



# La posición competitiva de los aeropuertos españoles y catalanes

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## Major developments in the Spanish aviation market in past decade have influenced the network performance of Spanish airports

- Major infrastructure expansions at Barajas and El Prat
- Entry of Vueling and Clickair into the market
- Hub building by Air Berlin at Palma de Mallorca
- New home bases of Ryanair: Girona, Madrid, Valencia, Reus
- Dehubbing of Barcelona by Iberia, consolidation at Madrid
- EU-US Open Skies: no restrictions for air services between Spain and the US



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### Question

- How do Spanish and Catalan airports perform in the aviation network under these new market circumstances?
- How has the network performance of Spanish and Catalan airports changed over time?

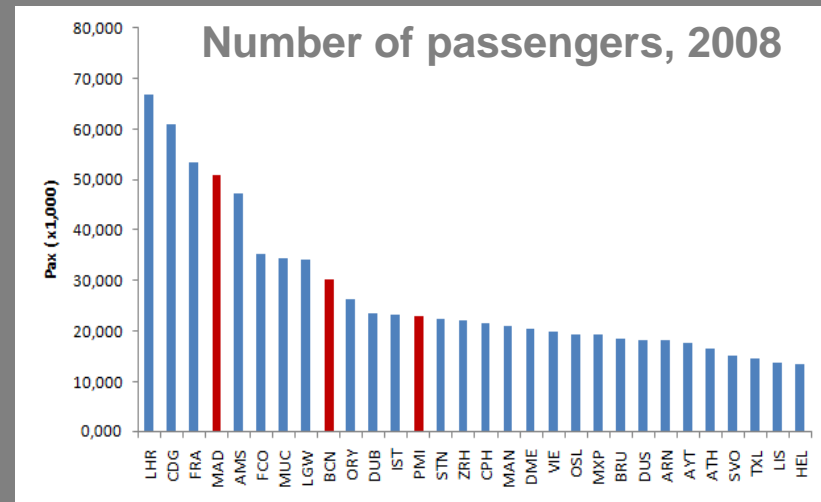


# Outline

- **How to measure airport network performance?**
- **The concept of connectivity**
- **Connectivity of major Spanish and Catalan airports from a European perspective**
- **Major changes in the performance of Spanish and Catalan hubs**
- **Direct and indirect connectivity developments: some observations**
- **Outlook and recommendations**

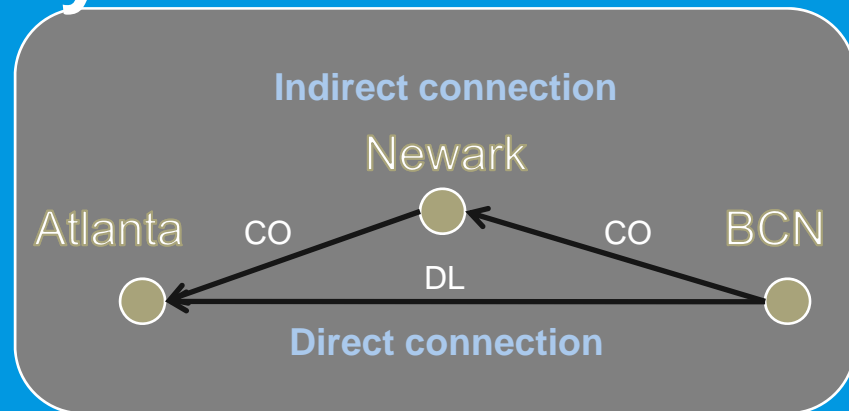
# The traditional perspective on airport network performance: 'top 10 lists'

- Traditional perspective:
  - Passenger numbers
  - Number of destinations
  - Number of flights
  - Tonnes of freight
- Although valuable in themselves, these measures do not give good insight in competitiveness and network quality of an airport
- Why not?



# Hub-and-spoke systems: direct and indirect connectivity

- Hub-and-spoke systems have changed the way airlines and airports compete through their networks in a structural way:
  - Airlines compete directly on routes
  - but also indirectly via their hubs
- New paradigm: analysis of network performance of airports and should take into account both direct and indirect connections



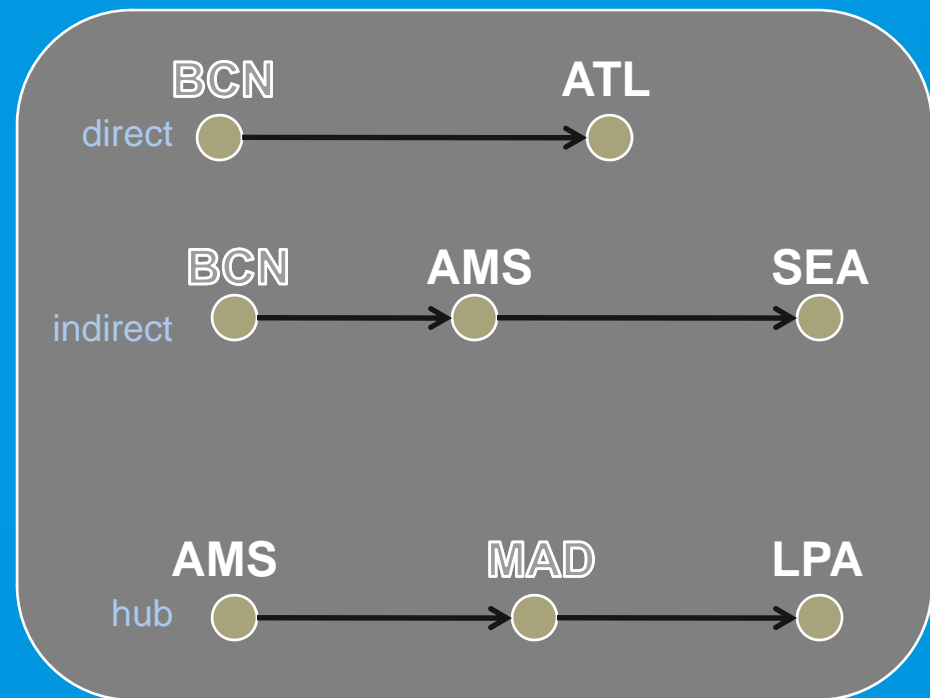


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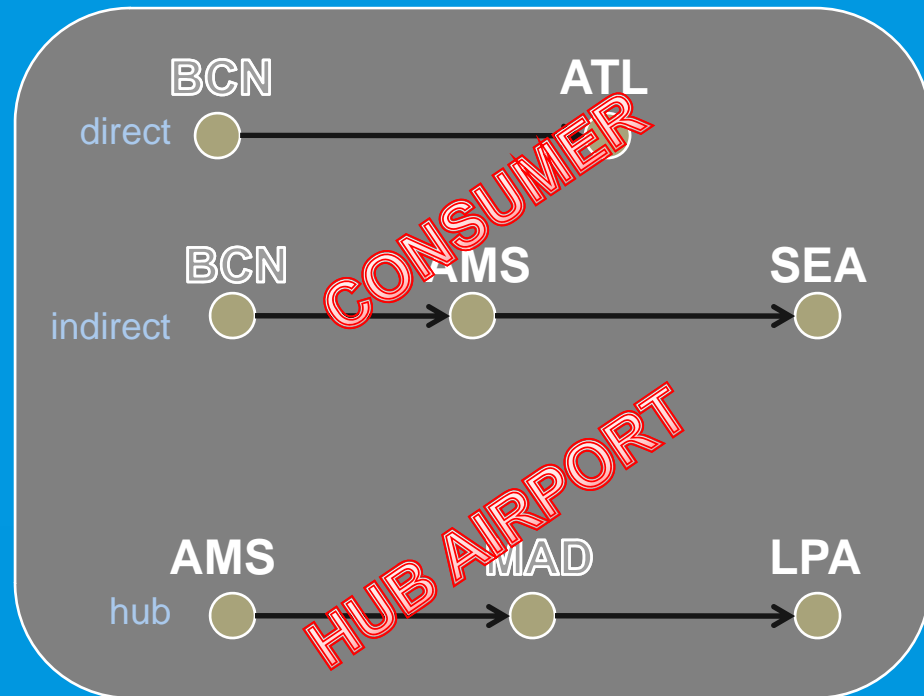
# Three types of connectivity for each airport

