

# CONSOLIDATION AND DE-HUBBING PATTERNS

5<sup>th</sup> Airneth Annual Conference

14<sup>th</sup> April, 2011

*Renato Redondi*

*University of Brescia - ICCSAI*

- Relationship between airline consolidation and de-hubbing
  - Consolidation of an hub carrier into mergers/acquisitions or alliances could induce de-hubbing to avoid overlapping, to better integrate into a consolidate network, or to serve new markets
  - However, when the hub-carrier fails to consolidate, de-hubbing may again happen due to financial distress or bankruptcy
- Questions to be addressed:
  - Which are the consequences of de-hubbing for airports and passengers?
  - Is it likely to be “re-hubbed” by the same carrier or other carriers?
  - Which is the role played by low-cost carriers?

- De-hubbing in US and Europe from 1994

<b>Year</b>	<b>Airport</b>	<b>Hub-carrier</b>	<b>Main cause of de-hubbing</b>	<b>Main References</b>
1994	Denver	Continental	New airport	Szyliowicz and Goetz, 1995
1995	Nashville	American Air.	Network restructuring	Johanson, 2007
1995	San Jose	American Air.	Network restructuring	
2000	Gatwick	British Air.	Downsizing/ Restructuring	Halstead, 2001
2001	Bruxelles	Sabena	Bankruptcy	Dennis, 2005
2001	Zurich	Swissair	Bankruptcy	Knorr and Arndt, 2004
2001	Basel	Swissair/ Crossair	Bankruptcy	Burghouwt, 2007 Dennis, 2005
2001	Baltimore	US Airways	Network restructuring	Vowles, 2001
2001	Raleigh-Durham	Midway	Bankruptcy	Johanson, 2007
2003	Pittsburgh	US Airways	Network restructuring	Berry, 2008
2004	Clermont-Ferrand	Air France	Network restructuring	Burghouwt, 2007 Thompson, 2002
2005	Cincinnati	Delta-Northwest	Merger	Sorkin and Bailey, 2008
2007	Barcelona	Iberia	Network restructuring	Burghouwt, 2008
2008	Malpensa	Alitalia	Downsizing/ Bankruptcy	IRER, 2008

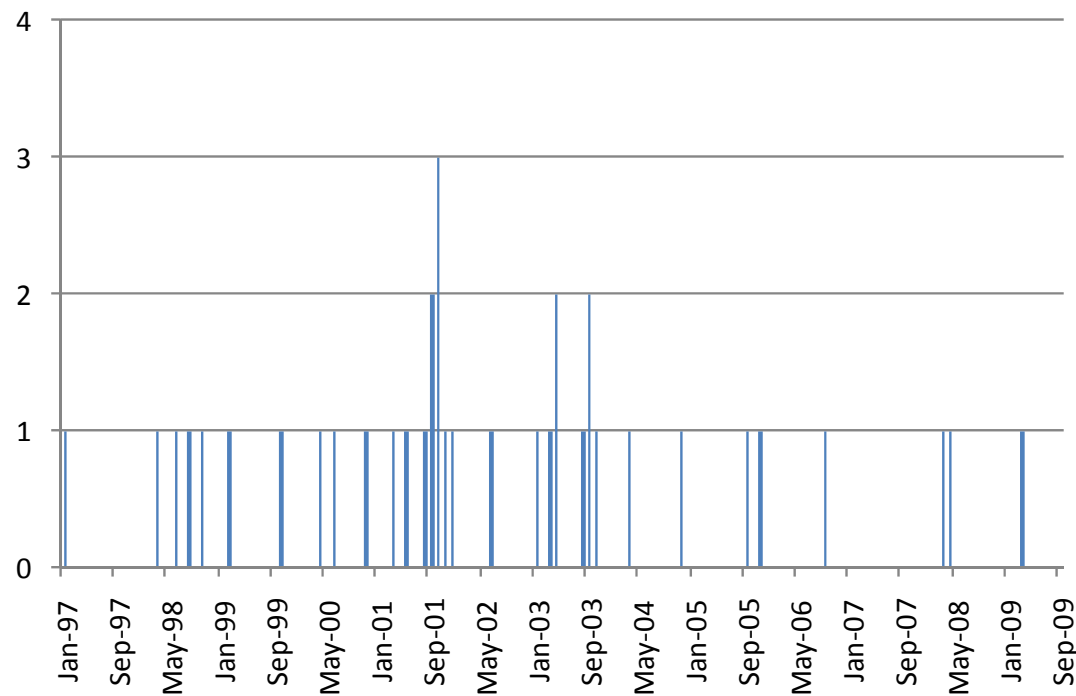
- How to measure hubbing activities? The simplest demand-based “number of transit/transfer passengers” has some drawbacks mainly due to data availability
- We employ a supply-based proxy based on the number of “viable” connections offered in the hub. We consider three conditions:
  1. online transfers or interline-transfers in the same alliance
  2. the time between the incoming and the outgoing flights must be between 1 and 3 hours
  3. a routing factor limit of 1.2
- We calculated this measure on all airports with scheduled flights from 1997 to 2009 on a monthly base (OAG data). The analysis covers all 2.141 airports worldwide with at least a viable connection during the period.
- The connectivity measure is adjusted for removing intra-year seasonal effects

