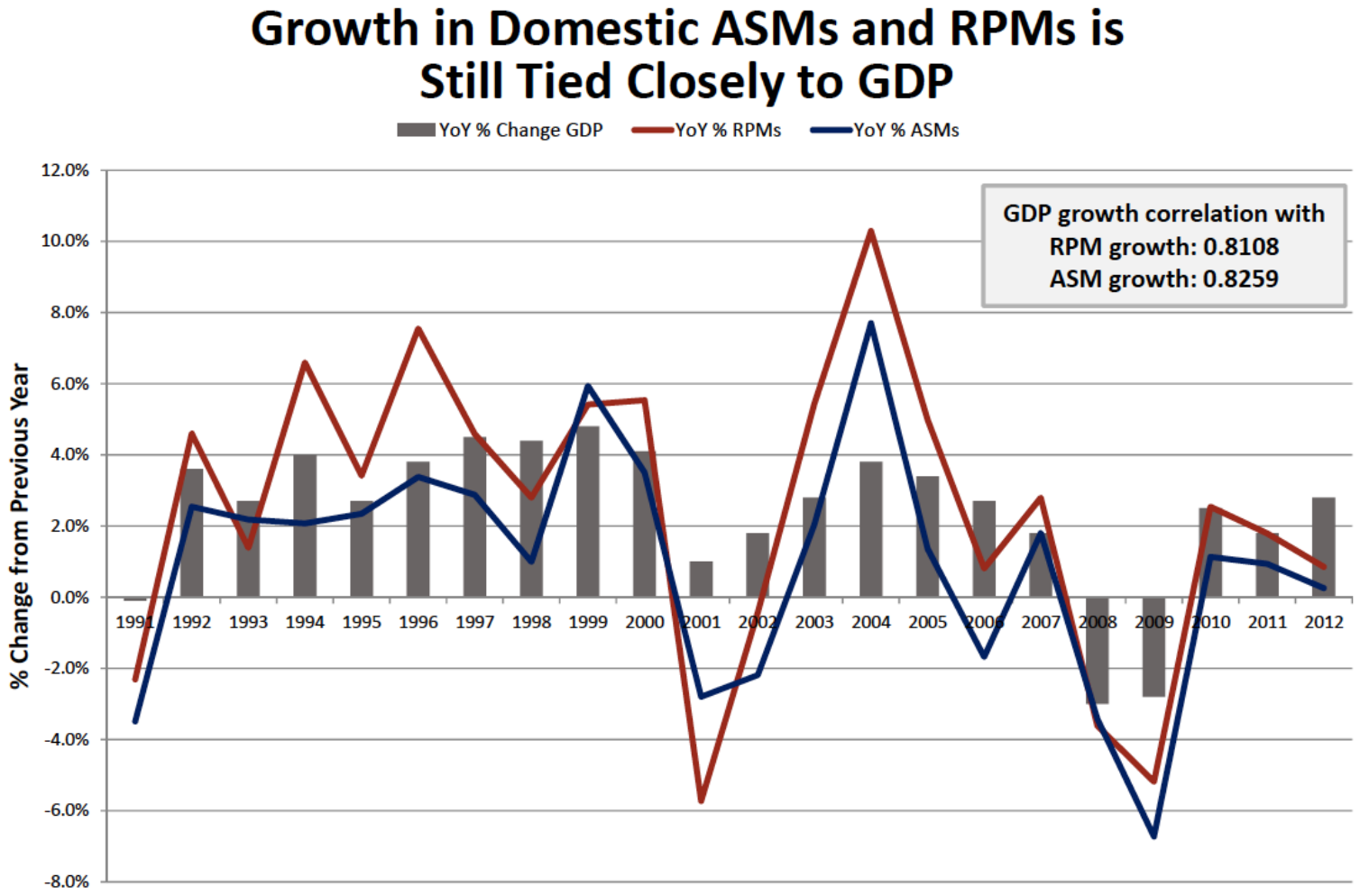
Regional load factors

Year on Year Comparison	Sep 2013 vs Sep 2012		2013
	RPK	*ASK*	*PLF*
Africa	6.9%	7.4%	73.2%
Asia/Pacific	8.5%	7.1%	78.1%
Europe	3.4%	3.1%	83.9%
Latin America	8.3%	6.1%	80.9%
Middle East	10.4%	13.0%	77.2%
North America	2.3%	3.1%	83.9%
International	5.7%	5.7%	80.9%
Australia	2.6%	1.9%	78.1%
Brazil	1.0%	-1.9%	78.1%
China P.R.	10.6%	12.1%	80.2%
India	16.4%	5.7%	71.5%
Japan	7.8%	7.5%	69.3%
Russian Federation	12.1%	11.2%	78.7%
US	1.4%	1.0%	81.0%
Domestic	5.1%	4.7%	79.1%
Africa	5.7%	6.0%	73.7%
Asia/Pacific	9.2%	8.4%	78.0%
Europe	3.7%	3.2%	83.1%
Latin America	6.5%	4.0%	79.5%
Middle East	9.5%	12.5%	77.2%
North America	1.7%	1.8%	82.0%
Total Market	5.5%	5.3%	80.3%

RPK: Revenue-Passenger-Kilometers; ASK: Available-Seat-Kilometers; PLF: Passenger-Load-Factor;
All Figures are expressed in % change Year on Year except PLFwhich are the load factors for the specific month.