- **Direct connectivity**
  - Direct flights between A and B
  - E.g. *BCN-Atlanta*
- **Indirect connectivity**
  - Connections between A and B via hub H
  - E.g. *BCN-Amsterdam-Seattle*
- **Hub connectivity**
  - Hub connectivity: number of connections *via* a certain hub airport
  - E.g. *Amsterdam-MAD-Las Palmas*



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## The three types of connectivity can be measured with the *Netscan* connectivity model

- **Developed by SEO Economic Research in '90s and further improved later on**
  - See e.g. Veldhuis (1997); IATA (2000); Burghouwt & Veldhuis (2006); Burghouwt et al. (2009); Burghouwt & Redondi (2009)
- **Netscan counts number of connections**
  - directly and indirectly with a transfer at another hub airport
- **Netscan attaches a weight to each connection, depending on its quality**
- **Quality depends on transfer time and detour time**
  
- **Output: Connectivity Units or CNU**
- **1 CNU equals 1 direct, non-stop flight (maximum quality)**
- **Viable indirect connection: between 0 and 1 CNU**

# Example: connectivity in the Barcelona to Singapore market

- One direct connection in 2007 (Singapore Airlines)
  - 4 flights per week
- Various indirect connections via European hubs
- Quality of each connection varies due to differences in detour and transfer time



	hub		alliance	transfer time (min)	detour factor	frequency/ week	quality	CNU
BCN	<i>direct flight</i>	SIN	Star	0	100%	4	1,00	4
	Amsterdam		SkyTeam	165	116%	14	0,43	6
	Paris CDG		SkyTeam	205	113%	28	0,36	10
	Frankfurt		Star	177	109%	80	0,29	24
	Istanbul		Star	334	108%	3	0,07	0
	Heathrow		OneWorld	191	118%	77	0,30	23
	Zurich		Star	148	107%	21	0,50	10
<b>Total</b>						<b>227</b>	<b>0,34</b>	<b>77</b>



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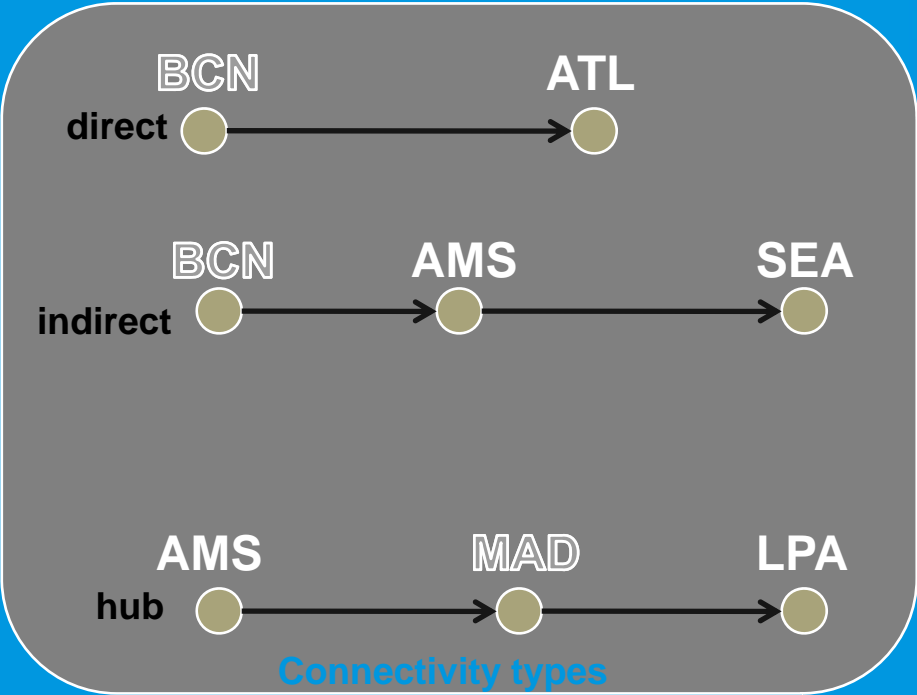
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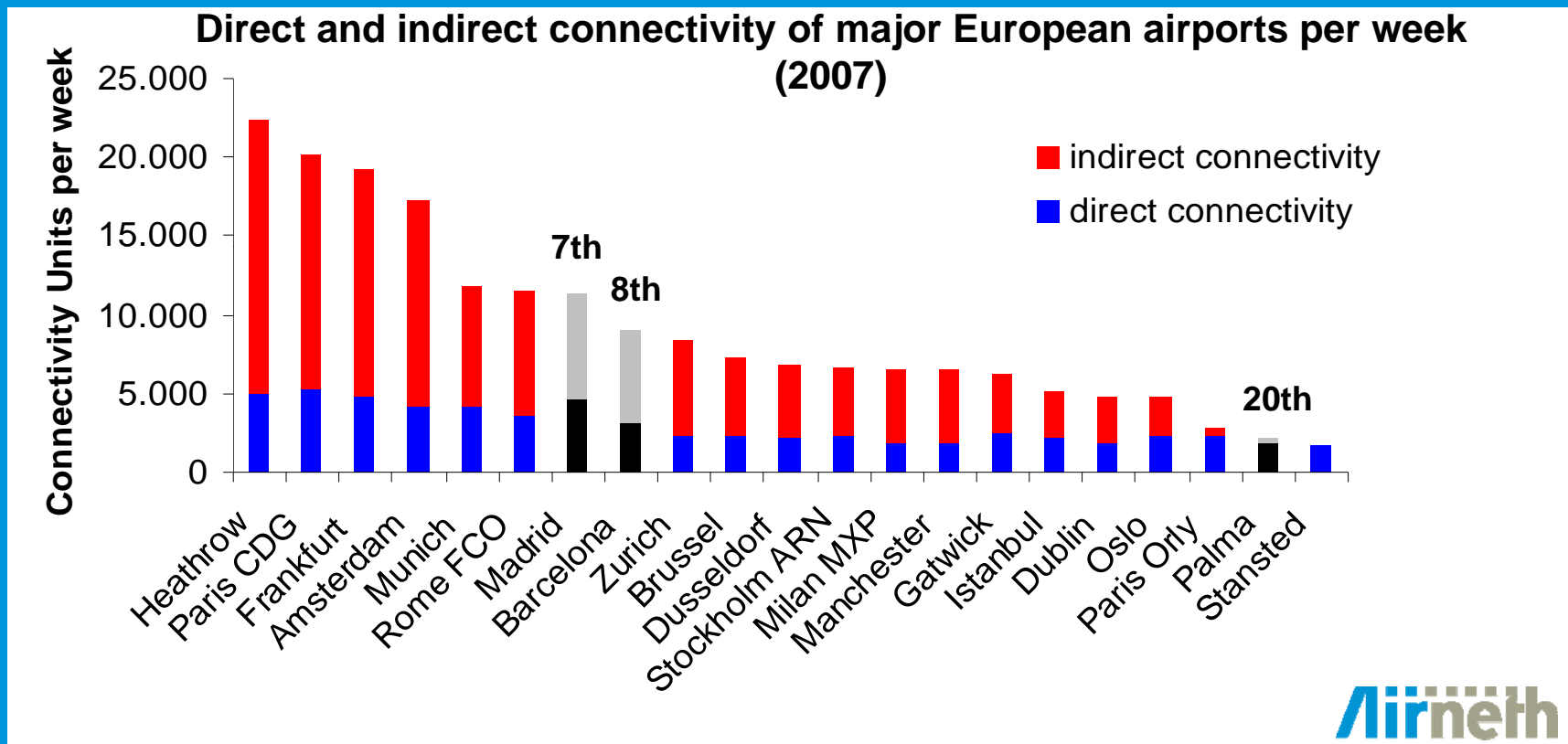
# How do the major Spanish and Catalan airports perform in terms of connectivity from a European perspective?