- How to define de-hubbing?
- We introduce three conditions:
  1. **Connection constraint:** the adjusted number of connections decreases by at least 75% - to less than  $1/(2^2)$  – expected square effect when flights halve
  2. **Dimension constraint:** the initial adjusted number of connections, is higher than 150 connections per day - to exclude smaller hubs
  3. **Operation constraint:** the airport continues some of its scheduled services after de-hubbing - to exclude cases in which airports were closed and replaced

Area	Number of cases
Europe	11
North America	11
Central-South America	8
Asia-Pacific	7
<b>Total</b>	<b>37</b>

- We find **37 cases** of de-hubbing worldwide

- De-hubbing peaks after September 11th, 2001 and in the second half of 2003, after the spreading of SARS



- The classification of what caused de-hubbing is a difficult task
- In most cases there are multiple factors to be considered (es: Alitalia with Malpensa)

Network restructuring	12
Merger	5
Downsizing - Financial distress	10
Bankruptcy	5
New airport	3
Other problems	2
<b>Total number of de-hubbing cases</b>	<b>37</b>

- In some cases a few months after network restructuring, the carrier begins merger talks or joins an alliance (es: Air France with Clermont – Ferrand and Nice)
- If the hub carrier is not able to consolidate and restructure its network, de-hubbing may take place anyway, due to downsizing induced by financial distress or bankruptcy.

