

# Session 8 – Recap

Empresa

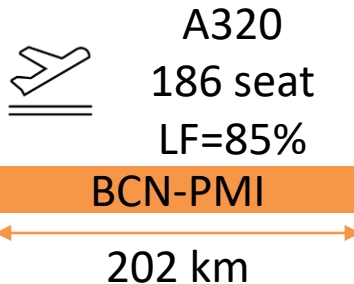
# AIR TRANSPORT INDICATORS



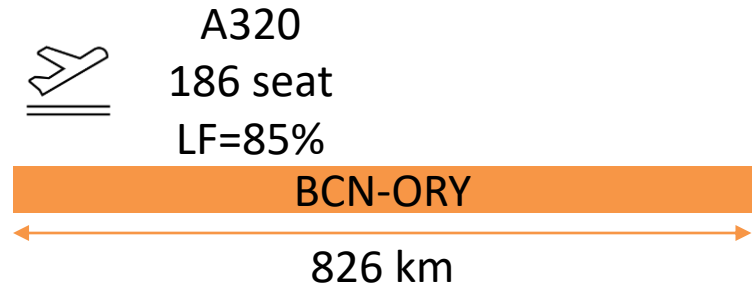
## 1. Passenger transport

- Flights
- Seats
- Passengers (pax)
- LF: Load Factor (esp: Factor de ocupación/llenado)
- SL: Stage length (great circle distance)
- ASK: Available Seat Km (esp: AKO, USA: ASM)  $\rightarrow$  seats\* dist
- Block time, flight time, taxi time
  - Block time = taxi out + flight time + taxi in

# AIR TRANSPORT INDICATORS - Example

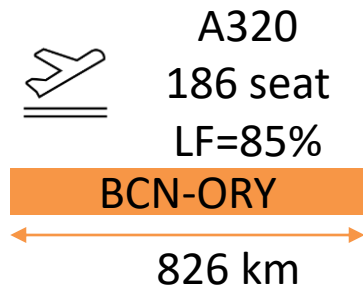


Flights: 1  
Seats: **186**  
Pax:  $186 * 85\% = 158$   
ASK:  $186 * 202 = 37.572$   
RPK:  $158 * 202 = 31.937$

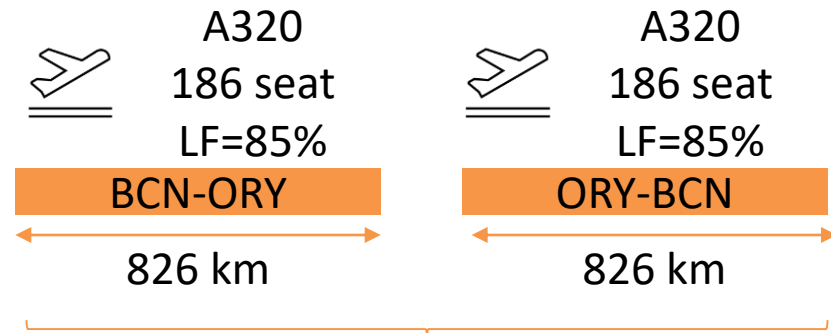


Flights: 1  
Seats: **186**  
Pax:  $186 * 85\% = 158$   
ASK:  $186 * 826 = 153.636$   
RPK:  $158 * 826 = 130.590$

# AIR TRANSPORT INDICATORS - Example



Flights: 1  
Seats: **186**  
Pax:  $186 * 85\% = 158$   
ASK:  $186 * 826 = 153.636$   
RPK:  $158 * 826 = 130.590$



Flights: 2  
Seats:  $2 * 186 = 372$   
Pax:  $2 * 186 * 85\% = 316$   
ASK:  $2 * 186 * 826 = 307.272$   
RPK:  $2 * 158 * 826 = 261.181$



# Question!

What can  
passengers expect  
to see happening at  
18:40?

**Barcelona to Fuerteventura**

12 Aug Wednesday €59.94	13 Aug Thursday ✈️	<b>14 Aug Friday €50.94</b>	15 Aug Saturday ✈️	16 Aug Sunday €50.94
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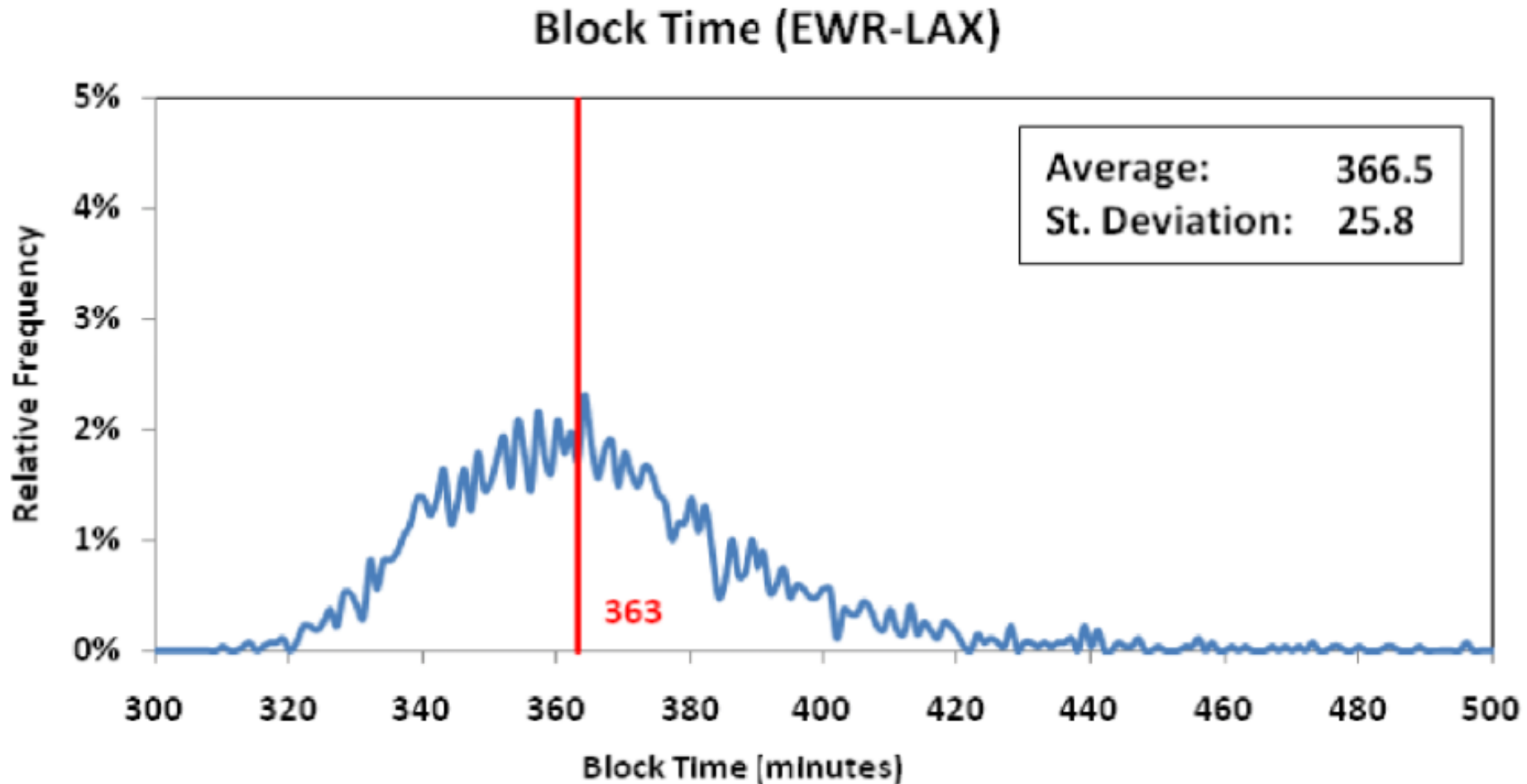
 Ryanair	<b>18:40</b> Barcelona	 Duration 3h 20m	<b>21:00</b> Fuerteventura	Flight no. FR 6302	Type Direct	<b>4 seats left at this price</b> Value fare <b>€50.94</b>
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# Block times



- **Block time = from door closed to door open**
  - Can also be from brake release to brake set
- **ACTUAL block time is variable, affected by**
  - Ground crews, pushback and taxi-out times at different airports
  - Different airport runway configurations on different days
  - Airport congestion, departure queues, ground holds
  - Weather and wind speeds while airborne; specific route flown
  - Arrival queues, descent patterns, taxi-in delays
- **SCHEDULED block time involves trade-offs**
  - Longer planned schedules increase “on-time” performance
  - But, increases operating costs, reduces utilization, gate issues
  - Should buffer be applied to block time or turn-around time?

