



Demand and Supply

Istanbul Technical University
Air Transportation Management, M.Sc. Program
Aviation Economics and Financial Analysis

Module 2

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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

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, higher on short haul and small aircraft routes

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			YTD 2013 vs. YTD 2012		
	RPK	ASK	PLF	RPK	ASK	PLF
Africa	6.9%	7.4%	73.2%	7.2%	5.4%	69.9%
Asia/Pacific	8.5%	7.1%	78.1%	5.2%	4.7%	78.3%
Europe	3.4%	3.1%	83.9%	3.5%	2.1%	81.8%
Latin America	8.3%	6.1%	80.9%	8.5%	8.9%	79.1%
Middle East	10.4%	13.0%	77.2%	12.0%	12.4%	78.1%
North America	2.3%	3.1%	83.9%	2.7%	1.4%	83.5%
International	5.7%	5.7%	80.9%	5.2%	4.4%	80.0%
Australia	2.6%	1.9%	78.1%	3.7%	4.0%	76.5%
Brazil	1.0%	-1.9%	78.1%	-0.3%	-4.8%	75.6%
China P.R.	10.6%	12.1%	80.2%	12.0%	12.1%	81.1%
India	16.4%	5.7%	71.5%	4.0%	0.6%	75.8%
Japan	7.8%	7.5%	69.3%	5.6%	5.6%	63.6%
Russian Federation	12.1%	11.2%	78.7%	9.9%	8.7%	75.6%
US	1.4%	1.0%	81.0%	1.7%	1.6%	84.0%
Domestic	5.1%	4.7%	79.1%	4.8%	4.2%	80.2%
Africa	5.7%	6.0%	73.7%	6.8%	4.8%	70.7%
Asia/Pacific	9.2%	8.4%	78.0%	7.2%	6.7%	78.1%
Europe	3.7%	3.2%	83.1%	3.5%	2.1%	81.0%
Latin America	6.5%	4.0%	79.5%	6.1%	4.8%	77.7%
Middle East	9.5%	12.5%	77.2%	11.0%	11.5%	78.3%
North America	1.7%	1.8%	82.0%	2.0%	1.5%	83.8%
Total Market	5.5%	5.3%	80.3%	5.0%	4.3%	80.1%