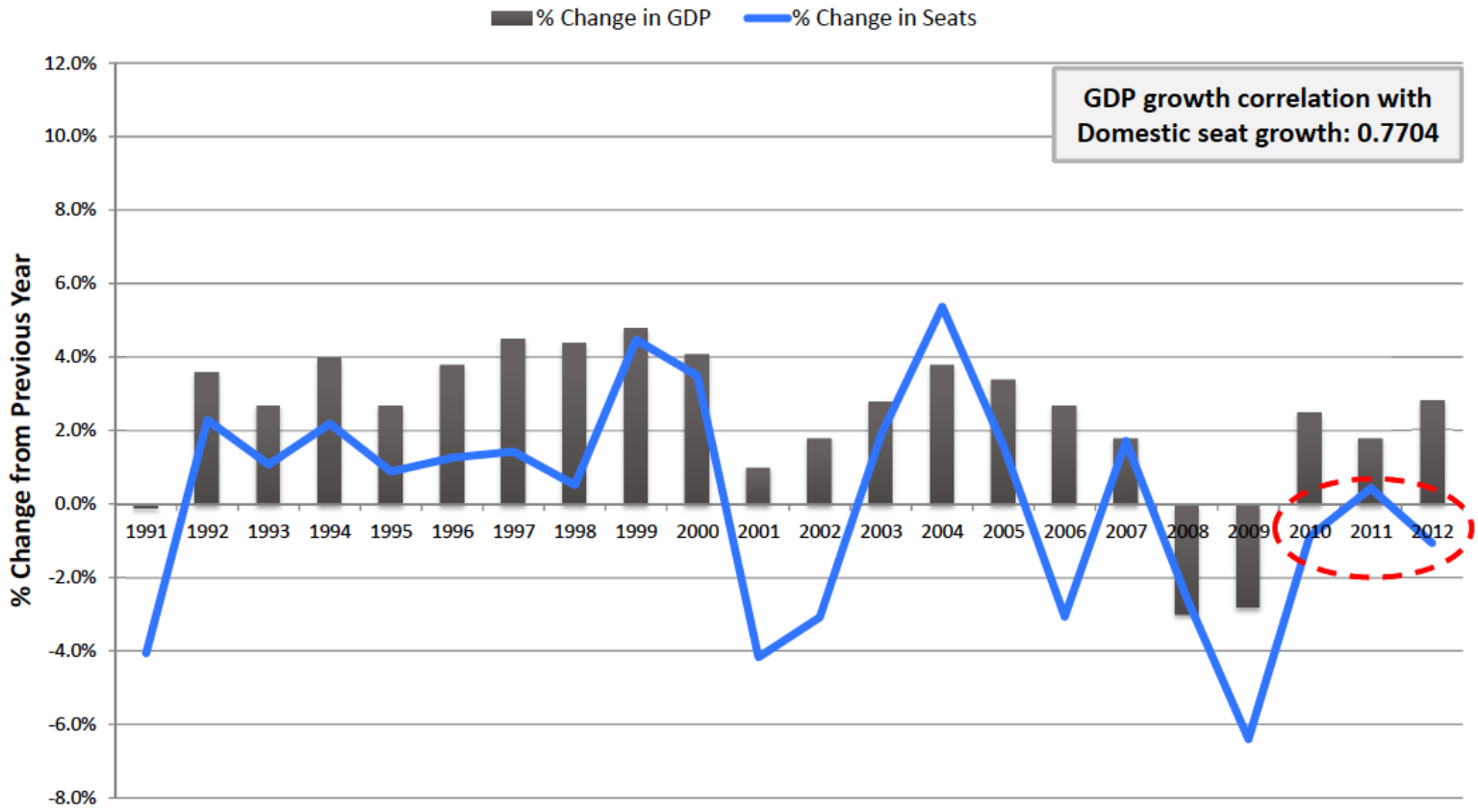
Source: IATA, September 2013

Recent Changes in U.S. Data-Capacity Discipline



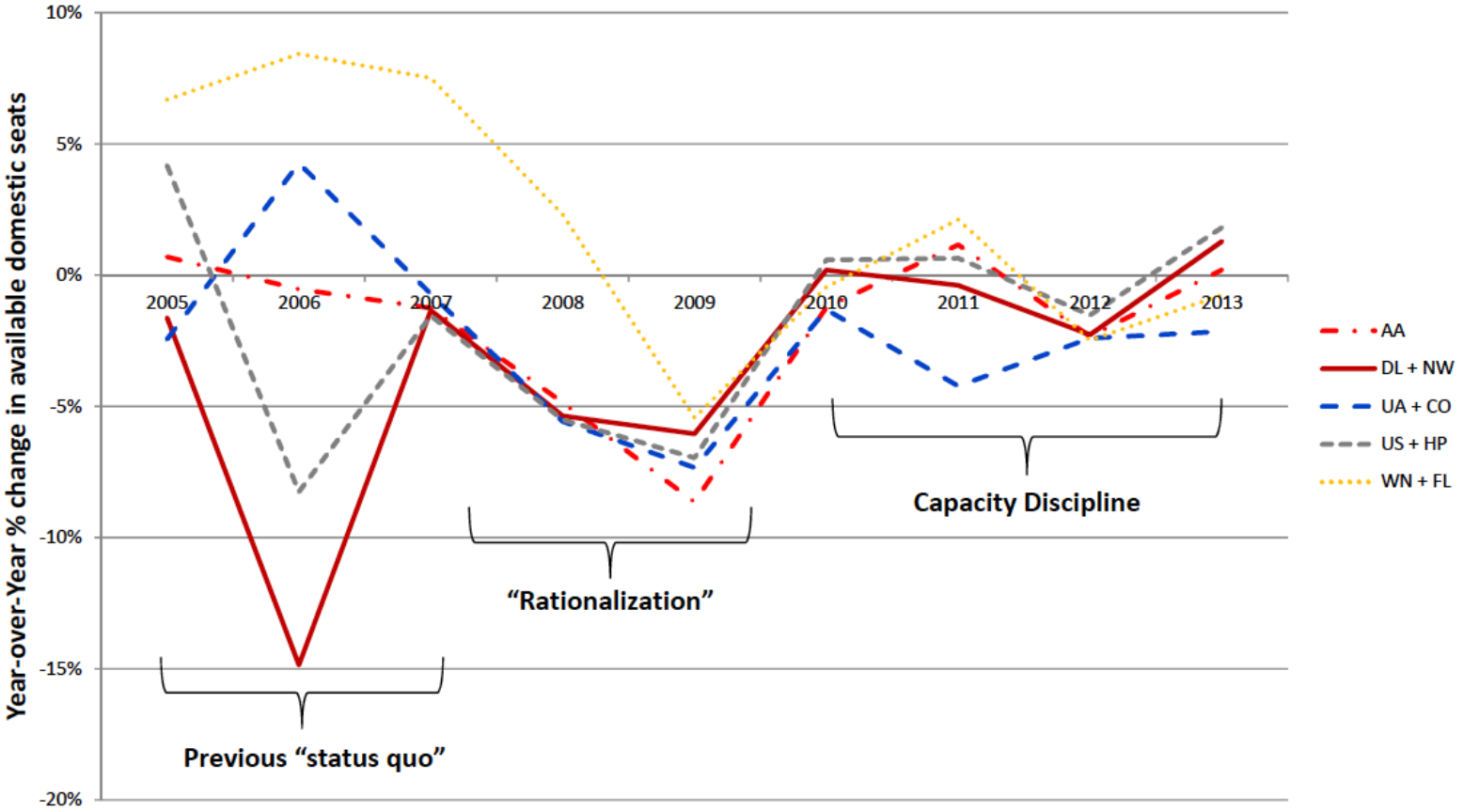
Source: Michael Wittman, *New Horizons in U.S. Airline Capacity Management: From Rationalization to "Capacity Discipline"*, MIT International Center for Air Transportation, November 2013

A Break in the Pattern? Domestic Seat Departures Have Recently Fallen Despite GDP Growth



Source: Michael Wittman, *New Horizons in U.S. Airline Capacity Management: From Rationalization to "Capacity Discipline*", MIT International Center for Air Transportation, November 2013

The Last Nine Years of Domestic Aviation Can Be Divided Into Three Epochs



Source: Michael Wittman, *New Horizons in U.S. Airline Capacity Management: From Rationalization to "Capacity Discipline*", MIT International Center for Air Transportation, November 2013

