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THE CONSEQUENCES OF THE GROWING EUROPEAN LOW-COST AIRLINE SECTOR

TRANSPORT AND TOURISM

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Content:

The study provides an analysis of the impact of the changes in air transport market as a consequence of the emergence of low fares airlines. Evidence proves that this development has had a significant impact on established airlines, the main airports, and also on intra- and intermodal competition, European tourism, passenger flows and regional development.

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Executive summary

Study Context

Low-cost carriers have had a serious impact on particular air transport markets but the extent and nature of this effect have been largely regionalised. The low-cost phenomenon started in the US and it proved to be a robust service concept from the financial and operational view-point. Despite the homogeneous designation usually used to define this service, we can observe in the literature that a significant diversification of models exists and to understand the dynamics and potential of this recently emerged market we must start by observing the variety of its business models.

Some core characteristics seem to be common to the majority of the low-cost models. These are: high aircraft utilisation; internet booking; use of secondary airports; minimum cabin crew; lower wage scales; lower rates of unionisation among employees; one class of seating; short ground turn-around times; no cargo carried; very simple fare structures and price strategies; adoption of strict yield management techniques; e-ticketing; often no seat allocation (for faster boarding); no frills, i.e. passenger having to pay for food and beverages; no connections; point-to-point services. It is worth noting that the increased competition in the aviation sector led the so-called 'legacy' airlines to adopt some of these characteristics of the low-cost airlines in an attempt to better survive in this new deregulated environment.

The purpose of this study is to provide answers to some of the effects that LCA may be producing across Europe (in passengers, airports, airlines, etc.) and within the air transport industry. Some of the key questions are:

- Is the EU aviation sector moving in the right direction?
- Are the recently adopted EU measures sufficient to address the recent developments in the EU aviation sector?
- If not, how and through what measures can EU policy contribute to achieving an optimal result for the aviation sector and customers, taking into account safety and environmental concerns as well as EU requirements related to competition law and state aids?
- Does the EU need a common approach towards airports, their capacity and their infrastructure?

The study opted for a systemic analysis to the air transport sector and develops along six chapters in which we address our understanding of the consequences of growth of Low-Cost Airlines (LCA) for transport infrastructure and passenger flows in Europe. Chapter Two starts by discussing the LCA concept and the different ways it has developed across the world. Chapters Three and Four address the current LCA market and its trends. Chapter Five addresses the effects on airports. Chapter Six address the overall economic and social impacts accruing from the existence and development of LCA.

Synthesis of the research

The main outcomes of the research work undertaken are:

1. There is a consolidation trend towards a limited number of big LCAs that will have consequences on the market structure and the market behaviour with a possible risk of abuse of market power.

2. Contestability characteristics should be guaranteed to prevent abusive behaviour of incumbents towards new entries.
3. On top of the returns from air ticket sales LCAs generate extra income from other sources that enable them to maintain low fares even if a low-cost of operations is not sustainable. Additional studies are needed to define the limit of those activities and to answer the following questions: should one allow activities such as gambling on board? what are the benefits and externalities that can accrue from such a business spin-off?
4. Regional airports can give some support to new airlines. Abuse of this opportunity needs to be avoided, and the EU has already produced legislation to prevent this.
5. The evolution of all cost items (landing fees, fuel, wages, etc) should be monitored to understand and foresee possible strategies of LCAs. As an example, pressure on pilot wages may result in a weakening position.
6. The reaction of the European LCAs to the new European regulations such as compensation of travellers in case of delays or cancellation is not yet known. Moreover, discussion has to be launched on whether a non-guaranteed service should ever be allowed in Europe even if information is given in advance.
7. Information is still insufficient on the possible reactions of primary airports towards LCAs. Despite the importance of this market it is unclear whether they will accept their entry and, if so, whether they will opt for separated low cost (i.e. here, too, the designation 'Low Charge' is to be preferred) facilities. This question is not independent of the airports' choice of pricing regimes - that is, dual till versus single till - and requires further investment in understanding the dynamics of price and cross-financing between aeronautical and non-aeronautical activities.
8. Some airports and airways are subject to congestion, resulting in a shortage of good slots. This may result in two attitudes: a more interventionist one, in which one should guarantee an optimal allocation of slots among all companies, LCAs as well as conventional carriers; or a less interventionist one where the problem is left to market forces to decide so as to ensure the most efficient use of scarce resources. No consensus exists on this issue.
9. Unlike the airline sector, the European airport sector is expected to remain healthy and profitable.
10. There is competition between airports of the same size or role within the transport network. Regional airports do not pose a threat to major hubs. Competition between airports in neighbouring regions increases traffic and reduces fares but does not simply redistribute a constant traffic volume.
11. Entries into the market are possible, most obviously by redeveloping former military airfields. However, such newly created facilities will tend to have a weak bargaining position with potential airline users, and initial operations may be unprofitable as charge rates will be low, coupled with modest traffic flows. In addition, the distances of such facilities from large population centres often means that their catchment areas are limited.

12. In summary, there is no evidence to suggest that the development of low-cost carrier services from small regional or specialist airports is causing any significant financial difficulty for larger airports. In some extreme cases, it may have resulted in scarce capacity at large airports being used more efficiently by larger aircraft serving longer distance routes.
13. It is clear that a unique LCA-model does not exist, even if most of the European LCAs use the Southwest model as their basic reference. The European LCA market has three big players, but they differ in the products they are offering and also in their management strategies. Next to those big companies there seems to be some space for niche players, although in that part of the market there is a lot of entry and exit, the latter often through bankruptcies.

Recommendations to policy-makers

In brief, the answers to the fundamental questions raised in the terms of reference are:

- a) Based on the research undertaken we can state that the EU aviation sector is moving in the right direction. The growth paths of the European airlines and airports are comparable to those of their international peers. As in the rest of the world, European Low-cost Airlines (LCAs) are growing at a higher rate than the rest of the business. The effects of European LCAs on tourism, regional development etc., are clearly positive with evident changes in travel and leisure habits. As an example, the lower cost of mobility is fostering the adoption of weekend houses in a country different from where residence is established. The negative effects (environmental, etc.), in turn, are still under control and so it is still possible to devise mitigation strategies. Moreover, LCAs can play an important role in stimulating technological and operational improvements in the air transport business.
- b) Until now the developments in the EU aviation sector have corresponded with the expectations of EU policy. However, there is a consolidation trend towards a limited number of big LCAs that will have consequences on the market structure and the market behaviour with a possible risk of abuse of market power. It is very likely that LCAs will follow strategies of market domination similar to the network carriers. At the same time some airports and airways are subject to congestion, resulting in a shortage of good slots. It should be clear that those potential developments will possibly need quick (industrial-economic) preventive responses from EU authorities, so that regulation can pave the way to induce behaviour in line with sustainability objectives.
- c) In some respects there is already a common European approach to airports, in respect of the application of State Aid rules. The implementation of the Single European Sky may also assist in achieving common levels of runway capacity, which currently varies widely across the Union, with many airports failing to achieve 'best in class' levels of capacity for a given runway configuration. Beyond this, the scope for a common approach to airports is limited. In particular, the development of airports is closely linked to their respective hinterlands, and there is a need to retain sufficient degrees of freedom to accommodate local and regional interests and different decision-making processes. However, there would be a benefit in introducing a requirement for airports of over a certain size to produce and publish long-term master plans, so as to allow greater transparency as to airport development plans. It would also be beneficial to

airline operators if airports were required to publish regular capacity situation updates, so as to alert airlines to imminent or future capacity constraints.

- d) Intermodal competition can be a sector where the benefits of LCAs may have an effect on other modes, in particular high-speed rail, given the difference of fixed costs, among other elements. Given the activity on both sides, with HSR entering into an alliance for a frontal competition with LCAs, this interactive dynamic should be carefully monitored.
- e) We expect the EU to set a legislative framework common to LCAs and the conventional (or traditional) carriers where both can operate in an optimal way. This requires tools for design, monitoring and evaluation. Any solution where LCAs and conventional airlines run under different legislative frameworks will foster disruptive behaviour and unfair competition between these two types of airlines.
- f) Other EU initiatives also contribute to the efficiency and effectiveness of these markets, and inherent quality of their products, such as:
 - The further development of the Single European Sky;
 - The protection of passengers rights;
 - The greening of air transport operations;
 - The development of advanced concepts, techniques and technologies to:
 - enhance air traffic management
 - enhance ground-handling operations
- g) In view of the potential concentration of market power and the increasing variety of market strategies, both of LCAs and of traditional airlines, it is worth highlighting that in the course of time the two approaches will tend to present a distinction between short and long haul. In the short haul the two products will tend to maintain clear differentiation with only certain niche players (e.g. Brussels Airlines) moving in the direction of the LCA approach, while in the long haul the level of uncertainty about the strategies followed is quite higher but it is likely that for flights exceeding six hours LCA and traditional approaches will be more convergent
- h) We advise the European authorities to develop two instruments. First of all, there is a need for a monitoring instrument of the European low-cost market based on data and research on the industrial and economic behaviour of all actors. Next, there is a strong need for a benchmarking instrument, not only for the European air transport market, but for the entire world. An observatory for LCA evolution and impact assessment is recommended.

List of abbreviations and acronyms

AA	American Airlines
AAR	Aarhus, Denmark
ABD	Abadan
ABZ	Dyce (Aberdeen, Scotland - United Kingdom)
ACI	Airport Council
ADB	Adnan Menderes (Izmir-Turkey)
AEA	Association of European Airlines
AF	Air France
AGP	Pablo Ruiz Picasso (Malaga – Spain)
AHO	Fertilia (Alghero, Italy)
AirT	Air Transat
ALC	Alicante El Altet (Alicante – Spain)
AMS	Amsterdam-Schiphol (Netherlands)
AOC	Altenburg Nobitz (Altenburg – Germany)
AOI	Falconara (Ancona – Italy)
ARN	Arlanda (Stockholm – Sweden)
AS	Alaska Airlines
ASK	Available Seat Kilometre
ASM	Available Seat Mile
ATA	ATA Airlines
ATH	Eleftherios Venizelos (Athens – Greece)
AVE	Alta Velocidad Espanhola
AWA	America West Airlines
AZ	Alitalia
BA	British Airways
BAA	British Airports Authority
BBS	Blackbushe (Yateley - United Kingdom)
BCN	El Prat De Llobregat (Barcelona – Spain)
BFS	Aldergrove International Airport (Belfast - United Kingdom)
BHX	Birmingham (United Kingdom)
BIO	Sondica (Bilbao – Spain)
BIQ	Biarritz Parme (France)
BLK	Blackpool (United Kingdom)
BLL	Billund (Denmark)
BOH	Bournemouth International, United Kingdom
BRI	Palese (Bari – Italy)
BRN	Belp (Berne, Switzerland)
BRU	Brussels (Belgium)
BUD	Ferihegy (Budapest – Hungary)

BVA	Beauvais-Tille (Paris –France)
CDG	Charles De Gaulle (Paris – France)
CIA	Ciampino (Rome – Italy)
CO	Continetal Airlines
CTA	Fontanarossa (Catania - Italy)
DBV	Dubrovnik (Croatia)
DRS	Dresden, Germany
DUB	Dublin, Ireland
EC	European Commission
EDI	Turnhouse (Edinburgh, Scotland - United Kingdom)
EGC	Roumanieres (Bergerac – France)
EIN	Eindhoven, Netherlands
ELFAA	The European Low Fare Airline Association
EMA	East Midlands (Derby - United Kingdom)
ETS	European Trading Scheme
EU	European Union
FAO	Faro, Portugal
FDH	Friedrichshafen (Friedrichshafen – Germany)
FRL	Luigi Ridolfi (Forli, Italy)
GDP	Gross Domestic Product
GLA	Glasgow International (United Kingdom)
GOA	Cristoforo Colombo (Genova – Italy)
GOT	Landvetter
GRO	Girona-Costa Brava (Gerona – Spain)
GRQ	Eelde
GRZ	Thalerhof
GVA	Genève-Cointrin (Geneva – Switzerland)
HAI	Hanover Airport
HAM	Hamburg Airport (Germany)
HAU	Haugesund, Norway
HHN	Frankfurt-Hahn (Germany)
HST	High-Speed Train
IATA	International Air Transport Association
IB	Iberia
IBZ	Ibiza, Spain
ICAO	International Civil Aviation Organisation
ICE	Inter City Express
IFR	Instrument Flight Rules
INV	Inverness (United Kingdom)
IST	Ataturk (Istanbul, Turkey)
JER	Jersey, United Kingdom
KIR	Kerry (Farranfore – Ireland)
KLU	Alpe Adria (Klagenfurt - Austria)

KSC	Barca (Kőcsice- Slovak Republic)
KTX	Korean Train eXpress
LBA	Leeds/Bradford (United Kingdom)
LBC	Lübeck Blankensee
LCA	Low-Cost Airline
LCC	Low-Cost Carrier
LDY	Eglinton (Derry United Kingdom)
LFA	Low-Fare Airline
LGW	London Gatwick (United Kingdom)
LH	Lufthansa
LIG	Bellegarde (Limoges – France)
LIS	Portela (Lisbon - Portugal)
LRH	Laleu (La Rochelle – France)
LTN	London Luton (United Kingdom)
LTU	LTU International
MAD	Barajas (Madrid – Spain)
MAGLEV	Magnet Levitation
MAN	Manchester (United Kingdom)
MEN	Brenoux (Mende – France)
MJV	San Javier (Murcia – Spain)
MME	Durham Tees Valley (Teesside, Durham United Kingdom)
MMX	Sturup (Malmo – Sweden)
MRS	Marseille Provence (France)
MST	Maastricht/Aachen (Netherlands)
MUC	Franz Josef Strauss (Munich, Germany)
MPX	Malpensa (Milan, Italy)
NAP	Capodichino (Napoli – Italy)
NCE	Côte d'Azur (Nice – France)
NCL	Newcastle (United Kingdom)
NOC	Ireland West Airport (Knock, Ireland)
NW	Northwest Airlines
NYO	Skavsta (Stockholm – Sweden)
OLB	Costa Smeralda (Olbia – Italy)
ORK	Cork (Ireland)
ORY	Orly (Paris – France)
OSL	Oslo Airport, Gardermoen (Norway)
OST	Ostend/Bruges (Belgium)
PGF	Llabanere (Perpignan – France)
PIK	Prestwick (South Ayrshire - United Kingdom)
PIS	Biard (Poitiers – France)
PMI	Son Sant Joan Airport (Palma Mallorca - Spain)
PMO	Punta Raisi (Palermo – Italy)
PRG	Praga Airport

PRG	Ruzyně (Prague - Czech Republic)
PSA	Galileo Galilei (Pisa – Italy)
PSR	Liberi (Pescara – Italy)
PUF	Pau-Pyrénées (France)
RDZ	Marcillac (Rodez – France)
RHE	Reims (France)
RLG	Laage (Rostock-Laage, Germany)
RPK	Revenue Passenger Kilometre
SDR	Special Drawing Rights
SK	SAS Scandinavian Airlines
SKG	Macedonia International (Thessaloniki – Greece)
SNN	Shannon, Ireland
SPU	Split, (Croatia)
STR	Stuttgart Echterdingen (Stuttgart – Germany)
SVG	Sola (Stavanger – Norway)
SWA	Southwest Airlines
SXB	Entzheim (Strasbourg – France)
SZG	W. A. Mozart (Salzburg – Austria)
TGV	Train à Grande Vitesse
TIA	Rinas Mother Teresa (Tirana – Albania)
TRF	Sandefjord (Torp – Norway)
TRN	Sandro Pertini (caselle) (Turin – Italy)
TRS	Ronchi Dei Legionari (Trieste - Italy)
TUF	St Symphorien (Tours – France)
TW	Taiwan Airlines
TXL	Berlin-Tegel/Otto Lilienthal (Berlin, Germany)
UA	United Airlines
UK	United Kingdom
US	US Airways
VBS	Brescia Montichiari (Brescia – Italy)
VCE	Marco Polo (Venice – Italy)
VIE	Schwechat (Vienna – Austria)
VLC	Valencia (Manises – Spain)
VST	Västerås/Hasslo (Stockholm – Sweden)
WLU	Work Load Units
XRY	Jerez De La Frontera, Spain
ZAD	Zadar, Croatia

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1. Introduction

Low-cost carriers have had a significant impact on particular air transport markets but the extent and nature of this effect have been largely regionalised. The low-cost phenomenon started in the US and it proved to be a robust service concept from the financial and operational view point. Despite the homogeneous designation usually used to define this service, we can observe in the literature that a significant diversification of models exists (Windle R., et al, 1996; Doganis R., 2001; Calder S., 2002; Lawton T. 2002; Francis G. et al., 2004; among others) and to understand the dynamics and potential of this recently emerged market we must start by observing the diversity of its business models.

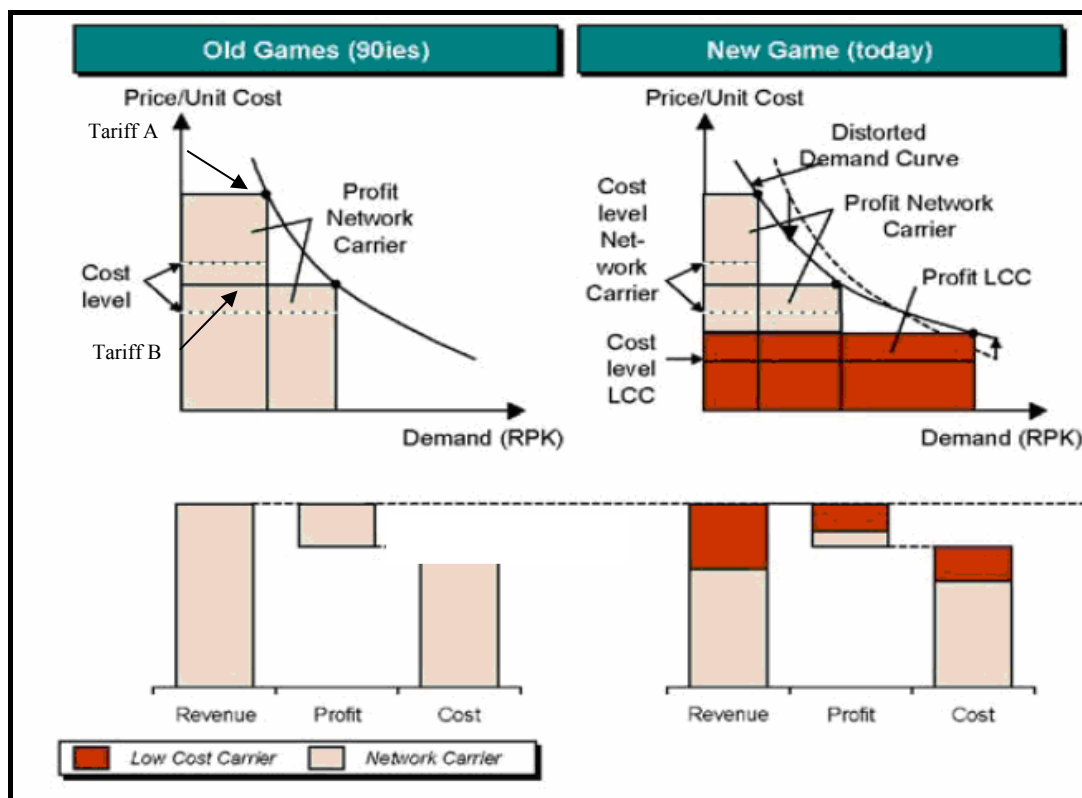
Some core characteristics seem to be common to the majority of the low-cost models. These are: high aircraft utilisation; internet booking; use of secondary airports; minimum cabin crew; lower wage scales; lower rates of unionisation among employees; one class of seating; short ground turn-around times; no cargo carried; very simple fare structures and price strategies; adoption of strict yield management techniques; e-ticketing; often no seat allocation (for faster boarding); no frills, i.e. passenger having to pay for food and beverages; no connections; point-to-point services. It is worth noting that the increased competition in the aviation sector led the so-called 'legacy' airlines to adopt some of these characteristics of the low-cost in an attempt to better survive in this new deregulated environment.

From the economic view point Figure 1 below illustrates the cost advantage that generally applies to all low-cost models. Traditionally, the airlines optimised their revenues by segmenting the supply, for example: economy, business, first, etc. (the left graph of Figure 1 presents two market segments priced with Tariff A and Tariff B). The lower tariffs were defined as a function of both unit costs and potential competition; the upper tariffs in function of the travellers' willingness to pay. As the unit costs were very high, the lower tariffs were above the lower areas of the demand curve (right hand side of the graph), and as a result a considerable part of the market was prevented from flying. This part of the market corresponds to people with a very low willingness to pay. The LCAs entered into the market targeting precisely this part of the market (central graph in Figure 1), through very low fares (right hand side of the graph). As a result, a significant share of the market was suddenly able to travel.