We will look at:

- Direct and indirect connectivity of Madrid, Barcelona and Palma compared to major European counterparts
- Hub connectivity (*number of transfer opportunities*) via Madrid, Barcelona and Palma compared to the other European hubs

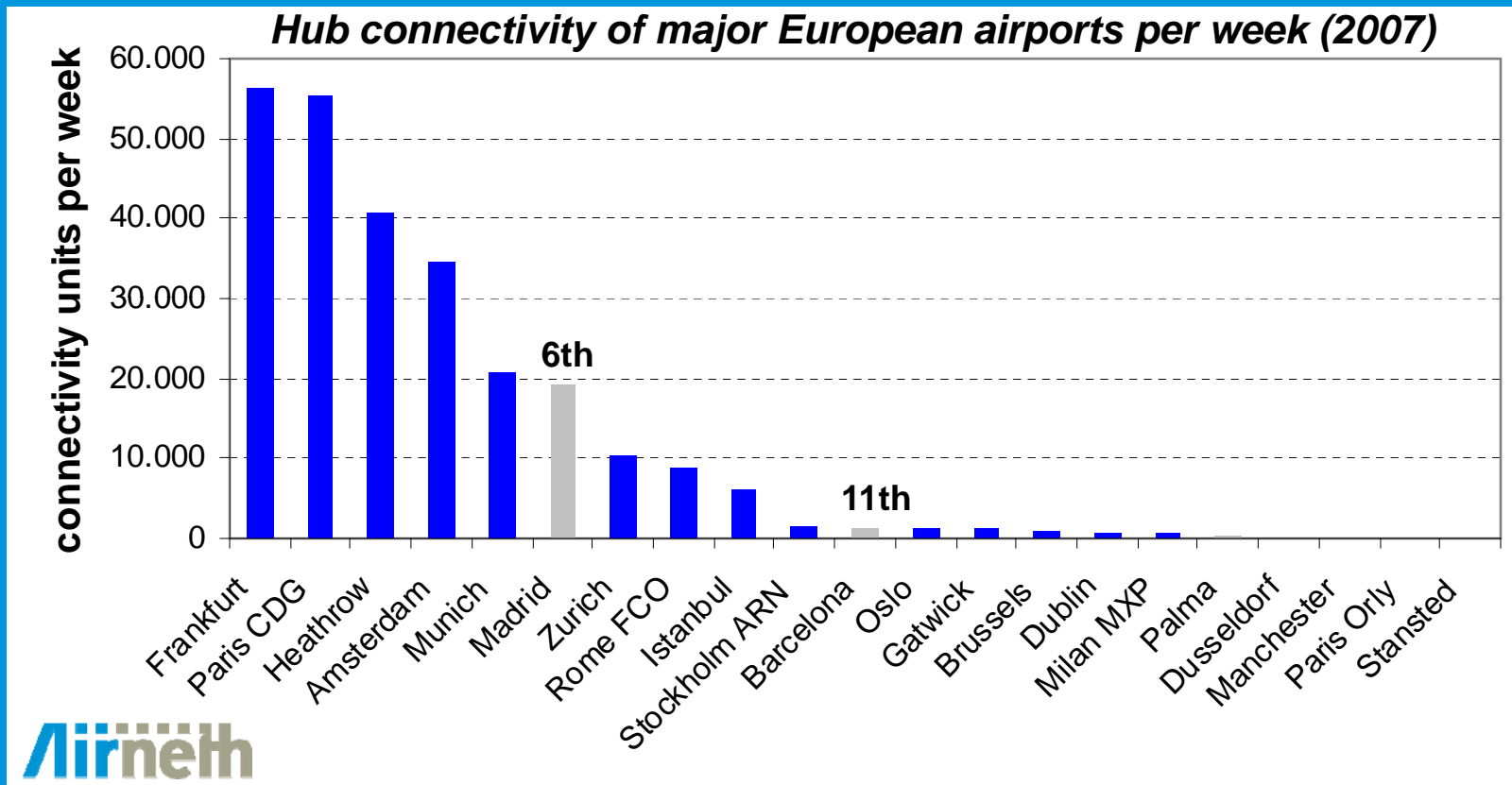


# Madrid and Barcelona rank 7th and 8th in terms of total direct and indirect connectivity among major European airports; Palma 20th



- Barcelona compensates lower direct connectivity with relatively high indirect connectivity via other European hubs
- 'Puente Aéreo' effectively connects BCN via Madrid to rest of the world
- Palma typical low-cost base: not integrated in worldwide alliance networks

# As a connecting hub for Oneworld, Madrid plays a much more important role than Barcelona. Palma is low-cost mini-hub for Air Berlin



After dehubbing of Barcelona by Iberia, Barcelona lost its already weakened role as a European hub in favor of Madrid. Barcelona now strong 'spoke' for worldwide alliances (Oneworld, Star and SkyTeam) as well as low-cost home base (VY/Click). Direct and indirect connectivity still at high level, regardless of loss of hub function