Why supply more seats? Reason 1

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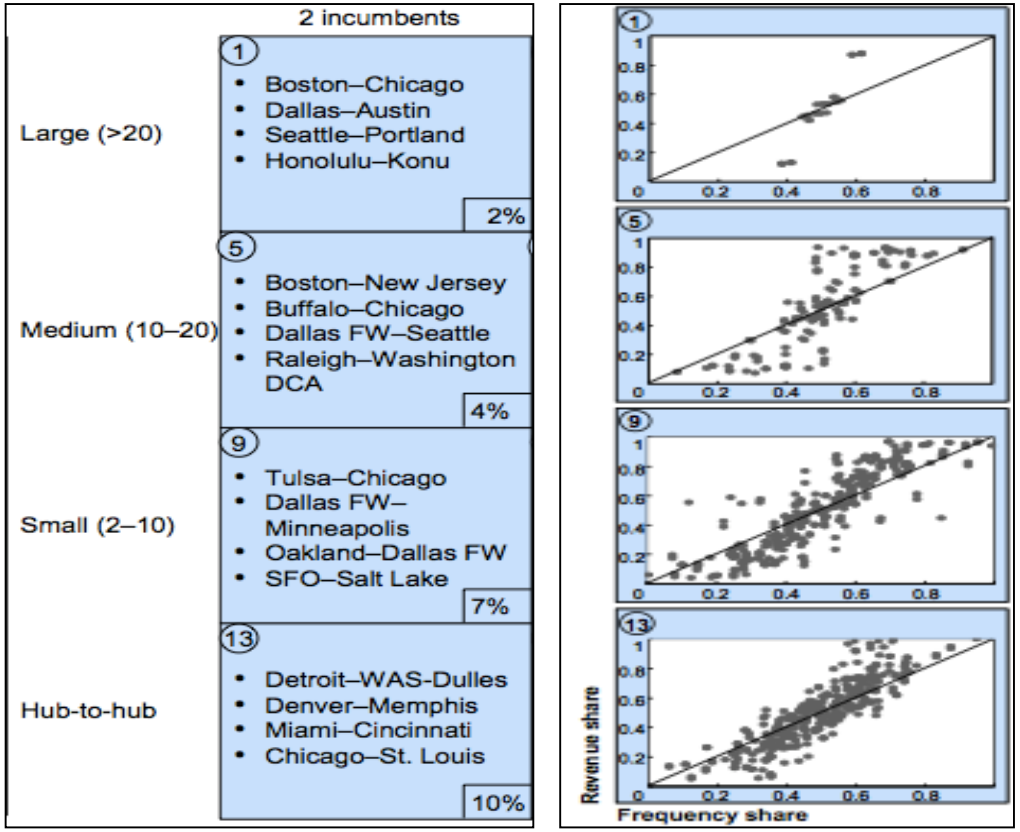
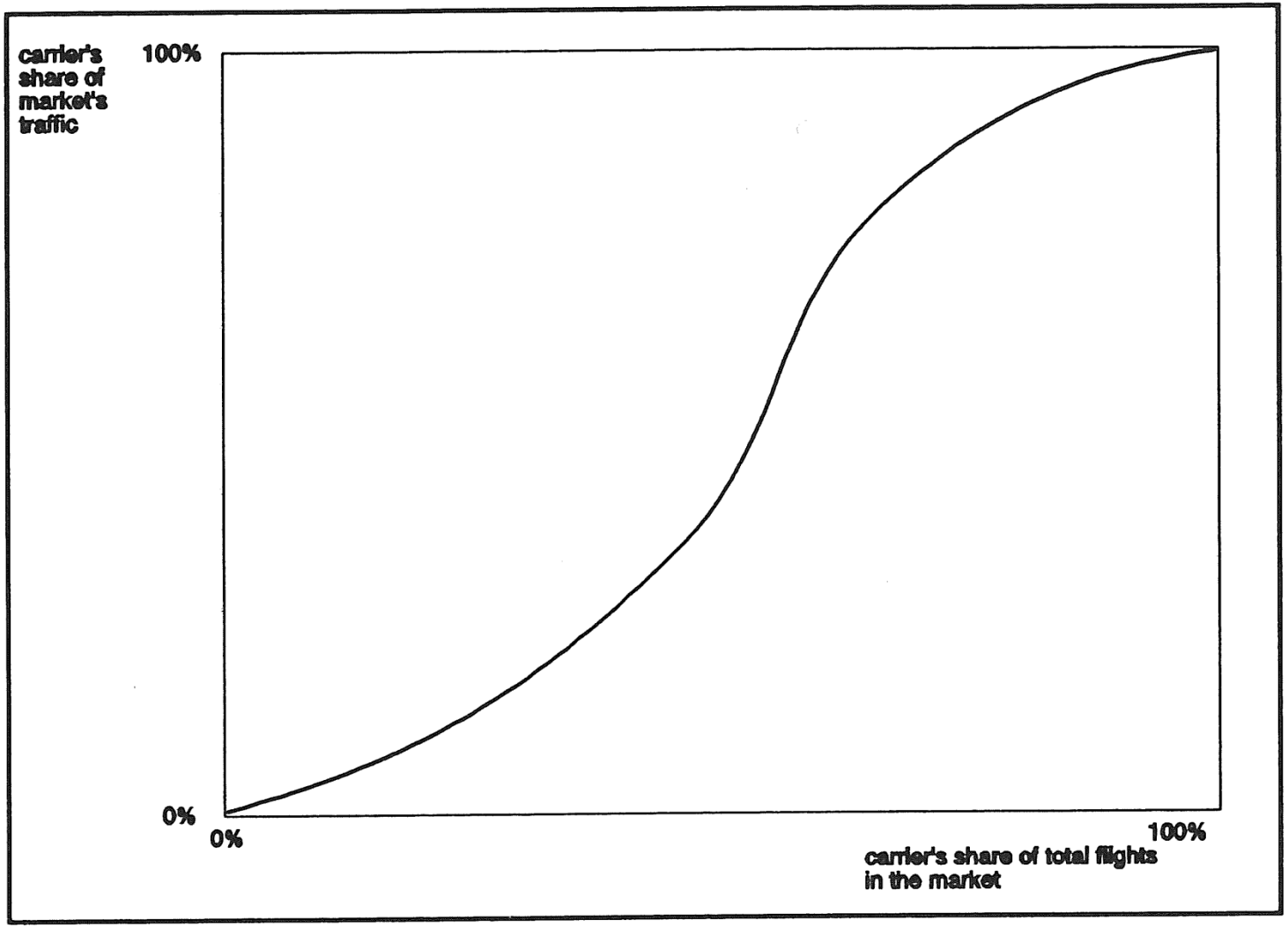
- **Reason 1: Schedule frequency disproportionately increases revenues (the S-curve phenomenon).**



Source: McKinsey analysis for IATA, 2006

The S-Curve effect



Source: Tretheway and Oum (1992)

Why supply more seats? Reason 2

InterVISTAS

- **Reason 2: the addition of new network points geometrically increases product lines (city-pair markets)**
  - If number of network points connected to a hub increases from
    - 9 to 14 (5 additional points),
    - But potential additional city pairs 45 to 105 (50 additional city-pairs).
    - A roughly 50% increase in points, increase number of markets (products) by 122%

Source: Dempsey and Gesell (2006)

Why supply more seats? Reason 3

InterVISTAS

- **Reason 3: There is a time lag between order and delivery of aircraft**
  - airlines increase aircraft orders aggressively when economy is strong
    - But take delivery during weak part of economic cycle

Source: Dempsey and Gesell (2006)

Why supply more seats? Reason 4

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- **Reason 4: High fixed costs provide an incentive to use aircraft even when demand is low**
  - parked aircraft do not generate revenue
    - Yet the carrier incurs fixed costs of ownership
  - It may be more sensible to fly the aircraft at a loss, so that some contribution to the fixed costs can be made
    - The flight must generate at least enough revenue to cover the incremental flying costs of the flight (fuel, crew, catering, maintenance)
    - Any additional revenue contributes to fixed costs

Source: Dempsey and Gesell (2006)

Bankruptcy laws

- **Stephen Wolf of United Airlines:**
  - "In a truly free market (…) oversupply would be temporary. That is, the least efficient producers will exit the market.
  - **U.S. bankruptcy laws, however, in effect displace the realities of the marketplace and have now become a barrier to exit.** Carriers are able to operate literally for years without repaying their debt obligations; consequently, their capacity is artificially retained in the system (…)"

Source: S. Wolf, *Where Do We Go From Here?* (1995)

Structural Oversupply

- **Why would structural overcapacity occur?**
  - Large and indivisible capital
  - Long planning horizons
  - Incentives for firms to defer capacity adjustment
  - Subsidies to capital expansion
- **What to look for**
  - Profit over business cycle
  - Return on invested capital
  - Bankruptcies and reorganizations
  - Capacity utilization

Structural Oversupply - Myth or Reality?