# Block times





# Exercise, research and/or analysis

## How long should a flight last?


- Open an Excel file
- Go to [flightaware.com](http://flightaware.com) and look for 9 historic flights and write down the following total block times
- Calculate the average block time & the 80% highest value:

BCN-CDG: (VY vs. AF)

BCN-AMS: (VY vs. KL)

MAD-LHR: (BA vs. IB)






# Exercise, research and/or analysis

## Where did you fly last time?

Assuming LF= 85%, calculate:

- Aircraft type: [flightaware.com](http://flightaware.com)
- Gauge (number of seats per aircraft): Wikipedia (airline + aircraft) → seats
- Passengers (pax): calculation with LF
- SL: Stage length ([gcmap.com](http://gcmap.com))
- ASK: Available Seat Km
- RPK: Revenue Pax Km
- Block time, flight time, taxi time (flight aware)

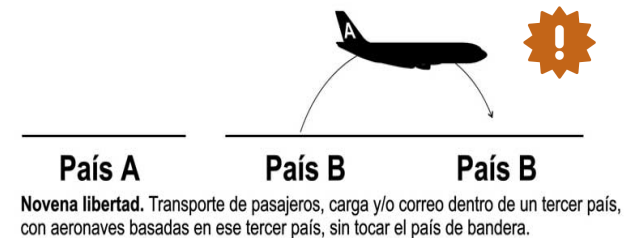
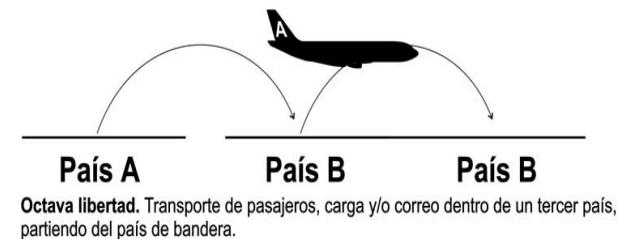
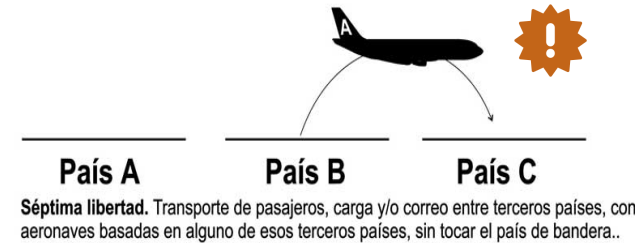
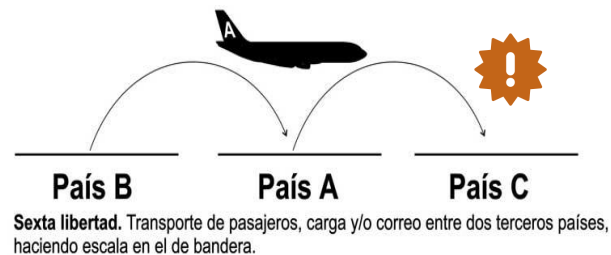
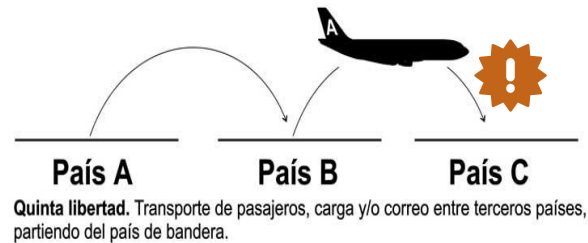
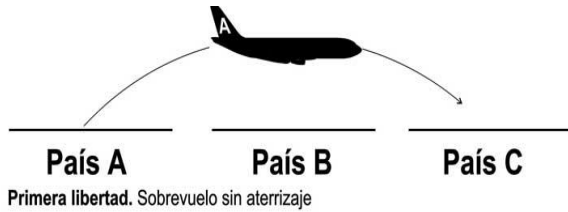



# Exercise, research and/or analysis

## Introduction to excel:

1. Download and open the excel file “Cebu\_2019.xlsx” from ATENEA
2. Add a column ASKs and calculate the ASKs based on already existing information
3. Using excel filters and the functions “SUMA” and “CONTAR”, calculate the following:
  - Number of seats departing from the airport in November
  - Number of arriving flights at the airport in February
  - Number of seats from Cebu to Shanghai Pudong airport (PVG)
  - Number of domestic flights departing from the airport in August
  - How many ASKs did Philippine Airlines fly from the airport in June?
  - Average stage length (in Km) of Air Asia from the airport in December?

# FREEDOMS OF THE AIR





## Exercise, research and/or analysis

Do some research and find out an example flight of the following cases:

- 1<sup>st</sup> freedom flight with Air France
- 3<sup>rd</sup> freedom flight with Cathay Pacific
- 4<sup>th</sup> freedom flight with Cebu Pacific from Hong Kong
- 5<sup>th</sup> freedom flight with Emirates from Athens (hint: Emirates route map)
- 6<sup>th</sup> freedom example with Qatar Airways from Cape Town
- 7<sup>th</sup> freedom example with Ryanair departing from Vilnius
- 9<sup>th</sup> freedom example with easyjet from Munich



# FACTORS PROMOTING AIR TRANSPORT GROWTH

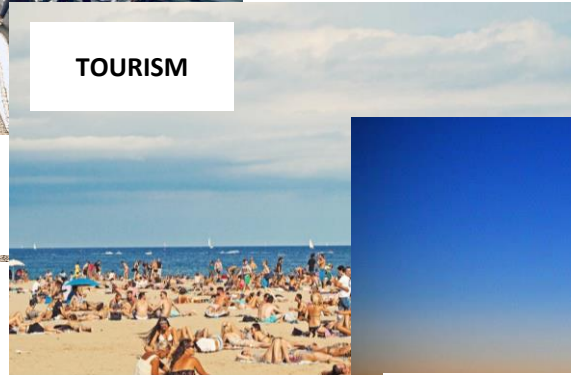
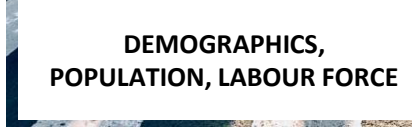
**NATIONAL/REGIONAL GDP &  
GDP PER CAPITA**



**TOURISM**



**DEMOGRAPHICS,  
POPULATION, LABOUR FORCE**



**FUEL & FX**



# Question!

What is GDP?

Why is so important for air traffic growth?

Which countries are more likely to grow their air traffic volumes

**NATIONAL/REGIONAL GDP &  
GDP PER CAPITA**

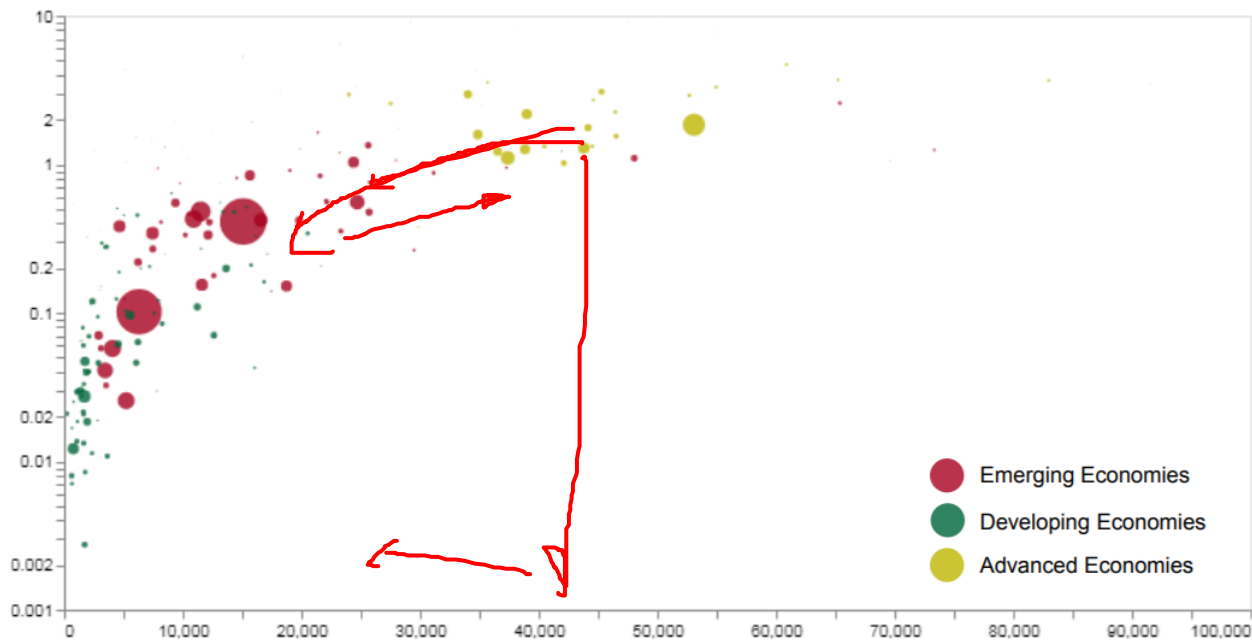


# AIR TRANSPORT vs. GDP per CAPITA



In 2017, 30% of emerging country populations took a flight

2017 trips per capita (each bubble is a country)