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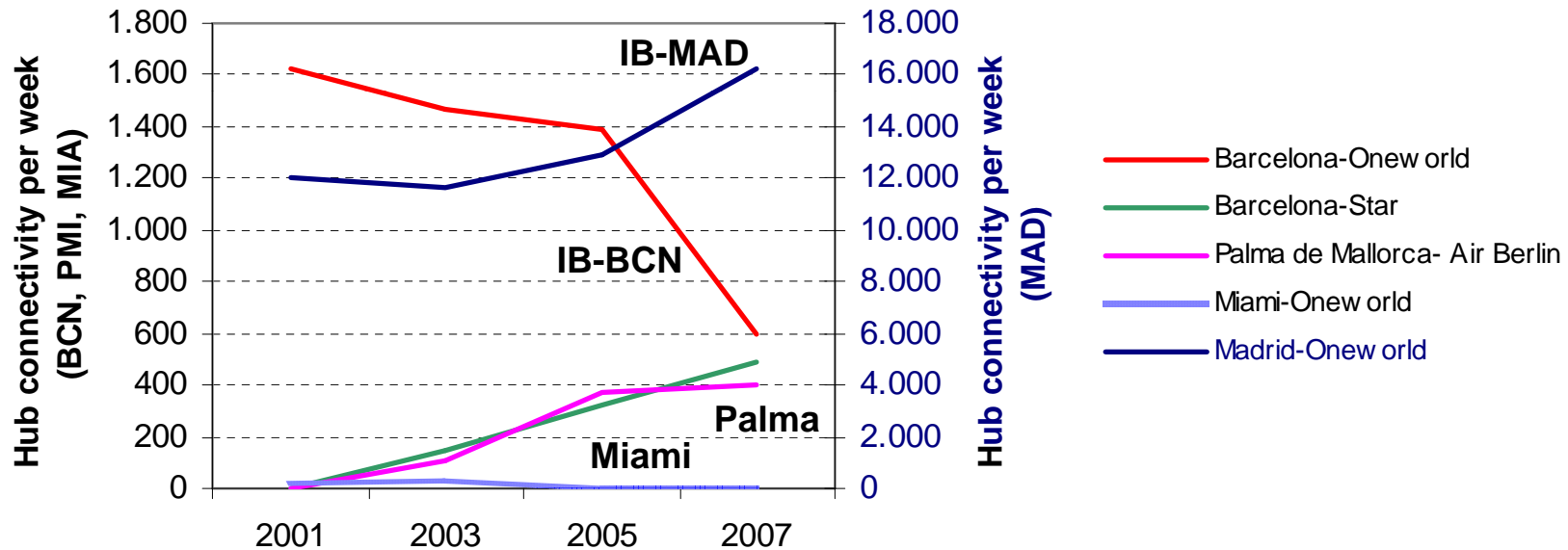
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# Hub performance in Spain and Catalonia: from multi-hub to single hub and back again?

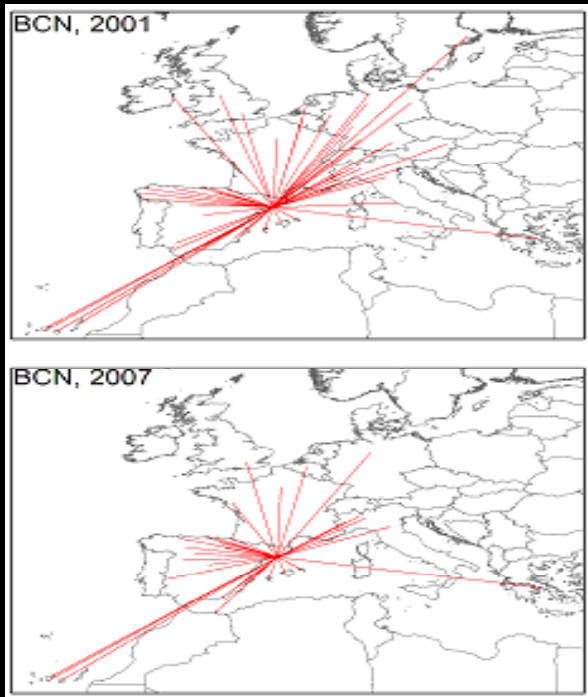
- **Hubs are instruments for an airline to create network quality, not a goal in themselves**
  - with hubs, airlines can fill flights with transfer passengers and increase the scope and density of the network
- **During the 1990s, Iberia operated three hubs: Madrid, Barcelona and Miami**
  - Madrid: strong focus on Latin-America
  - Barcelona mainly intra-European hub
  - Miami extra-territorial hub to Latin-America
- **Since 2004, Iberia has moved to single hub system**
  - Miami hub dropped in 2004
  - Barcelona hub operation dismantled from 2005 on (-5.6 million seats)
  - Iberia Master Plan 2006-2008: focus on Madrid, but with less destinations at higher frequencies and better aircraft utilization
- **From 2002 on, Air Berlin started to build-up 'leisure hub' at Palma de Mallorca, connecting Germany with the Iberia Peninsula**
- **From 2003 on, modest hub building by Spanair (Star alliance) at Barcelona**

# Hubbing and de-hubbing: development of hub connectivity 2001-2007 at Madrid, Barcelona, Palma and Miami

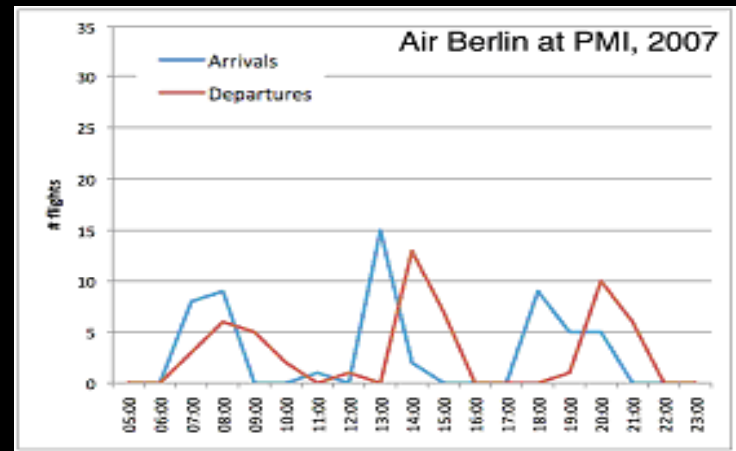
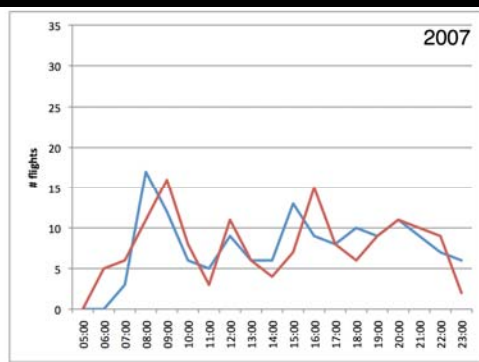
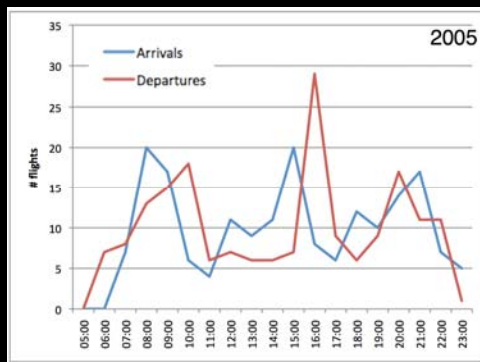
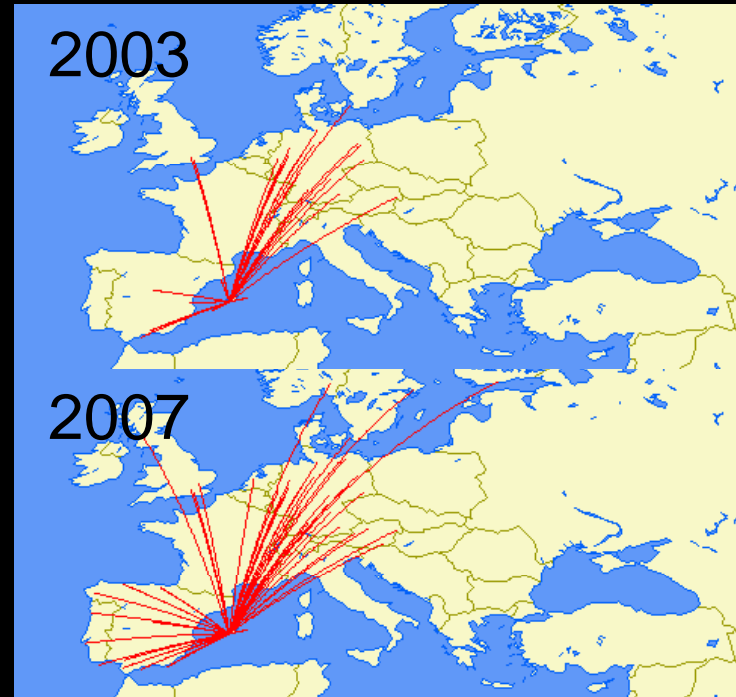