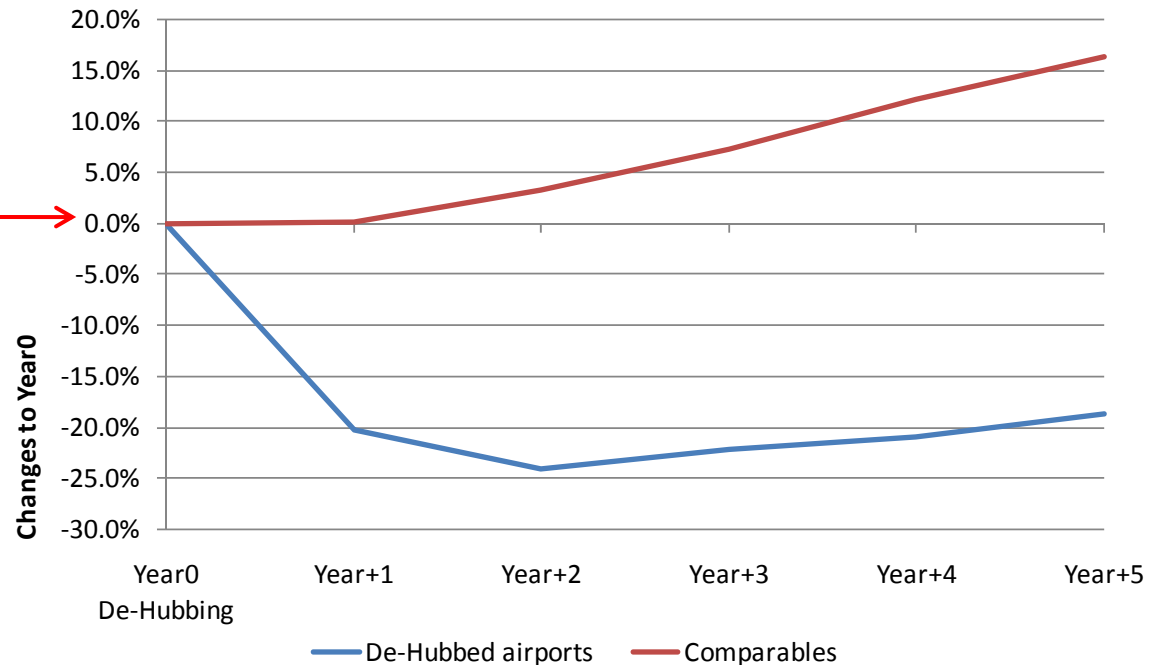
Rank	Airport	Country	Adj. no. of conn.	Decr.	De-hubbing month	Hub Carrier	Cause
1	Cincinnati/Northern Kentucky	US	22,105	86%	November-05	Delta Air Lines	Merger
2	Pittsburgh International	US	16,790	98%	September-01	US Airways	Netw. Restr.
3	Lambert-St. Louis International	US	15,165	95%	October-03	American Airlines	Merger
4	Milan Malpensa	Italy	4,434	94%	March-08	Alitalia	Netw. Restr.
5	Brussels National	Belgium	3,576	83%	November-01	Sabena	Bankruptcy
6	London Gatwick	UK	2,744	79%	October-01	British Airways	Netw. Restr.
7	Ronald Reagan National	US	2,136	85%	September-01	US Airways	Sept. 11
8	Luis Munoz Marin International	Puerto Rico	1,790	82%	September-08	American Airlines	Netw. Restr.
9	Orlando International	US	1,575	77%	May-01	Delta Air Lines	Merger
10	Kimpo International	South Korea	1,411	100%	March-01	Korean Air Lines	New airport

- The biggest de-hubbing in terms of the adjusted number of connections happened in US and Europe



## De-hubbing impact on offered seats

Prior to de-hubbing level



•Comparable airports have similar dimension (within 10%) and operate in the same region

•In the first year after de-hubbing (Year +1) offered seats in comparable airports is unchanged (+0.1%), confirming that de-hubbing happens on average in periods of slow-growth

•On average the recovery starts two years after de-hubbing

•In five years comparable airports see offered seats increasing by 16.2%, against a decline by 17.5% in airports which suffered de-hubbing.

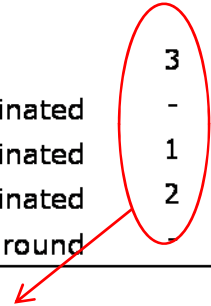
We classify each of the 37 cases by the following two criteria:

1. **Re-hubbing /No Re-hubbing scenario:** the adjusted number of connections after de-hubbing recovered its initial value in time?
2. We consider offered seats after 5 years from de-hubbing (or last data available)
  - **“Alliance-dominated” scenario:** more than 50% of seats is then offered by an Alliance
  - **“Low cost-dominated” scenario:** more than 50% of seats is then offered by low cost carriers
  - **“Unallied-dominated” scenario:** more than 50% of seats is then offered by unallied carriers
  - or else, **“Battleground” scenario.**

▪ We indentified **only 3 cases** of re-hubbing

▪ After 5 years their traffic is **-3.9%**, against **-20.4%** for the other 34 cases

Offered seats	Number	Year+1	Year+2	Year+3	Year+4	Year+5
<b>All de-hubbing cases</b>	37	-20.3%	-24.1%	-22.1%	-21.0%	-18.7%
<b>No Re-hubbing</b>	34	-20.3%	-25.2%	-23.8%	-22.1%	-20.4%
<b>Re-hubbing</b>	3	-20.1%	-13.2%	-6.0%	-10.7%	-3.9%
Low Cost-dominated	-	-	-	-	-	-
Alliance-dominated	1	-29.9%	-18.6%	-12.7%	-2.8%	-2.5%
Unallied-dominated	2	-15.2%	-10.5%	-2.6%	-14.6%	-4.6%
Battleground	-	-	-	-	-	-