2017 Middle Class (m. people)

7,750

4,566

Lower and Upper  
income class

2,984

Middle-class Emerging  
Middle-class Developing  
Middle-class Advanced

World Population

2017 real GDP per capita  
(2010 \$US at Purchasing Power Parity)

# AIR TRANSPORT vs. GDP



Figure 2 - Relationship of Real GDP and Air Travel



Source: IMF and SRS Analyser, 2016




# Question!

Why are Fuel and Forex  
important for air traffic  
growth?


**NATIONAL/REGIONAL GDP &  
GDP PER CAPITA**






## Exercise, research and/or analysis

1. In term of Forex, was 2014-2015 a good year for Russian airlines and air traffic?  
Hint: Search what happened between the Russian Ruble and the US Dollar
2. In term of Forex, search what has happened with Latin American currencies in the last 10 years (Colombian Peso COP, Argentinian Peso ARS)?
3. In terms of fuel, from 2007 until now, which are the good years for airlines?



## Exercise, research and/or analysis

1. Download from Atenea the document “Spain\_seats\_2004\_2019.xlsx”
2. Add a column and classify the rows between domestic and international
3. Build a pivot table with the following shape  
Columns: Year 2004 -2005-...-2019  
Rows: Domestic vs. International
4. Plot the results in two lines
5. What can we see?  
What can explain the air traffic volume trends?  
Which indicators would you analyze?



## Exercise, research and/or analysis

Possible sources (GDP, tourism...):

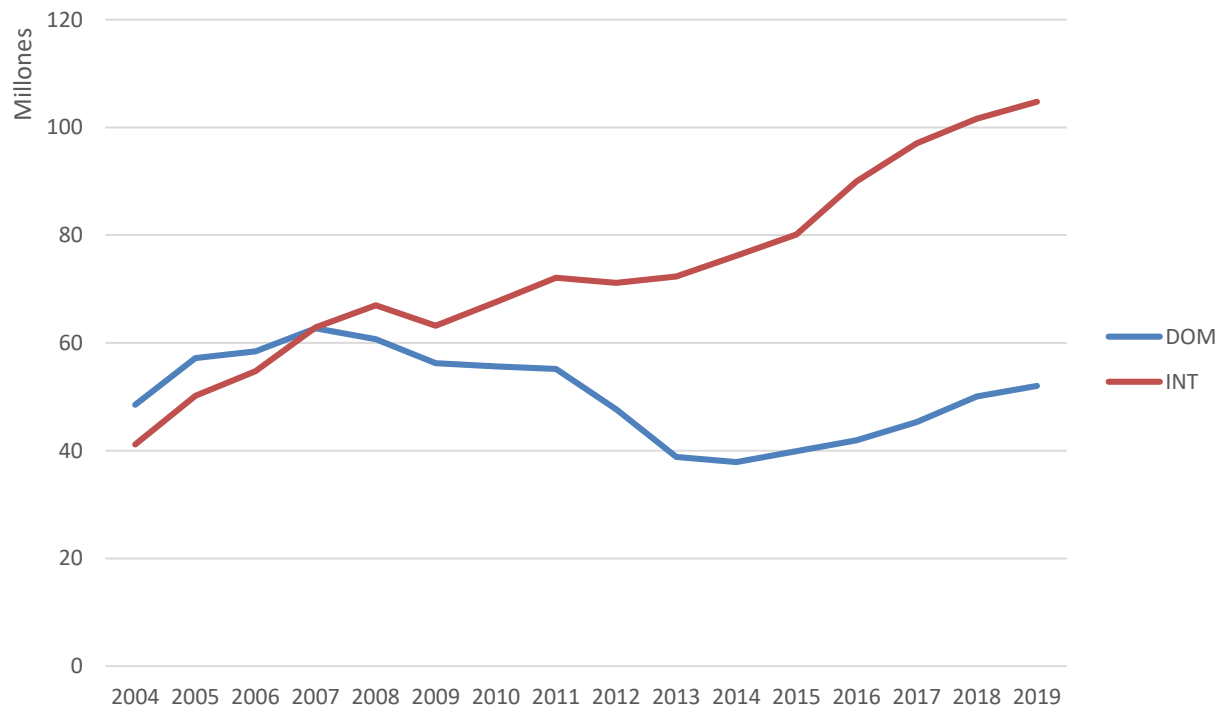
<https://data.worldbank.org/>

What other things can we analyze?

Repeat the analysis with the document “Spain\_seats\_by\_airline\_2004\_2019.xlsx”, which includes the breakdown of seats by airline.

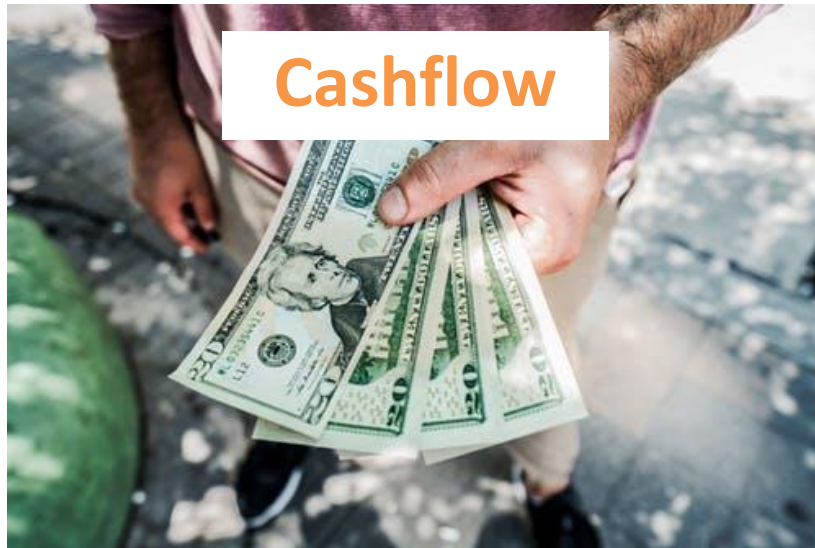
# Excel exercises

## Spain\_seats\_2004\_2019.xlsx





# Expense vs. cost



Cashflow

Cash out (salida de caja)