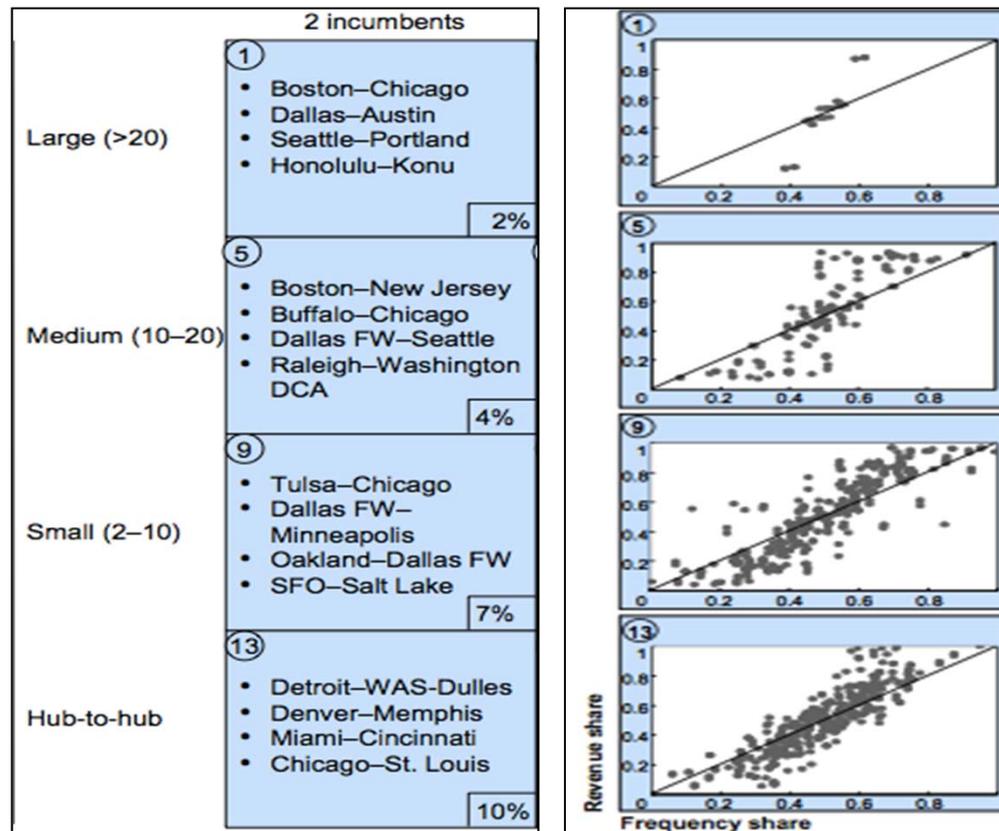
Source: IATA,
September 2013

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

Why supply more seats?