This explains the success of the LCA concept which was to offer low fares and with it conquer the market that was previously economically excluded from flying. A precondition for success was that low fares could only be sustainable if there was a low-cost operation. So, in fact the low cost is a consequence of the strategy followed and not the strategy itself, so the most correct designation for these services should be Low Fare Airlines, instead of Low-Cost Airlines.

According to a McKinsey (2002) study a low-cost configuration can save up to 57% costs through operational and managerial features. The traditional airlines have been reducing costs, but they continue to lag far behind the LCAs. As a result, they continue to target a smaller market share, corresponding to the passengers with a high willingness to pay. Additionally, they have been witnessing a reduction in the lower areas of their demand curve to the LCAs.

Figure 1: Economic model for low-cost model



Source: Franke, 2004.

By observing the different continents and the reports on how the respective low-cost airline models evolved we understood that some factors acted as a catalyst for the spread of low cost. These are: regulatory framework; degree of entrepreneurship; density of population and relative wealth; travelling culture; airport availability; adherence to internet facilities. A strong relation exists between the intensity of these factors and the development of local societies which is a determinant for the position of the different countries and continents in the market development life cycle of low-cost airlines. In Table 1 below we synthesise a comparison between the life cycle evolutions of these services across the world.

Table 1: Life cycle for market development of low-cost airlines

Life cycle stages	USA	CANADA	Europe			Asia	Australia	New Zealand	Rest of the world
			UK	Mainland Europe	East Europe				
1. Innovation	■	■	■	■	■	■	■	■	■
2. Proliferation	■	■	■	■			■	■	■
3. Consolidation	■	■	■						
4. 2 nd phase of entrants	■								
5. Consolidation	■								
6. Market maturity	■								

Source: Francis et al, 2006.

The consensus view is that deregulation has been an indispensable precursor to the introduction of low-cost airlines in all geographical contexts but it is also the consensus among analysts that by itself this is far from being sufficient to foster their evolution along the life cycle indicated in Table 1, otherwise the uneven spread of this model around the world would not be justified.

Besides, another relevant phenomenon associated with the evolution of low-cost models is the competitive pressure that by their simple existence is put on the 'legacy' airlines that tend to adopt cost cutting strategies driving the aviation sector to a very likely consolidation of the low-cost model market with traditional 'legacy' airlines. The purpose of this study is to highlight some of the effects that LCAs may be producing across Europe (in passengers, airports, airlines, etc.) and within the Air Transport industry, and to answer some of key questions:

- Is the EU aviation sector moving in the right direction?
- Are the recently adopted EU measures sufficient to address the recent developments in the EU aviation sector?
- If not, how and through what measures can EU policy contribute to achieve an optimal result for the aviation sector and customers, taking into account safety and environmental concerns as well as EU requirements related to Competition Law and state aids?
- Does the EU need a common approach towards airports, their capacity and their infrastructure?

After this brief introduction to the systemic complexity of the low-cost concept by itself and its diversified materialisation in the different parts of the world, the next chapters will address our understanding of the consequences of growth of Low-cost Airlines (LCA) for transport infrastructure and passenger flows in Europe. Chapter Two starts by discussing the LCA concept and the different ways it developed across the world. Chapters Three and Four address the current LCA market and its trends. Chapter Five addresses the effects on Airports. Chapter Six addresses the overall economic and social impacts resulting from the existence and development of LCA.

2. LCA concept

2.1. Introduction

This chapter aims to provide a detailed description of the different ways LCA materialised in the different parts of the world. The chapter starts by defining the main characteristics that contribute to the profile of the various LCA types and continues providing details on the business models supporting those LCA' types.

2.2. Typology

There is no single best definition of a low-cost airline (LCA), also known as a low fare, no-frills or discount airline¹. The term originated within the airline industry for airlines with low operating costs or with costs lower than their competitors. Through popular media the term has since referred to any carrier with low ticket prices and limited services regardless of their operating costs.

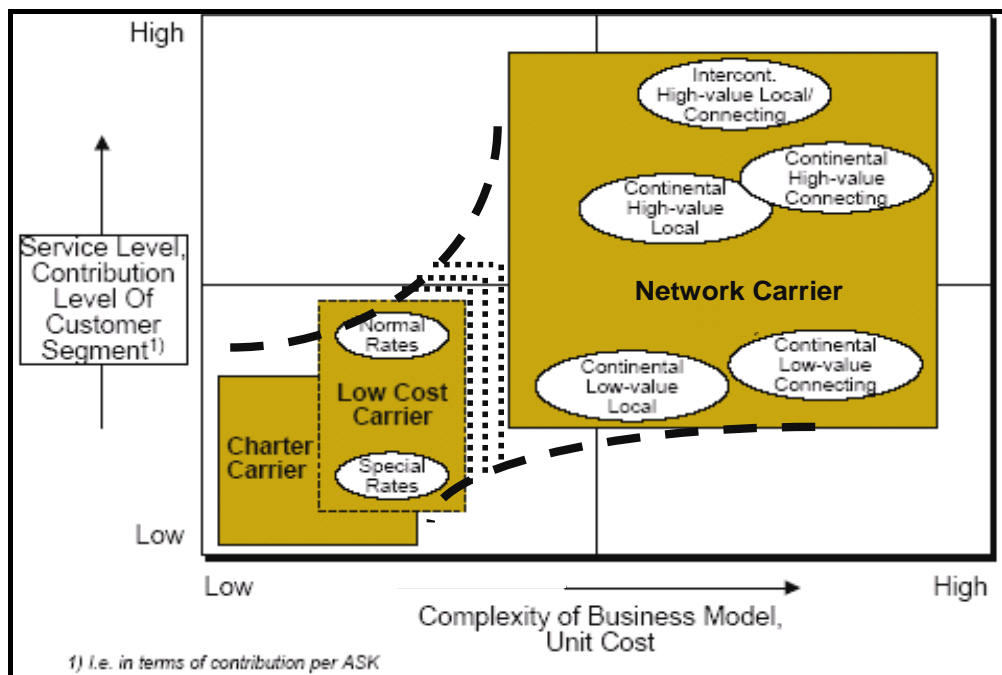
The concept originated in the United States with Southwest Airlines, which began service in 1971. It was copied afterwards and in the early 1990s spread to Europe and subsequently to the rest of the world. In Europe the trend started in 1991, when the Irish company Ryanair, previously a traditional carrier, transformed itself into an LCA². It was followed by other LCAs in the UK (e.g. easyJet in 1995) and then continental Europe.

It is now generally accepted that a low-cost airline offers low fares and eliminates most traditional additional passenger services. The business design is mainly characterised by one or more of the following key elements: a simple product, low operating costs, and the specific positioning. Table 2 summarises the characteristics of the LCA concept indicating typical practices of the LCA business model.

Not every low-cost airline implements all of the points mentioned in Table 2. Some try to position themselves by allocated seating, while others operate more than one aircraft type, and others will have relatively high operating costs but lower fares. For example, Air Berlin in 2005 commenced UK domestic services as feeders to its German services out of Stansted, exploring the network effect, which is a rather uncommon feature in LCA business.

¹ The European air transport market can be sub-divided into four business models: intercontinental carriers, regional and small network carriers, low-cost carriers, charter companies.

² Another Irish company, Aer Lingus, originally a flag carrier, also transformed itself into an LCA.

Figure 2: Airlines' customer segments and business portfolio

Source: Franke, 2004.

Francis et al. (2006) developed a typology, conceptually distinguishing five broad types of what is known as low-cost carriers:

- The Southwest copycats – Airlines that have been set up from scratch or those that have been remodelled by a private entrepreneur. This type is best represented by Southwest itself or easyJet;
- Subsidiaries – Airlines that have been set up as subsidiaries of long-established airlines aiming to compete and regain a share of the low-fare segment which was previously taken away from the established companies. Although formally autonomous they often elements of cross-subsidisation. Examples are MetroJet (by US Airways), Snowflake by SAS, bmibaby by bmi, and originally Go by British Airways;
- Cost-cutters – Typically long-established 'legacy' airlines attempting to cut their operating costs sometimes only by reducing some of the frills once offered. A number of 'legacy' companies have adopted this strategy either permanently or for some period of time. Examples are: BA and Aer Lingus shedding significant numbers of staff and rationalising their fleets; Air France and Iberia who have begun offering cheap one way tickets and charging passengers for their food;
- Diversified charter carriers. Low-cost subsidiaries developed by charter airlines. Examples are: Thomsonfly by Britannia; Hapag Lloyd Express by Hapag Lloyd; etc.
- State-subsidised companies competing on price. These are not true low-cost carriers as such but they act in the market as if they were. They are financially supported by Government ownership or subsidies allowing them to offer low fares without the need to cover their long run average costs. Alitalia, Olympic Airlines, TAP Portugal, Iberia or Sabena are some examples of these type of companies.

Before the emergence of LCAs, a clear separation existed between network carriers and charter companies. Charter flights were most of the time part of holiday packages and did not represent a significant share of costs or profits. They yielded low returns per passenger and were easy to operate because the tour operators committed in advance to their block seat allocations. The other end of the spectrum belonged to network carriers with high revenues per passenger and a high degree of sophistication and complexity of the business. Network carriers operated both

simple point-to-point local lines and the more complex connections with passenger and luggage transfers through one or more airports. The low-cost airlines filled the ‘gap’ in customer segment and business scope between charter and network carriers as Figure 2 shows. Moreover, as their business models become ‘blurred’ – deviating from the original Southwest model of low yield, low-cost – LCAs compete with both charter companies and network carriers alike.

Table 2: Characteristics of the LCA-concept

Basic characteristics	Detailed characteristics
A simple product	<ul style="list-style-type: none"> • one passenger class / one cabin class • simple fare schemes with limited product differentiation • no frills, such as catering, lounges and frequent flyer programmes,... • no ticket repayment and rebooking
Low operational cost combined with high productivity	<ul style="list-style-type: none"> • single aircraft type reducing training and servicing costs as well as crew and maintenance costs • lower crew wage schedules due to low average seniority and performance linked wage structure, personnel performing multiple tasks (for instance flight attendants also cleaning the aircraft or working as gate agents), etc. • outsourcing of all non-flying jobs (i.e. ground handling, aircraft maintenance, call centres,...) • emphasis on direct sales of tickets, especially over the Internet (avoiding fees and commissions paid to travel agents and computer reservations systems) • the use of secondary airports with excellent slots, low landing fees, less congestion,... • simplified routes, emphasising point-to-point transit instead of transfers at hubs (again enhancing aircraft utilisation and eliminating disruption due to delayed passengers or luggage missing connecting flights) • high seat density • high utilisation of aircraft achieved through short flights and fast turnaround times (i.e. more block-hours/day means lower unit cost) • low rotation time^(a) of approximately 20 minutes • free seating encouraging passengers to board early and quickly
Specific positioning	<ul style="list-style-type: none"> • aggressive marketing campaigns • leisure travellers and price-conscious business travellers • stronger fuel hedging programmes.

^(a) The time the aircraft is parked on the ground when engines are turned off.

Source: based on Bieger and Agosti (2005); ELFAA (2004), Doganis (2006); Klaas and Klein (2005) and Taneja (2004).

On the other hand, both charter and network carriers have been adjusting their business strategies. According to Binggeli and Pompeo (2002) European charter airlines increased the share of ‘seats only’ offered in their scheduled services from 20% to 36% between 2000 and 2004 and started offering them through the internet, in exactly the same way that LCAs do. At the same time conventional network carriers and the so called ‘legacy’ carriers are adopting LCA concepts, in the LFA version (Low Fare Airline) offering cheaper tickets, expanding online sales, offering holiday packages, car rental and hotel booking possibilities. Sometimes they have even been setting up their own low-cost clones³. In summary, there is presently a continuum of airline positioning in terms of customer segmentation and complexity of their business model (Lopes, 2005).

³ Examples being Germanwings, a subsidiary of Lufthansa’s regional partner Eurowings, in which LH holds a 49.9% stake, bmibaby from BMI, Clickair from Iberia, Centralwing from LOT and others that have ceased operations.

2.3. Business models

Whatever sector one is dealing with, competition between operators will always result in some adjustment of an airline's own business model to that of the competitor. It is striking that recently in the airline business the benchmark seems to be the LCA sector:

- The charter sector was confronted with a decreasing market share. Some of them, such as Thomsonfly in the UK, introduced LCA-characteristics into their business model. Both Air Berlin and Sterling Airways are also good examples of traditional charter airlines that re-branded into an LCA. Other charter companies started to offer air-only tickets, besides their traditional holiday packages;
- Quite a number of conventional carriers planned, started or acquired no-frills subsidiary companies, in order to hinder LCA growth. Examples are British Airways (with GO, sold in 2002 to easyJet), KLM (with the conversion of AirUK into Buzz, sold in 2003 to Ryanair⁴ and more recently with Transavia), LOT with Centralwings, Iberia with Clickair, Austrian with Lauda and SAS (Snowflake). Others have adjusted their pricing policies to offer competitive fares.
- Aer Lingus (2006) and Meridiana (2003) are two examples of network carriers that transformed themselves into LCAs.

This evolution shows that most carriers are continuously reviewing their own business models and adjusting their competitive reactions, sometimes with the risk of cannibalising their core business. The major reaction is basically the same for most carriers. In those European markets with high competition from LCAs, conventional carriers strive to increase their productivity and to decrease their unit costs, in order to offer competitive prices.

In addition, the conventional carriers use one or more strategies out of a set of the alternatives listed below:

- Discouraging the potential entry of LCAs by drastic price decreases, combined with capacity increases and/or loyalty programs; this often results in a price war.
- The acquisition of an LCA (for instance in 2000 Cityjet acquired by Air France).
- The creation of an independent LCA (see the examples above, with a.o. GO, Buzz, Germanwings, Centralwings, Clickair and Snowflake).
- The creation of an LCA within the traditional airline itself (for instance BMI and Bmibaby), which requires a strict distinction between the two products.
- The switch to more profitable markets, which has network effects (for instance Swiss abandoned some of its destinations from Geneva airport at the moment that easyJet became a dominant carrier at that airport).
- The radical transformation of a full service carrier into an LCA (for instance Aer Lingus, Flybe).

The increase in the number of LCAs and/or their size creates a tendency towards consolidation, in order to guarantee growth and market dominance. A typical example is Air Berlin, acquiring dba in 2006 and LTU in 2007. The major question then becomes whether those companies will or can keep their current cost structure. An explosive growth can become a threat for the low-cost philosophy, and generates higher wages and a more complex management structure. And in the case of Air Berlin acquiring the charter company LTU, one can ask the question whether there are economies of scope, although LTU has rights over a considerable number of valuable slots at congested airports (for instance Düsseldorf).

⁴ The takeover of BUZZ resulted in a closure in April 2003 with two-thirds of the workers dismissed.

To maintain their profitability, LCAs increasingly turn to revenue sources other than ticket sales. Typical examples are commissions from hotels and car rental companies, credit card fees, (excess) luggage charges, in-flight food and beverages, advertising space. Potential growth of this kind of income could come from telephone operations and gambling on board. That is, the LCA concept evolved into LFA (Low Fare Airline) irrespective of the source of revenues supporting the operation. As an example, MINTeL(2006) states that Ryanair's revenue from sources other than ticket sales contributed €259 million to its 2005-06 net profit of €302 million. Those revenues already represent 16% of the carrier's total revenue. For easyJet, that kind of income represented only 6.5% of the airline's total revenue which increased by 41.3% from 2004.

Lower workforce costs are another source of cost reduction compared with the traditional airlines. ECA(2002) reports the gross annual income of a pilot of short-distance carriers is on average lower by 28% than that of pilots of traditional airlines, and LCA pilots fly 25% more time. Besides flying longer, pilots and crews have less resting time and do multiple tasks: flight planning, weight and balance, supervising luggage loading and refuelling operations, cleaning the plane, hosting passengers at the boarding gate and replacing ground staff, etc. Moreover, LCAs make extensive use of flexible wages, and the fixed wages are 5 - 50% lower than those of the traditional airlines. In terms of labour contact, LCAs typically establish direct contracts with workers or with manpower agencies avoiding the collective agreements, which tends to favour the strong party, and are often ruled by laws different from the country where the worker actually works⁵ (Dobruszkes, 2006).

Other interesting sources of revenue are financing from airports and often from local authorities, through the reduction of airport fees or any other financial incentive. LCAs commonly use secondary airports, which in most cases are heavily underutilised. Naturally, airports will strive to gain LCAs' attention and the usual way is to reduce aeronautical charges. Similarly, air transport activity generates welfare that goes behind the airports' activities, inducing regional economical and social development. Secondary airports are often located in depressed or rural regions, which naturally seek some sort of development. Consequently, local authorities recognising in the LCAs' activities a potential driver for social and economical developments, are willing to provide financial help (for example: tax exemption, marketing support while LCAs start a new connection)⁶. The aeronautical reduction fees can be understood as another incentive, as most of these secondary airports are public. These incentives can be quite relevant and there are already some cases that have been deemed to contravene the EU's competition rules, for example Charleroi Airport (Brussels) and Ryanair⁷.

The last source of cost cutting corresponds to the most visible face of LCAs: customer on-board service. LCAs do not provide free drinks or food on their flights, but sell them to any passengers⁸. Luggage is also controlled; commonly one piece in the aircraft's belly and another in the cabin; and maximum weight is lower than that for traditional carriers. In this way, airlines get additional revenue, reduce the time with catering services while on ground, and reduce the aircraft's weight. Altogether LCAs are able to achieve substantially lower costs than the

⁵ Ryanair personnel work under Irish contracts, so that, for example, a German hired in Lübeck will be subject to the Irish social and work legislation, more favourable to the airline than the German legislation (Dobruszkes, 2006).

⁶ It is well-known that (direct or indirect) financing is an essential factor for Ryanair establishing a route, otherwise it will look for another destination. In the fiscal year of 2002-2003, it benefited from 168 million EUR, that is to say 70% of its net annual profit (La Tribune, 4 February 2004).

⁷ Commission Decision concerning *Charleroi Airport and Ryanair*, OJ L137 30.04.2004.

⁸ The emerging 'grab and go' shops at airports can well be the next development of the LCA learning strategies.

traditional airlines, and the difference can be more than 50%. Table 3 presents LCAs' cost advantage for the main cost items, assuming that a traditional carrier has an overall cost of 100%, and for each item listed the LCA cost advantage is shown.

Table 3: LCA's sources of cost advantage

	Cost reduction	Cost per seat
<i>Traditional Carrier</i>		<i>100%</i>
<i>Low-cost Carrier</i>		
Operating advantages		
Higher seating density	-16	84
Higher aircraft utilisation	-2	82
Lower flight and cabin crew costs	-3	79
Use cheaper secondary airports	-4	75
Outsourcing maintenance /single aircraft type	-2	73
Product / service features		
Minimal station costs and outsourced handling	-7	66
No free in-flight catering, fewer passenger services	-5	61
Differences in distribution		
No agents or GDS commissions	-6	55
Reduced sales/reservation costs	-3	52
Other advantages		
Smaller administration and fewer staff / offices	-3	49
<i>Low-cost Carrier compared to a traditional carrier</i>		<i>49%</i>

Source: Doganis (2006).

A similar outcome results from the analysis of the unit costs per seat-km of the intra European services of conventional airlines in 2003 and the two biggest European LCA: Ryanair and easyJet. The traditional airlines have consistently higher costs than both LCAs. Only Iberia gets close to easyJet's levels, but this is due to the longer average routes, which results in lower costs per km. Iberia's average route length was of 1158km, while for easyJet it was of 869km and for Ryanair was of 761km.