P&L

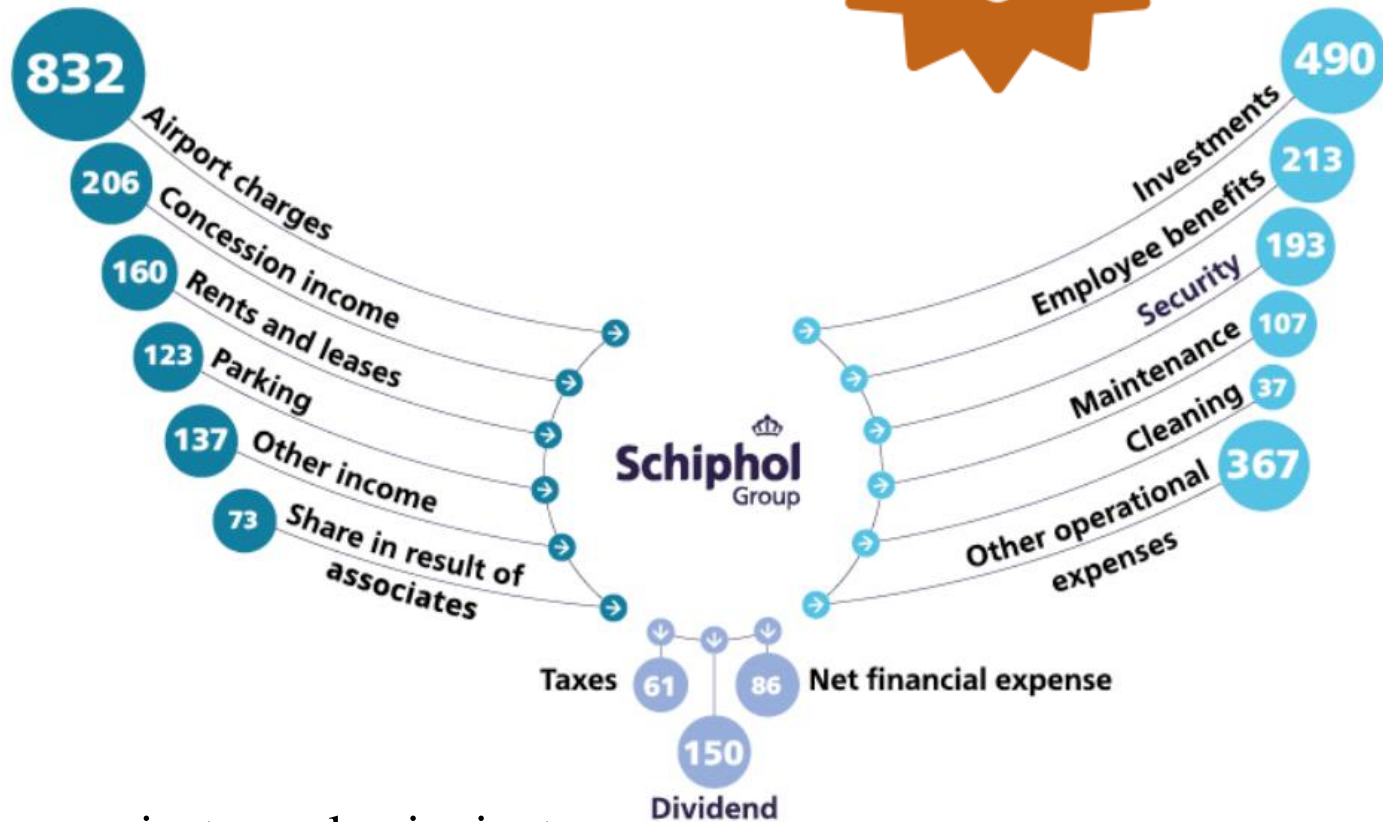
Depreciation  
Useful life  
Cost

# Airport business model



## Business model

(x EUR million)



Los ingresos se ajustan a la siguiente estructura:

- Ingresos aeronáuticos
- Ingresos no aeronáuticos

Warning between Investment Cashflow & Depreciation



# Exercise, research and/or analysis

## Channel Tunnel case

You are an investor. It's 1986 and one of the largest construction project is about to start. Eurotunnel offers you the possibility to invest in it. The project is not a risk-free investment, in fact the risk of the operation will be high, so as an investor you would expect a return of 13 percent on investments with a similar degree of risk to that of the Tunnel. Eurotunnel shares with you the following cash flows of the project:

**Q1. Determine if you would invest in it.**

Año	Flujo de tesorería
1986	—457
1987	—476
1988	—497
1989	—522
1990	—551
1991	—584
1992	—619
1993	211
1994	489
1995	455
1996	502
1997	530
1998	544
1999	636
2000	594
2001	689
2002	729
2003	796
2004	859
2005	923
2006	983
2007	1.050
2008	1.113
2009	1.177
2010	17.781



# NPV, IRR



NPV (Net present value) → Esp. VAN (Valor actual neto)

$$NPV = -C_0 + \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \dots + \frac{C_T}{(1+r)^T}$$

$-C_0 = \text{Initial Investment}$

$C = \text{Cash Flow}$

$r = \text{Discount Rate}$

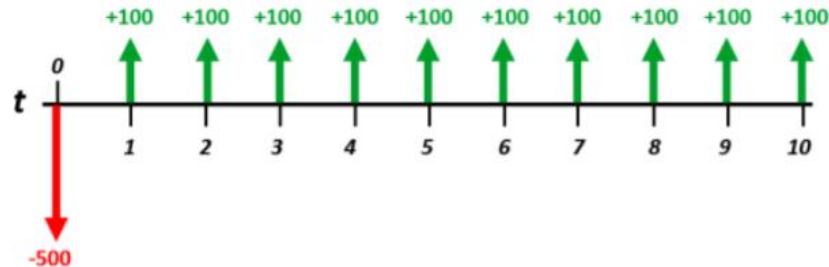
$T = \text{Time}$

IRR (Internal rate of return) → esp. (TIR)

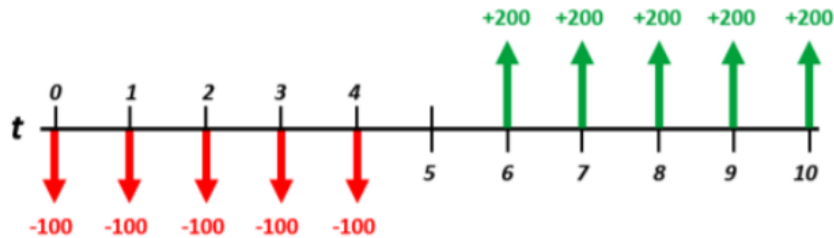
$r$  that makes NPV equal to 0

Use an excel spreadsheet to calculate the NPV (with different  $r$ ) and determine the IRR for the following 3 projects

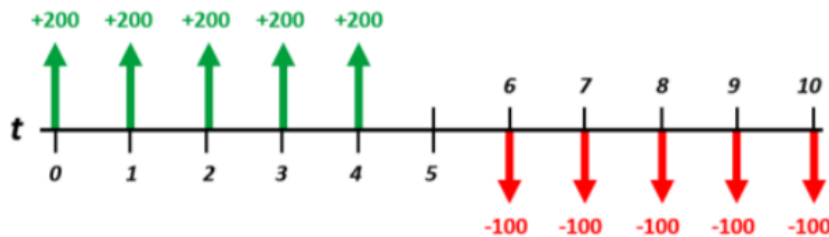
### Project A



### Project B



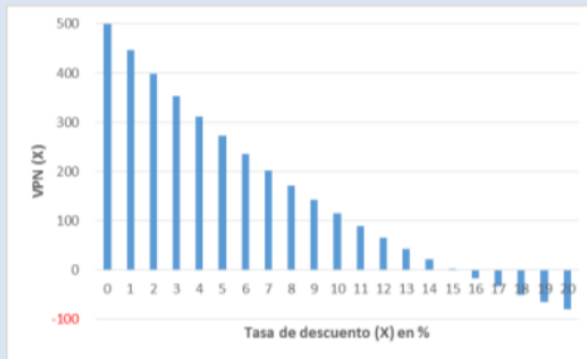
### Project C



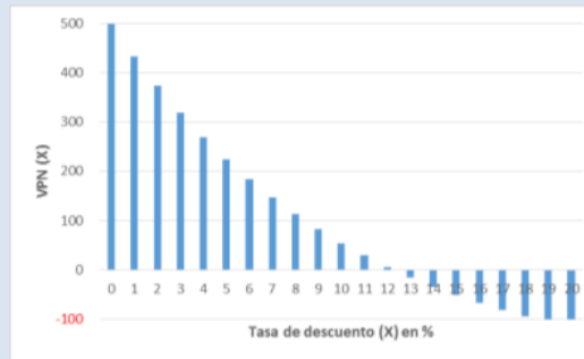
# Exercise, research and/or analysis

# Solutions

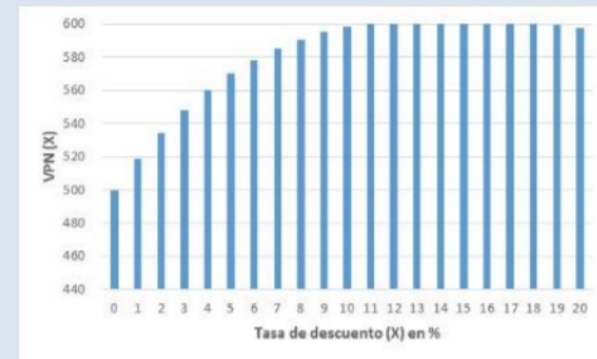
**Proyecto A**




**Proyecto B**



**Proyecto C**





## Exercise, research and/or analysis

**Due to political reasons, a new airport in Brasil needs to be built. Construction is expected to be in 2020. The forecasted demand for the new airport can be found in the excel file. The discount rate is 5%. Project information:**