- **Demand forecasts of +5.4% annually (IATA)**
- **Profitability is rising with less volatility over business cycle**
- **Airlines exhibiting capacity discipline (Metal Neutral Joint Ventures)**
- **Capacity utilization is trending upward**
- **Aircraft more nimble (B787) in serving a broader range of markets**

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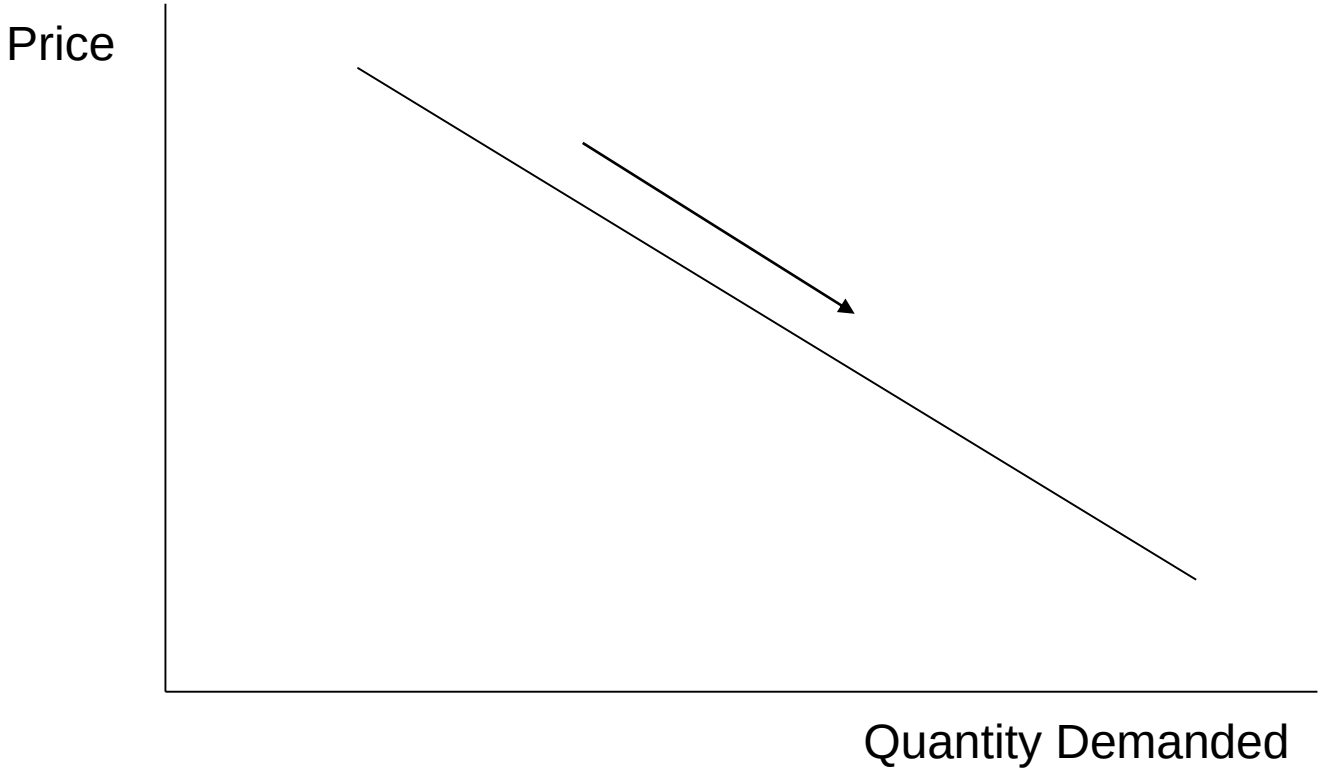
Demand