Table 4: Costs per seat-km of LCA vs. Traditional Carriers

	Cost per seat-km	Index (British Airways=100)
Traditional carriers		
Austrian	16.12	129
Lufthansa	14.62	117
Air France	14.52	116
SAS	13.02	104
Alitalia	12.57	100
British Airways	12.57	100
Iberia	9.03	72
Low-cost Carriers		
easyJet	6.9	55
Ryanair	4.81	38

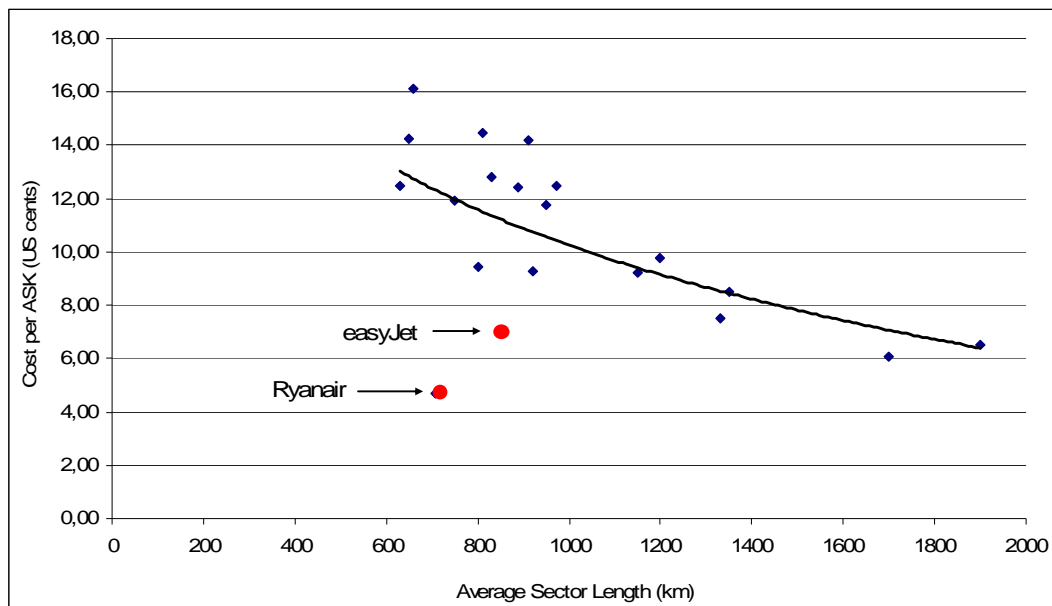
Source: Doganis (2006).

In order to remove the influence of an airline's network structure, the following figure plots the cost per available seat-km versus the average route length. The difference between traditional airlines and LCAs is more evident. Only for average distances of twice the LCAs average lengths can traditional airlines get close to LCA performance levels.

Summarising, the low-cost formula which first appeared in the United States has proved to be very robust ever since, even in less favourable times. In Europe the European Single Aviation Market has created the foundations for the spreading of the low-cost phenomenon. In recent years, many new airlines have entered the market, although a considerable number of them have gone bankrupt in the first years of operations.

The LCA business model is based on operating at very low-costs, which enables the reduction of fares below those of direct competitors and while still allowing the operator to earn profits. Airlines follow different strategies to achieve that cost reduction, but four main factors are visible: network, technology, distribution and service.

Figure 3: Unit costs on intra European flights (2003)



Source: Doganis, 2004.

3. The current LCA market

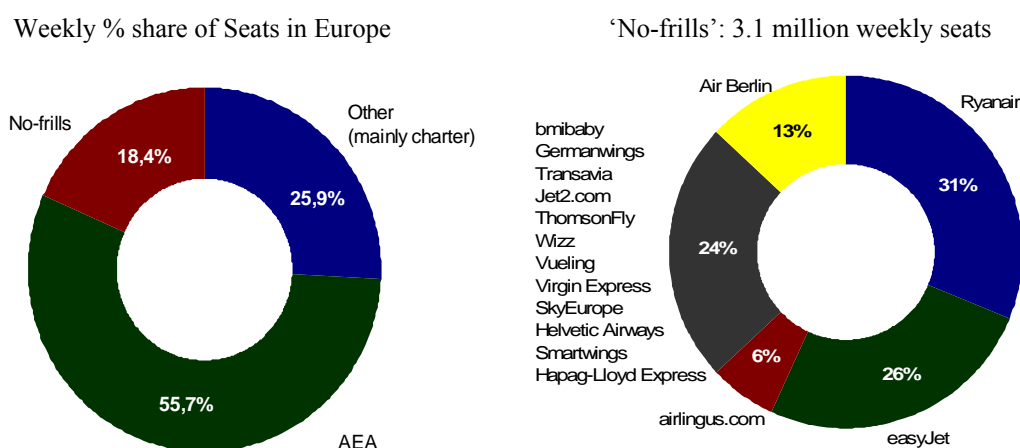
According to a rough estimate by the Association of European Airlines (AEA)⁹, in 2006 'no-frills' carriers accounted for just over a quarter of intra-European scheduled passengers. The sector continues to grow strongly, and as it does so the business model is refined and adapted (AEA, 2007, p. 13)¹⁰. Figure 4 gives the weekly percentage share of seats in Europe. The 'other' group corresponds essentially to the charter companies.

Figure 4 refers to the supply of seats, while Table 5 gives an overview of the major production indicators of some European Low-Fares Airlines. Three companies (Ryanair, EasyJet and Air Berlin) account for 75% of the no-frill total of Table 5. They are each several times the size of any of the other companies and the development of the services of LCAs in Europe varies largely from one country to another. The phenomenon spread unevenly across Europe and Central Europe continues to attract substantial new service.

European LCAs have benefited from a very liberal legal framework and a number of geo-political factors such as the ones below (MINTeL, 2006):

- The Single European Aviation Act, which guarantees Seventh¹¹ and Eighth¹² Freedom traffic rights to airlines.
- Underdeveloped air capacities in so-called 'secondary cities', such as Liverpool and 'secondary countries', such as Portugal, Ireland, etc..
- The enlargement of the European Union.
- Open-skies agreements with neighbouring non-EU countries, such as Morocco.

Figure 4: Weekly percentage share of seats in Europe, summer 2006



Source: AEA, Annual Report, 2006, own calculations.

⁹ Member airlines: Adria Airlines, Aer Lingus, Air France, Air Malta, Air One, Alitalia, Austrian, bmi, British Airways, Brussels Airlines, Cargolux, Croatia Airlines, Czech Airlines, Cyprus Airways, Finnair, Iberia, Icelandair, Jat Airways, KLM, LOT Polish Airlines, Lufthansa, Luxair, Malev Hungarian Airlines, Olympic Airlines, SAS, Spanair, Swiss International, TAP Portugal, Romanian Air Transport, Turkish Airlines, Virgin Atlantic.

¹⁰ AEA's annual review of the no-frills airlines indicates an increase in capacity (seats/week in the Summer timetable) of just over 20% in 2006 compared with 2005 (AEA, 2007, p. 13).

¹¹ The Seventh Freedom is the right of an airline to carry traffic between two countries outside its home country (e.g.: Alitalia operating between Paris and London, without serving Italy).

¹² The Eighth Freedom is also called 'cabotage' and is the right of an airline to carry domestic traffic in a foreign country as part of a service from/to its home country (e.g.: Austrian conveying people from Barcelona to Madrid on a flight originating in Vienna).

Table 5: Production indicators for Low-Fares Airlines (2006)

Airline	Passengers (million)	Average load factor (%)	Number of daily flights	Number of routes	Permanent employees	Number of aircraft
Ryanair	40.5	83.0	750	440	3,500	120
EasyJet	33.7	84.6	765	278	4,220	121
Air Berlin ¹	16,8	77,9	n.a.	n.a.	4,000	62
Flybe ²	5.5	n.a.	270	116	1,700	36
Transavia.com	5.1	84.0	78	105	1,463	27
Norwegian	5.1	79.0	160	83	650	20
Hapag-Lloyd Express ³	4.6	79.3	n.a.	n.a.	n.a.	18
Sterling	4.0	82.0	120	74	1,178	24
Wizzair	3.0	80.0	63	49	460	9
Sky Europe	2.7	77.0	59	79	850	16
Myair.com	1.1	73.0	24	37	190	5
Sverigeflyg	0.4	80.0	42	6	50	6

¹ Air Berlin acquired dba in March 2007 and later LTU in the same year. The number of aircrafts and n. of employees include dba;

² Flybe acquired BA Connect (the regional arm of British Airways) in 2007 except the routes out of London City airport;

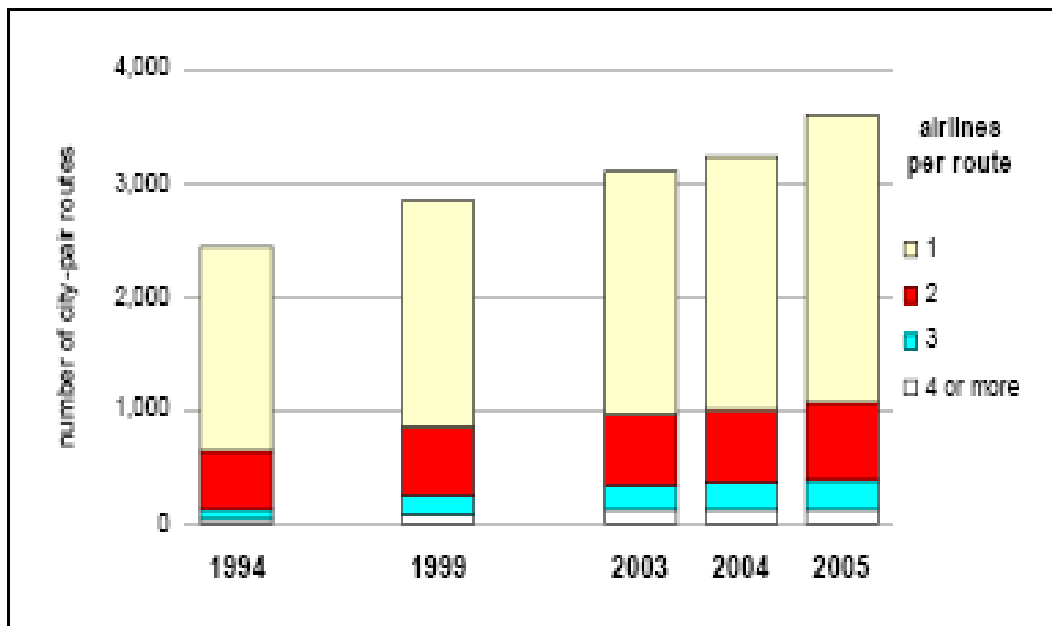
³ Hapag-Lloyd Express has been renamed TuiFly in 2007 integrating other airlines of the same group.

Source: European Low Fares Airline Association (ELFAA), 2007; websites airlines.

So far most LCAs have tried to avoid mutual competition. Ryanair, for instance, concentrates on smaller markets and regional airports, while easyJet is focussing on bigger markets and primary airports. An important question is whether this behaviour or that potential overcapacity might result in a price war and/or a consolidation wave. Experience in the air transport business points to consolidation and the possible emergence of alliances, although this is an element so far not evident in the Low-cost (or No Frills, or Low Fare) market.

There was a significant growth in the number of services between June 2004 and June 2005, as shown by Figure 5 that shows the city-pair services added to the European network since 1994. However, although the proportion of single-carrier routes had a slow decline between 1994 and 2004 to approximately 69% of all European city-pairs, this decline was reversed in 2005. By June of that year slightly more than 70% of European scheduled air services were operated by a single airline. This is probably largely due to the new point-to-point routes being opened, often by LCAs. The highest number of carriers operating on any European route was seven, competing for traffic between Catania and Milan.

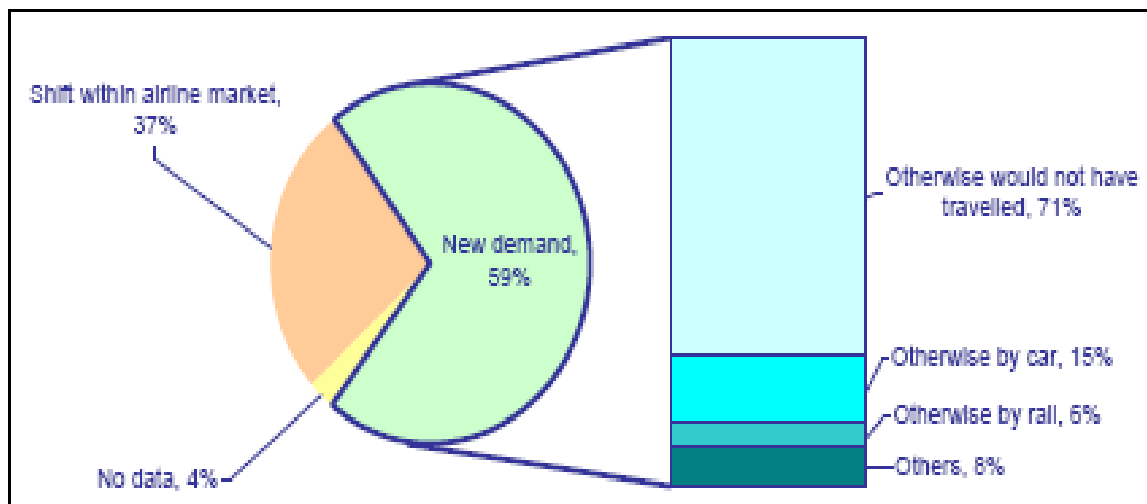
Figure 5: Evolution of European routes served by single carriers



Source: Cranfield University, 2005.

Finally, it is often argued that low-cost carriers do not compete with traditional carriers, but with other transport modes. A 2003 survey of ELFAA - the association that represents the interest of the low-cost airlines in Europe - states that, if LCAs had not existed, around 30% of air travel would not have taken place or would have taken place with another mode of transport. However, from Figure 6 it is clear that the majority of the LCA passengers are new travellers or clients from other airlines.

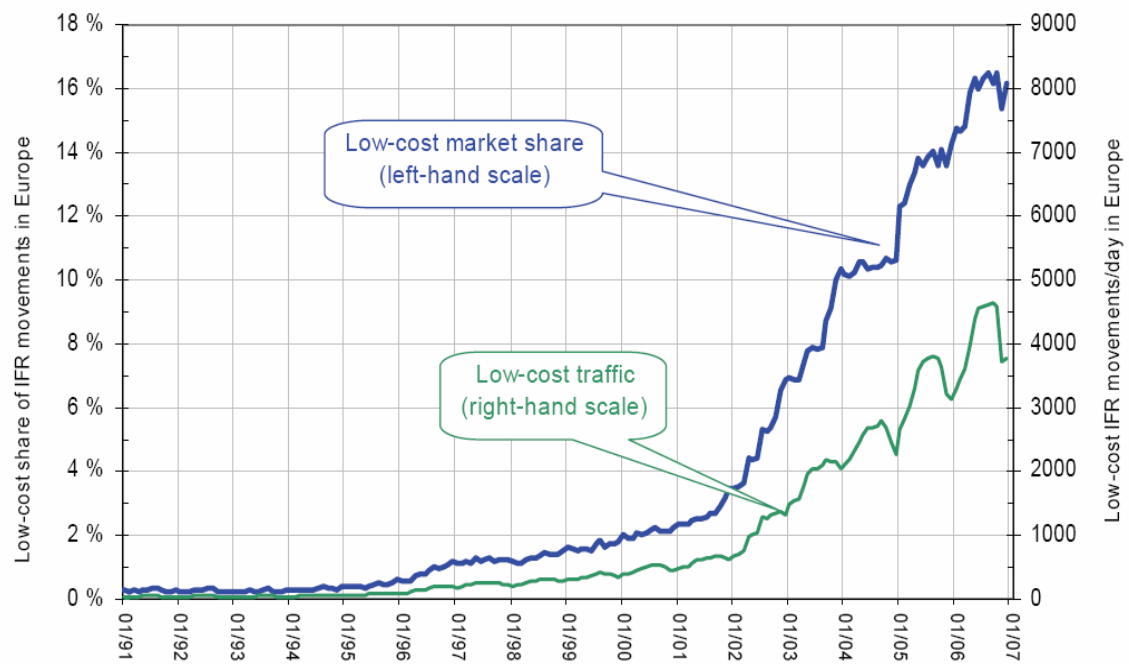
Figure 6: Generation of new passengers through low fares



Source: ELFAA, 2004.

Nonetheless LCA have been continuously gaining market share, in particular since 1999, fuelled by the rapid expansion of the two major carriers: Ryanair and easyJet (Doganis, 2006).

Figure 7: Market share of European low-cost airline operations



Source: EUROCONTROL, 2007.

4. Trends in the LCA market

This chapter is dedicated to the analysis of trends in the LCA market and how the different airlines are expected to develop in the coming years.

The European LCA market continues to grow strongly, cf. Ryanair (+23%) and easyJet (+16%) in 2006. The flag carriers are slightly losing market share to the LCAs. The main question is whether the same growth rhythm and market share evolution will continue.

An analysis carried out by Deutsche Bank in May 2007 calculated that the low-cost market segment might have a volume growth of ca. 15% per annum as a combination of share shift from other airline segments, GDP growth, and a very modestly rising propensity to travel. For flag carriers little or no volume growth should be expected in European short haul, beyond that of feeding into the long-haul network. All of the major low-cost players are expected to have a disciplined capacity growth, i.e. below 15% p.a., except for Ryanair, which is increasing its capacity with more than 20% (Deutsche Bank, 2007, p. 5).

A second way to forecast future growth is a disaggregate one. By looking at the detailed investment strategies of companies like Ryanair, Air Berlin and easyJet, information on the number of aircraft ordered and delivered during the following years can be collected. Linking this information to the hub strategy can produce forecasts of the regional flows. A third alternative to forecast potential future traffic is based on a number of productivity indicators. Table 7 summarises for 2006 for some LCAs a number of those indicators: daily flights per aircraft, passengers per aircraft per day, employees per aircraft, passengers per employee.

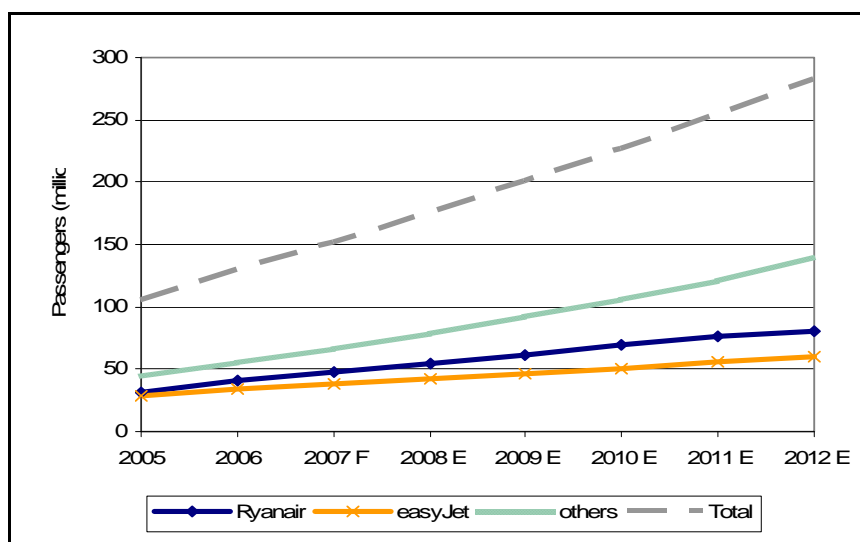
Table 6: Estimated number of aircraft and passengers carried by European LCAs until 2012

	2005	2006	2007 F	2008 E	2009 E	2010 E	2011 E	2012 E
Number of aircraft								
easyJet	108	120	143	160	177	194	211	228
Ryanair	87	113	132	152	172	192	212	225
others	152	181	221	260	302	347	395	458
Total	347	414	495	572	651	733	818	910
Passengers (millions)								
easyJet	28	34	38	42	46	51	55	60
Ryanair	31	41	48	55	62	69	76	81
others	45	56	67	79	92	106	122	141
Total	105	130	152	176	201	227	253	282
note: F - forecast; E - estimate								

Notes: F – forecast; E – estimated

Source: Lopes (2005), airlines websites, authors calculations.

Figure 8: Estimated number of aircraft and passengers carried by European LCAs until 2012



Source: Lopes, 2005, airlines websites, authors calculations.

Notes: F – forecast; E – estimated

Table 7: Some productivity indicators (2006)

Airline	Daily flights / aircraft	Passengers / aircraft / day	Employees / aircraft	Passengers / employee
Ryanair	6.25	925	29.2	11,571
easyJet	6.3	763	34.9	7,986
Flybe	7.5	419	47.2	3,235
Transavia.com	2.9	518	54.2	3,486
Norwegian	8.0	699	32.5	7,846
Hapag-Lloyd Express	n.a.	700	n.a.	n.a.
Sterling	5.0	457	49.1	3,396
Wizzair	7.0	913	51.1	6,522
Sky Europe	3.7	462	53.1	3,176
Myair.com	4.8	603	38.0	5,789
Sverigeflyg	7.0	183	8.3	8,000

Note: we preferred not to calculate productivity indicators for Air Berlin, with reference to Note 1 of table 5 page 19 (i.e. the fact that the number of aircrafts and the number of employees include dba)

Source: own calculations based on ELFAA data and websites airlines.