**There are no cases where re-hubbing took place by another carrier**

- **Ronald Reagan National** in Washington. De-hubbing was temporary and due to stricter security limitations following the September 11th, 2001
- **Ninoy Aquino** International Airport, in Philippines. Philippine Airlines was severely affected by the 1997 Asian Financial Crisis. After corporate restructuring, the airline gradually restored its services
- **Shanghai Hongqiao** airport, China Eastern Airlines transferred international activities to the new Shanghai Pudong International Airport in 1999. Due to the strong growth of the Chinese domestic market, in time even the Shanghai Hongqiao airport recovered hub activities

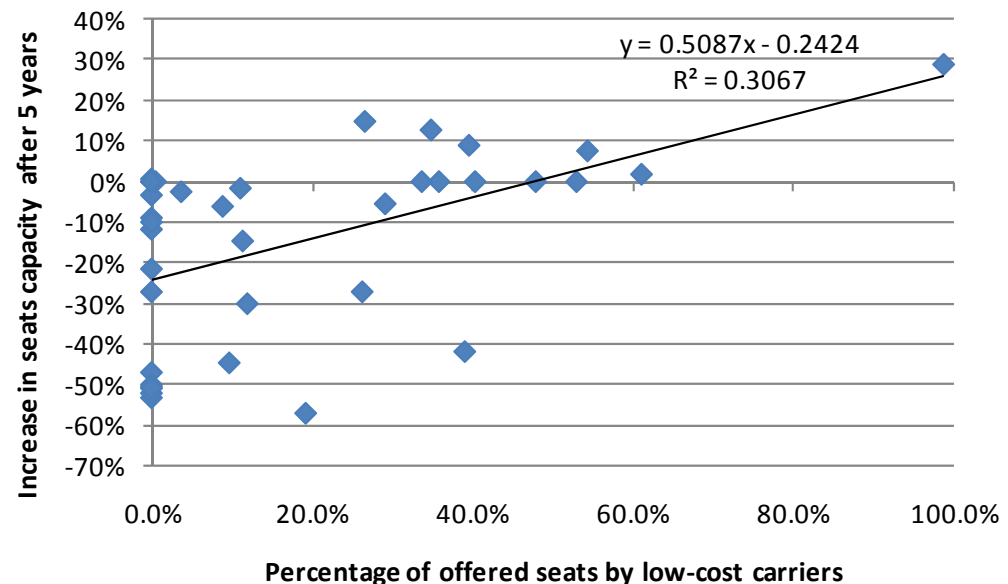
Re-hubbing is not likely. *Which are the alternatives for airports to avoid decline?*

Offered seats	Number	Year+1	Year+2	Year+3	Year+4	Year+5
<b>All de-hubbing cases</b>	37	-20.3%	-24.1%	-22.1%	-21.0%	-18.7%
<b>No Re-hubbing</b>	34	-20.3%	-25.2%	-23.8%	-22.1%	-20.4%
Low Cost-dominated	4	-13.2%	-18.0%	-14.6%	-8.9%	12.8%
Alliance-dominated	6	-28.5%	-24.0%	-21.4%	-18.3%	-19.3%
Unallied-dominated	12	-15.3%	-24.7%	-24.2%	-23.1%	-26.8%
Battleground	12	-23.8%	-28.8%	-27.2%	-25.0%	-22.6%
the first carrier is low-cost	4	-20.8%	-22.3%	-17.9%	-16.3%	9.0%
the first carrier is not low-cost	8	-25.3%	-31.6%	-31.3%	-28.8%	-27.1%

▪ **Best recovery for Low Cost-dominated scenario**

▪ Recovery is still possible when the main carrier is low-cost

- Relationship between offered seats by low cost carriers and the increase in seats capacity
- It confirms a robust positive relation
- On average, each percentage point of seats by low cost carriers brings an extra-growth of 0.5%.