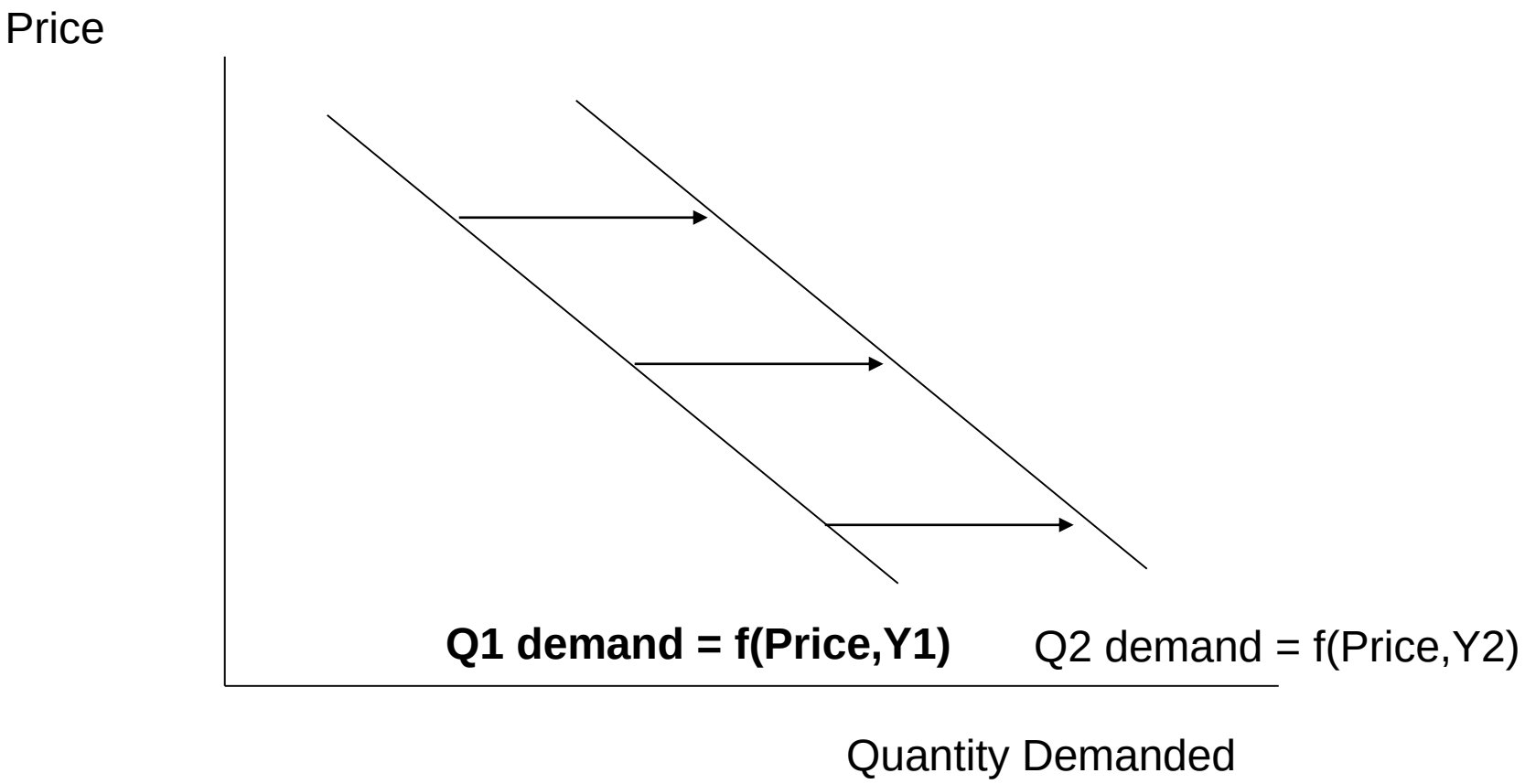


Change in demand

- **Quantity demanded = f (Price)**



Shift in demand



Elasticity

$$E_{price} = \frac{\%\Delta Quantity}{\%\Delta Price}$$

$$E_{Income} = \frac{\%\Delta Quantity}{\%\Delta Income}$$

Elasticity

- **Example:**
  - 10% increase in price
  - Traffic drops by 12%
  - Thus elasticity = -1.2

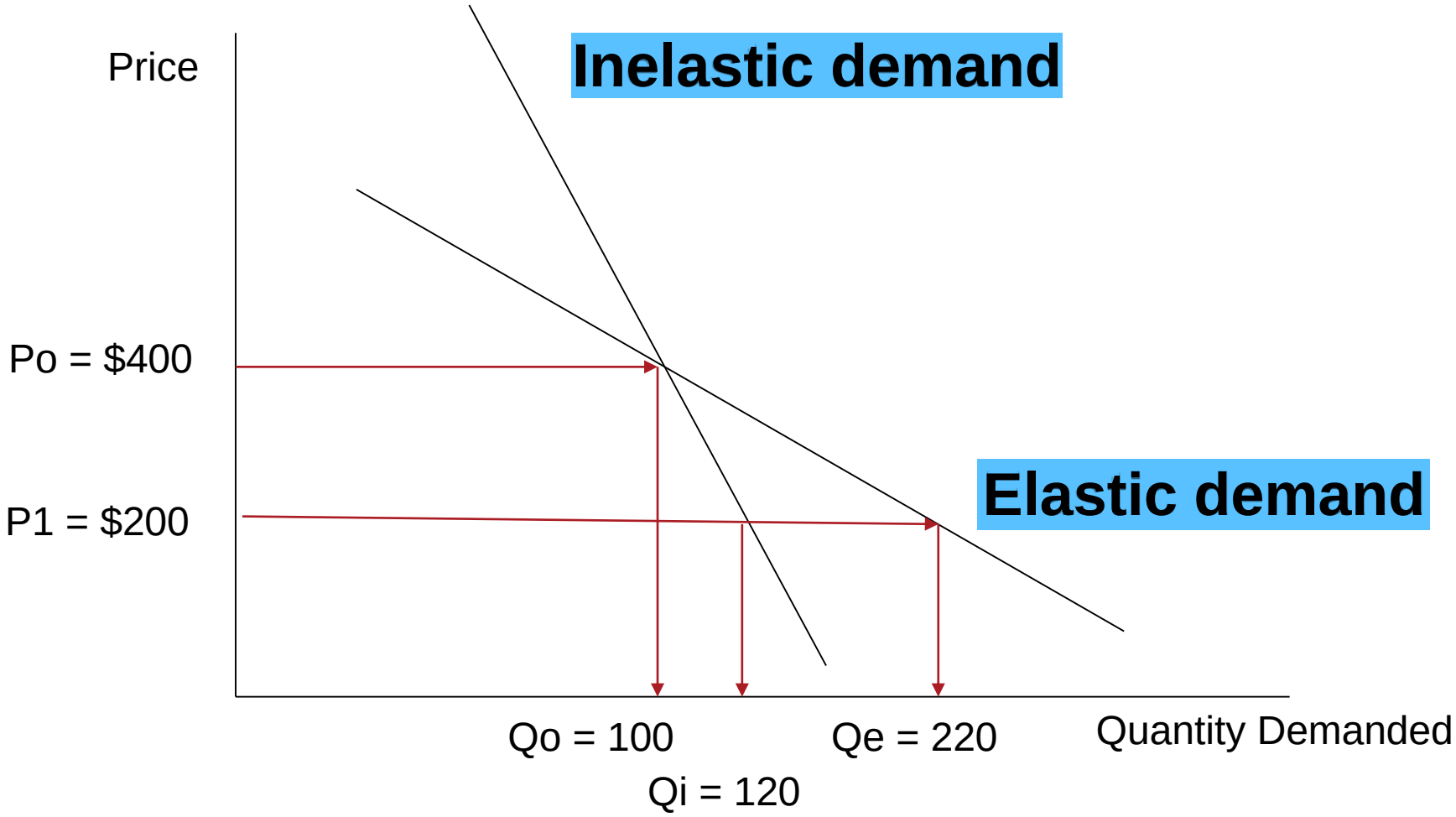
= -12% / 10%

Actual airline demand elasticities

- **Demand is**
  - Elastic if $|\varepsilon| > 1$
  - Unit elastic if $|\varepsilon| = 1$
  - Inelastic if $|\varepsilon| < 1$
- **Typical price elasticities**
  - First Class -0.81
  - Economy Class -1.00 - 1.20
  - Discount -1.60 - 2.00
- **Typical Income elasticity 1.80**

InterVISTAS Consulting produced major study of airline demand elasticities for IATA

Elastic vs inelastic demand in a diagram



Factors that affect demand

- **Factors that affect airline demand:**
  - Price
  - Income
  - Travel time
  - Demographics
    - population
    - age distribution of population
    - cultural ties between cities
  - Price and convenience of other modes of transport
  - Price and convenience of competing airlines
  - Frequency of service
  - Timing of service

Source: Tretheway and Oum (1992)

Factors that affect demand – cont.