The differences in productivity figures of the LCAs are due to different scales of activity, different types of product (e.g. the type of airports used), and different networks. Assuming that in the near future the LCAs will keep similar productivity figures, multiplying those figures by a number of new aircraft added to the network gives an indication of the growth in absolute figures.

It should be clear that the current economic activity supports additional growth of the LCAs, but at the same time there is a risk that some inputs will become much more expensive, resulting in a slow-down in this growth. The current full order books of the main aircraft manufacturers, Airbus and Boeing, have shifted negotiation positions resulting in higher purchase prices and lease costs. A similar reasoning applies to pilots. Ryanair, for instance, no longer charges pilots for aircraft type rating training. At the same time some airports and airways are becoming congested which increases the costs for the airlines. These evolutions may reduce the future growth of LCA activities.

According to MINTeL(2006) the market share of LCAs in Europe in terms of available seats per week went down in many markets in 2006, which is interpreted as a sign of a certain maturity level, although no consensus exist around this interpretation. There is the potentially increasing competition from conventional carriers on city pairs, with for instance the price reaction of Brussels Airlines to the entry of easyJet on the Brussels-Geneva route. With increased competition there is a possibility, as in any competitive market, of short-term excess capacity, but the airline industry tends to correct such imbalances quickly.

An overview of the bankruptcies, mergers and take-overs that occurred in the LCA sector in 2006 is given in Table 8 below. It illustrates that for some companies (e.g. Air Berlin) the expanding market share can at least partly be explained by taking over other carriers.

Table 8: LCAs bankruptcies or mergers in Europe

Year	Airline	Country	Event
1999	AB Airlines	UK	Bankruptcy
	Color Air	Norway	Bankruptcy
	Debonair	UK	Bankruptcy
2002	GO	UK	Bankruptcy
2003	Air Lib	France	Bankruptcy
	Buzz	UK	Merger with Ryanair
	Goodjet	Sweden	Bankruptcy
2004	Air Polinia	Poland	Bankruptcy
	Basic Air	Netherlands	Merger with Transavia
	Duo Airways	UK	Bankruptcy
	Flying Finn	Finland	Bankruptcy
	Germania Express	Germany	Merged with dba
	GetJet	Poland	Bankruptcy
	Jetgreen	Ireland	Bankruptcy
	Skynet Airlines	UK	Bankruptcy
	V-Bird	Netherlands	Bankruptcy
	VolareWeb	Italy	Bankruptcy
2005	Air Andalucia	Spain	Bankruptcy
	Eujet	Ireland	Bankruptcy
	Intersky	Austria	Bankruptcy
	Maersk Air	Denmark	Merged with Sterling
2006	Air Tourquoise	France	Bankruptcy
	Air Wales	UK	Bankruptcy
	Budget Air	Ireland	Bankruptcy
	dba	Germany	Merged with Air Berlin
	Flywest	France	Bankruptcy
	HiFly/ Air Luxor	Portugal	Bankruptcy
	MyTravelite	UK	Reintegrated into MyTravel Airways
	Snalskjusten	Sweden	Bankruptcy
2007	LTU	Germany	Merged with Air Berlin

Source: Mintel, 2006.

5. Airports

5.1. Introduction

This section describes the different types of European airports. It includes an analysis of their structure, business models, financing and capacity. A supplementary analysis is made of the systems for setting aeronautical charges, national aviation policies and financing concepts of regional airports in Europe. The results feed into an analysis of the question of whether regional airports pose a financial threat to major hubs due to traffic diversion.

5.2. Types of airports

Airports can be differentiated by several criteria. The clearest means of differentiation is traffic volume measured in terms of aircraft movements (arrivals and departures) per year, passengers per year or cargo tonnes per year. Further differentiation may be made by flight destinations (domestic and international) and the purpose of passenger travel (leisure and business) (Jarach, 2005). As this work concentrates on the impact of low-cost airlines, and these generally do not offer cargo services (Franke, 2004), airports with a focus on air cargo are not considered in any detail. There are in any case relatively few European airports which specialise in air cargo.

Table 9 shows the different ways in which airports can be categorised. This framework was created with the specifications for categorisation of airports based on the work of Maertens (2007) on long-haul traffic from regional airports.

Table 9: Criteria for hub/main and feeder/regional airports adapted from Maertens and Jarach

	Primary Hub	Secondary Hub	Feeder/Regional airport	Low-Cost Airport
Size in passengers per year	> 20 million	>10 million	< 10 million	Not applicable *
Main airport of the national flag carrier	Yes	No	No	No
Connections outside Europe	Yes	Yes or No	Yes or No	Possible but untypical**
Examples	Frankfurt, Charles de Gaulle, Amsterdam, Heathrow	Barcelona, Gatwick, Copenhagen	London-City, Bremen, Stuttgart	Stansted, Luton, Lübeck, Frankfurt-Hahn
<p>* The comparison of Stansted (34 m passengers p.a.) and e.g. Hamburg-Lübeck (c. 700,000 passengers p.a.) shows that low-cost airports may vary significantly in terms of size.</p> <p>** Francis et al show that the transferability of the LCA model to long-haul traffic is limited (Francis, Graham, Ison) but Franke points out that LCAs are likely to continue their expansion into new market segments (Franke, 2007). Therefore, connections outside Europe, e.g. to North Africa are possible but not the most important characteristic of the LCA phenomenon.</p>				

Primary hubs are major economic centres that are home to one or more full-service airlines such as Lufthansa or Air France (Jarach, 2005). These airlines may operate at more than one (primary or secondary) hub. In Europe, there are only a few primary hubs: London Heathrow, Frankfurt, Paris Charles de Gaulle, Amsterdam and Madrid (Gillen, Niemeier, 2006).

Regional and feeder airports may essentially be regarded as identical entities. At many regional airports, the busiest route is a feeder service to the nearest large hub (e.g. 40% of Edinburgh

Airport's total passenger traffic for instance travelled to and from London in 2006 (CAA)). These airports also commonly offer a range of regional business-oriented services and charter services to popular holiday destinations. Low-cost airports differ in that low-cost carriers operate a completely different network of multiple city pairs served independently from each other. Possible interconnections between services are most likely to be unintentional or of low priority (Franke, 2004), and it is generally necessary to reclaim baggage after arrival and re-check it for the onward flight.

5.3. Business model

Airports undertake a wide range of activities, which can be split into the two general categories of 'core' and 'non-core'-activities. The core category comprises all activities that are essential for an air transport service to operate at a given airport. This includes the following elements:

- Provision of runways, taxiways and aprons
- The provision and operation of terminals in which passengers' flight formalities are completed, including the processing of baggage;
- Provision of space within terminals in which concessionaires in a variety of retail businesses may provide shopping or catering facilities for passengers' use. (TRL, 2006)

Airports may operate an extensive range of non-core activities in-house in addition to these functions. Some of the more significant non-core activities are ground handling, car parking, air traffic control or retail services (TRL, 2006). Some core activities may be carried out by third parties, although these activities are crucial to airline operations, e.g. air traffic control.

The activities of an airport can be categorised by the need for the airport to carry them out and the degree to which they are essential for airline operations. There are three general categories of activities:

- Core activities an airport must operate itself, such as the provision of runways;
- Core activities an airport can outsource, such as the provision of air traffic control services;
- Non-Core activities which may or may not be outsourced, such as hotel operation.

Ground handling services in particular can account for a significant part of an airport's revenues¹³ (Fraport Annual Report 2006). Overall, the structure of airport businesses is based on the provision of infrastructure for the operation of passenger or cargo aircraft. Additional product differentiation and diversification may arise from other services provided for passengers to make their travel more amenable.

At the end of the millennium, there were around 200 airports in Europe with an annual throughput below 1 million passengers. These have the potential for greater traffic levels, although in many cases investment in additional terminal facilities would be needed in order to realise the capacity inherent in the runway. The large majority record financial losses and are publicly owned, being maintained with state or regional subsidies (Caves, 1999). The problem is that airports have significant levels of fixed costs, and in these airports the revenues (both from aeronautical charges and from retail and other sources) are not enough to cover these costs. Studies demonstrate, however, that the unit costs of these (smaller) airports reduce significantly as traffic reaches the threshold of 1.5 million work load units (WLU¹⁴) per year, and this effect

¹³ For the financial year 2005 - 2006, Fraport overall revenue was €2089.3 million. Ground-handling activities accounted for around 30% of total revenues, to a total value of €624.1 million (Fraport Annual Report, 2006)

¹⁴ Defined as 1 passenger or 100 kg of freight.

continues to an upper limit of 3 millions WLU. per year¹⁵. As a result, many of them have been attempting to attract LCAs, with the aim of increasing revenues. However, LCAs have considerably different demands from traditional airlines.

Mirroring the air services, LCAs' main airport demands are low charges, fast turn-around times and simply constructed terminals (Barret, 2004). Moreover, they are not very concerned about passengers' comfort or the quality of the airport related services, but are fundamentally concerned with cost minimisation. So they will only contract for the minimum level of services, and will also negotiate prices down to the minimum possible level. Commonly, they do not require business lounges, air bridges or baggage transfer services. They tend to use the aircraft parking stands adjacent to the terminal, so that passengers can walk directly to the aircraft. All these demands are translated into the airports' design and services. In order to offer low prices, low-cost airports or terminals tend to have simple designs or be open spaces. The space per passenger tends to be smaller than in an airport or terminal meant for a traditional airline, in order to reduce the costs. In terms of retail services, the LCAs' demands result in a reduced amount of retail activity, simply because building and operating commercial space in airports can be particularly expensive¹⁶ (Francis, 2003).

Annex 2 presents different cases of low-cost airports. Each airport is different, reflecting a unique combination of diverse issues and aspects, including geographical location, historic traffic records, dimension, infrastructure conditions, etc. Therefore, no unique business model can be drawn for an airport that intends to attract LCAs. Nonetheless some common points can be identified.

First, due to the need to lower the aeronautical charges, the consequent financial return may not be enough. Airports will inevitably have to look for other non-aeronautical revenue sources, such as parking lots and advertising. However, this is not free of risk as retail activities, for example, may result in considerable costs.

Second, the airport's hinterland plays an important role in the airport's bargaining power and positioning. A location near a heavily populated region results in a considerably different position to a location in a rural area, and the same applies to an airport located in a predominantly industrial region or in a tourist region. Third, the low-cost market is at this stage in its European development highly volatile, with new companies constantly entering the market while others leave, and with non-profitable routes being quickly abandoned. So long term agreements and investments must be conveniently assessed to incorporate the risk of withdrawal.

Fourth, LCAs are different in terms of objectives, demands and even negotiation terms. Airports need to take this into consideration when attempting to attract an airline, as negotiating with one that takes a broad view and is open to mutual benefits is completely different to negotiating with a company that only seeks to maximise its own profits while holding out a constant threat to abandon service and move to another airport (Francis, 2003).

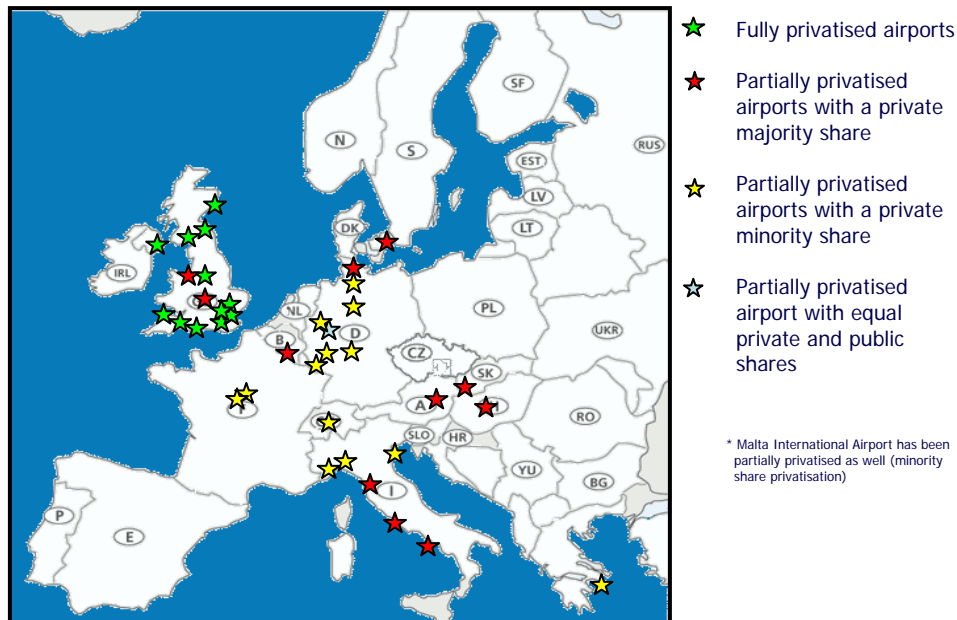
¹⁵ ICAO found the average unit costs for airports of less than 300000 WLU is around \$15, while for airport moving 300000–2.5 million is of \$9.4, and for airports handling 2.5–25 million WLUs is around \$8 (Francis, 2004).

¹⁶ For example: security measures, nowadays they introduce considerable costs on building and running airport spaces.

5.4. Financing

Most airports in Europe are still under public control. However, over the past twenty years there has been an increasing use of private capital in airport financing as the current use of private capital displayed in Figure 9 shows for selected European airports.

Figure 9: Selected European Airports and differing degrees of private ownership



Source: Müller-Rostin, Niemeier, Müller and Ehmer.

Perhaps the most important privatisation was that of the UK's BAA in 1987, which began a continuously growing involvement of private capital in airports. Privatisation does not necessarily mean that an airport becomes more profitable in general. But it appears that, if all other factors relating to a given airport remain constant, private ownership enhances the profitability of that airport. This qualification is necessary because privatisation may be accompanied by a new structure of regulation of aeronautical charges; it may also be the case that financing costs associated with the privatisation erode operating profits. Hence, privatisation does not in itself guarantee that an airport will become more profitable but it is more likely that existing potential profit sources, especially in non-core activities such as car parking or retail, are exploited to a higher degree (Oum, Yu, 2003).

Table 10 shows the share of commercial revenues as a percentage of total revenues for selected airports in Europe. While the average has declined somewhat, developments within the sample differ from significant decline of commercial revenue share to significant increases. There is currently no reliable research into the reasons for this development. Possible reasons for the increasing relative importance of aeronautical revenues are increasing traffic volumes and changes in the business environment, including the loss of intra-EU duty free business. There is as yet no definitive view as to whether passengers using low-cost services are more or less likely to use airport retail facilities than passengers using full cost services.

Airport financing does not differ significantly from that of other industries. Smaller airports tend to have less access to private capital, although this appears to be more a result of local political constraints than a lack of interest on the part of the capital markets. The financing options used by airports reflect the whole spectrum offered by the capital market.

Table 10: Comparison of European Airport operators' commercial revenue shares in 1998 and 2004

Airport Company	Share of commercial revenue in total revenue 1998	Share of commercial revenue in total revenue 2004	Growth
Aéroports de Paris	55.8%	28.0%	-27.8%
Copenhagen	48.6%	25.3%	-23.3%
Amsterdam	41.4%	28.2%	-13.2%
Berlin Group	45.8%	33.2%	-12.6%
London-Gatwick	66.6%	55.4%	-11.2%
London-Heathrow	50.8%	47.2%	-3.6%
Manchester	34.0%	31.1%	-2.9%
Vienna	28.9%	27.6%	-1.3%
Swedish Airports Group	23.4%	25.0%	1.6%
Stockholm	22.3%	24.0%	1.7%
AENA (Spain)	28.7%	34.9%	6.2%
ANA (Portugal)	24.1%	31.8%	7.7%
Average	39.2%	32.6%	-6.6%

Source: based on TRL data.

5.5. Capacity

The capacity of an airport depends on the infrastructure that can be used, e.g. the number and features of runways, the number of aircraft parking stands and the size of the passenger terminals. The way in which this infrastructure is operated can have a significant effect on overall capacity, particularly in the case of runways. A simple runway layout with a taxiway between each end of the runway and the terminal is unlikely to have capacity for more than around 20 aircraft movements per hour, but the addition of a full-length parallel taxiway and rapid exit- and entry taxiways can increase capacity to 40 – 45 movements per hour.

An example of this situation is the development of the hourly capacity of Frankfurt airport displayed in Figure 10. Although only relatively small changes have been made to the infrastructure of the airport, peak runway capacity has increased by around 6% over the past six years.

As shown in Figure 11, there is consistently more demand for runway capacity than the airport can supply at Frankfurt, so even small improvements in the hourly capacity make an important difference to the airport. These capacity constraints are a common characteristic of almost all primary hubs (Oum, Yu, 2003).

Significant numbers of regional airports operate at less than optimum levels of runway throughput. In addition, there are a good number of disused former military airfields with potentially serviceable runways, which could in principle be converted for commercial use. However, the extent to which these runway resources can be tapped in order to relieve congestion at primary hubs is, in practice, limited. Surface access to regional airports and old military airfields is frequently poor, requiring significant funding for road improvements which may not be available. In addition, there have been cases where planning applications to develop former military airfields have been refused on environmental grounds, such as Bentwaters in the UK.

Figure 10: Hourly Arrival and Departure Capacity at Frankfurt Airport

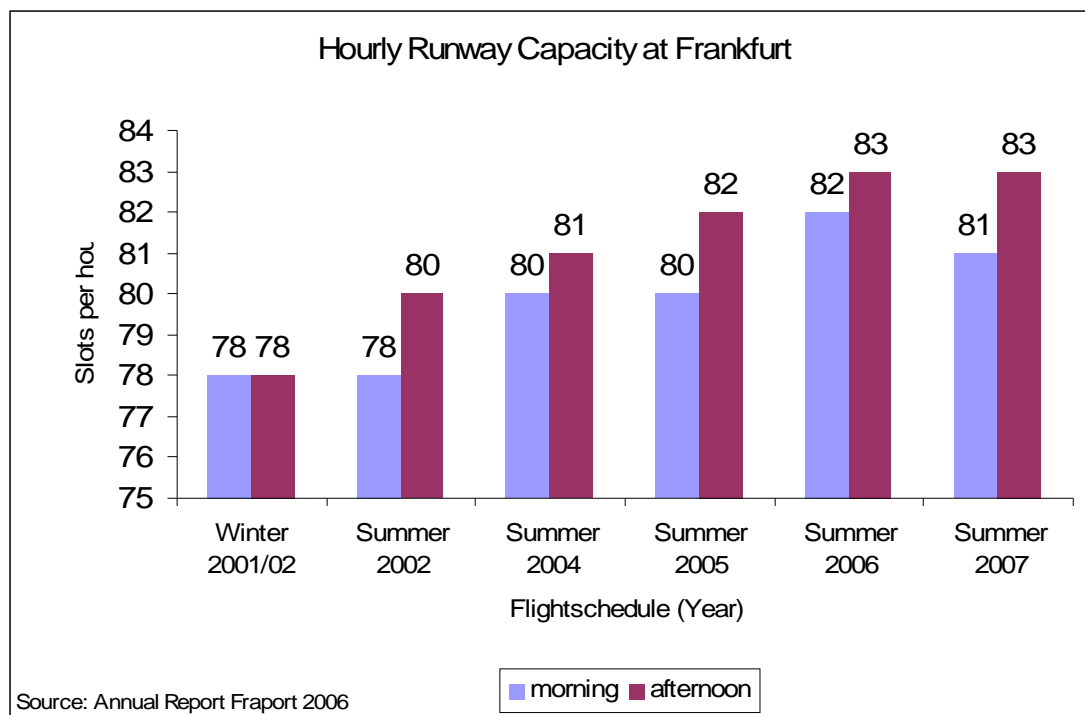
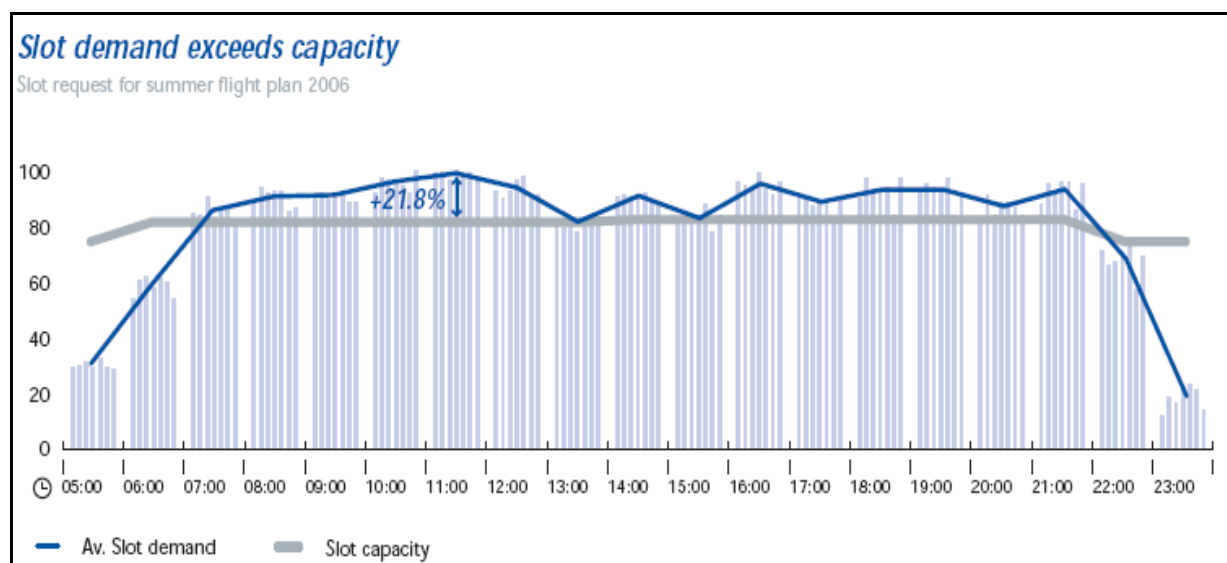


Figure 11: Slot demand and runway capacity at Frankfurt in 2006



Source: Fraport 2006.