- Competitive pressure by low-cost carriers is recognized (Berry and Jia, 2008) as a major factor to induce consolidation and de-hubbing processes
- On the other side, the best recovery is when low-cost carriers enter the airports after de-hubbing
- What happened after de-hubbing also shows that low-cost carriers are not set against entering primary airports on principle
- After de-hubbing, airports are willing to meet (any) conditions set by low-cost carriers. Basically low airport charges and no-frills services.
- Profound implication for the airport strategy
  - IRREVERSIBLE STRATEGY
  - “Overbuilt facilities designed for connectivity” no longer required (sunk costs)
- **Future re-hubbing** by low-cost carriers (at least on short-medium haul)?
  - Air Berlin encourages transfers at its Berlin Tegel, Düsseldorf and Palma hubs; it is also joining the Oneworld alliance;
  - Southwest has been doing hubbing activities in its main hubs for a few years

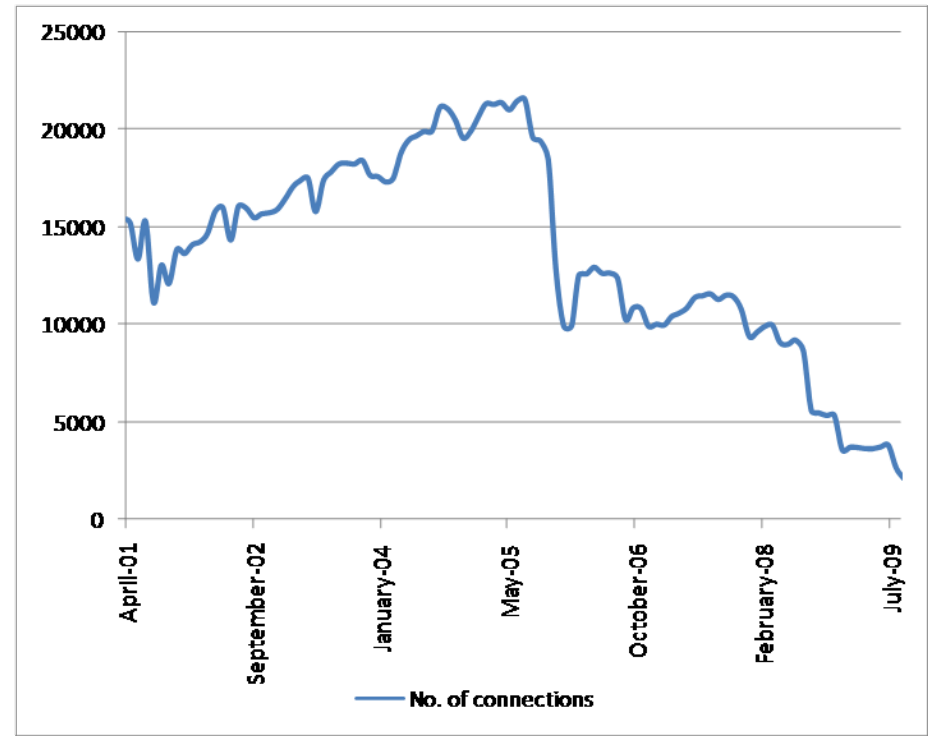
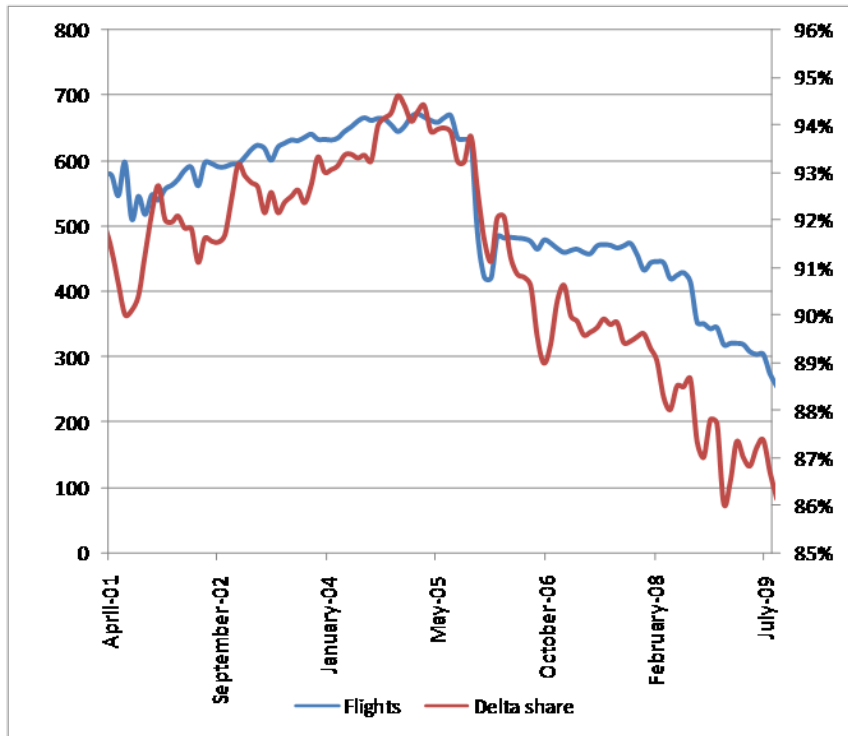
- In all other 26 cases average seats capacity declines strongly, even if with relevant variations
- In just two cases (Adelaide and Gatwick) the airports recovered their initial seats capacity
- The three major de-hubbing cases of Cincinnati, Pittsburgh and Lambert-St. Luis suffered similar fate with -43%, -57% and -42%. Their former hub carriers, Delta Air Lines, US Airways and American Airlines remained the first carriers after de-hubbing (Alliance-dominated scenario).