Initial investment: 250 M€

Annual maintenance costs

2021 – 2026: 3% of initial investment

2027 – 2030: 5% of initial investment

Aeronautical Revenues: 12€ per passenger

Non-aeronautical Revenues: 6€ per passenger

**Q1. Determine if the project should go on (i.e. What is the NPV after a period of 10 years?)**

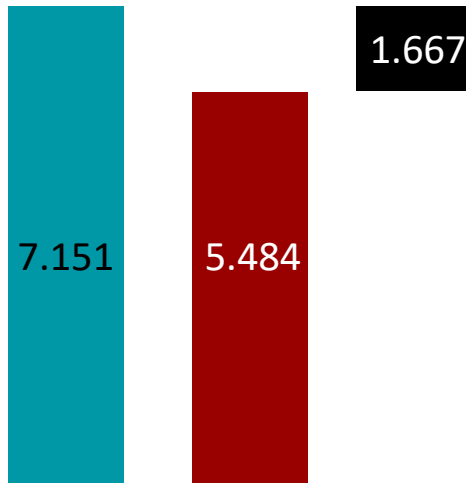
**Q2. Considering a cost overrun of 10% of the initial investment calculate the NPV for different rates of discount (0%, 5%, 10%, 15%) and determine the IRR**

# Airline profit equation



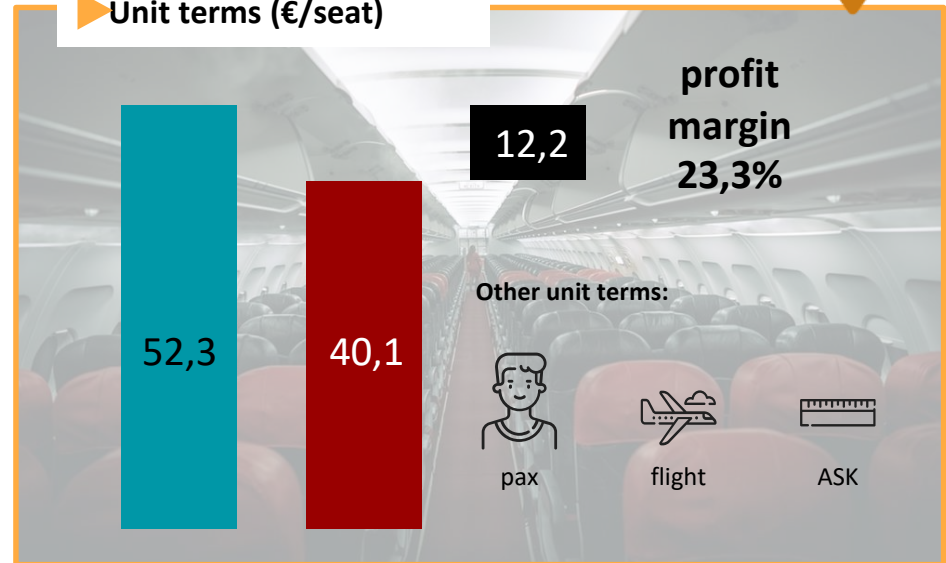
## Absolute terms (Mn €)

$$\text{Total Revenues} - \text{Total Costs*} = \text{Profit*}$$



  
136,8  
Mn  
Seats

## Unit terms (€/seat)



Fragile  
equilibrium



What do  
investors  
seek?

# Thinking in unit terms

- . Why thinking in unit terms?

- . Unit revenues

Average Fare (Ingreso medio) → ing/pax

RASK

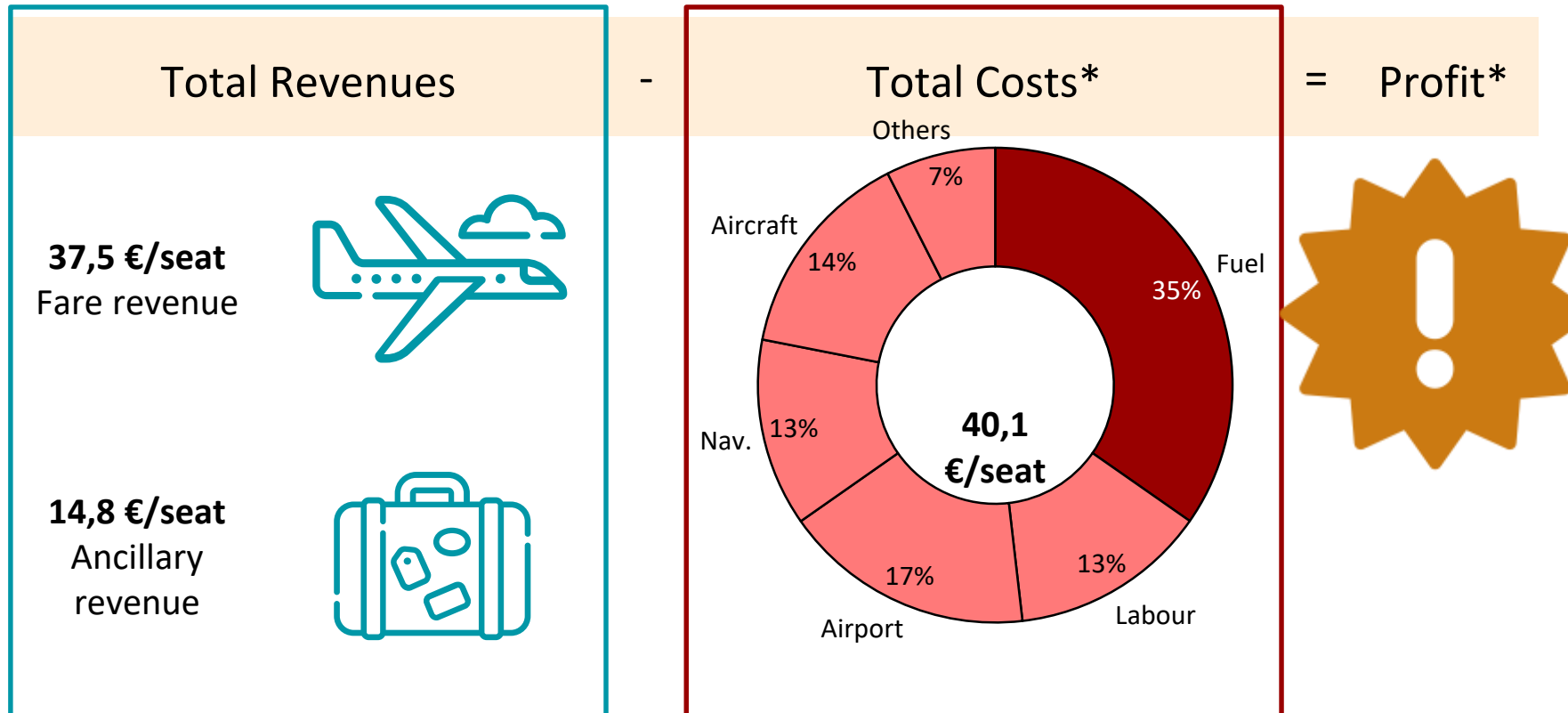
Revenue/seat

- . Unit costs

CASK

Cost/seat

# Thinking in unit terms



## Thinking in unit terms

$$\text{Total Revenues} - \text{Total Costs}^* = \text{Profit}^*$$

$$\underbrace{\text{Pax} \cdot \text{average fare (€/pax)}}_{\text{Seats} \cdot \text{LF}}$$