A number of previously disused or underused airports or airfields have been adopted by low-cost carriers. Examples include Bydgoszcz in Poland and Rodez in France. It is difficult to generalise as to the extent to which the use of such airports relieves congestion at primary hubs or regional airports. Examples include:

- It is reasonable to assume that the use of Hahn airport, a former military airfield, has made a small contribution to relieving congestion at Frankfurt-Main airport;
- It is likely that the use of Kaunas airport in Lithuania has diverted some traffic from the main airport at Vilnius, which is itself only a small regional airport;

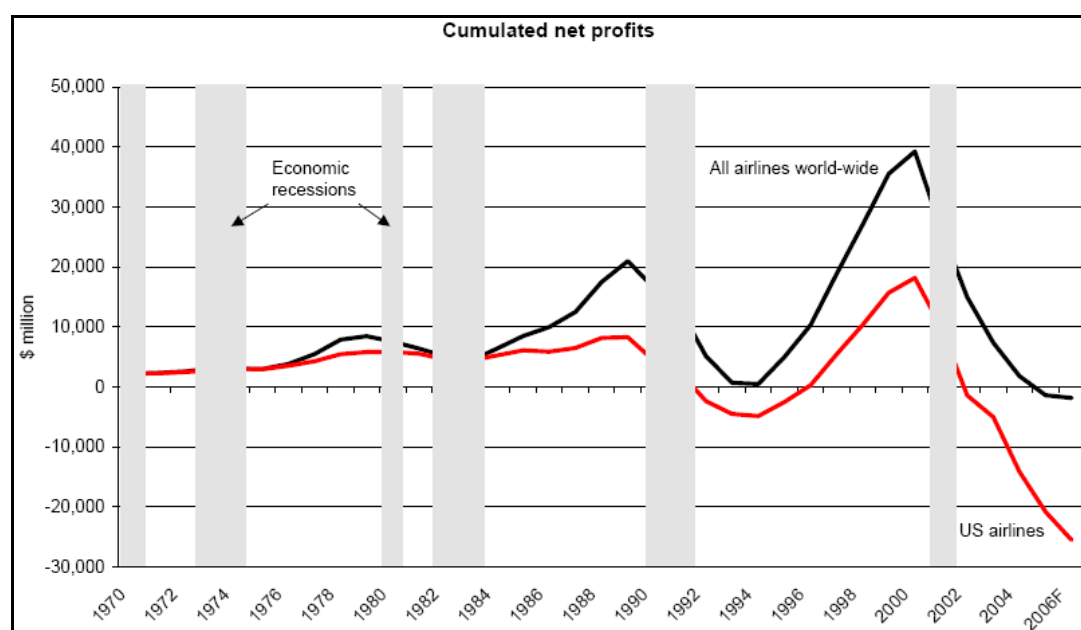
- It is reasonable to assume that most of the traffic between London and Rodez in France (and to a number of other small French regional airports) is newly generated traffic, relating to expatriate property ownership, which would not previously have used air services.

The overall situation with respect to capacity is that Europe's larger hubs are congested, and suffer from significant delays in gaining permission to build additional infrastructure. Regional and low-cost airports generally have actual or potential spare capacity, but the extent to which this can be used to meet excess demand at hub airports is limited by poor surface access and distance from the hub airports' catchment areas.

5.6. Airport profitability

In contrast to the low historic profitability of the airline sector as a whole displayed in Figure 12, airports in Europe generally produce healthy profits, as Figure 12 shows. Table 10 and 11 show the overall profitability of ACI airports and display very healthy profit levels.

Figure 12: Accumulated profits of IATA airlines over time



Source: IATA.

Table 11: Profitability of ACI airports for the years 2000 to 2004

Operating Results	2004	2003	2002	2001	2000
Operating Margin	20.8%	19.3%	20.6%	22.8%	27.9%
Net profit	9.6%	6.8%	9.5%	11.0%	14.5%

Table 12 below shows a comparison of the profitability of airports and their most important airlines. The operating margins of airports are much higher than those of airlines.

Table 12: Operating Profit per Passenger of Airports and their hub-dominating Airlines

Airport Company	Operating Profit (Airport Performance Indicators 2006)	Operating Profit (Airline Performance Indicators 2006)	Hub dominating airline
AENA (Spain)	19%	1.6%	Iberia
Aéroports de Paris	17%	2.3%	Air France/KLM
Amsterdam	22%	2.3%	Air France/KLM
ANA (Portugal)	15%	-0.7%	TAP
Copenhagen	40%	-2.7%	SAS
Frankfurt	4%	-0.4%	Lufthansa
London-Gatwick	30%	8.3%	British Airways
London-Heathrow	37%	8.3%	British Airways
Munich	4%	-0.4%	Lufthansa
Stockholm	27%	-2.7%	SAS
Swedish Airports Group	4%	-2.7%	SAS
Vienna	32%	-4.0%	Austrian
Average	21%	0.6%	Average

Source: TRL 2006a, TRL 2006b.

Table 13 below contrasts profitability at a range of European airports with that of international peers. It shows clearly that despite the healthy profits of European airports, airports in other parts of the world can be even more profitable (in terms of margin rates).

Table 13: Profitability of selected airports worldwide

Airport-company/Airport	%	Region
Atlanta	68%	North America
Los Angeles	22%	North America
Washington Dulles	22%	North America
Vancouver	17%	North America
Miami	15%	North America
Auckland	66%	Asia/Australia
Airports of Thailand	56%	Asia/Australia
Singapore	43%	Asia/Australia
Hong Kong	32%	Asia/Australia
Tokyo Narita	15%	Asia/Australia
Copenhagen	40%	Europe
BAA	35%	Europe
Amsterdam	22%	Europe
Aéroports de Paris	17%	Europe
Frankfurt	4% ¹⁷	Europe

Source: TRL, 2006a.

¹⁷ The striking difference in results for Frankfurt airport is very likely due to differences in the presentation of accounts, although this is not highlighted in the data source.

5.7. Airport charges

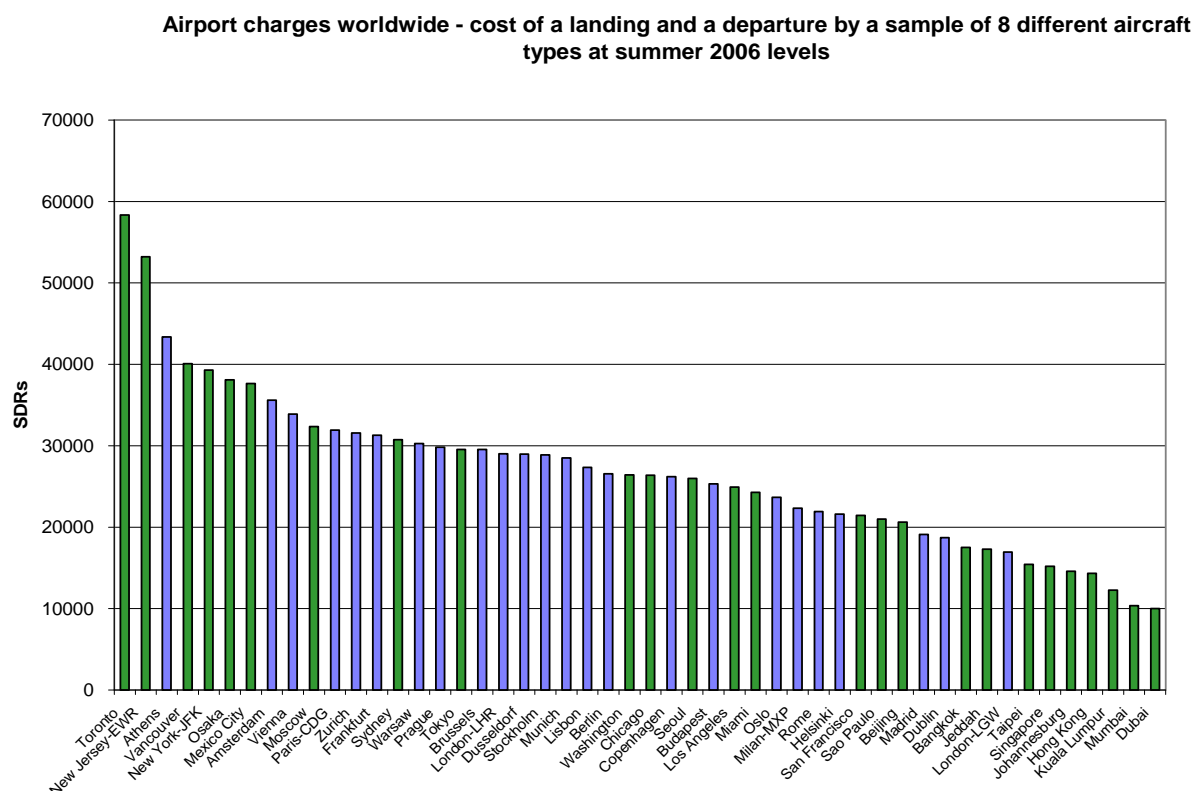
At present, airport charges in Europe are set according to a wide variety of national systems. Aeronautical charges at major international hubs at London Heathrow, Amsterdam, Paris Charles de Gaulle and Frankfurt are set under the terms of regulatory pricing systems, which allow charges to be set at levels which assist in the financing of future infrastructure needs. At some airports, such as Copenhagen, prices are set at levels agreed with airline users without any direct regulatory influence. At other airports, notably the Spanish, Italian and Portuguese airport systems, prices are adjusted annually but increases are subject to governmental approval and may not be subject to a specified regulatory formula.

At other, smaller airports, prices may change irregularly and infrequently. In the UK, prices at a number of regional airports have not changed significantly for a number of years, because of the competitive pressure on prices imposed by the price cap regulation applied to the main London airports and Manchester.

Although draft Directive 2007/0013 (COM (2006) 820, 24.1.2007) is intended to provide a framework which will set various requirements for transparency in setting airport charges, it is not intended to impose a unified pan-European pricing formula.

Charges at European airports vary widely. Figure 13 below illustrates the wide range of charge levels (TRL, 2006c). Charges at European airports are distributed widely across the range, with most sitting at or below the average.

Figure 13: Airport Charges Worldwide in comparison



5.8. Airport policy

There is no standardised European airport or aviation policy, beyond the general targets for transport infrastructure, emissions, etc.

In the UK, the government aviation white paper (The Future of Air Transport – HMSO December 2003) sets out clear objectives and targets to be achieved in terms of capacities, traffic flows, resulting economic development and environmental standards, for all airports with a throughput of over around 2 million passengers p.a. Such a policy approach in terms of detail, focus and strategic outline appears to be unique in the EU.

Germany is currently reviewing the old general plan for transport. Such plans exist to some extent for all member countries, but for transport as a whole. In some countries, e.g. Austria, aviation is not included in such plans. For smaller countries a stand-alone aviation policy would be largely irrelevant because of the proximity of nearby airports in nearby countries.

The expansion of most airports is subject to national, regional or local government approval, and these approvals may be subject to a long and complex planning approval process. The planning processes for airport expansions are a particularly significant hurdle in adding infrastructure to large airports. Examples of this are the long-running process for the expansion of Frankfurt airport and the slow progress in achieving expansion at Stansted airport, despite its inclusion in government policy.

National aviation policies are not consistently defined at a national level. At the European level legislation refers to specific issues, e.g. air traffic management, but there appears to be no policy covering airports as an individual topic.

5.9. Financing concepts of regional airports

With the exception of the UK, where most airports are now wholly or partly owned by the private sector, regional airports are predominantly owned by public authorities. Most of these are at the regional rather than national level. Public funding is generally possible for purposes of regional economic development but may not be provided on a discriminatory basis, e.g. for one airline only which was the core problem with the case of Charleroi and Ryanair (Gillen, Niemeier) (See case study in the Annex 2 to this report).

Europe is a continent with many airports, the majority of which are still publicly owned. Ownership of airports ranges from full public ownership to full private ownership with mixed forms in between. The following general forms can be identified, although individual cases may differ:

- Full float: 100% of the airport company's shares traded (e.g. Heathrow airport, UK).
- Partial float: some of the company's equity is traded, public (mostly the case) or private shareholders hold the remaining shares (e.g. Charles de Gaulle airport, UK, with a private minority share, Vienna airport, Austria, with a private majority share).
- Trade buyer: private investors bought shares of the company directly from the prior owner and hold a share in the equity of the airport company. The share sold may be the whole company (e.g. Tirana airport, Albania).
- 100% public ownership (e.g. Lisbon airport, Portugal).

Relatively few airports are subject to full price regulation, as is the case for the airports of Gatwick, Heathrow, Stansted and Manchester, but the setting of prices for airports is usually subject to a consultative process with airlines and public authorities. The spectrum of arrangements for the setting of airport prices varies from simple consultation with the airlines (Copenhagen) to an extensive legally binding regulated process (e.g. Heathrow). Most European airports are limited in their entrepreneurial freedom to set aeronautical charges because of the obligation to consult airlines and public authorities.

Occasionally airports impose charges with the blessing of their governing body which have not been fully accepted by airline users, but they are in general relatively limited in their ability to set prices freely, notwithstanding the absence of a formal regulatory framework. This may be due to competition with other airports.

5.10. Traffic diversion by regional airports away from major airports

It has been argued that the development of small airports serving low-cost carriers may be financially damaging to larger hubs. On balance, there are no grounds for these concerns.

Firstly, many large hubs are suffering from capacity constraints. This means that if, at the margins, some traffic is diverted to newly developed low-cost airports, the capacity which is thereby released can be easily redeployed, most likely for international rather than regional services. However, traffic diversion is itself unlikely, since low-cost carriers are most likely to initiate services from a low-cost airport from the outset, rather than operating from a hub and subsequently moving out.

Secondly, the development of low-cost carrier services frequently results in traffic demand being newly generated, rather than diverting demand from existing services. This is because low-cost airline pricing is often so low that it will create new demand for air travel. Even in cases where there is direct competition between low cost and full cost services on parallel routes (e.g. London Heathrow and Gatwick to Brussels in competition with London Stansted to Charleroi) there is little evidence of significant reductions in traffic flows on the full-cost services. This is largely because full-cost services tend to be operated at higher frequencies than low-cost services, thus retaining a greater attractiveness for business travellers. There may be some revenue dilution for the full-cost carriers, but this will tend to impact the carriers themselves rather than the airports.

Thirdly, low-cost carriers have, in a number of cases, created traffic flows on entirely new routes which were not previously served from hub airports. The French regional routes used by expatriate property owners which we mentioned previously are a good example of this phenomenon. Other examples include the newly created routes between the UK and the south of Spain (e.g. Girona) and Portugal (e.g. Faro). Both Girona and Faro were secondary airports served mainly with flights from the main national airports Madrid and Lisbon, respectively. The LCA exploited the tremendous potential of the British tourism market to south Europe, establishing direct routes.

6. Understanding the impact of LCA growth

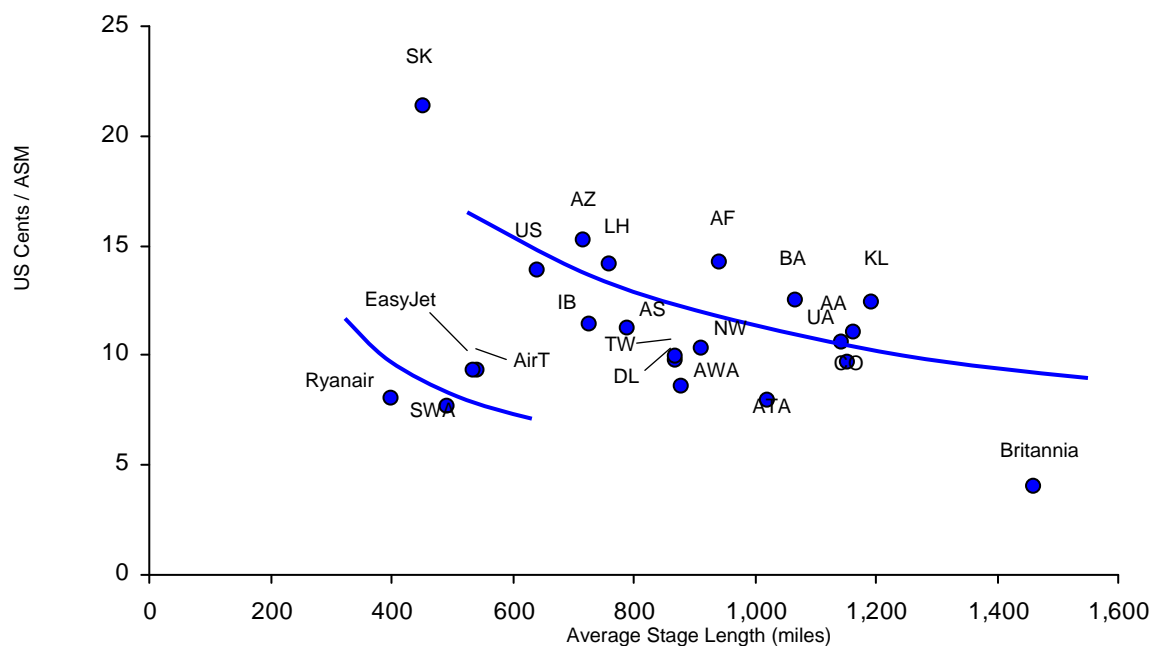
A systemic approach was taken to understand the impacts of the different variables entailed in the low-cost environment. Annex 1 provides an illustration of this approach and the next section gives a comprehensive explanation of the relations and feed-back loops between identified variables.

6.1. Impact on prices

Up to now no exact and reliable cost functions of LCAs and conventional carriers have been produced. However, some cost indicators such as costs per seat-mile are available. A comparison with the cost figures of traditional carriers shows an important cost advantage for LCAs (see Figure 14).

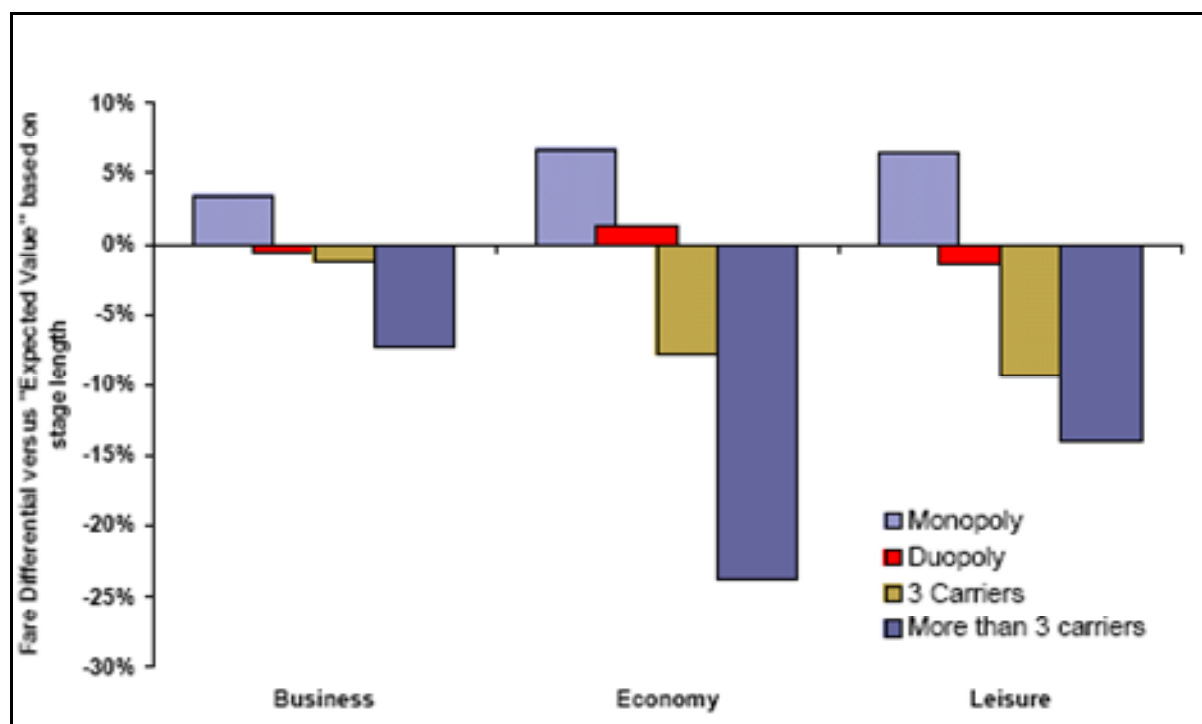
This results in a totally different pricing structure and strategy. LCAs do not opt for a traditional seat management system, since they are not directed towards business travellers, and as such they attach less importance to the 'spill rate'. Their pricing strategy is mainly one of increasing prices as the flight date approaches and hence the number of passengers who are already booked.