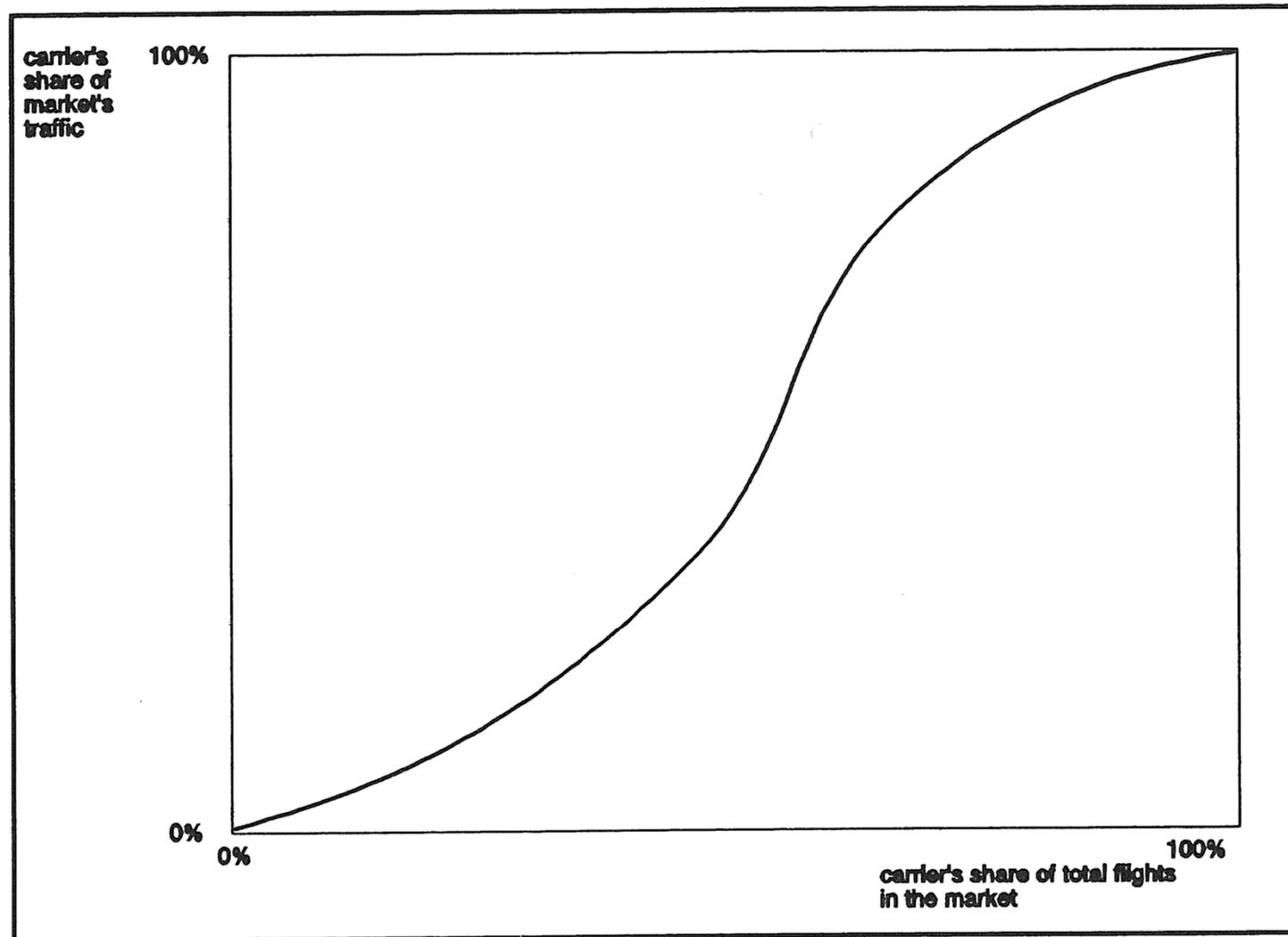
Reason 1

- 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

- **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

- **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

Why supply more seats?

Reason 4

- **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 (...)”

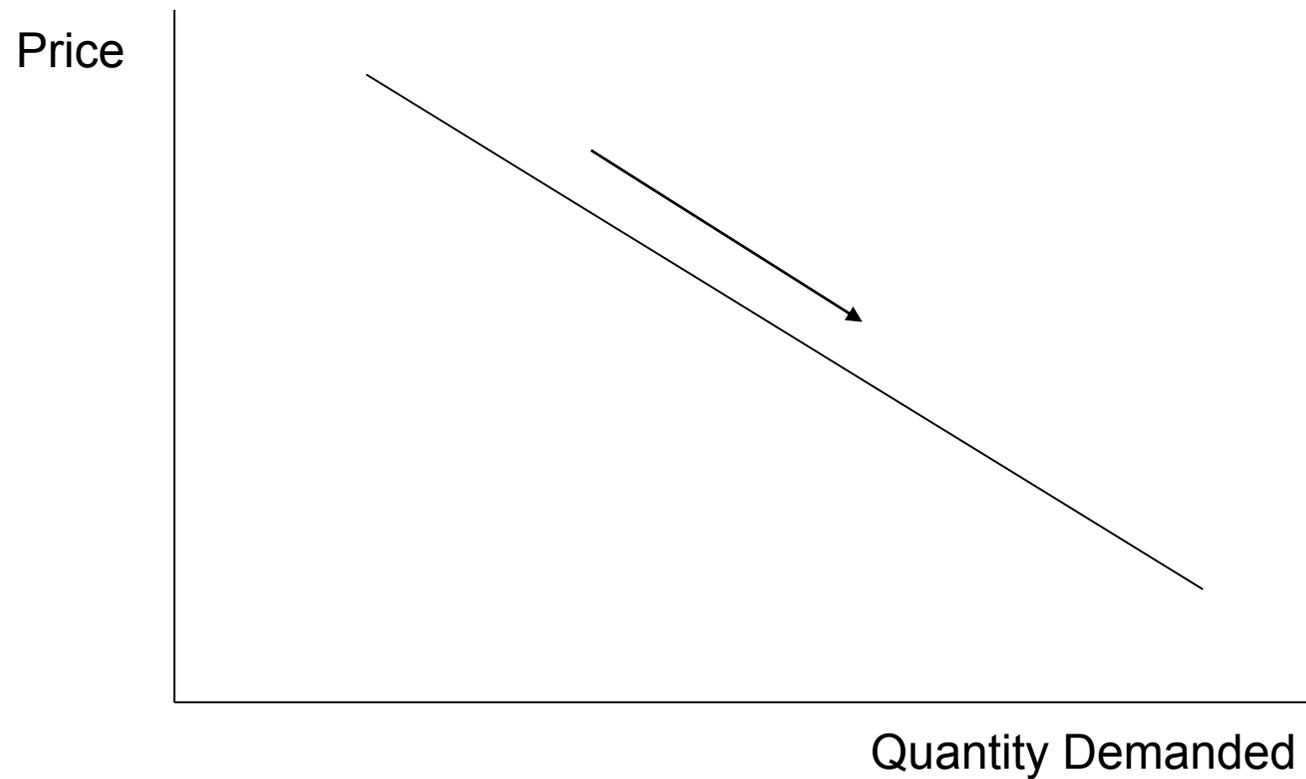
Source: S. Wolf, *Where Do We Go From Here?* (1995)