Scenario		Number	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Decline</b>	Average	26	-21.4%	-26.9%	-26.1%	-24.7%	-26.3%
	25% percentile		-33.9%	-39.3%	-41.7%	-41.7%	-49.3%
	Median		-16.7%	-29.0%	-29.3%	-22.1%	-27.2%
	75% percentile		-6.2%	-11.6%	-11.6%	-7.5%	-6.8%
<b>Alliance-dominated</b>	Average	6	-28.3%	-25.1%	-23.2%	-22.2%	-23.5%
	25% percentile		-29.8%	-37.0%	-42.6%	-47.4%	-51.9%
	Median		-17.2%	-27.8%	-34.9%	-22.5%	-25.9%
	75% percentile		-8.6%	-11.8%	-0.1%	2.8%	2.5%
<b>Unallied dominated</b>	Average	12	-15.3%	-24.7%	-24.2%	-23.1%	-26.8%
	25% percentile		-30.0%	-36.0%	-35.6%	-33.8%	-48.9%
	Median		-7.5%	-27.6%	-21.5%	-21.4%	-21.5%
	75% percentile		-4.7%	-12.1%	-14.4%	-13.8%	-10.3%
<b>Battleground- Non low-cost first carrier</b>	Average	8	-25.3%	-31.6%	-31.3%	-28.8%	-27.1%
	25% percentile		-42.0%	-41.0%	-46.5%	-45.9%	-43.3%
	Median		-22.5%	-29.3%	-29.3%	-30.0%	-30.1%
	75% percentile		-12.9%	-20.1%	-18.4%	-13.2%	-16.3%

- In each year, the number of destinations after de-hubbing decreased less than offered seats
- Some routes are still being offered to exploit the residual O-D demand, even if with a decreased frequency
- The negative effect on accessibility is less severe than the direct impact of de-hubbing on airports traffic
- The decrease in the number of long-haul destinations (figures in brackets) exceeded the reduction in the number of destinations