- Day of the week
- Season
- Amenities (and price of amenities)
  - food quality
  - entertainment
  - seat width / seat pitch
- Customer loyalty
  - Frequent Flyer Programs
  - Corporate travel programs, where benefits are provided for commitment for large share of travel
- Safety and security
- Distance

Source: Tretheway and Oum (1992)

The key factors

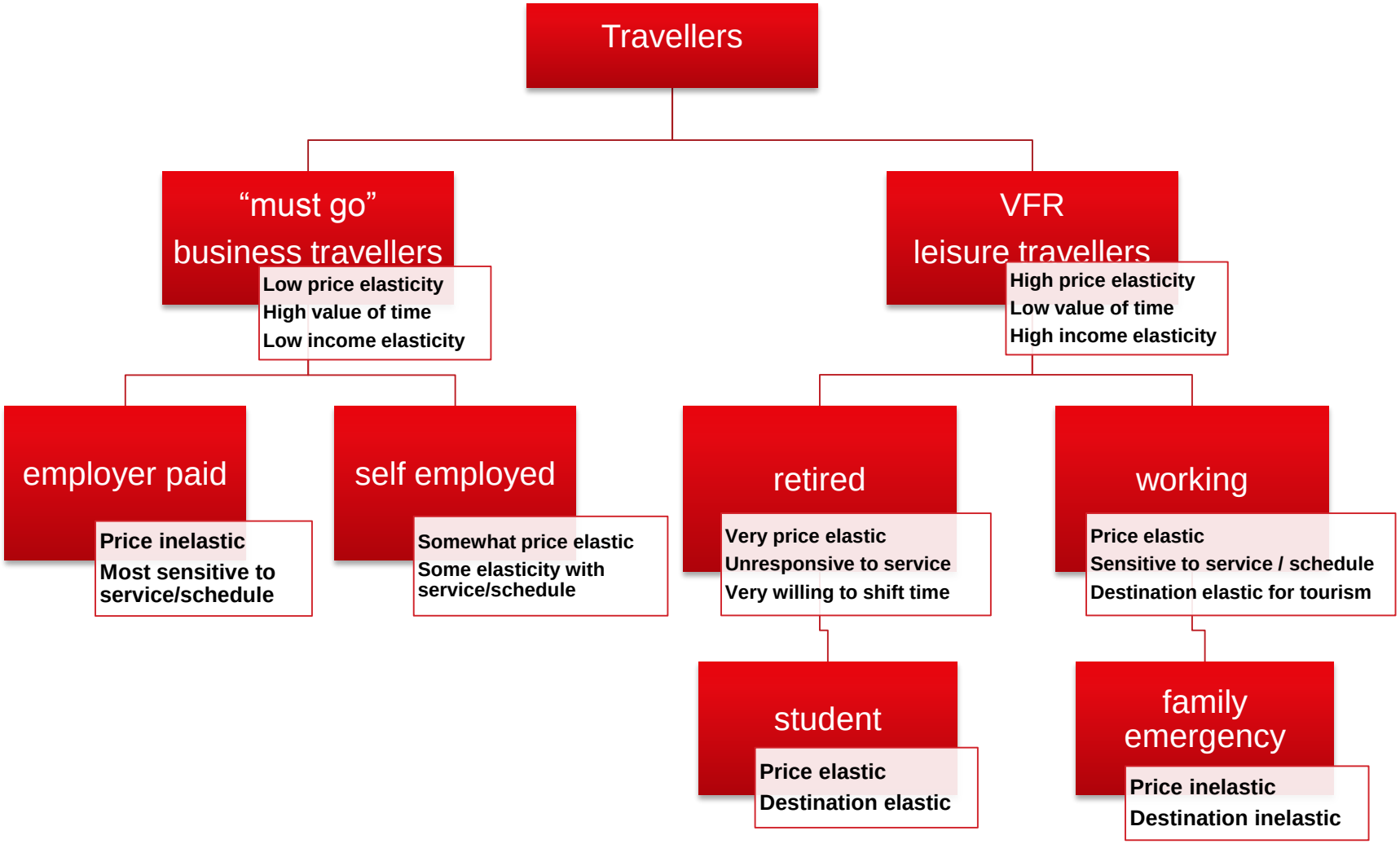
- **Price**
  - Lower fares lead to higher demand
- **Frequency of service**
  - More important for business travellers
  - One study found that doubling frequency would lead to a 20% increase in demand for business but only a 5% increase for leisure travellers
- **Income**
  - Air travel is pro-cyclic
    - When economy drops 5%, air travel may drop 9%

Source: Tretheway and Oum (1992)

Derived demand

- **Air Travel is a *derived* demand**
  - People do not buy airline product simply because they want to fly
  - They buy airline product as part of another activity
    - A leisure experience
    - A business engagement
  - We say airline demand is derived from demand for leisure or business engagements, etc.
  - Thus airline demand is affected by prices and other aspects of other elements
    - Low hotel prices stimulate demand for air travel

Segmentation of Market Demand



Leisure vs. business

- **Leisure travellers:**
  - Travel on personal time
  - Low time sensitivity
  - High price sensitivity
  - Travel is generally booked in advance
- **Business travellers:**
  - Travel is on company time
  - High time sensitivity – frequency is important factor
  - Lower price sensitivity
  - Flexibility is also important – last minute bookings

Source: Tretheway and Oum (1992)

Price discrimination in the airline business

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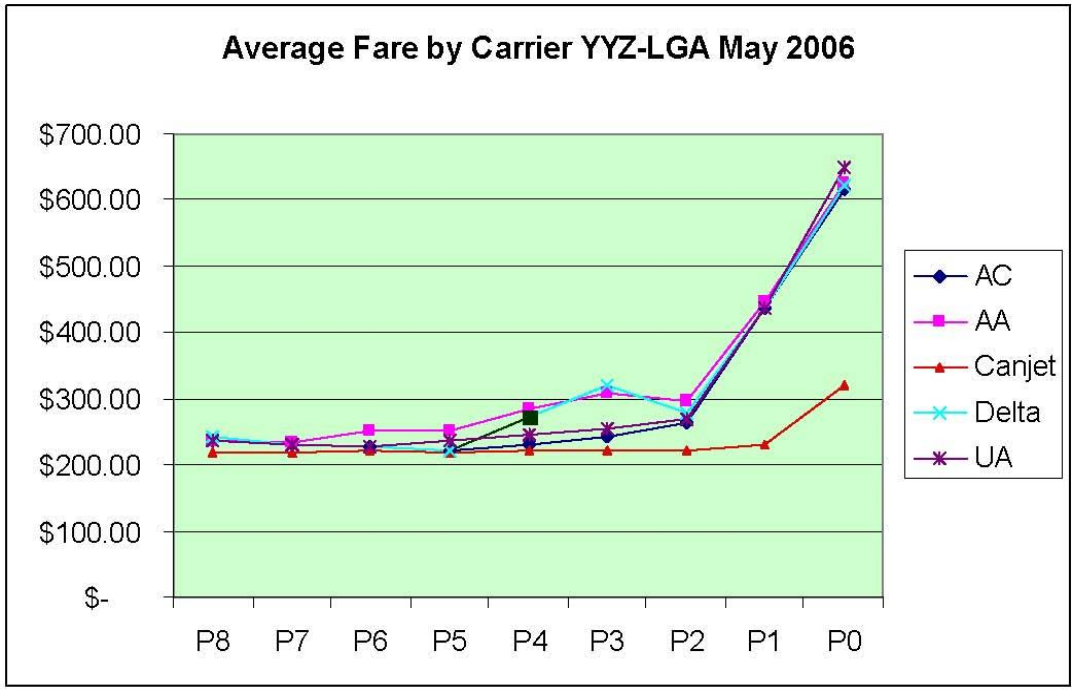
- airline has ability to charge two consumers different fares
  - consumers of discount fare have no ability to sell their seat to a full fare consumer
- airlines differentiate the product
  - Ex) full fare seats allow flexibility to change travel plans
- airlines recognise that full fare product is often bought close to date of flight
- discount seats can be bought much earlier and are usually sold with restrictions
- Price discrimination
  - Sell flexible product at full fare
  - Sell a restricted product at lower fare, but with advance purchase