Demand

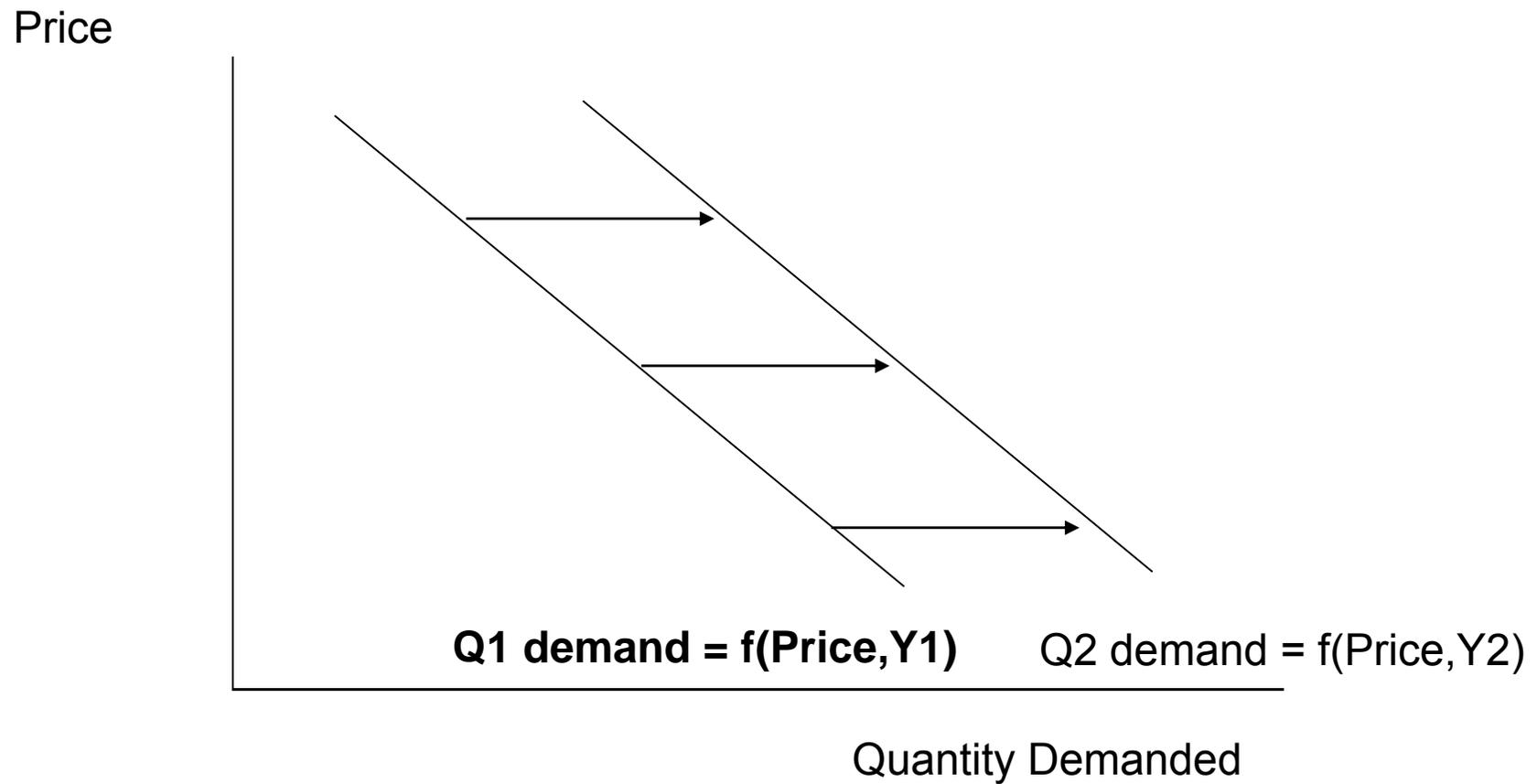


Change in demand

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



Shift in demand



Elasticity

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