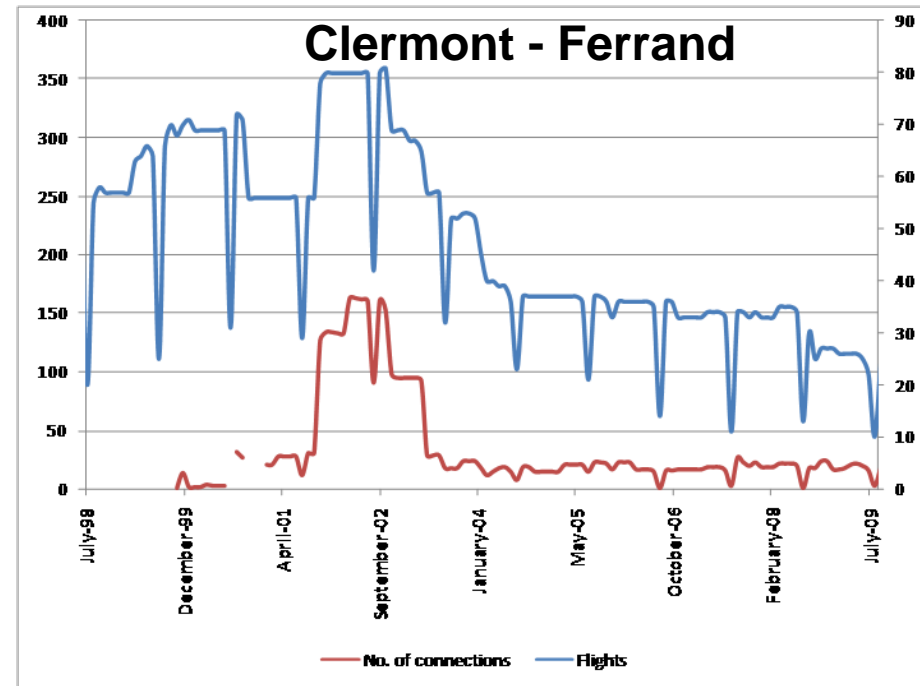
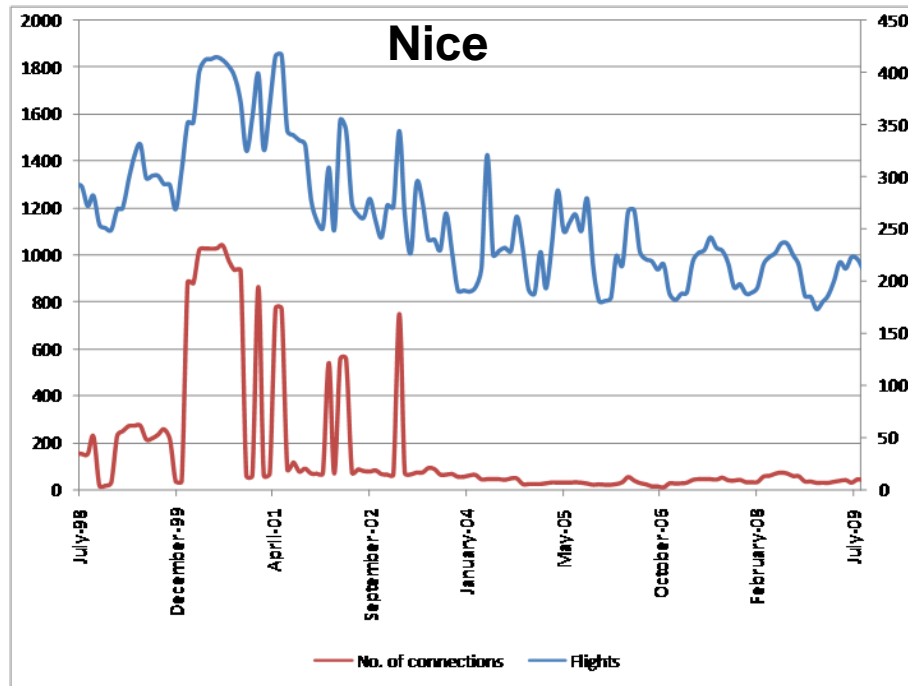
Number of destinations	Number	Year+1	Year+2	Year+3	Year+4	Year+5
<b>All de-hubbing cases</b>	37	-15.0% <b>(-18.9%)</b>	-15.9% <b>(-20.3%)</b>	-14.9% <b>(-17.1%)</b>	-15.7% <b>(-17.7%)</b>	-11.6% <b>(-14.8%)</b>
<b>No Re-hubbing</b>	34	-14.7% <b>(-18.6%)</b>	-15.9% <b>(-20.1%)</b>	-15.6% <b>(-17.8%)</b>	-16.3% <b>(-16.9%)</b>	-12.4% <b>(-14.0%)</b>
Low Cost-dominated	4	-0.9% <b>(-17.0%)</b>	-6.4% <b>(-7.6%)</b>	-1.3% <b>(-11.5%)</b>	2.8% <b>(-12.5%)</b>	28.3% <b>(16.3)</b>
Alliance-dominated	6	-22.6% <b>(-18.9%)</b>	-13.6% <b>(-8.7%)</b>	-15.3% <b>(-13.7%)</b>	-20.8% <b>(-24.1%)</b>	-22.5% <b>(-32.6%)</b>
Unallied-dominated	12	-9.8% <b>(-14.4%)</b>	-14.6% <b>(-15.8%)</b>	-17.7% <b>(-6.5%)</b>	-17.7% <b>(-7.7%)</b>	-20.1% <b>(-8.2%)</b>
Battleground	12	-20.2% <b>(-27.7%)</b>	-22.2% <b>(-31.2%)</b>	-19.0% <b>(-32.7%)</b>	-18.6% <b>(-24.6%)</b>	-12.0% <b>(-13.6%)</b>
the first carrier is low-cost	4	-17.7% <b>(-32.0%)</b>	-17.3% <b>(-27.7%)</b>	-9.0% <b>(-21.6%)</b>	-11.2% <b>(-12.7%)</b>	26.0% <b>(+6.6%)</b>
the first carrier is not low-cost	8	-21.4% <b>(-24.8%)</b>	-24.4% <b>(-33.2%)</b>	-23.3% <b>(-39.4%)</b>	-21.8% <b>(-31.8%)</b>	-17.4% <b>(-29.6%)</b>
<b>Re-hubbing</b>	3	-18.7% <b>(-20.7%)</b>	-15.7% <b>(-21.4%)</b>	-8.2% <b>(-13%)</b>	-9.8% <b>(-21.4%)</b>	-4.3% <b>(-18.8%)</b>