Figure 14: Costs in US Cents per ASM



Source: Booz Allen Hamilton, 2003.

The increase in the number of carriers on a route also has an impact on the fare as illustrated by Figure 15 where the presence of more than three carriers resulted in very significant fare reductions.

Figure 15: Impact of route competition impact on average fares, 2004

There is also a clear positive direct social impact of LCAs. Figure 4 showed that in 2002 approximately 42% of the total demand of LCAs in the EU consisted of people that would otherwise not have travelled.

6.2. Impact on the environment

The European Union (EU) has been taking various initiatives to reduce and keep at low levels the greenhouse gas emissions. This behaviour reflects the commitment in respecting the limits and directives as defined in the Kyoto Protocol. Indeed, the European Commission (EC) has recently taken a step further and brought forward a set of proposals and options that would enable the world to limit global warming to no more than 2°C more than pre-industrial temperatures (COM(2007) 2 final). Nonetheless, the first results from this commitment are already visible and from 1990 to 2003 the EU's total greenhouse gas emission fell by 5.5% (CE, 2005).

The civil aviation industry has always received special treatment from governments. Currently, the bilateral agreements exempt air transport companies from paying jet fuel taxes. The terms of how its greenhouse emissions are accounted are unique: only the CO₂ emissions are included in the Parties' national emission totals; and the international flights are not taken into consideration. Therefore, these flights' emissions are not included in the limits imposed by the Kyoto Protocol.

Without limits to growth, and despite the shadows of terrorism and the major recent increase in fuel prices, the civil aviation market has recorded a remarkable growth for the past decades. In parallel, the emissions have followed an upward trends, and there has been an increase of 73%, from 1990 to 2003, in emissions from international flights of the 25 EU Member States of the EU. Even so, emissions from aviation currently account for only 3% of total EU greenhouse emissions. Looking to the future, forecasts predict that at current trends, by 2020 aviation emissions are likely to double from present levels, cancelling out more than 25% of the 8%

emission reduction the EU-25 must achieve in order to reach the Kyoto Protocol targets (EC, 2005).

In line with its principles, the European Commission (EC) by the end of 2006 had brought forward a proposal (COM(2006) 818 final) for legislation to include aviation greenhouse gas emissions into the EU Emission Trading Scheme (ETS), in order to keep them at admissible levels and to prevent them from compromising EU's Kyoto Protocol targets. The underlying rationale was that bringing aviation into the EU ETS would be the best approach, from an economic and environmental point of view, to tackle the sector's emissions. The current proposal foresees that as of 2011, emissions from all domestic and international flights between EU airports will be included in the EU ETS; and one year later, from 2012, all international flights - from or to anywhere in the world - that arrive at or depart from an EU airport will also be covered. All air transport companies will be included regardless of their nationality (EU-based or foreign¹⁸).

As in other sectors, emissions are considered commodities that can be traded. The EC's studies aim for an initial allowance price ranging from €6 to €30 per tonne of CO² emitted. Under the same rationale, the creation of an auctioning market is foreseen, where companies can trade emissions (to sell the non-spent allowances or to buy more if needed). Companies will be allowed to buy allowances for other sectors but will not be allowed to sell outside the air transport sector. Furthermore, this is an emissions cap scheme so companies cannot buy unlimited amounts of emissions. The sector will receive an initial quantity of allowances, which can then be increased through purchasing from the market.

So far no consensus exists on the best solution to proceed with the initial distribution of free allowances. On the one hand, there are supporters of auction mechanisms, believing the best approach would be to let the market run itself. On the other hand, there are some who advocate that to avoid disruption in the air transport sector, particularly in a period where most air transport companies are undergoing major financial difficulties, an initial batch of allowances should be granted for free. The amount of allowances to give should be determined on benchmarking based on efficiency parameters. The emission cap will remain constant up to 2012 and then progressively fall to levels prior to those of 1990, at a rate of 1% per year, corresponding to the expected companies' annual efficiency increase.

The EC has meanwhile commissioned an impact assessment study in order to evaluate the full dimension of the proposed scheme (SEC, 2006a and SEC, 2006b). The EC expects that this regime will provide an incentive to companies to pursue rationalisation and efficiency, leading to considerable reductions in the energy consumption levels. The EC's studies call for a reduction of 36% in CO² emissions by 2015 for all (national and international) arriving and departing flights, which corresponds to a reduction of 122 million tonnes of CO².

The impacts on air transport activity is expected to be somewhat neutral for airlines. Firstly, at economic and social levels, the EC's studies indicate that companies will pass on, to a large extent or even in full, the cost of participating in the scheme to their customers, which by 2020 will represent an increase of €4.6 to €39.6 per flight, which is a value significantly lower than rises due to oil prices change in recent years. Secondly, no significant impact is foreseen on demand, because it was concluded that 'aviation is in general not very price sensitive' (SEC,

¹⁸ Non-EU Member States' airlines wishing to fly into EU will have to buy allowances to cover emissions for the entire route (both in EU and non-EU airspace). Unless the country of origin already has in use a scheme similar to the EU. It is precisely the obligation of buying allowances for the route when in non-EU airspace that is raising considerable objections from some countries, notably from the United States and Australia.

2006a, pp. 6). Thirdly, market competition is expected not to be affected, as all airlines will be subjected to the same regime. However, it is still too soon to anticipate the reaction of individual and corporate decision-makers as they start perceiving the damage caused by their travel commitments. Information technology has, of course, a very important role to play here and some companies (e.g. British Airways) are already providing information per individual trip on emissions and respective costs of externalities caused on their web page.

However, the main conclusions from the EC's studies have been widely contested in another study funded by the airline industry¹⁹. Opinions on the issue of the price sensitivity of airline passengers are refuted on the basis that the airline market is highly elastic, especially in the lower area of the demand curve (see discussion about Figure 1 above) where the LCAs work. In this way, slight increases in tariffs could result in significant reductions in demand. Under this scenario, airlines may have to absorb and internalise eventual increases, reducing their revenue margins. Bearing in mind that many airlines are already suffering considerable budget constraints, that situation could result in some airlines withdrawing from some markets.

Financial problems resulting from higher airline costs, along with an eventual reduction in the number of companies in the market, may lead to a reduction in competition, which would ultimately result in a reduction in consumer choice and withdrawal from routes and markets.

Airlines have also raised the issue of the amount of free allowance available, stating that they will have to buy considerable amounts of supplementary allowances to keep operating with the same markets levels (McLaren, 2006). That study concludes that companies will have to buy up to 45% of their emissions by 2022 (Ernst & Young, 2007), which will make it the only sector in the current EU ETS to pay for its own growth. Such amount will represent (based on an allowance price of €30 per ton of CO₂) around €45 billion from 2011 to 2022, which represents per annum up to twice the cumulative profit of Europe's airlines over the last decade (Travel Daily News, 2007).

It should be noted nonetheless that IATA, ICAO and the aviation sector in general agree to bringing the sector into the EU ETS, but they are afraid that a badly designed plan would penalise airlines and further reduce their already sparse profits (Aviation Week, 2006). Regardless of the scenarios, the EC's proposal is on the table for discussion and sooner or later the aviation sector will have to enter the EU ETS. As a matter of fact, under the auspices of IATA, airlines are already working to achieve zero emissions within fifty years.

The EC's proposal has the merit of finally aligning the air transport sector with the EU's responsibilities in the global warming phenomenon. The major flaw is that it only targets airlines, and excludes all other agents, which may have an equal or even bigger contribution (e.g. ground agents, etc). Airlines are indeed the visible face of pollution in the air transport sector. However, they have considerable restrictions in their operations, which prevent further optimisations. Looking to the air transport sector, airlines are the weakest link having a reduced market power and little room for manoeuvre. Let us present some examples to highlight the argument:

- Fuel consumption depends upon aircraft technology. Yet airlines are technology-users and not technology-developers, so they cannot intervene in the rhythm and pace of aircraft evolution. What they can do is to buy state-of-the-art aircraft but the sector has been experiencing financial difficulties which make such investments difficult to achieve.

¹⁹ *Analysis of the EC proposal to Include Aviation Activities in the Emissions Trading Scheme*, Ernst & Young, York Aviation, 2007.

Besides, today investments banks are the ones taking firmly the ownership of commercial aircraft, and many companies are only leasing them;

- Air navigation systems suffer from technical, operational, political, procedural, economic, social, and implementation shortcomings (Penner, 1999), which result in inefficient procedures (e.g. increase of holding times), and in inadequate airspace optimisation (e.g. non-direct routes);
- Airspace is nowadays a combination of restricted (for military or other uses) and unrestricted regions. Airlines may only fly through unrestricted airspace in order to circumvent restricted airspace. Routes are thus sinuous, longer and non-optimal. Studies from EUROCONTROL show environmental gains of 1 to 2% could be achieved just by removing the current borders, at zero cost. Moreover, the current diversity of airspace systems introduces costs to the air transport market of around €880 to €1400 million per year. The Single European Sky project may solve many of these problems;
- Airports' congestion is another main driver for airlines' emissions. While airborne, during holding periods waiting for landing authorisations, aircraft emissions can increase by 30% compared with cruise stage. While on the ground, queues for taking off are also major contributors to emissions, as to move the aircraft forward pilots have to use large applications of power;
- Other environmental constraints are likely to increase fuel consumption. For example, airlines are often required to climb using a very steep route, in order to reduce the noise levels at ground level, and such situations result in an increase in fuel burning. A study indicates that a 3 decibel reduction in noise results in a 5% fuel increase (Penner, 1999). There is thus a trade-off between externalities that have never been considered, although it seems they would benefit from the definition of the environmental profile of each airport.

Another interesting fact is that, contrary to general understanding, air transport is not isolated at the top of the most polluting modes of transport. As the following Figure 16 shows, other modes of transport can be as polluting as air transport in certain situations.

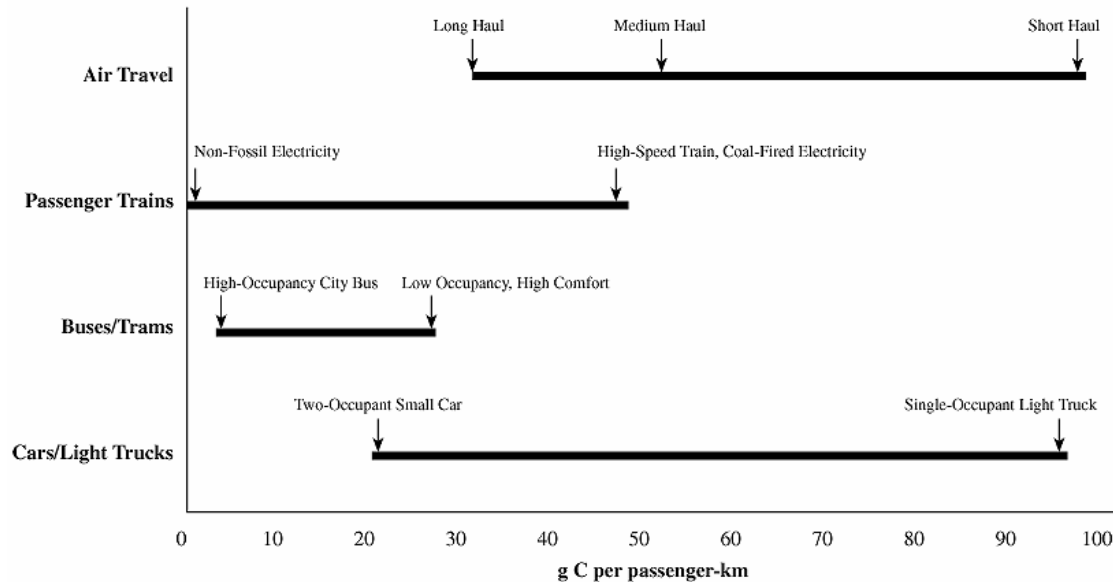
All of this evidence indicates the existence of a significant amount of inefficiencies in the air transport system that, if solved, could result in significant savings. Moreover airlines, despite being at the front in terms of pollution, are in many situations the victims of a heavily controlled and non-efficient system.

Interestingly, the LCA's business model appears to have an environmentally-friendly character. These companies pursuing cost minimisation, have been reducing energy consumption and waste production to minimum levels, with positive benefits to the environment. Generally they operate modern fleets, based on the new generation of Boeing B737, or Airbus A319 or A320. These aircraft have lower energy consumption rates per passenger in their classes, and stay below all current noise limitations. Furthermore, they often use regional airports with very low congestion levels. Holding times are minimal and fuel consumption is also reduced.

These airports are normally located in less densely populated areas, where the noise impact is not so severe. Finally, the low-cost companies do not normally operate night flights. So the low-cost companies, by flying with low noise aircrafts, serving areas with lower noise restrictions during day time, produce a very low noise impact. In addition, low-cost companies have highly efficient operations. The aircraft are on the ground for very short periods of time, which further reduces energy consumption. They also have more efficient seat configurations, while traditional air transport companies carry in those aircraft around 160 passengers, low-cost companies can load up to 190 passengers. Furthermore, low-cost companies' load factors are

usually higher than that of the traditional air transport companies, which means that each low-cost company's aircraft transports more passengers than network carriers.

Figure 16: CO₂ intensity of passenger transport per transport solution



Source: Peener, 1999.

The combination of a more efficient seat configuration, with a higher load factor and new generation aircraft, results in very low levels of energy consumption per passenger. Finally, low-cost companies have no frills. These companies do not offer drinks, meals, newspapers, and other gifts on board, which significantly reduces the amount of waste normally generated by traditional airlines.

The advent of LCAs has been boosting populations' mobility. People who otherwise would not travel or use other modes of transport, fly nowadays on a regular basis (e.g. a growing number of British people have been buying a second house in the south of Portugal to benefit from it during holidays and weekends, only possible due to the LCAs' low tariffs). Regions that for a long time have been in decline are nowadays on the route of many tourists and business travellers. The LCAs, which have emerged as the result of European construction, are currently one of the main pillars for that construction. They promote the EU's cohesion, and social and economic development, by granting air travel access to a vast majority of the population. If the positive side of this evolution cannot be questionable, the cost of it should be correctly weighed.

Air transport is a major source of pollution and, as such, LCA activity is a real contributor of emissions. Moreover, like all air transport fares, LCAs' fares currently do not incorporate environmental costs, which means that air transport is being subsidised by other sectors. If this is acceptable or not, it is a decision which should be subject to political decision-making based on scientific reasoning. Yet the impetus of limiting LCAs' activity, in order to reduce their environmental burden, should be taken with extreme caution as it would not only go directly against one of the EU's central beliefs - people's mobility - but it would also be very difficult to implement.

6.3. Impact on regional economies

Regional social and economic development is directly linked with the mobility of people and freight. This has been an underlying reason for the Treaty of Rome providing for implementation of the single European market. Although the accomplishment of those principles in the air transport sector has taken several decades to achieve, the benefits for Europe's peoples and economies are undeniable. The impact on regional economies derived from air transport activity can be broken down into three main classes:

- Direct effects, which correspond to the increase in employment in activities directly related to air transport, such as: airlines; handling, maintenance and catering companies; airports; shopping within airports; or parking facilities. It is estimated that 1000 jobs are created for every million passengers through an airport (York Aviation, 2004).
- Indirect effects, which correspond to the increase in employment and economic activity in the region as a result of the increase in flows of people, for tourism and business purposes;
- Catalytic effects, which correspond to the attraction and retention of incoming investment and the stimulation of tourism. The increase in commercial activity enhances a region's competitiveness by attracting leisure and business passengers, which ultimately leads to a sustainable growth in incomes and employment.

The LCA activity produces similar positive effects in the regions where they operate. As they have a significant share of passenger travel for leisure purposes, the main economic sector to benefit is tourism. LCA's business model leads these companies to choose regional airports, which are, in many cases, located in depressed and underdeveloped economic regions. Moreover, these regions are commonly unknown to most people, and by flying to them and advertising them on their websites LCAs improve regions' visibility. Thus, the benefits introduced by LCA activity are even more evident than the traditional air transport companies as they tend to fly to the well developed economic regions.

In addition, by offering low fares, LCAs encourage air travel and, consequently, the number of people passing through the region has an inherent positive effect. Even in well-developed regions when competing with the established companies, LCAs lead to an overall reduction in fare prices, which further induces air travel to the region.

The benefits brought by LCA activity have been studied for several European regions. Table 14 summarises the main findings.

LCA usually search for non-served regional airports and, at least for the first years, airports are dependent upon a single source of passengers.

Such situations give LCAs a comfortable bargaining power and, indeed, these companies are well known for their aggressive negotiating nature. As local authorities seek the development of their regions, air transport is seen as a major driver for the achievement of that goal, and they are therefore willing to offer very advantageous conditions to the LCA. This has already led the European Commission to intervene, for example at Charleroi airport (Belgium) where local authorities agreed to pay a fee per passenger landed.

Table 14: Benefits for Regional Economies from the LCA activities

Airport, Region	Main findings
Carcassone, France (a)	Passengers generated (2003): 253000; Direct income: 8.4 millions €; Indirect income: 135 millions €; Induced income: 272.4 millions €.
Cologne Bonn, Germany (b)	Taxes paid 91 millions €; Cost & productivity advantages for companies in region: 147.6 millions€; Average spent per incoming passenger: 285.42€.
Pisa, Italy (c)	Passengers generated (2003): 316000; Average spent per business incoming passenger: 431.40€. Average spent per tourism incoming passenger: 496.52€. Total economic impact of foreign passengers: 149.2 millions €.
Ract Madoux Groupe Second Axe (2003) Rapport d'étude: impact socio-economique de la compagnie aerienne Ryanair dans la region et alentours de Carcassone. Institut für Verkehrswissenschaft und der Universität zu Köln (2004) die regionalwirtschaftlichen des Low-cost-Markets im Raum Köln/Bonn S. Anna University of Pisa (2003).	

6.4. Safety and security

There is no evidence that LCAs have lower standards of safety than traditional airlines. Many LCAs operate young fleets which are not only are equipped with the most up-to-date safety technologies but also require less maintenance, leading to cost reductions. Furthermore, LCAs have made efforts to overcome passengers' belief that low fares may result in lower investment in aircraft maintenance, in order to gain the confidence of those passengers that do not fly with them because of these concerns. Such efforts reveal LCAs' awareness of this stereotype and, as such, it is unlikely that they would take any action that might jeopardise their safety levels, as that could result in bankruptcy.

In addition, the air transport sector in general dedicates significant efforts to the supervision and enforcement of reliable maintenance practices, and there is no evidence to support the need for additional care with LCAs.

6.5. Freedom of movement of persons

One of the pillars of the European Union (EU) is the free movement of persons within the EU. The creation of the Single European market has been the achievement of that goal and peoples' mobility has been increasing ever since. The emergence of the LCA has led the EU's mobility towards a new stage. Two main drivers can be identified for this evolution: low fares and new destinations. The LCAs entered the market offering substantial discounts, when compared with the incumbents. They have also changed the selling channels, bypassing the traditional monopoly of the sales agents, and started to sell directly to final customers either via Internet websites, or through call centres. As a result, people who either could not afford to travel or travelled using other modes of transport shifted to these companies.