# Development of the Barcelona and Palma hubs

## Iberia at Barcelona



## Air Berlin, Palma de Mallorca



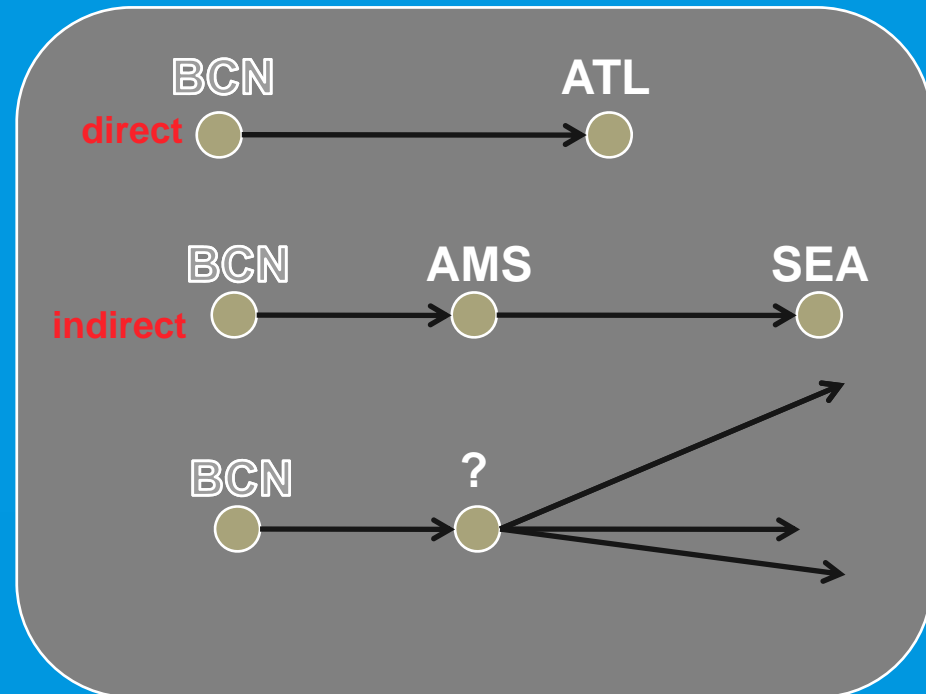


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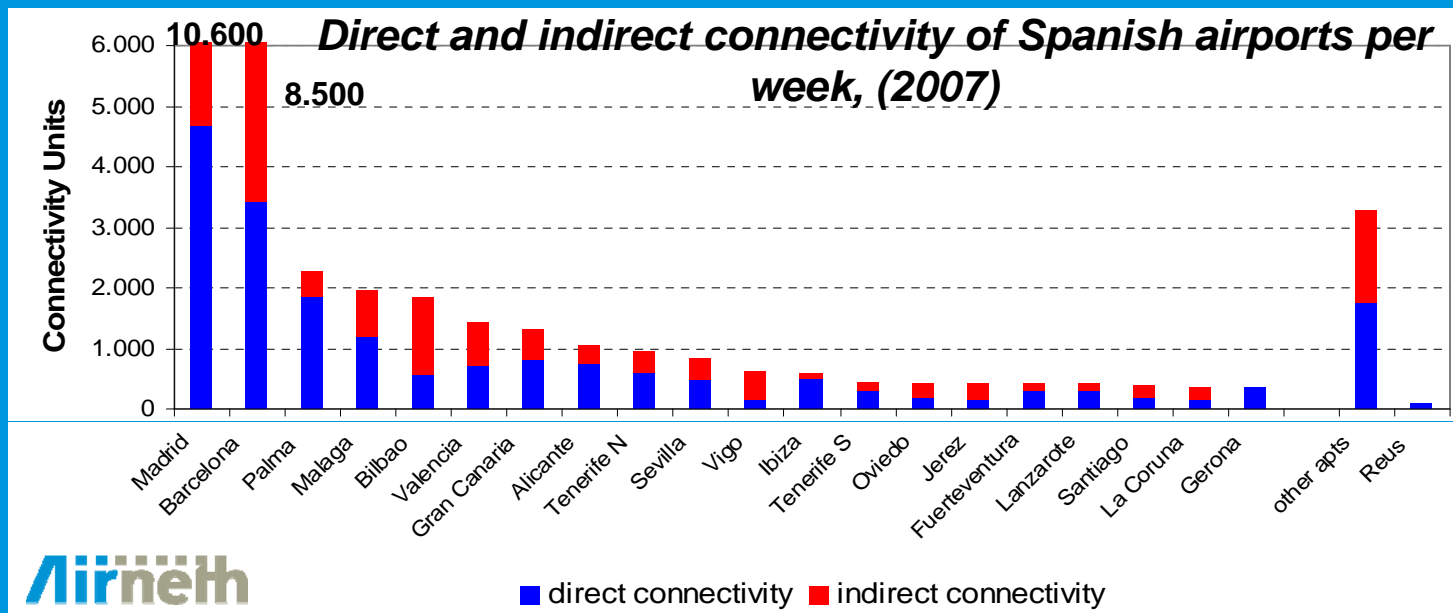
# Let's focus: direct and indirect connectivity from Spanish and Catalan airports in detail

- How do airports perform in terms of direct and indirect connectivity?
- What are the most important onward connecting hubs for passengers at the major Spanish and Catalan airports?
- Source: Suau & Burghouwt (2009; forthcoming)