- In 1980s Delta created a hub in Cincinnati with a new terminal 3. It grew to be Delta's second largest, after Atlanta
- Even before Delta merged with Northwest Airlines in 2008, the airline had cut flight capacity from the Cincinnati hub due to financial problems (Chapter 11).
- Cincinnati closer vicinity to Northwest hubs (Minneapolis, Detroit, Memphis) induced Delta to cutback again flights and connectivity in 2008. It is still reducing its presence.
- The airport is declining (-50% of offered seats). No other carrier has so far replaced Delta.





- Between 2000 and 2003, Air France concentrated some connectivity in the secondary hubs of Nice and Clermont-Ferrand
- Before Air France merged with KLM (5<sup>th</sup>, May 2004), it had restructured its network and concentrate hub activities in Paris Charles de Gaulle
- Traffic in Clermont-Ferrand declined while Nice, given its geographical position, continued to offer O-D European flights



## Nice

- Number of routes **increased by 22%** in 5 years;
- Average frequency **decreased by 57.5%** in 5 years;
- Low cost carriers entered the airport;
- Average aircraft capacity increased by more than 30%;
- Its network changed from hub and spoke to point to point.

## Clermont-Ferrand

- Number of routes **decreased by 45.25%** in 5 years;
- Average Frequency **decreased by 10.77%** in 5 years;
- No other carrier replaced Air France.

## Decomposition of seats variations

Nice	No. of routes	Average frequency	Average aircraft capacity	Seats
1 year after	5.75%	-7.90%	4.48%	<b>2.33%</b>
2 year after	6.68%	-30.31%	16.80%	<b>-6.83%</b>
3 year after	19.67%	-48.13%	20.63%	<b>-7.84%</b>
4 year after	20.41%	-59.31%	32.63%	<b>-6.28%</b>
5 year after	21.89%	-57.50%	30.15%	<b>-5.46%</b>

Clermont-Ferrand	No. of routes	Average frequency	Average aircraft capacity	Seats
1 year after	-18.16%	-10.66%	6.73%	<b>-22.08%</b>
2 year after	-38.27%	-11.27%	8.53%	<b>-41.01%</b>
3 year after	-40.50%	-11.00%	8.95%	<b>-42.55%</b>
4 year after	-43.58%	-10.82%	7.87%	<b>-46.53%</b>
5 year after	-45.25%	-10.77%	5.92%	<b>-50.10%</b>

- **Airline consolidation** is a major factor to explain de-hubbing
- We introduce **quantitative conditions** and find 37 different cases of airports which suffered de-hubbing in the world
- Our results show that, on average, airports that suffered de-hubbing **did not recover their original traffic in 5 years**
- We did not find any case in which airports recovered their hub activities by other carriers. Is future **re-hubbing by low-cost carriers** possible?
- When low-cost carriers enter the airport, traffic shows much faster recovery trends
- **The negative effect on accessibility is less severe** than the direct impact of de-hubbing on airports