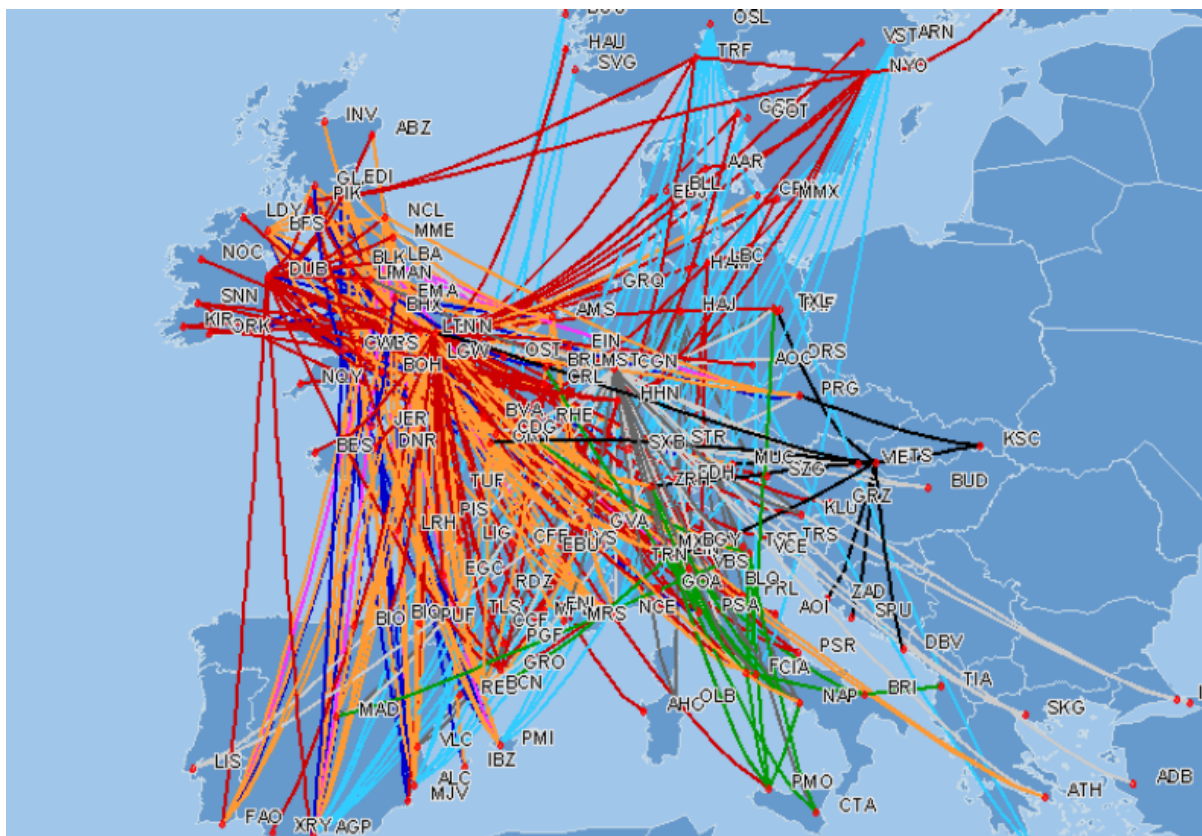
Figure 4 shows that almost 60% of the passengers travelling with LCAs are new passengers and that around 40% have moved from the traditional airlines, which shows that LCAs have mainly created their market rather than competing with the traditional companies. Another conclusion is

that almost half of the new passengers would not travel, were it not for the existence of LCA flights. This evidence leads to the conclusion that LCAs are conducive to air travel, as a considerable percentage of people that previously did not travel now do so.

The number of LCAs has been progressively growing since the EU air transport market liberalisation, although a significant number of them have meanwhile gone into bankruptcy. The increase in the number of LCAs has been accompanied by an increase in the number of destinations served, because their business model is based on bypassing the main airports and choosing either non-served destinations with a high growth potential, or regional airports within main metropolitan areas. In any case, the amount of population served by LCA routes increases. The following picture presents the network of the nine most representative LCAs. The network is dense and covers almost entirely the EU's territory.

Summarising, taking into consideration that, firstly, LCAs have been reducing the cost of travel and, as such, inducing mobility; and, secondly, the number of destinations served has been growing, we can conclude that the LCAs have been promoting equity and reducing imbalances within EU, which ultimately leads to the conclusion that they are fostering construction of the EU and promoting European peoples' integration and cohesion.

Figure 17: LCA Network



Source: ELFAA, 2005.

Note: Routes served by Ryanair, easyJet, VolareWeb, bmi Baby, Hapag-Lloyd Express, Germanwings, Sterling, SkyEurope, jet2

The travels patterns in Europe have dramatically changed over the past couple of decades. Several factors have been behind this change; just to mention the most relevant ones: the construction of Europe that abolished most of the internal borders and established a truly European single space; the continuous European economic and social development has given

citizens a higher income and longer holiday periods; and the emergence of cheap and fast ways of travelling, notably the LCA.

Today the LCA have an extensive air network of direct routes connecting a vast number of European cities and regions for rather affordable prices. There is a general understanding that their development has been conducive to air travelling and ultimately tourism. Citizens that normally travelled a few times per year using land modes of transport (car, train or bus) or, perhaps, did not travel at all, could now afford to travel by air as prices are far cheaper. Progressively, European citizens have got used to travelling away from their home cities for the most diverse purposes using air transport and planning their own journeys.

Holidays are a period of time when people travel the most for leisure purposes, because they comprise a relatively long period of time usually spanning a minimum of five days (or one week). However, the advent of the LCA has created the opportunity for the development of leisure trips for very short periods of time. These kinds of journeys range from a single day up to three days, which corresponds to a weekend plus one day of holiday (Monday or Friday), and are done for a wide diversity of purposes.

Two main trends are visible in the market for short trips: one related with the traditional city (or short) breaks, other concerning secondary housing. City breaks are the traditional products travel agencies sell for the short period trips. And although in existence for a long time, these products have only become a commonplace after the upsurge of the LCA. For example, in 2005 Short Breaks (a travel agency specialising in city breaks) reported a growth in city break sales of 50% for Budapest, 30% for Prague, 200% for Cracow, and 60% for Warsaw. Thomson estimated an increase of about 25% in city break sales from 2005 to 2006 as the aggregate result of: the German World Cup, the Winter Olympics in Turin, and Rembrandt and Mozart's birthday anniversaries in Amsterdam and Salzburg. In particular, the German Cup was apparently responsible for a growth of 5% in bookings to Germany, and the release of the Da Vinci Code film responsible for a growth of 10% bookings to Paris²⁰.

The other trend is more recent and concerns the stimulus provided by cheap air links to the real estate business of secondary housing. Increasingly, medium to high-income households have been buying second residences outside their home countries. Commonly, the households are from the wealthier European countries (notably the United Kingdom) that have turned their attentions to Southern Europe, which is considerably cheaper and has much better weather conditions all year round. The Northern European households travel regularly (on a weekly basis or twice per month), using LCA cheap fares, to their secondary residences located in Southern Europe to spend a weekend. Naturally, this business has stimulated the real estate business in these regions.

Summing up, there is evidence that LCA have brought major changes in European travel patterns. They have generated new traffic in many cases for tourism purpose by people who otherwise would either not travel or choose other modes of transport. Travelling for resting, shopping, sight-seeing and cultural purposes is a common habit nowadays amongst many European citizens. Recently, a new trend has emerged in the market connected with the real estate business²¹, in which high income people use cheap air links to cheaper and interesting regions to acquire a second house. In all these cases, LCAs seem to be a key enabler. However, there is no scientific grounds to establish a correlation between the LCA offer and the increase

²⁰ Travel Trade Gazette (2006) *City breaks set to rise*, 6 January 2006, pp 7.

²¹ Travel Weekly (2005) *Operator looks east as city breaks boom*, 2 February 2005.

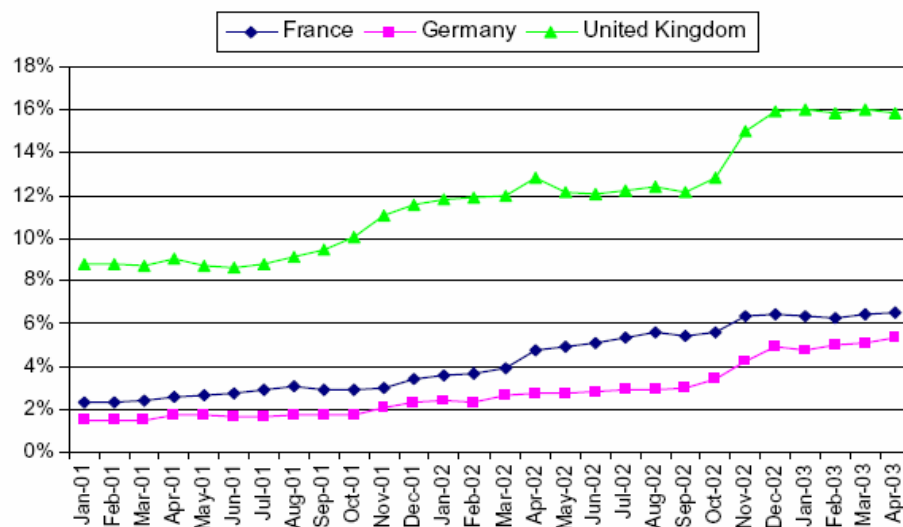
of travel or change of travel patterns. To validate this preliminary diagnostic an in-depth study is required with surveys made to better understand the factors that contribute to increase travelling.

6.6. Competition in the air transport sector

LCAs have emerged differently across Europe, reflecting the continent's natural diversity in terms of willingness to travel and, of course, income. The next two graphs illustrate that diversity. The first represents the evolution of the LCAs in three EU countries, while the second presents a snapshot of the LCAs' market share in March 2003. Both show wide disparities amongst countries. The UK is the member state with the highest number of LCAs and the one with the highest rate of growth. This may be due to the fact that British people have always had a high propensity to fly compared to other European nations, for both income and geographical reasons.

Apart from a small number of routes to North Africa, the LCAs operate exclusively within Europe and mostly in the short-haul market. Thus, they do not compete with the traditional companies in the long-haul market, nor on the short-haul feeder routes. To sustain international routes, traditional companies use their regional network to collect passengers. As such, although these routes are short-haul, they are an integral part of a long-haul transport service and very few passengers are willing to have a first leg on one airline and change to a different one afterwards. So, in practice, LCAs do not compete for feeder flights.

Figure 18: Market share of European low-cost airline operations in some European member countries



Source: Francis et al (2006).

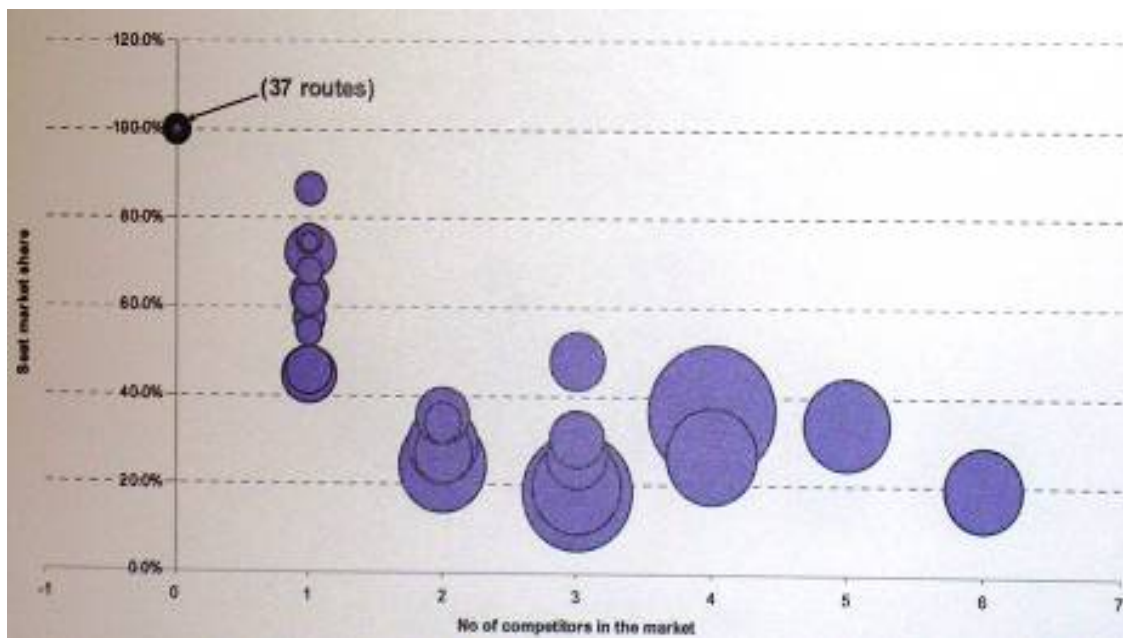
To understand the competitive nature of the air transport market it is necessary to look in detail at each route or city pair served. As LCAs operate on a point-to-point basis, the competition occurs at the same level. Moreover, many LCAs create their own routes, which means that a growth in LCA supply does not necessarily entail an increase in competition.

Two main operating strategies may be identified in the LCA market: one consists of creating new markets, while in the other airlines opt to enter large, established markets with other airlines already operating.

Ryanair, the largest European LCA, essentially follows the first strategy. The first step is to identify potential markets not explored so far. The targets are secondary airports. Then, the airline approaches local airports and authorities envisaging benefits either through fee reductions or fiscal incentives, which are generally achieved. Both of them are eager to attract airlines, the former to increase revenues; and the latter to induce social and economic development. If successful the route is established, otherwise it selects another regional airport or searches for other region.

The following diagram, figure 19, shows the type of routes served by Ryanair from London in summer 2003. Each circle reflects the seat capacity share from London for each city pair in which the airline competes. The horizontal axis represents the number of competitors, while the vertical one the airline's share of seat capacity. On nearly 60 % of the routes Ryanair operated alone.

Figure 19: Ryanair route selection (2003)



Source: Air Transport Group (2004).

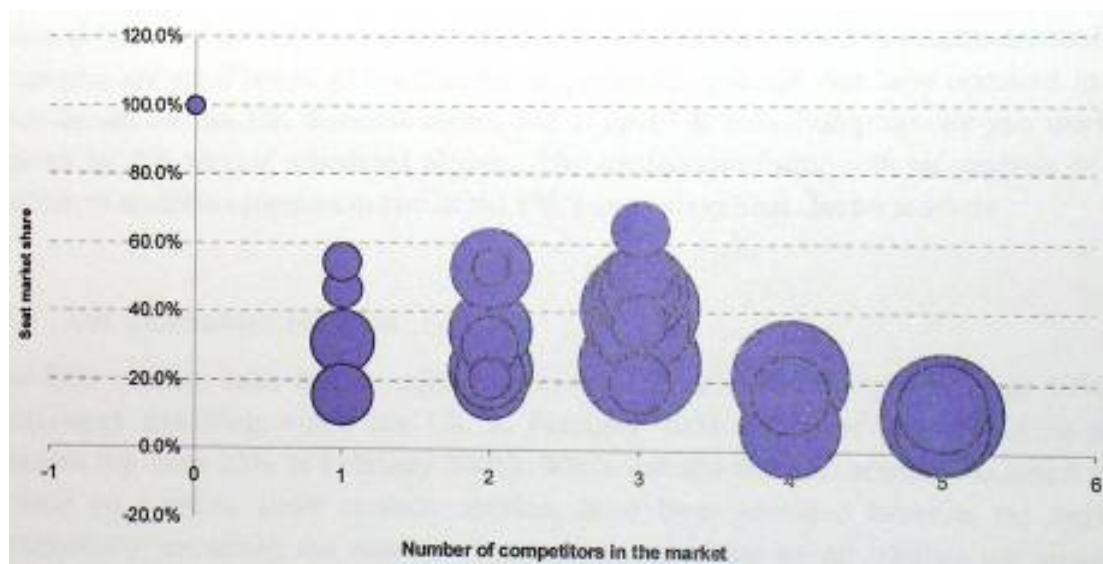
The strategy is clear: to avoid direct competition and induce traffic. The potential passengers are either those who currently choose other modes of transport, or that do not travel. Implicitly, they are mainly leisure passengers, and may be price-sensitive. So an airline's competitiveness remains in its ability to drop fares to a threshold that triggers passengers' modal shift or matches their willingness to pay. Furthermore, with no competitors, airlines do not need to elaborate on matching frequencies or schedules.

Doganis (2006) presents a paradigmatic case of traffic generation. The city pair market was Manchester and Nice. In 1995, the route had 14600 passengers (7600 scheduled and 7000 charter). In 1997 easyJet launched a service between Nice and Liverpool, near Manchester, and in the very first year of operations the airline carried 70000, and 10000 flew between Manchester and Nice (all charter, as scheduled flight had been discontinued). Attracted by such a promising market British Airways re-entered the market. In 2003 the market had grown to 176000 passengers.

The other strategy is being followed by the second largest European LCA, easyJet. This airline prefers to enter on large markets, which naturally are already being disputed by other companies. The following diagram, figure 20, represents the seat capacity share and number of competitors for each route flying from London in Summer 2003. In contrast to the other strategy, easyJet has predominantly chosen routes with other rivals already operating; in only one route there was a single competitor, in all others they were one of three or more.

In order to gain market share, easyJet competed with frequencies offering double and some times triple daily flights. Higher frequency means that customers have a higher degree of choice, which is important for the business passengers. The purpose is clear: to be an economical and sound alternative to traditional carriers (Air Transport Group, 2004). The target segments are both the leisure market offering low fares and making use of passengers' willingness to pay, and the business segment, by offering low fares and high frequencies. Indeed, easyJet has indicated that on some routes the business passengers' proportion reaches 50%, while Go indicated 30% (Mason, 2000 and Mason, 2002).

Figure 20: easyJet route selection (2003)



Source: Air Transport Group (2004).

Regardless of the strategy adopted, LCAs' competitive advantage stems from low fares, which is more evident on routes with other competitors. The following table presents the evolution of fares on the city pair London - Toulouse, after the entry of Ryanair and easyJet. Immediately after the entry of Ryanair, both Air France and British Airways reduced fares and have continued to reduce them until 2005. In this year easyJet entered in the market, which forced Air France to leave.

Table 15: Evolution of fares on the city pair London-Toulouse

Airline	Route /special conditions	1	2	3	4
		Out. Mon 15, Back Wed 17, Apr 2002	Out. Mon 14, Back Wed 16, Apr 2003	Out. Tue 2, Back Thu 4, Dec 2003	Out. Mon 4, Back Wed 6 Apr 2005
Ryanair	Stansted - Carcassonne	187	180	109	112
British Airways	Gatwick - Toulouse	910	273	183	193
Air France	Heathrow - Toulouse	910	606	185	discontinued
British Airways	if staying Saturday night	246	198	239	211
Air France	if staying Saturday night	234	193	185	discontinued
easyJet	Gatwick - Toulouse				91

Source: Doganis (2006).

6.7. Competition and cooperation with other modes of transport

The issue of competition between modes of transport generally appears after liberalisation or deregulation within the transport market. In a regulated environment, transport companies' incentives and freedom to compete are very limited, and commonly there is a clear segmentation: air transport for the international destinations and national remote destinations, railways for national destinations and road transport for national destinations, where rail supply is non-existent. This does not mean that there is no overlap in the transport, but that one mode of transport has a natural vocation, commonly achieved through price regulation. On the other hand, in a commercially driven market environment transport companies, in an attempt to increase demand, may naturally enter in direct competition on some routes or markets.