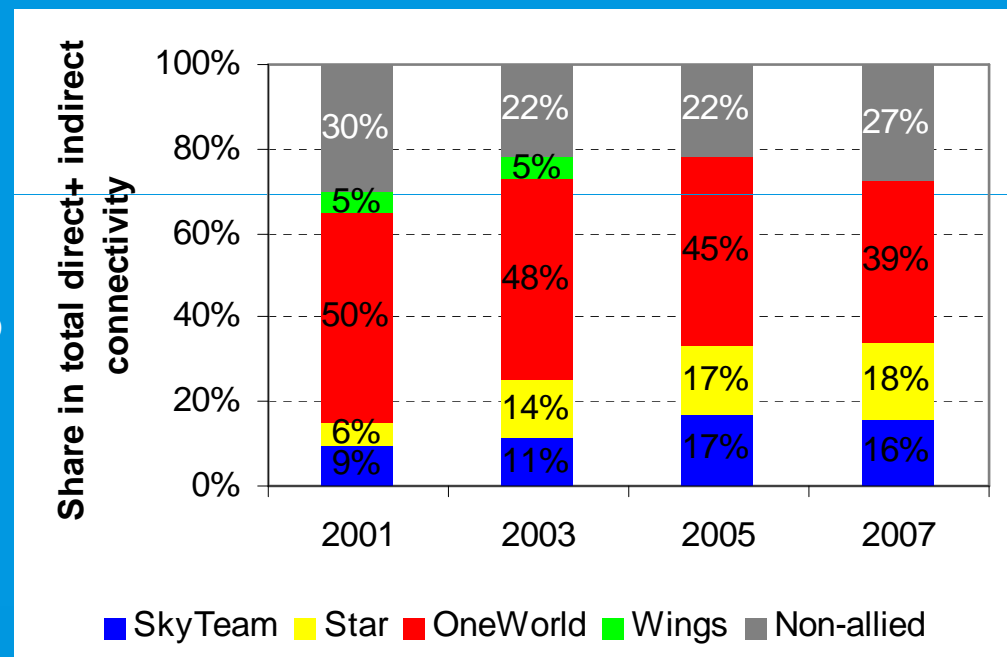
# Madrid and Barcelona take account of 50% of all connectivity by air offered to Spanish consumer

- Most smaller airports have far more direct connections than indirect connections
  - Available indirect connections routed through Madrid>Iberia still dominant in connecting domestic market with long-haul destinations
- **Bilbao, Valencia, Vigo and Malaga** are exceptions: they are very well integrated in networks of other alliance hubs
  - Paris CDG, Frankfurt, Munich, Milan MXP and Heathrow are most important onward hubs
  - Passengers have access to the rest of the world with just a single transfer
- **Palma, Ibiza and Gerona** are predominantly served by low-cost/ leisure airlines with direct flights only
  - They have almost no connections via the hubs of global airline alliances
  - Direct connectivity accounts for >80% of total connectivity



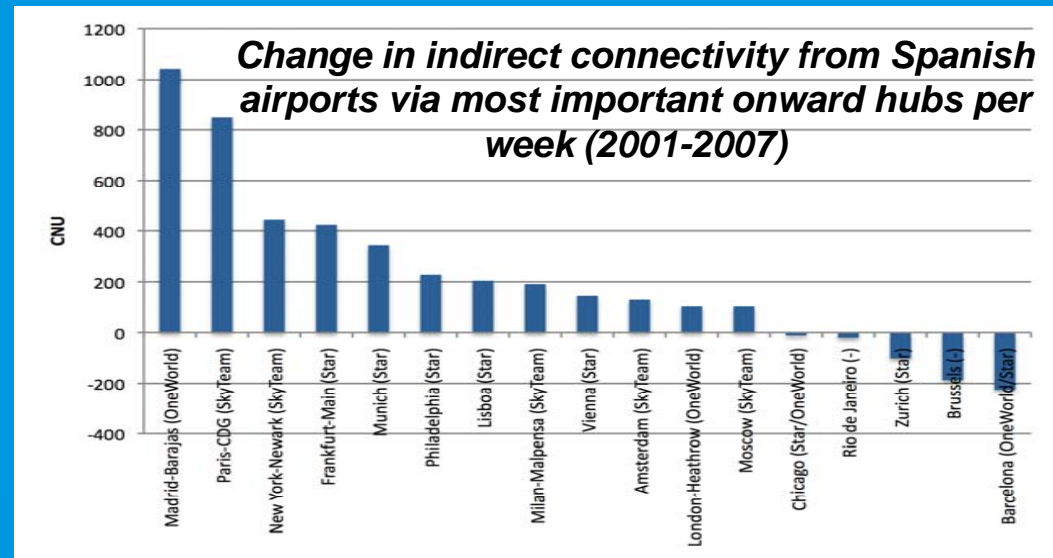
## Connectivity levels increasing; share of OneWorld alliance under pressure

- Overall growth in direct connectivity for almost all airports
  - +42% for whole airport population between 2001 and 2007
  - In particular high growth rates at Gerona, Reus, Valencia and Madrid due to establishment of Ryanair home bases
- Share of OneWorld in total direct and indirect connectivity offered at Spanish and Catalan airports decreased by 11%
  - Star and SkyTeam becoming more important



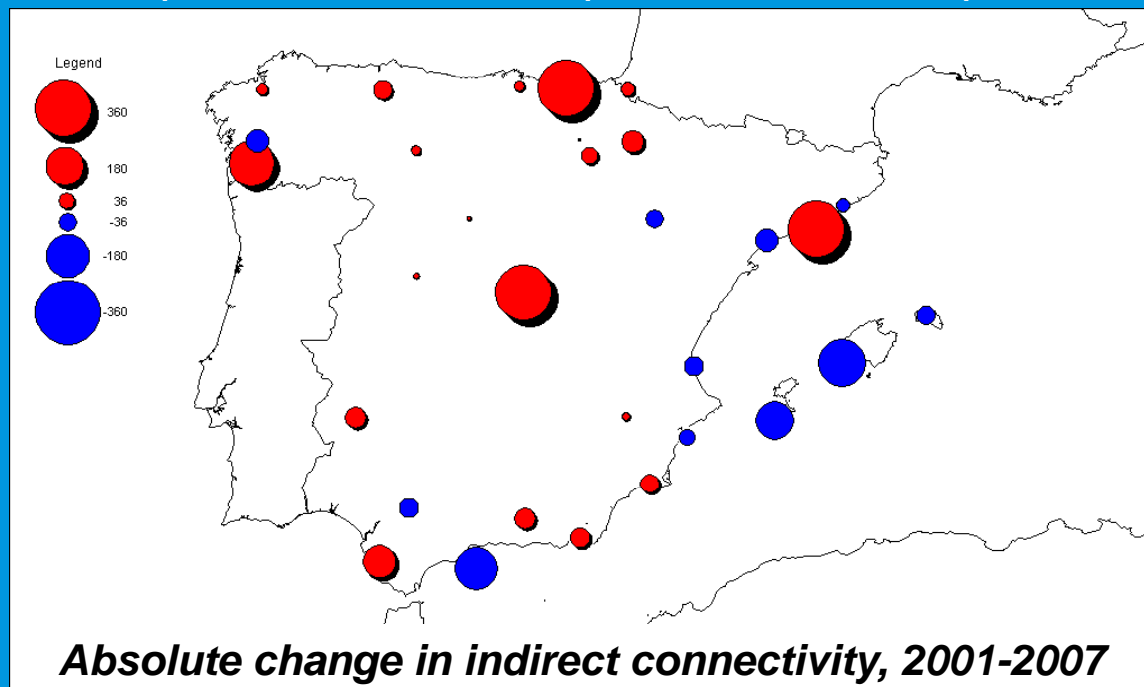
## Change of roles 2001-2007: Madrid and Paris CDG more important as gateways to the peninsula; Barcelona losing ground