$$\text{Seats} \cdot \text{cost/seat}$$

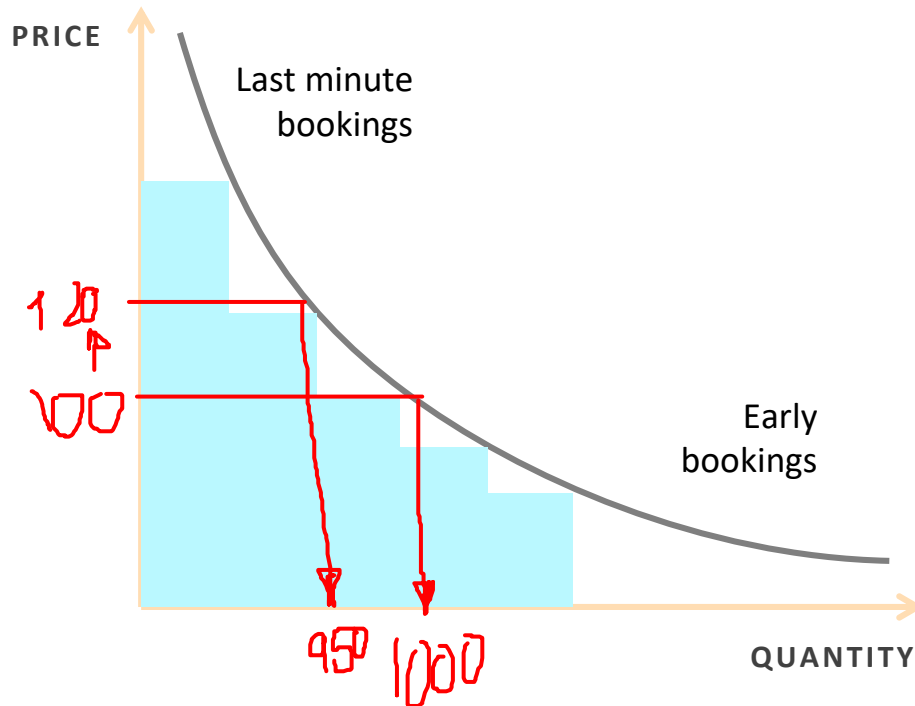


$$\text{Seats} \cdot (\text{LF} \cdot \text{av fare} - \text{cost/seat}) = \text{Profit}^*$$



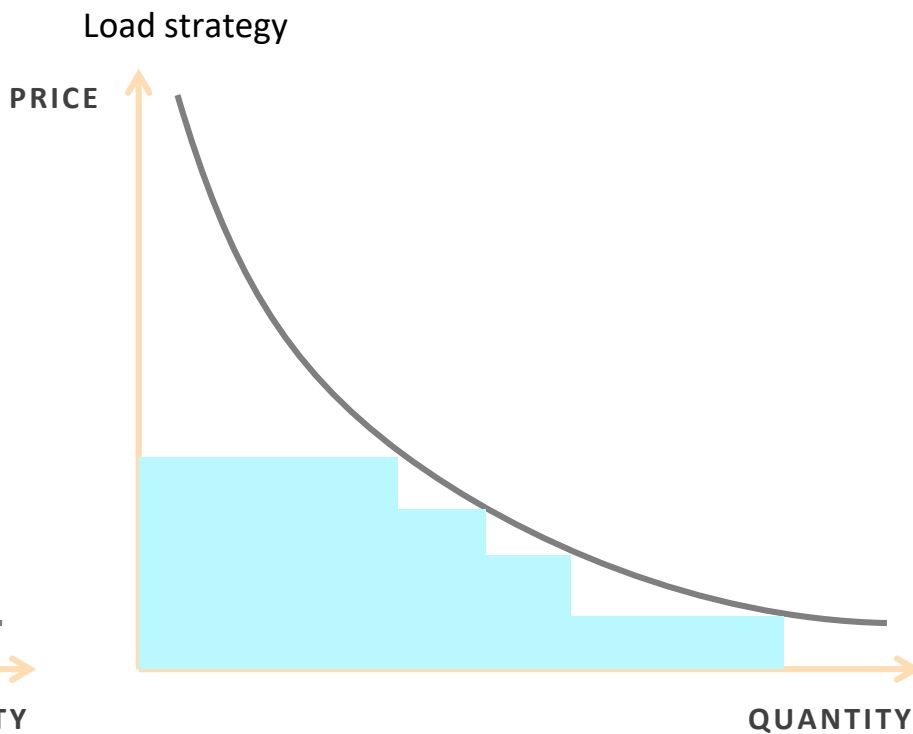
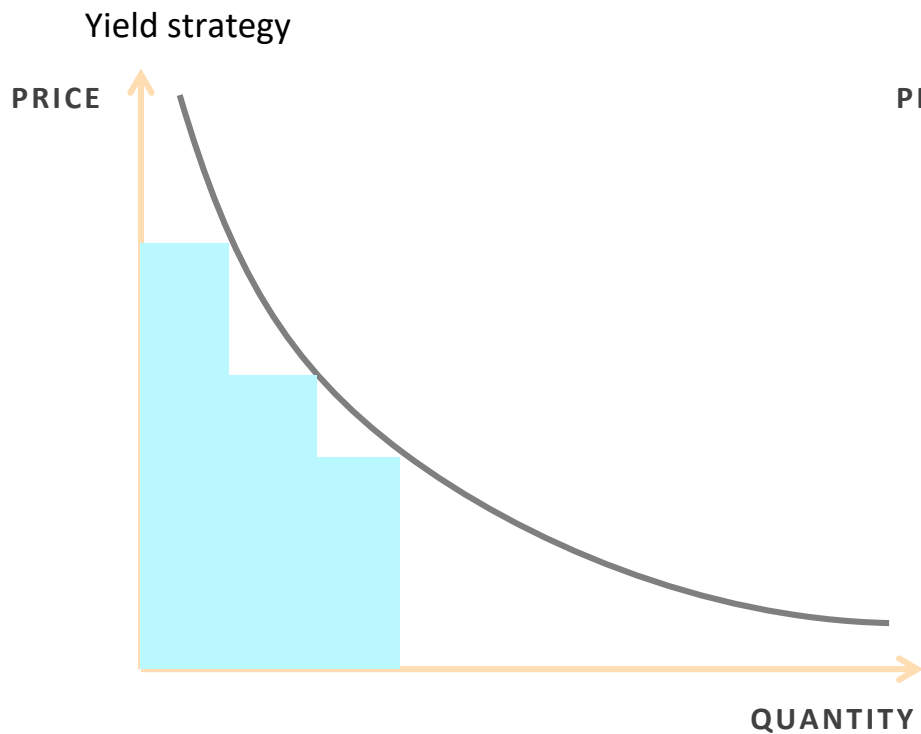
# What Price shall we charge?

## Differential pricing



- ▶ Willingness to pay  
Creation of different market segments to adapt to different "willingness to pay"
- ▶ Prevent diversion
- ▶ Estimate demand

# Yield vs. load strategy



# The goal: maximize revenue

Example: BCN – AMS (1241km) A321 (220 seats)

# seats sold per class

Fare (€)	Strategy A	Strategy B	Strategy C
200	22	10	19
170	25	12	21
140	27	14	23
110	40	45	42
85	20	60	36
60	15	40	25
40	10	30	18
Passengers	159	211	184
Load factor	72%	96%	84%
Total revenue (€)	19.830	19.650	20.490
Average fare (€/pax)	125	93	111
RASK (c€)	7,26	7,20	7,50



- ▶ Yield management?
- ▶ Load management?
- ▶ Revenue management

Question!

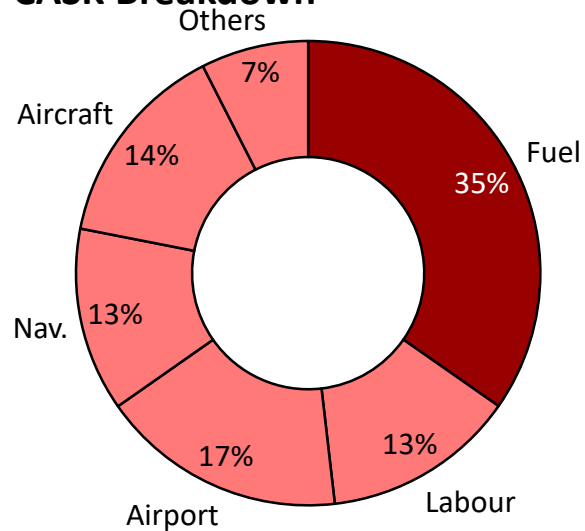
What are most important cost components for an airline?



Question!

