

# The Impact of New Type Air Services, *i.e. Low-cost Services, on the Transfer Passenger Market in Germany – Some New Evidence*

The question this paper deals with is whether or not new services, *i.e.* low-cost services and intercontinental services that bypass hubs, have any influence on the airline and route choice of passengers. For statistical reasons, we use Germany as a background to prove this case. We will look forward into the future, basing our thoughts on evidence found in Germany, and speculate about airline strategies with regard to low-cost services and more direct flights in intercontinental markets, in order to give some indication about the future role of hub airports on the one side, and of secondary airports on the other side.

By Dieter Wilken & Peter Berster

Since 2002, low-cost carriers (LCCs) have built up their services and networks very dynamically in, to and from Germany. Their market share has grown accordingly to about 25 per cent of a total of 173 million passengers in 2006. The direct competition and demand generation effects of LCCs have already been quantified in earlier research, but the indirect effects on transfer passenger flows via hub airports have yet to be demonstrated. Analyses of statistical data of the German air transport market show a growing impact of low-cost services, as well as of decentralized intercontinental services that bypass the hubs on transfer passenger volumes at hubs. Until recently, the relative importance of hubs grew to the detriment of secondary airports.

## Airport System and Traffic Structure in Germany

In 2006, the international airports of Germany handled a combined traffic volume of almost 173 million passengers

enplaned and deplaned, and of about 2.1 million air transport movements (ATMs) in commercial traffic on mainly scheduled services (Source: ADV). Since 1992, the second year after the reunification of East and West Germany, passenger traffic has doubled (corresponding to an average annual growth of 5.1 per cent), and the ATM volume has grown by 3.0 per cent annually, half as much as passenger volume has grown.

Germany has two hub airports, Frankfurt (FRA) and Munich (MUC), with both origin-destination (O-D) and feeder traffic concentrations, while the other airports in Germany primarily handle origin-destination traffic to domestic and European destinations, and, in addition, feeder traffic to the German hubs and to several European hub airports as well (see Fig. 1). The biggest airport is Frankfurt (FRA) with 52.5 million passengers, with more than 50 per cent of them that use transfer flights.

Capacity problems have increased in Frankfurt and this has led Lufthansa to transfer a growing part of its hub operations to Munich (MUC), which is the second biggest airport in Germany with almost 31 million passengers. The portion of transfer passengers has consequently increased to about one third of the total passenger volume.

Commercial air traffic in Germany is rather concentrated at a few airports. The two hub airports FRA and MUC account for almost half of total traffic in Germany. The top six airports with the highest traffic volumes - Frankfurt, Munich, Düsseldorf (DUS), Berlin (BER, being an airport system), Hamburg (HAM), and Stuttgart (STR) - handle almost 125 million passengers combined, which accounts for more than 70 per cent of total traffic.

## Recent Developments of Flights and Capacity (Seats) Offered by Full-Service Network Carriers (FSNCs) and by Low-cost Carriers

In 2002, LCCs began to build up networks with domestic as well as border-crossing services. Flights on only 26 routes were offered in July 2002, but, one year later, the number of routes served had increased to 128. Fig. 2 (DLR, 2007) shows the subsequent development of LCC networks in, to and from Germany for the years 2004 to 2007. Almost 400 routes were served at the beginning of 2007, with more routes to come in the future. Around 3,700 flights per week have been offered on these 400 routes, with a total capacity of around 540,000 seats.

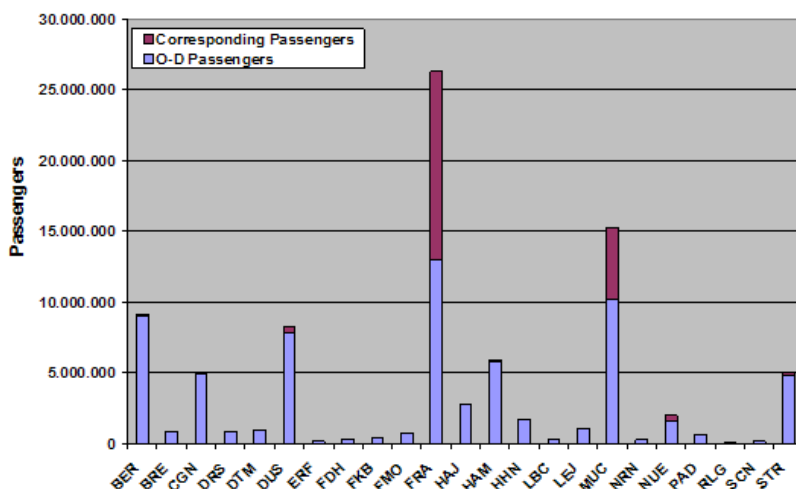


Figure 1: Number of Passengers at German Airports 2006 (Enplaning Passengers). Source: Federal Statistical Office, Germany