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

Elasticity

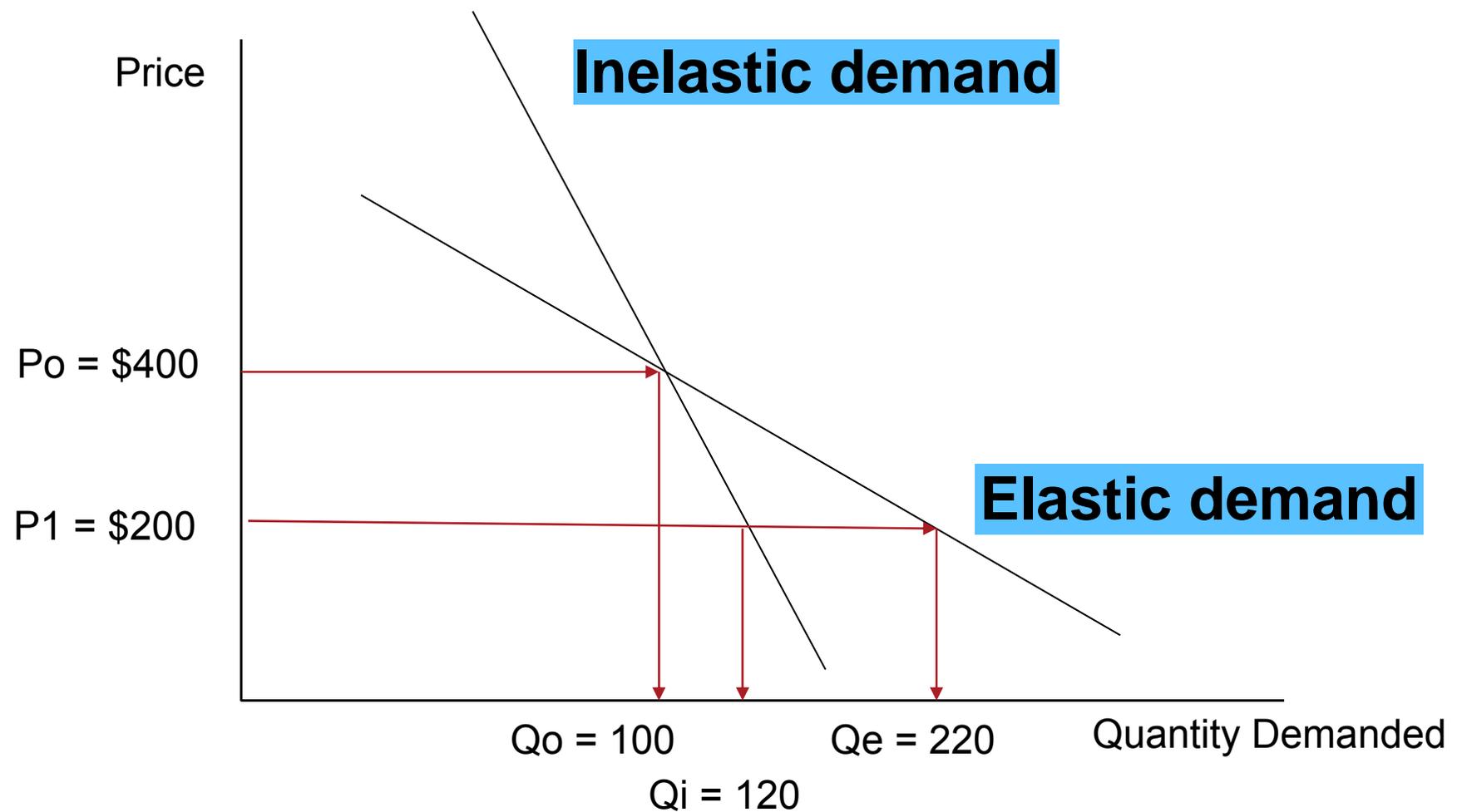
- **Example:**
 - 10% increase in price
 - Traffic drops by 12%
 - Thus elasticity = -1.2
- = -12% / 10%