Evidence of competition between air transport services and other modes of transport exists in different situations. Sinha (2001) found a substantial increase in competition between air transport services and road and rail services, after the United States liberalisation²². The two main United States' road companies were compelled to cut prices in order to reduce the shift of passenger to the LCAs. The rail company - Amtrak - had also to cut prices and introduced special deals for passengers. The same effects have been found in Australia. However, it is with the high speed train²³ (HST) that the competition issues are more intense, because it is the only land transport solution that can directly compete in term of travel times. Past experience shows that for distance up to 500km, HST may be more competitive than air transport, mainly because it commonly offers city centre to city centre transport services, while many airports are in the outskirts, which implies extra transport time from/to the city centres. This competitive advantage is then progressively eroded until a threshold around 1000km, above which air

²² In 1978 with the Airline Deregulation Act

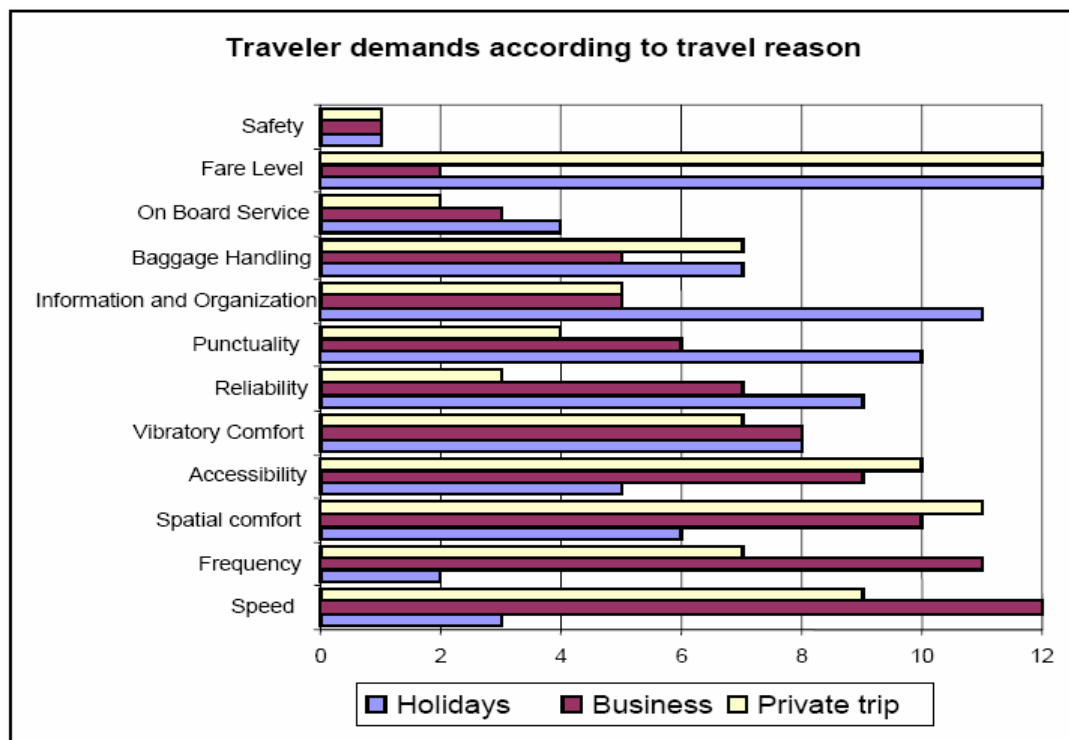
²³ This study adopted the definition for high speed train given in the EU Directive 96/48: The high-speed advanced-technology trains shall be designed in such a way as to guarantee safe, uninterrupted travel: a speed of at least 250 km/h on the lines specially built for high speed, while enabling speeds of over 300 km/h to be reached in appropriate circumstances; or a speed of the order of 200 km/h on existing lines which have been or are to be specially upgraded; or the highest possible speed on other lines.

transport has no direct competitors (Givoni, 2006). In terms of time, evidence shows that HST may compete for journeys up to 3 and half hours (Esplugas, 2005).

There are diverse types of HST, such as for example: the Shinkansen in Japan, the TGV in France, the AVE in Spain, the ICE in Germany, the X-2000 in Sweden, the Pendolino in Italy, KTX in Korea and the MAGLEV. There are significant differences between them, in terms of technology, types of railways or maximum speed, but all of them are able to reach the speed thresholds to be considered HST.

Speed is indeed the determinant factor for HST competing head-to-head with air transport, followed by tariffs. When the HST were first introduced in Europe, in the eighties, air tariffs were very high as the result of the regulatory regime. The HST services thus entered the market offering cheaper tariffs than air transport services, which led some passengers to move to rail services. Additionally, HST transport companies may compete in terms of frequency and quality of service. Commonly HST transport companies are in a position to offer higher frequencies than air transport services, which is especially important for the business travellers that favour the flexibility of service frequency. Other advantages include the railways' higher safety levels, punctuality and availability of city centre to city centre services. The following figure 21 depicts the travellers' reason for preferring HST.

Figure 21: Traveler Demands according to travel reason



Source: Esplugas (2005).

In addition, trains are more spacious and comfortable than aircraft, which are other advantages (Givoni, 2006). The following table presents the modal share evolution on two high-speed lines. In both situations air transport services have lost market share, which demonstrates the competitive advantage of the HST services. Therefore, there is evidence that HST may compete head to head with air transport and to some extent capture part of the air transport market share.

Table 16: Modal share evolution before and after the introduction of HST services

	TGV, Paris - Lyon line			AVE, Madrid - Seville line		
	Before (1981)	After (1984)	Change	Before (1981)	After (1984)	Change
Aircraft	31	7	-24	40	13	-27
Train	40	72	32	16	51	35
Car and bus	29	21	-8	44	36	-8
<i>Total</i>	<i>100</i>	<i>100</i>	<i>37^(a)</i>	<i>100</i>	<i>100</i>	<i>35^(b)</i>
^(a) Total traffic increased by 37%. A total of 10% is related to the estimated trend of growth and 27% is considered as induced traffic.						
^(b) Total traffic increased by 35%.						

Source: Givone (2006).

However, there is considerable scope for other types of interaction besides competition. With the increasing congestion level in European airspace, HST are progressively being considered as a viable alternative to the medium to short-haul legs. So, instead of using air services, airlines are starting to use HST services, for example: Charles de Gaulle airport in Paris is directly served by the TGV network enabling Air France to compete, for instance, for passengers living in the Brussels region; likewise Brussels Airlines use the Thalys network to feed its flights at Brussels airport (luggage checked in at the Brussels-south station); or Frankfurt Airport is served by the ICE and Lufthansa sells tickets that include a rail leg. Moreover, there are regions served by HST but not so well by air links: in these cases HST may be used as alternative feeder services. Recently, an innovative service has been emerging, the 'system of airports', where nearby airports are linked through HST (Espulgas, 2005).

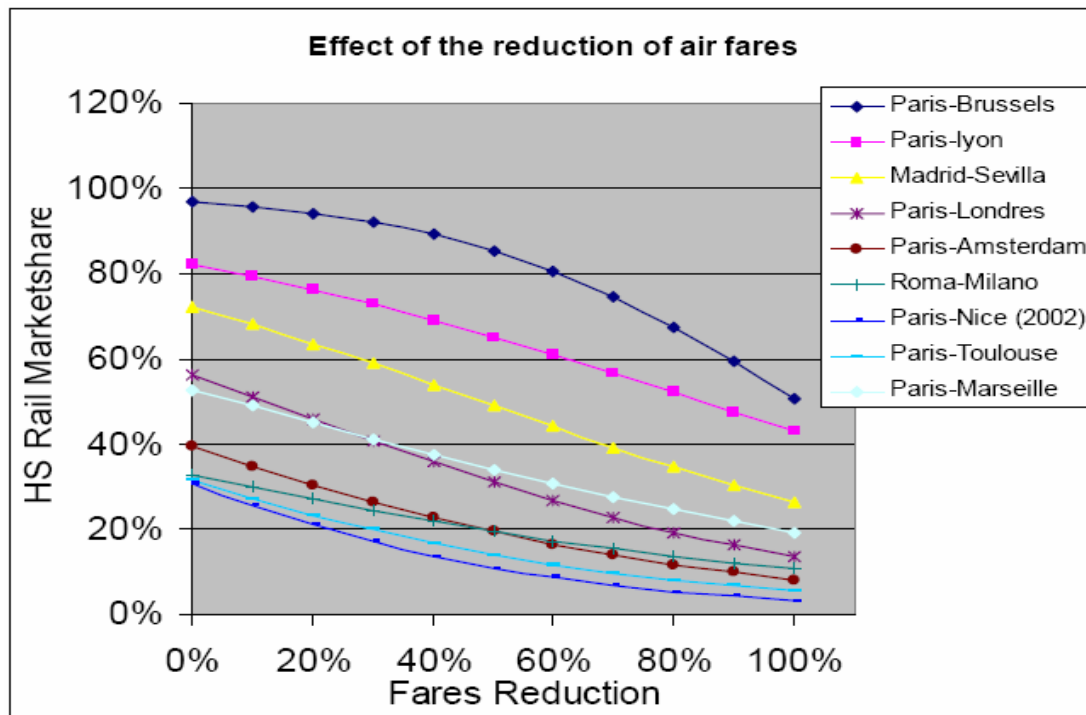
So far, the discussion has been centred on the interaction between the traditional air transport companies and the HST, where there is a reasonable amount of available literature. However, in respect of the interaction between LCA and HST there is a major lack of research and studies. Nonetheless, some considerations may be identified. One of the HST's main competitive advantages referred to previously concerns the lower tariffs when compared with air transport services. Naturally where LCAs compete in the same market this advantage no longer applies. Therefore, a shift to LCAs can be expected, if travel times are better than those of HST services. A recent study estimates the effect on the HST market share as a consequence of air tariff reductions (Figure 22). The study foresees considerable reductions in the HST market share as the consequence of the entry of LCAs into the market.

If this scenario comes true, it will be contrary to the current EU transport directives and, in particular, the objectives of the EU White Paper on Transport²⁴, where an increase of the train modal share and a curb on the growth of air transport activity is envisaged. However, further studies are needed in order to clarify the actual nature of the interactions between LCAs and HSTs and the level of traffic diversion between services, if any. Only with a sound understanding of the market conditions should a potential intervention be considered.

Secondly, because of the nature of the LCA business model, it is very unlikely that they will initiate joint services with HST. This scenario would entail the need to develop a set of common services and systems, such as ticketing systems, coordination of schedules, which LCAs would be unlikely to consider given their business model.

²⁴ COM(2001) 0379 - *European transport policy for 2010 : time to decide*

Figure 22: Rail market share predicted by the model corresponding to a reduction in Air Fares



Source: Espulgas (2005).

7. Conclusions and recommendations for policy-makers

The answers to the fundamental questions raised in the terms of reference are:

- a) Based on the research undertaken we can state that the EU aviation sector is moving in the right direction. The growth paths of the European airlines and airports are comparable to those of their international peers. As in the rest of the world, European Low-cost Airlines (LCAs) are growing at a higher rate than the rest of the business. The effects of European LCAs on tourism, regional development etc., are clearly positive with evident changes in travel and leisure habits. As an example, the lower cost of mobility is fostering the adoption of weekend houses in a country different from where residence is established. The negative effects (environmental, etc.), in turn, are still under control and so it is still possible to devise mitigation strategies. Moreover, LCAs can play an important role in stimulating technological and operational improvements in the air transport business.
- b) Hitherto the developments in the EU aviation sector have corresponded with the expectations of EU policy. However, there is a consolidation trend towards a limited number of big LCAs that will have consequences on the market structure and the market behaviour with a possible risk of abuse of market power. It is very likely that LCAs will follow strategies of market domination similar to the network carriers. At the same time some airports and airways are subject to congestion, resulting in a shortage of good slots. It should be clear that those potential developments will possibly need quick (industrial-economic) preventive responses from EU authorities, so that regulation can pave the way towards behaviour in line with sustainability objectives.
- c) In some respects there is already a common European approach to airports, in respect of the application of state aid rules. The implementation of the Single European Sky may also assist in achieving common levels of runway capacity, which currently varies widely across the Union, with many airports failing to achieve 'best in class' levels of capacity for a given runway configuration. Beyond this, the scope for a common approach to airports is limited. In particular, the development of airports is closely linked to their respective hinterlands, and there is a need to retain sufficient degrees of freedom to accommodate local and regional interests and different decision-making processes. However, there would be a benefit in introducing a requirement for airports of over a certain size to produce and publish long-term master plans, so as to allow greater transparency as to airport development plans. It would also be beneficial to airline operators if airports were required to publish regular capacity situation updates, so as to alert airlines to imminent or future capacity constraints.
- d) Intermodal competition can be a sector where the benefits of LCAs may have an effect on other modes, in particular High Speed Rail, given the difference of fixed cost, among other elements. Given the activity on both sides, with HSR entering into an alliance for a frontal competition with LCAs, this interactive dynamic should be carefully observed.
- e) We expect the EU to set a legislative framework common to LCAs and the conventional (or traditional) carriers where both can operate in an optimal way. This requires tools for design, monitoring and evaluation. Any solution where LCAs and conventional airlines run under different legislative framework will foster disruptive behaviour and unfair competition between these the two types of airlines.

- f) Other EU initiatives also contribute to the efficiency and effectiveness of these markets, and inherent quality of their products, such as:
 - The further development of the Single European Sky;
 - The protection of passengers rights;
 - The greening of air transport operations, extensive to all agents engaged;
 - The development of advanced concept, techniques and technologies to:
 - enhance air traffic management
 - enhance ground-handling operations
- g) In view of the potential concentration of market power and of increasing variety of market strategies, both of LCAs and of traditional airlines, it is worth stressing that in the course of time the two approaches will tend to present a distinction between short and long haul. In the short haul the two products will tend to maintain clear differentiation with only certain niche players (e.g. Brussels Airlines) moving in the direction of the LCA approach, while in the long haul the level of uncertainty about the strategies followed is quite higher but it is likely that for flights exceeding six hours LCAs and traditional approaches will be more convergent
- h) We advise the European authorities to develop two instruments. First of all, there is a need for a monitoring instrument of the European low-cost market based on data and research on the industrial-economic behaviour of all actors. Next, there is a strong need for a benchmarking instrument, not only for the European air transport market, but for the entire world. An observatory for LCA evolution and impact assessment would be recommended, in particular to observe the relation between LCA supply and the increase in travel for leisure and tourism.

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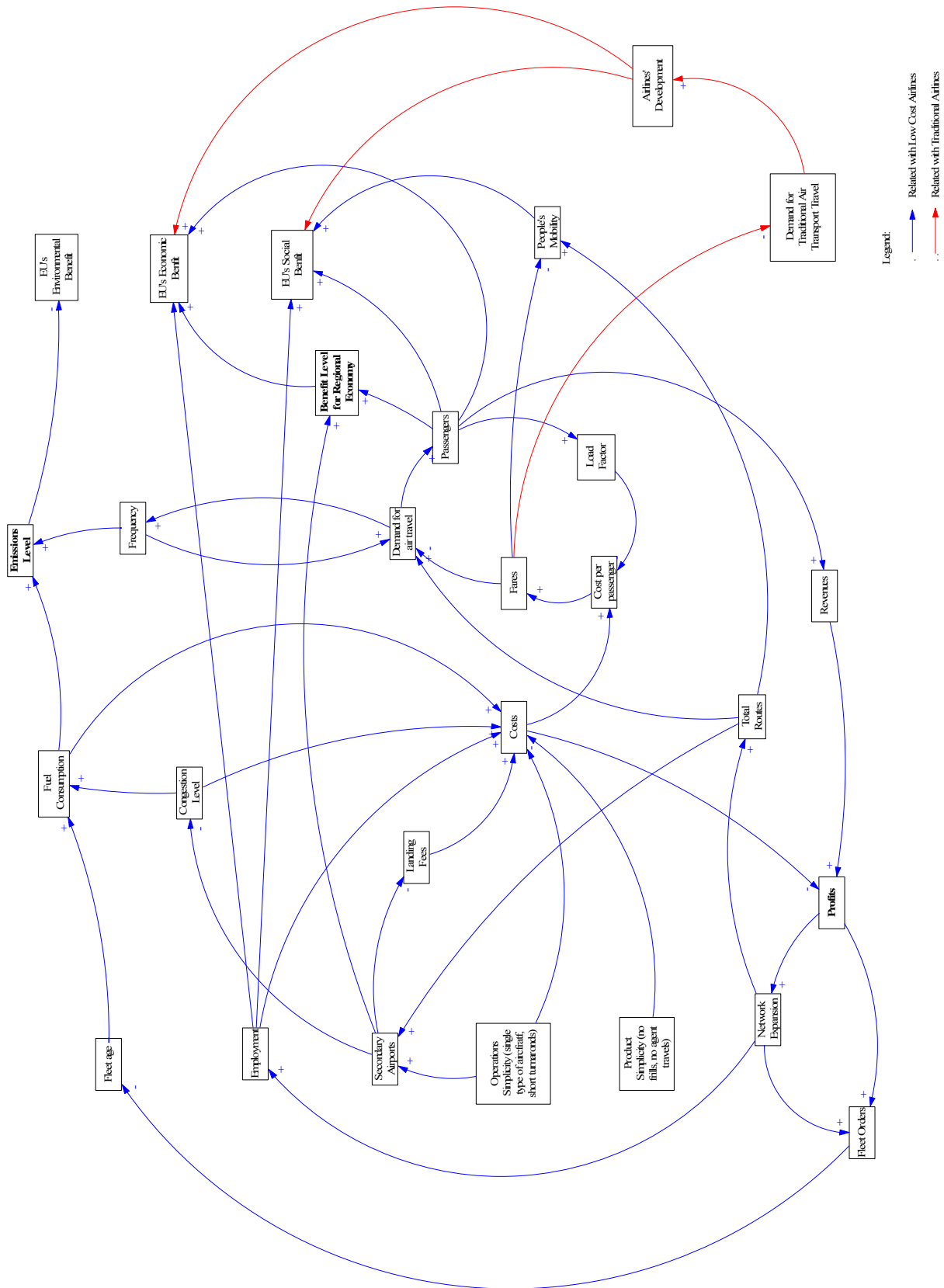
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Annex 1

Figure 23: Simple System Diagram representing impacts of low-cost growth



Annex 2

Airport case studies

The following airports all have significant levels of low-cost airline operations. These brief case studies illustrate the diversity of airport size and ownership structure which can characterise a low-cost airline base.

London Gatwick

Gatwick is London's second largest airport, and is currently handling around 34 million passengers per annum. It is the world's busiest single-runway airport, and is subject to severe runway capacity constraints through much of the day. Low-cost airline operations are now very significant, and easyJet is the second largest user of the airport. In addition, the airport has long been used extensively by charter carriers, a number of which have partly converted their products to the scheduled low-cost model.

The airport is wholly privatised, having been sold on a free float basis in 1987 and then acquired in 2006 following a hostile bid by Grupo Ferrovial. It has been subject to price regulation since it was first privatised, and its charges are now among the lowest of any European airport.

Lübeck

Lübeck was until 2000 a small and lightly used general aviation airfield, with commercial traffic limited to charter services. At that point low-cost operations operated by Ryanair began, initially to and from London and subsequently to a wider range of destinations once Ryanair had committed based aircraft to the airport. Ryanair marketed the airport as Hamburg-Lübeck, although the city of Hamburg is 54 kilometres distant and the bus connection takes around an hour.

When Ryanair commenced services the airport was wholly owned by the City of Lübeck, but in 2005 a 90% share was sold to Infratil, a New Zealand based infrastructure investment company. Following this sale the airport's aeronautical charges were raised, and subsequently Ryanair announced that it intended to reduce its level of service. Passenger numbers peaked at ca. 715000 in 2005 (2006: ca. 678000). Ryanair remains the largest operator, having been joined by Wizz Air of Poland.

Charleroi and Strasbourg

Ryanair began serving Charleroi in 1997 as an alternative airport to serve the city of Brussels. The airport is owned by the Walloon Government, which granted Ryanair a reduction in landing charges of €1 per passenger from the published rate, representing a reduction of 50%. The managing body of the airport also granted a €1 per passenger reduction in ground-handling charges, and it also paid €4 per passenger to a company jointly owned by Ryanair and the airport management. This payment was intended to be for promotional activities. A number of other incentives were also given to assist with the commencement of services.

Following complaints by Brussels airport and Sabena, these financial arrangements were investigated by the Commission. A number of aspects were found to be *ultra vires* of the state aid rules enshrined within the Treaty of Rome, and Ryanair was ordered to repay a total of ca. €4 million (BBC). Ryanair subsequently scaled back its services, and traffic peaked at a little over 2.0 million passengers in 2004, falling by 8% in the following year. However, the airport

has succeeded in attracting a total of five further low-cost carriers, and rapid traffic growth has returned, with 2.2 million passengers being handled in 2006.

A very similar chain of events occurred in the case of Strasbourg. In this case Ryanair transferred its services to the nearby Baden-Baden airport.

Robin Hood Doncaster Sheffield

Robin Hood airport has so far been the only UK military airfield to be successfully converted for use as a commercial airport. Its operational closure by the Royal Air Force in 1994 resulted in significant civilian job losses, in an area which was already suffering from the decline in traditional heavy industries. A planning application for its redevelopment was lodged in 2000 by a large North of England property developer and, despite overwhelming local support for the development, it was subject to a Public Inquiry. Following planning approval, it opened for commercial operations in March 2005.

Operations began with a mix of low-cost scheduled and charter services. While the airport's services may be characterised as low-cost/charter, the facilities and architectural style of the passenger terminal are of a high standard. Traffic development has been rapid, with around 900000 passengers in 2006.