- Iberia, Air France, Continental and Lufthansa show largest growth in indirect connections from Spanish airports via their hubs
  - Madrid, Paris, Newark, Frankfurt and Munich becoming more important
- Indirect connectivity from Spanish airports via Barcelona decreased substantially between 2001 and 2007
  - Consequence of de-hubbing by Iberia



## Overall growth of indirect connectivity at Spanish and Catalan airports. However, de-hubbing of Barcelona had negative impact on network quality at some airports

- Indirect connectivity increased by 20% during period of analysis
- Largest absolute growth of indirect connectivity at Bilbao, Madrid, Barcelona and Vigo
  - Foreign hubs increasingly compete for Spanish transfer passengers, in particular Paris CDG (AF) and Frankfurt (Lufthansa)
- De-hubbing of Barcelona has resulted in a decrease in indirect connectivity from the Baleares, Valencia, Zaragoza, Malaga and Alicante
  - Consequence: less travel options at these airports with one transfer





## Conclusions (1): the Barcelona case

- **Although Barcelona is not a major airline hub anymore, network quality offered to Catalan passenger still ranks very high among European airports**
  - Mainly due to strong (low-cost) European network, Puente Aéreo to Madrid and frequent links to major European hubs
  - However, substantial direct intercontinental network is lacking
- **Hub airlines tend to consolidate on a single hub. Return of Iberia unlikely**
- **New hub operation (e.g. Spanair/ Star) may deliver traffic density necessary for new long-haul services**
  - Conditions for successful hub operation partly available:
    - **Infrastructure : Midfield Terminal and parallel runways**
    - **Strong local market**
    - **Geographical location less suitable**
- **Attracting foreign long-haul airlines another way to improve intercontinental network**
  - 'New generation' hub airlines such as JetAirways India, Emirates, Etihad and Qatar Airways may search for off-shore hubs with 5th freedom rights
- **However, current industry crisis makes any hub rebuilding in the near future unlikely. Important is now to maintain existing links to major hub airports inside and outside Europe**



## Conclusions (2)

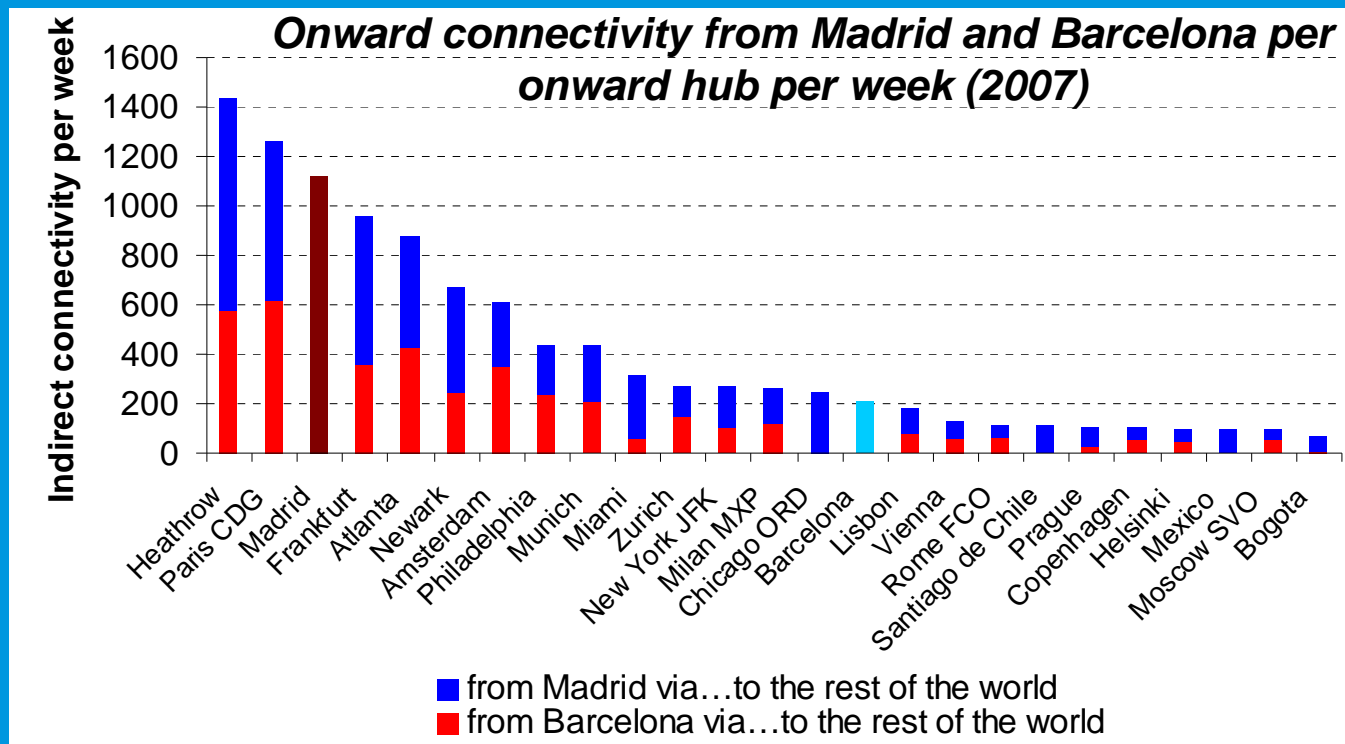
- **Baleares, Valencia and Zaragoza main victims of de-hubbing of Barcelona: indirect connectivity decreased between 2001 and 2007**
- **Market at larger secondary airports increasingly contested by foreign hubs such as Paris CDG and Frankfurt**
  - Break-down of Iberia's monopoly
  - More travel options, more competition and lower fares for Spanish consumer!
- **Low-cost carriers played important role in growth of small airport connectivity in Spain**
  - More opportunities will appear as Ryanair continues to receive new aircraft
  - However, there needs to be a strong local market for new lcc services
- **Competition and rationalization concerns**
  - Vueling/Clickair merger may lead to rationalization of network on routes served jointly as well as lower competition
  - Same holds true for the announced codesharing between Air Europa and Spanair