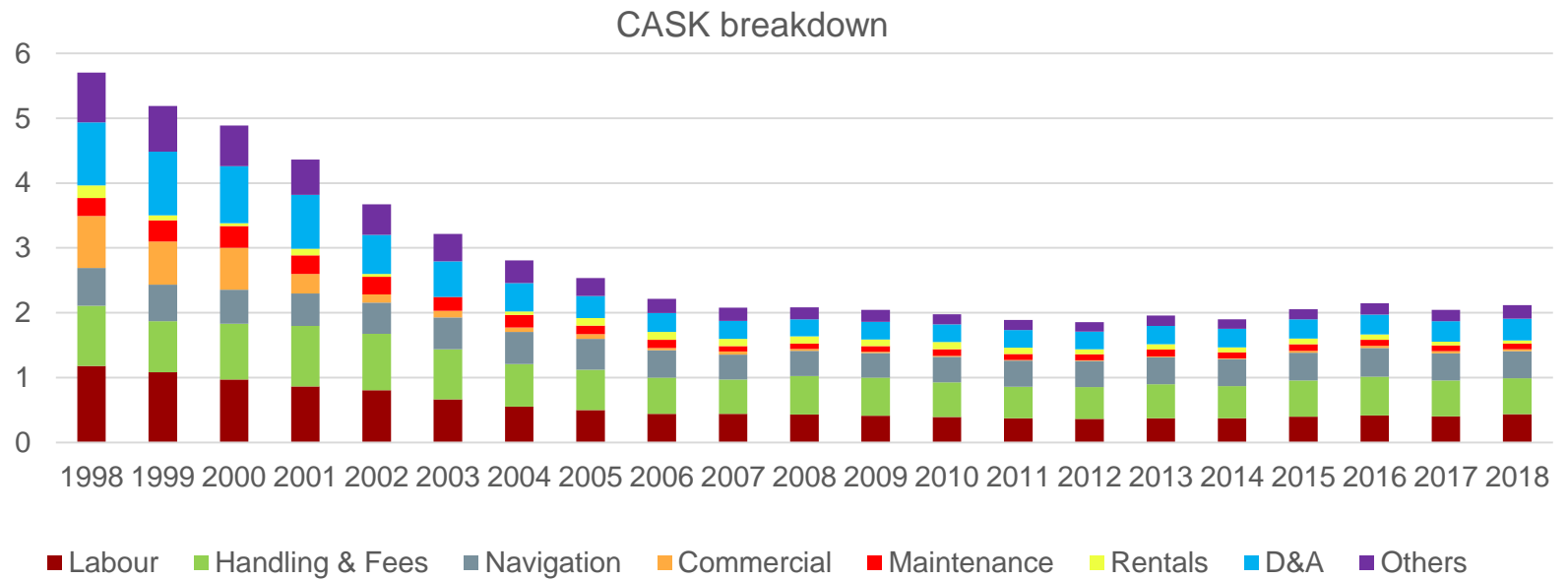
What has Ryanair done to reduce their unit costs?

**CASK Breakdown**



# Cost evolution

## Ryanair CASK breakdown (Fiscal year 1998 - 2018)





## Cost efficiency

Gauge (esp: calibre): #seats per aircraft

A320 IB 162 seats

A320 VY 180 or 186 seats

Aircraft utilization:

Block hours per day

Employee productivity:

Flight hours per year

Why are these two parameters important? → always think in unit terms



## Exercise, research and/or analysis

### **Cost efficiency: gauge**

Look for gauge of A320 & A321 of different airlines in Wikipedia and calculate the aircraft lease cost per seat (~1000€/flight A320, ~1100€/flight A321)

Wizzair  
Vueling  
Iberia  
American  
Delta Airlines  
Air Asia  
jetBlue  
Avianca  
easyjet  
Air China  
Cebu Pacific





## Exercise, research and/or analysis

### Cost efficiency: gauge

Look for gauge of A320 & A321 of different airlines in Wikipedia and calculate the aircraft lease cost per seat (~1000€/flight A320, ~1100€/flight A321)

Wizzair – 180/186 – 230 → 5,37€/seat

Vueling – 180/186 - 220

Iberia – 162/186 – 200/220

American – 150 - 190

Delta Airlines -157 - 191

Air Asia – 180-236

jetBlue – 162 - 200

Avianca – 150 – 194 → 6,66€/seat

Easyjet – 180/186 - 236

Air China – 158 - 185

Cebu Pacific – 180-230



## Exercise, research and/or analysis

### Cost efficiency: aircraft utilisation

An A320 with 186 seats has a lease cost of 200k\$/month. What is the cost per seat in the following cases?

Airline A: 8 flights per day -> 4,48€/seat

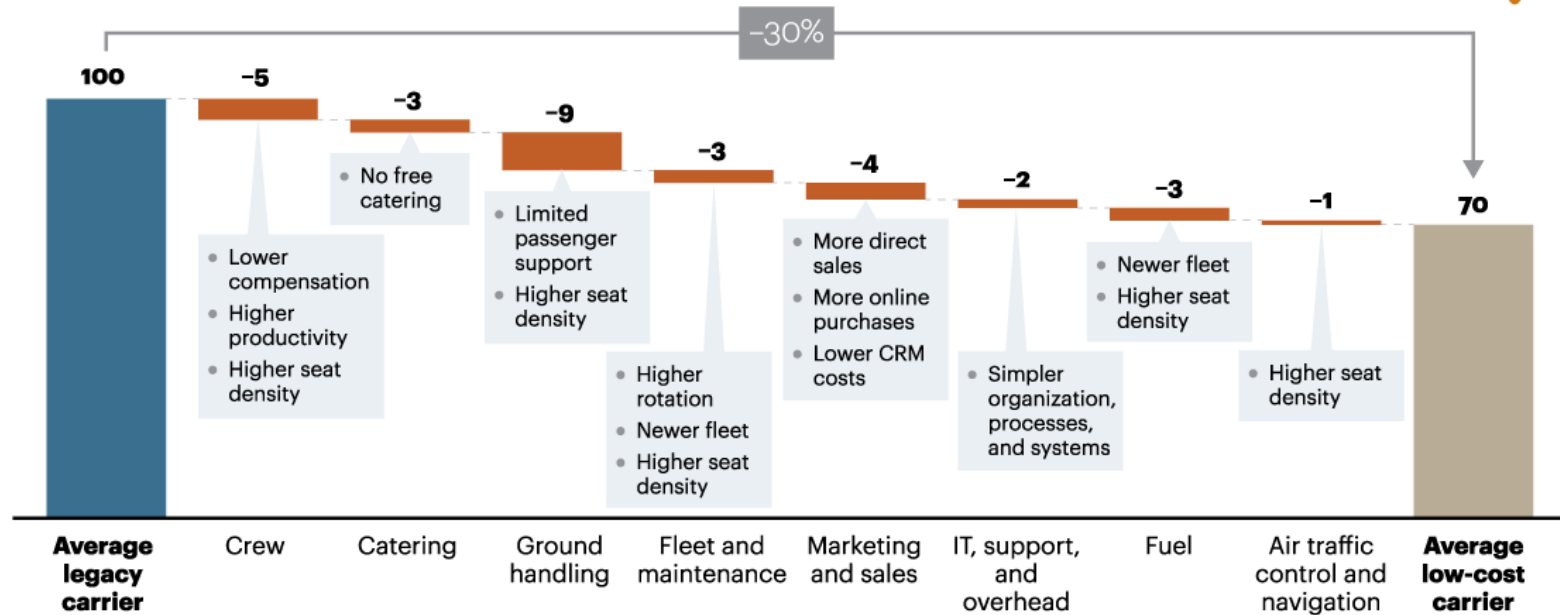
Airline B: 6 flights per day -> 5,97€/seat

# Cost efficiency



## Indexed costs, short- and medium-haul flights

(Average legacy carrier=100)



Note: CRM is customer relationship management. Costs are per available seat kilometer, considering higher seat density and intraday aircraft rotation, but same airports.

Sources: Airlines' annual reports; A.T. Kearney analysis



## Exercise, research and/or analysis

### Cost efficiency: LCC vs. Legacy profitability

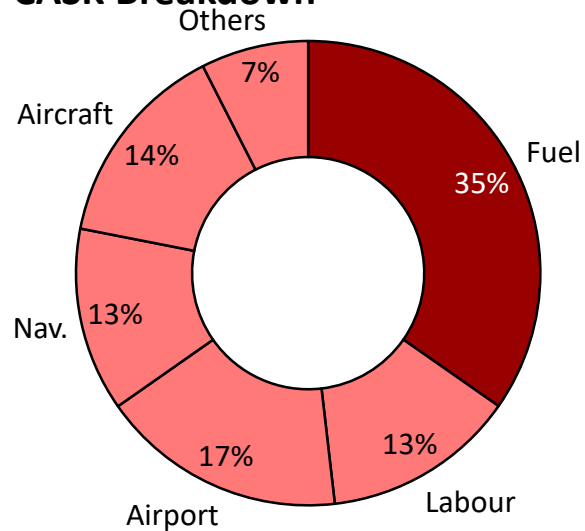
We are the managers of Airline 1 (LCC) and we are studying Airline 2 (Legacy). We need to determine what is the Rev/seat of Airline 2 making the following data and assumptions:

- Airline 1 (LCC): CASK 7,0 c€, Rev/seat 70€
- Both airlines have the same gauge (180 seats) and stage length (1100km)
- The unit cost difference follows the same pattern as the previous slide
- Both airlines are reporting the same profit margin

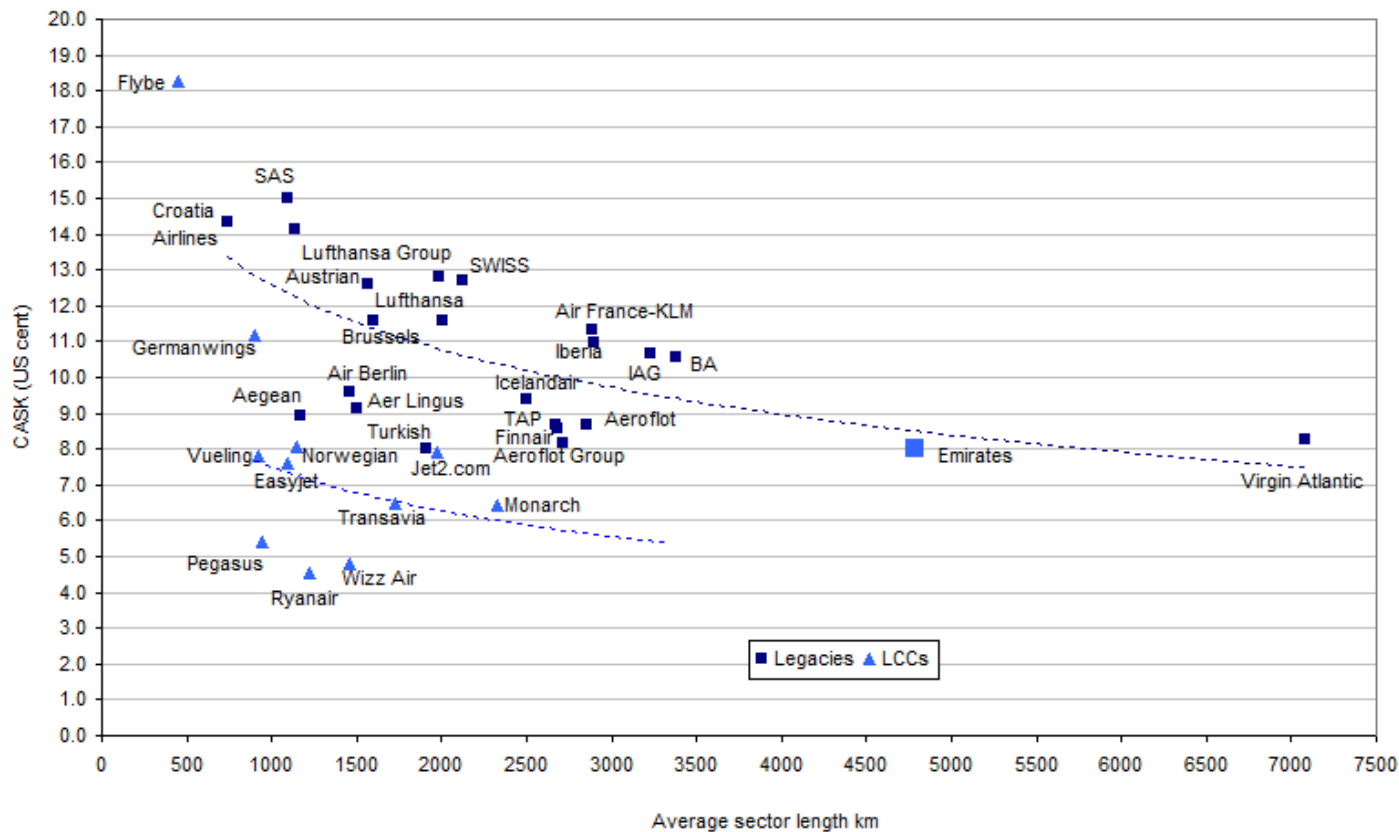
Question!

What happens with the CASK when flights get longer (i.e. BCN-PMI vs. BCN-LON)

**CASK Breakdown**



# Stage length adjustment

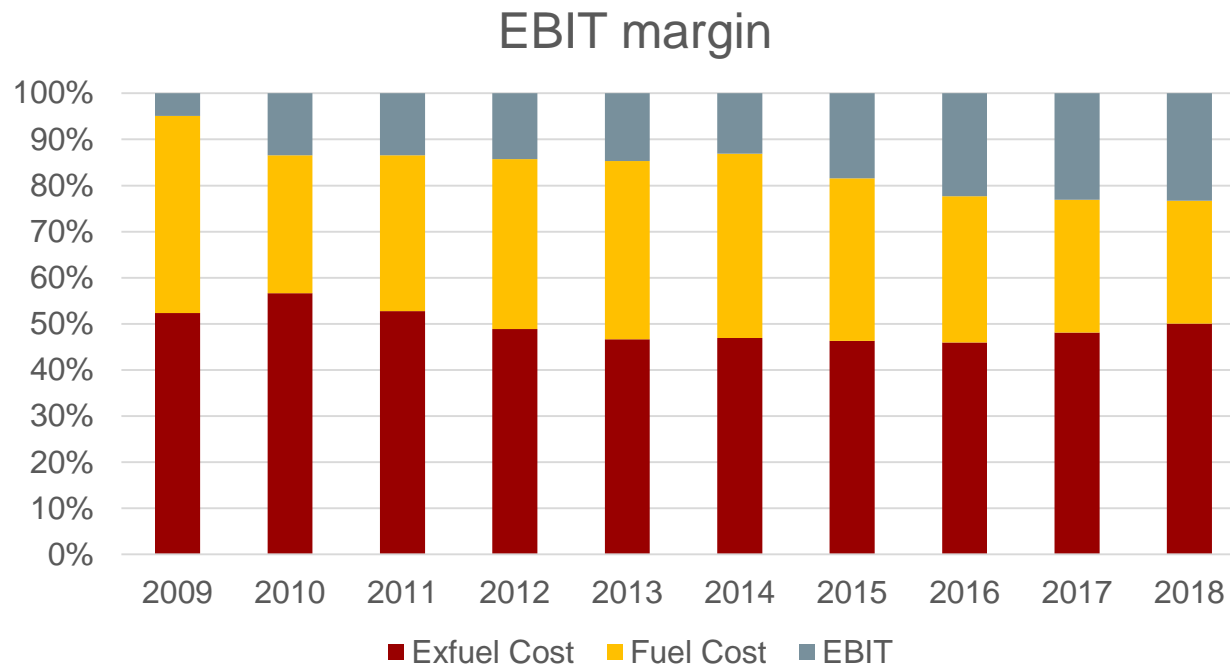




# Impact of fuel in profitability



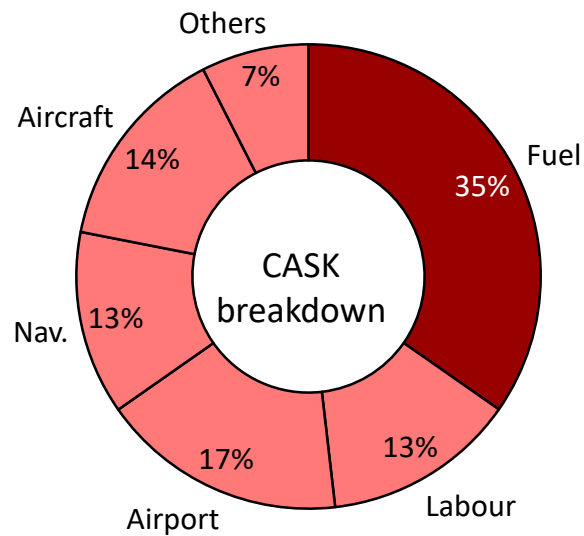
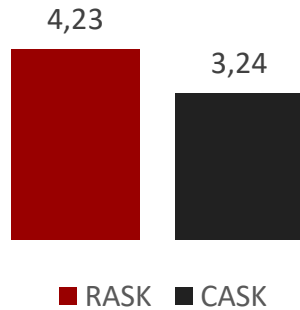
Ryanair cost breakdown & EBIT (Fiscal year 2009 - 2018)



**Exercise, research and/or  
analysis**

**Impact of Fuel for LCCs**

RASK & CASK (c€)



If fuel prices goes up 30%,  
how much would prices need  
to go up on the BCN – LON  
(~1200km) flight to maintain  
EBIT?