Inter-Temporal Price Discrimination

- **Can extract value from last minute booking passenger**
- **Varies with number of competitors**
- **Varies across markets**



Gillen and Hazledine (2011) The New Pricing in North American Air Travel Markets: Implications for Competition and Antitrust

Demand management

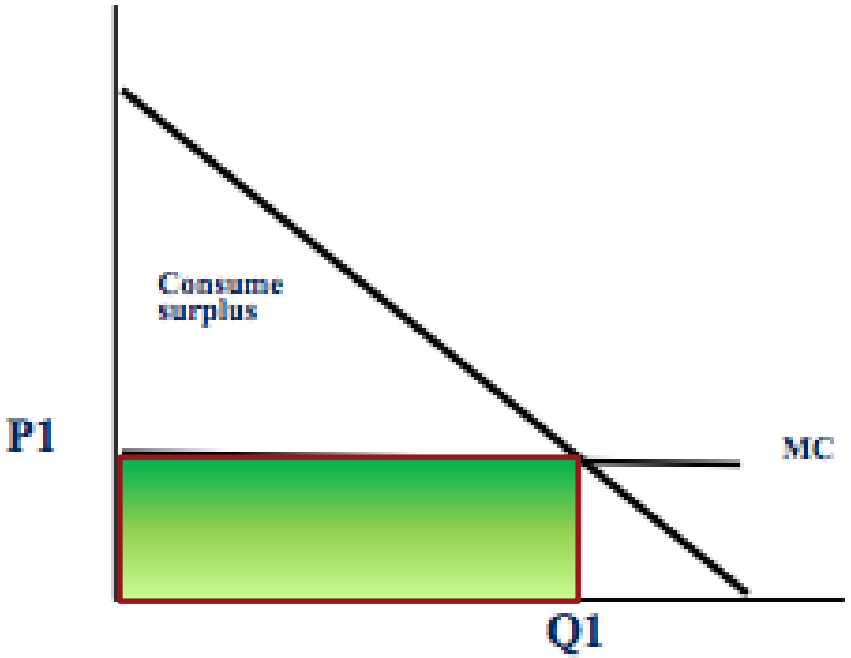
- **Airlines offer low fares, at off-peak times, with advance purchase requirements and other restrictions, to attract VFR traveller, but they must avoid diversion or cross over of "must go" travellers to the low fare product**

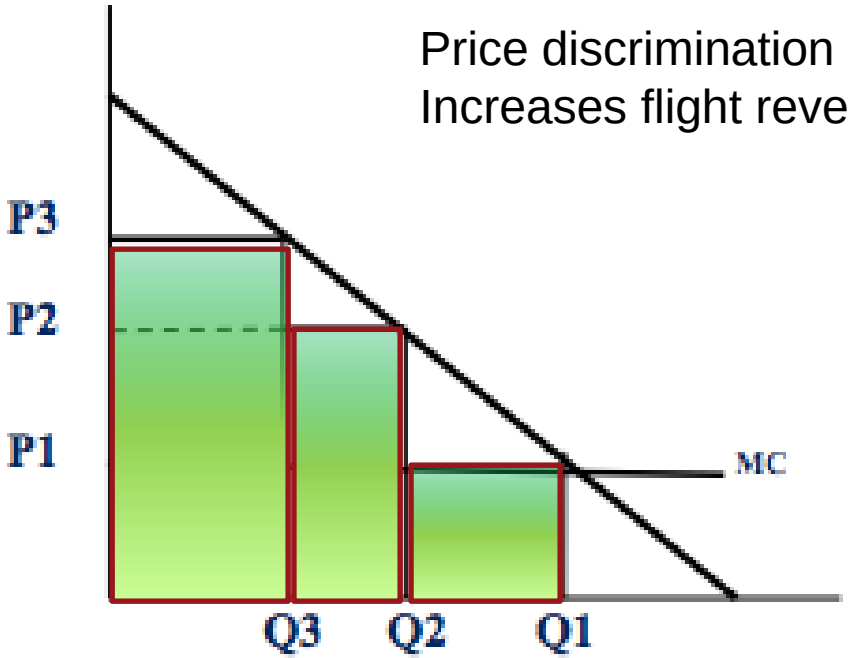
- **Airlines use restrictions on tickets**
  - Segment full fare market from discount fare as much as possible using *fences* on cheaper tickets

Demand Management – cont.

- **Typical conditions for cheaper tickets (fences)**
  - Advance booking
  - No refund or penalty on refund
  - Penalty for schedule change
  - No stopover privileges
  - Round trip ticket
  - No interline privileges

Price discrimination by passenger segment





Price discrimination
Increases flight revenue

Consumers and large carriers

- **All other factors held constant, many consumers prefer large carriers over small carriers**
- **Three reasons:**
  - Information costs
    - Large carriers have a large network, while many small carriers have limited service options
  - Quality of service
    - For example, connections are easier for a single airline, rather than switching airlines, as well as lower chance of lost or delayed baggage with a single airline connection
  - Frequent flyer programs
    - More destinations makes it easier to collect points

Source: Tretheway and Oum (1992)

Hubs and passenger demand

- **Hub disutility**
  - Passengers are affected by the number of transfers
    - Passengers generally are willing to pay more to avoid transfers
    - Hub connections disutility has been estimated at $30
- **Price effects**
  - Both positive and negative effects
    - Increased fuel and crew costs of hub operation can be offset by increased passenger traffic
    - Can lead to viable service to smaller communities, and overall increase in demand

Source: Tretheway and Oum (1992)