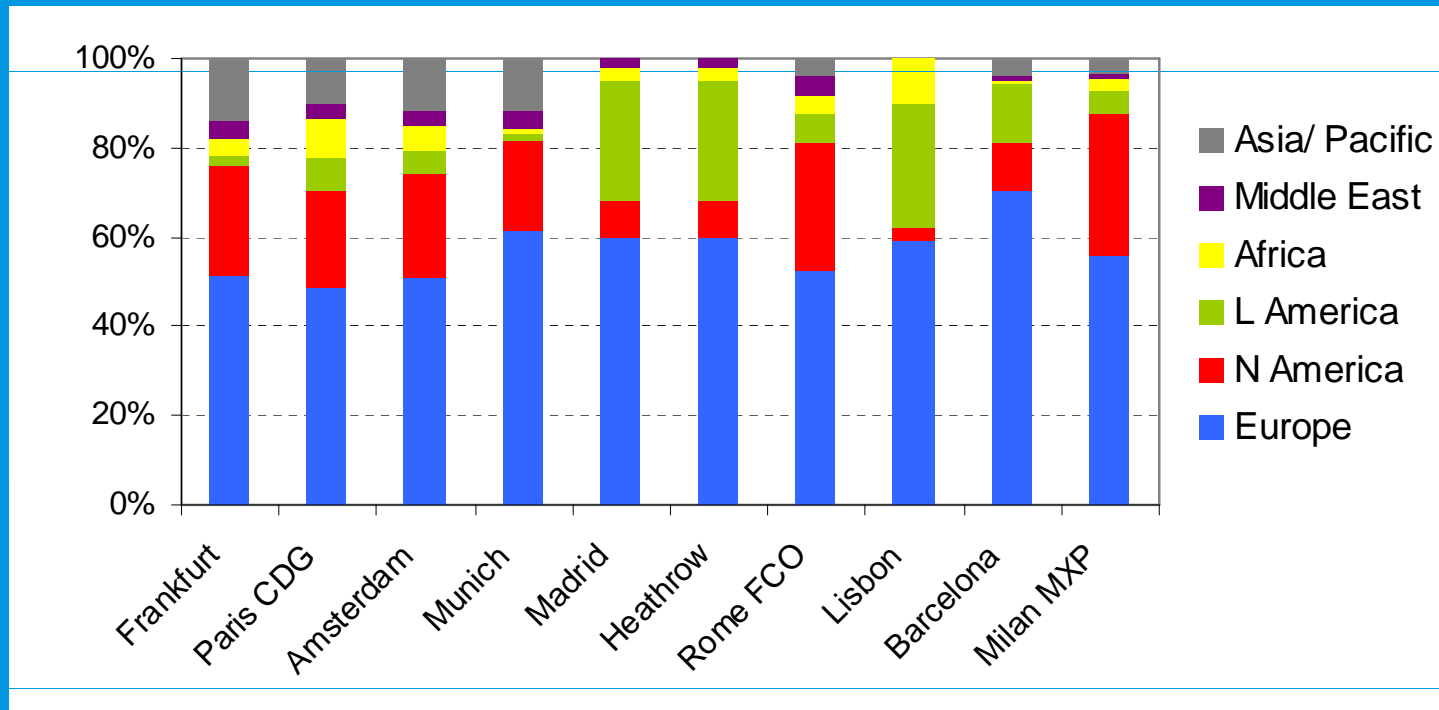
# Back-up slides

# Heathrow and Paris CDG most important foreign onward hubs for Madrid and Barcelona

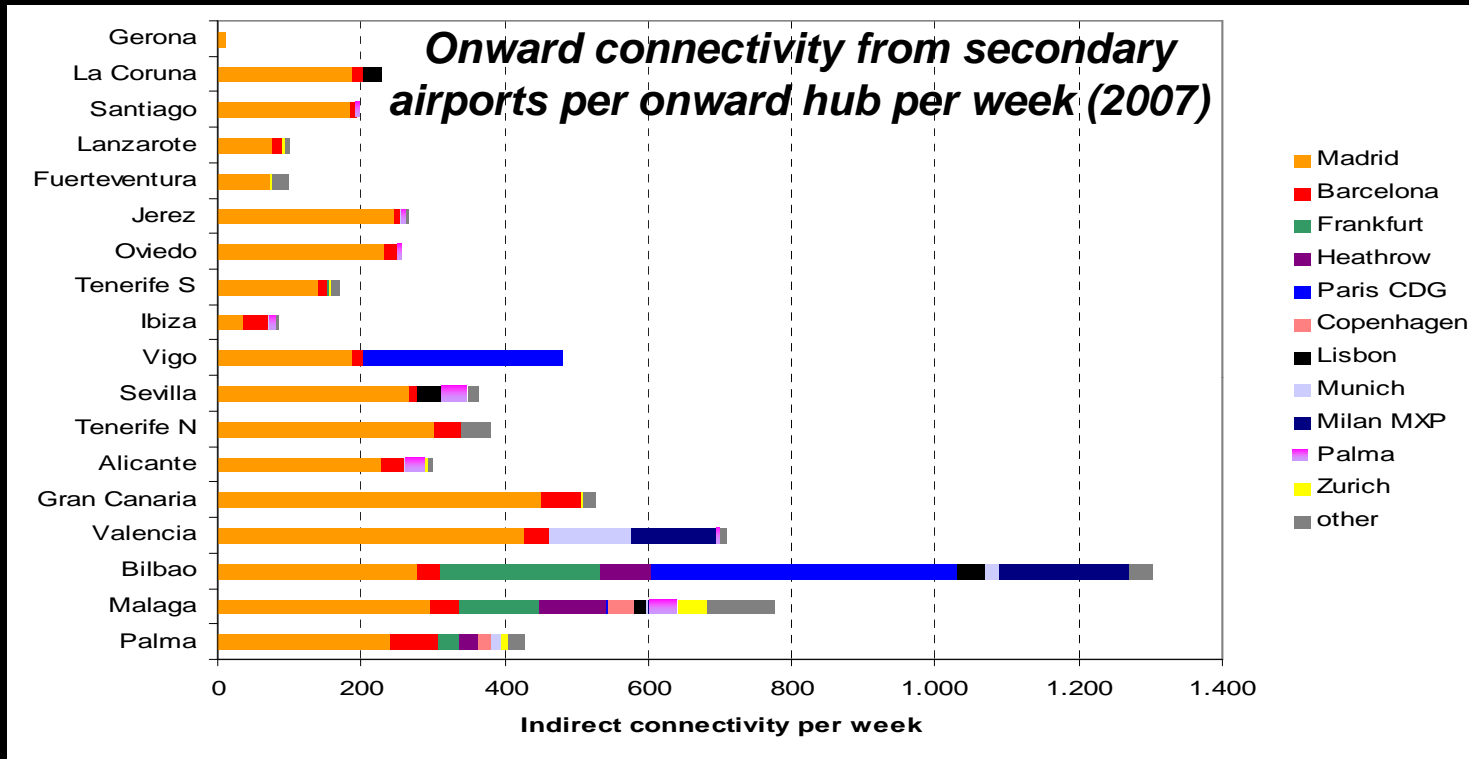
- Madrid and Barcelona provide passengers access to the rest of the world via similar hubs
  - ‘Puente Aéreo’ is effectively a feeder for Madrid, not for Barcelona
  - **Heathrow**, hub of Iberia’s OneWorld partner British Airways, most important onward hub for Madrid
  - The hub of SkyTeam member Air France, **Paris CDG**, most important onward hub for Barcelona



# Geographical specialization of hubs: hub connectivity per originating region per airport, 2007



# Madrid is dominant onward hub for most secondary Spanish and Catalan airports



- Madrid is the dominant connecting hub between Spanish regional airports and the rest of the world; Barcelona plays only a minor role
- Paris CDG is dominant connecting hub for Bilbao and Vigo due to Air France feeder services to Paris
- Milan Malpensa, Frankfurt, Munich, Palma and Heathrow play a role at a few larger airports
- Remarkably, Oneworld partner hub Heathrow not as important