Actual airline demand elasticities

- **Demand is**
 - Elastic if $|\epsilon| > 1$
 - Unit elastic if $|\epsilon| = 1$
 - Inelastic if $|\epsilon| < 1$
- **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

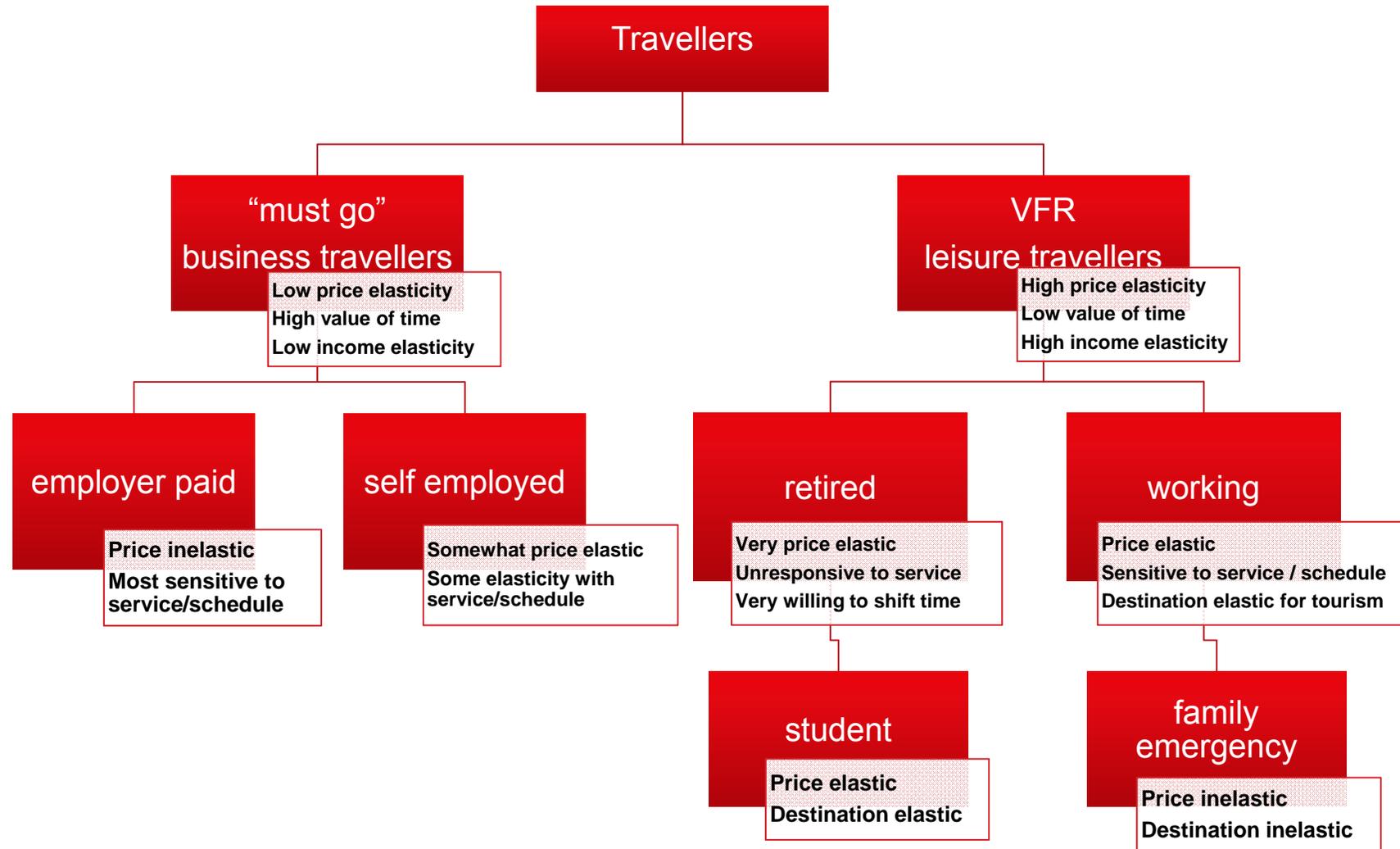
- **Price**
 - Lower fares lead to higher demand
- **Frequency of service**
 - More important for business travellers
 - One study found that doubling frequency would lead to a 20% increase in demand for business but only a 5% increase for leisure travellers
- **Income**
 - Air travel is pro-cyclic
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