Overbooking

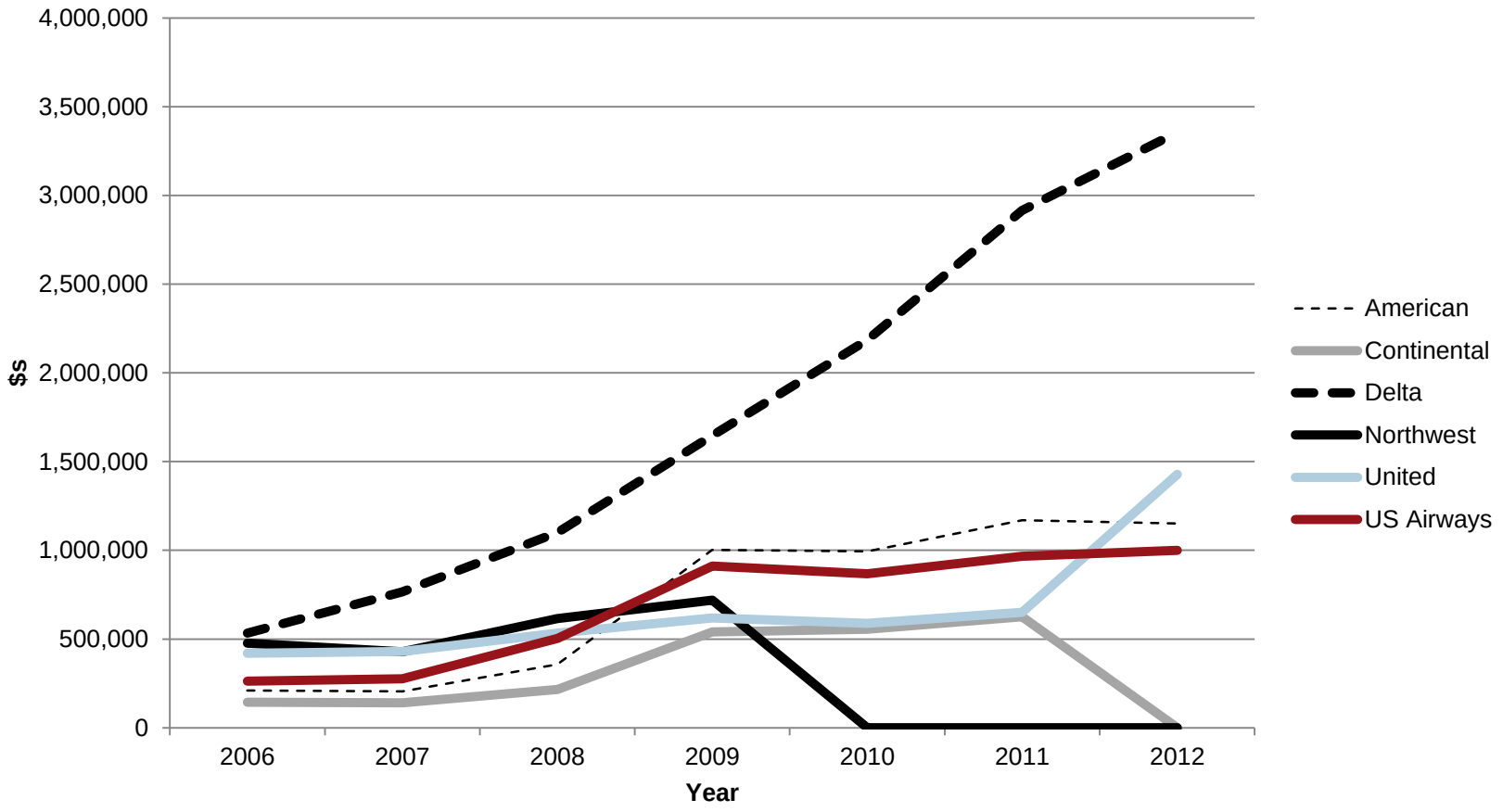
- **A portion of travellers will not show up for their flight**
  - Business travellers more often than leisure travellers
- **Airlines may offset loss of revenue by booking more seats than available**
  - Based on historic “no-show” rates
- **This can be an issue when all passengers are present for the flight**
  - Airlines offer incentives to passengers willing to take another flight
- **Non-refundability of ticket prevents no-show revenue loss**

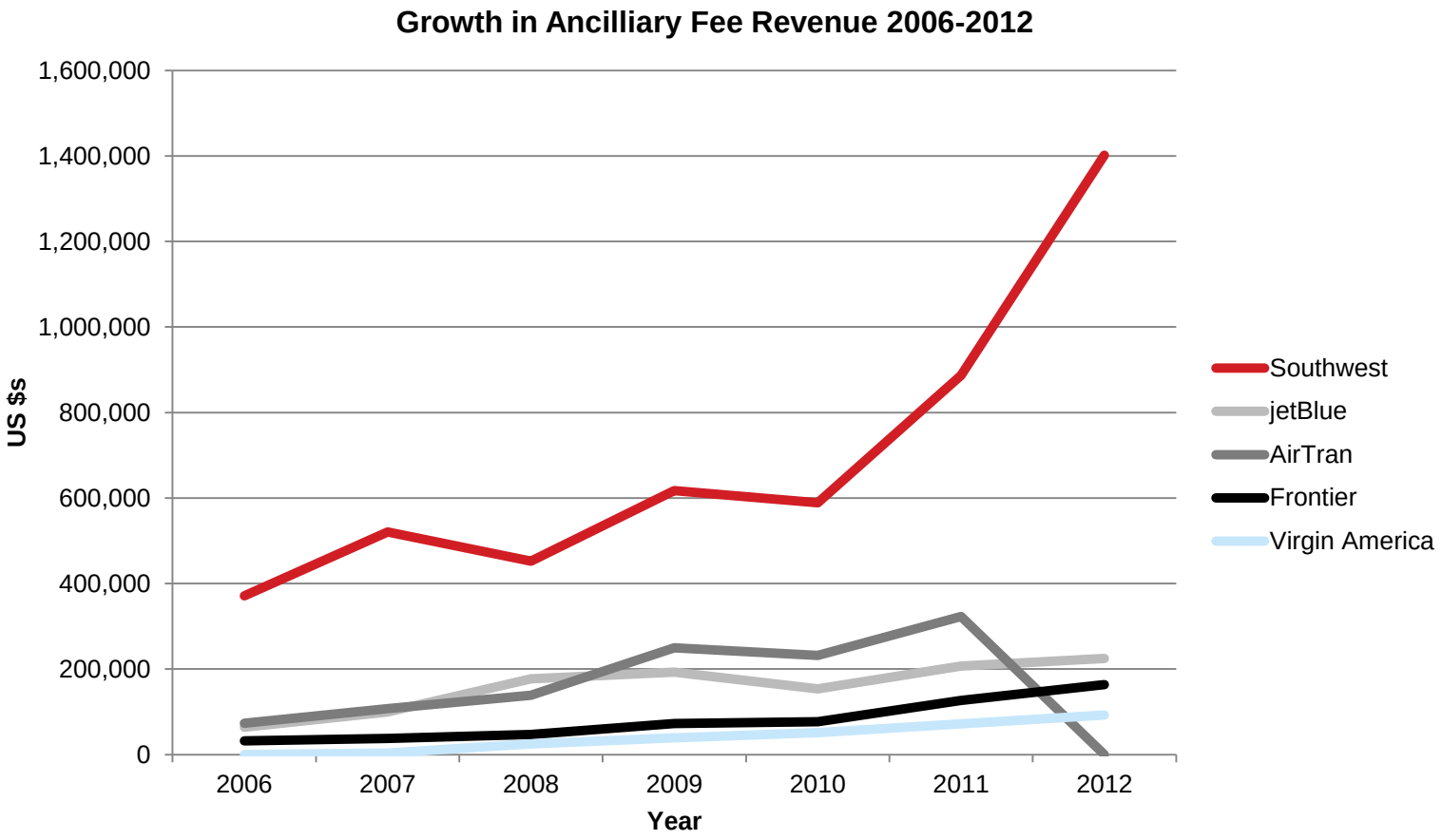
Source: Tretheway and Oum (1992)

Add-On Pricing (Product Unbundling)

- **Bundling moves people away from optimal consumption point**
- **Bundling requires ‘bribing’ customers to take good with bad**
- **Unbundling lets customer build product of choice for a given trip – create value**
- **Spirit (U.S. ULCC) lowers base fare when unbundling**
- **Airlines generating significant revenue and uncoupling from GDP**

Growth in Ancilliary Fee Revenue 2006-2012




Growth in Ancilliary Fee Revenue 2006-2012
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
US $s
2006
2007
2008
2009
2010
2011
2012
Year
Southwest
jetBlue
AirTran
Frontier
Virgin America

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