- 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

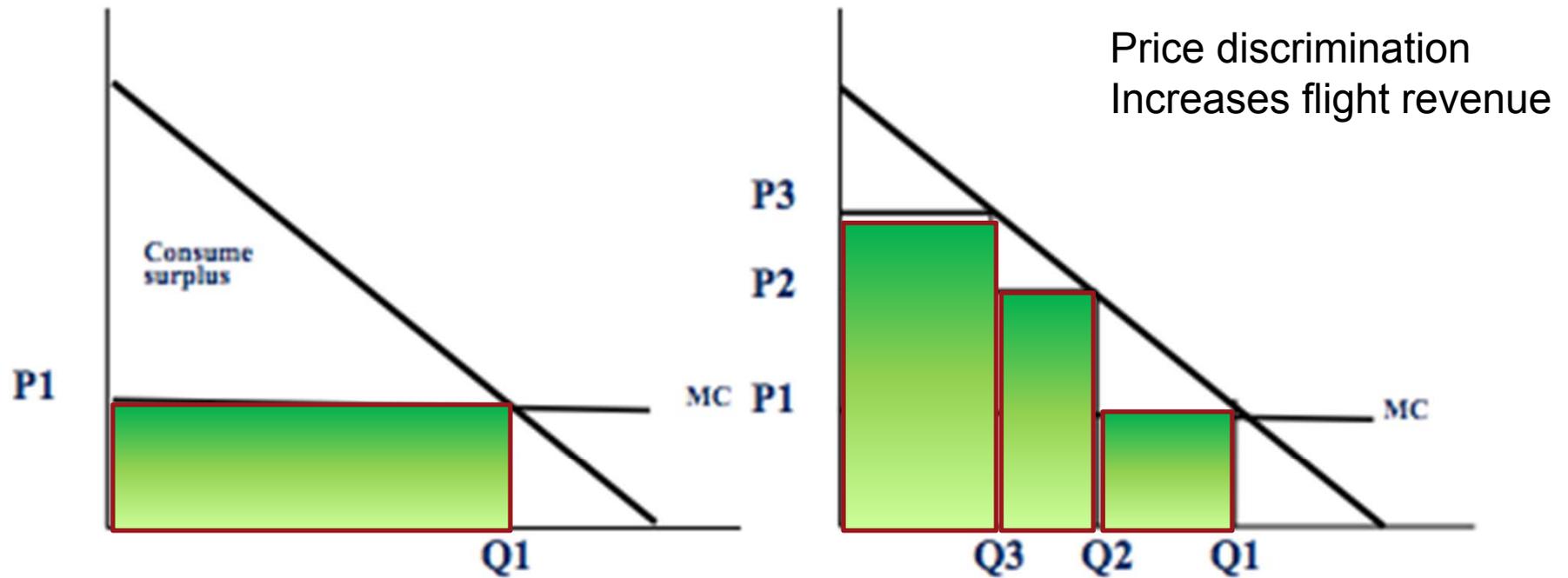
Demand management

- **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



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: Trethewey and O'Leary (1992)



Thank You!

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