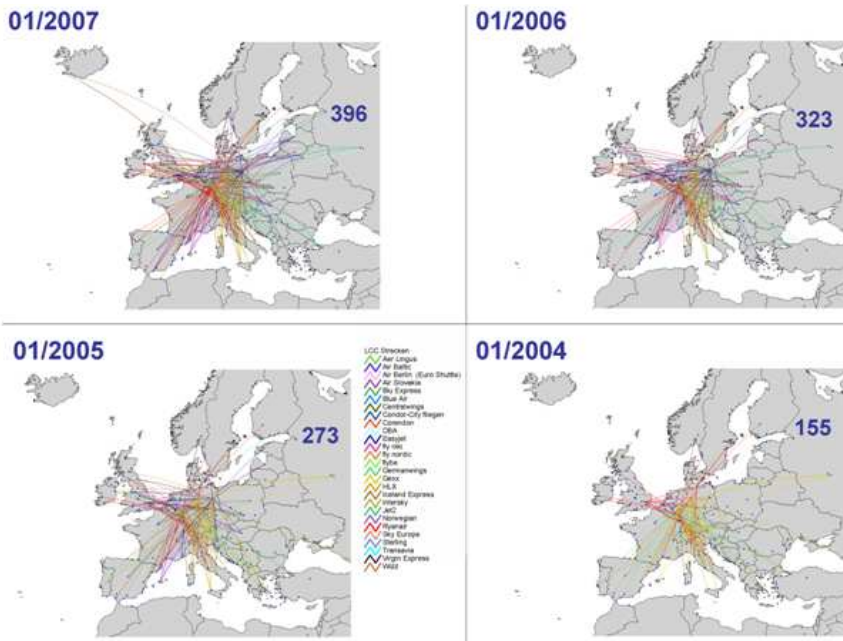


Figure 2: Development of Networks of Low-cost Carriers in Germany 2004 – 2007. (OAG)

Although LCCs offer low prices to all travelers, those for short-stay personal purposes form the main market segment of LCCs (Wilken, Berster, 2006). The market share of all LCCs combined has reached almost a quarter of the total passenger volume of all airports in Germany, with a strong tendency to increase further.

The market success of LCCs shows up clearly when the developments of flights of both full-service network carriers (FSNCs) and LCCs are compared. Fig. 3 shows the number of flights offered by FSNCs and LCCs in the German market from 1998 till 2006 (Flights per week in July).

The number of FSNC-flights has remained more or less constant over time, whereas the flight volume of LCCs has continuously increased since their market entrance in 2001/2002. The LCC share of flights reached a value of over 20 per cent in 2006, which has been primarily achieved on domestic and international routes in Europe. LCCs are not yet active in intercontinental markets.

The gain in market share by the LCCs has not just been the result of capturing newly generated passengers and passengers from other airlines in direct competition with these FSNCs, but has also been the result of capturing transfer passengers from hub services in rather indirect competition with FSNCs. Intercontinental services were, for a long time, concentrated on hub-to-hub airport

routes, and airlines have only recently begun adding flights on hub-to-secondary-airport links, like from New York to Berlin. Fig. 4 compares the development of intercontinental services from the two German hubs FRA and MUC with those from all other airports (depicted are the flights in one week of July for the years 1997 to 2006).

While for a long time the number of intercontinental flights from secondary airports in Germany has been rather small and stagnant, such services from the hub airports have reached high frequency levels already early and have increased in number substantially over time. Hub airport links have thus dominated these markets. There are now more than 1,100 flights per week offered from the hub airports FRA and MUC to inter-

continental destinations and almost 200 flights from all other airports in Germany. It is a rather recent phenomenon that secondary airports have been added to the intercontinental networks of FSNCs by connecting them with their hub airports. As can be seen in Fig. 4, the number of intercontinental flights bypassing the German hubs (and offered mostly by carriers other than Lufthansa) has almost doubled in the short time span of just two years between 2004 and 2006. In spite of this rapid growth, however, the total flight volume from secondary airports in Germany represents still a small fraction of the number of hub based flights (16 per cent).

### Recent Developments of Passenger Volumes in O-D and Transfer Markets at German Airports

The fact that LCCs have greatly increased the number of direct routes offered in Europe has led to a partial reorientation of passengers from indirect routes via FRA or MUC to direct hub-by-passing routes, as will be shown by analyzing O-D and transfer passenger flows by market segment. The market segments analyzed are:

- > Domestic German
- > Germany - Europe
- > Germany – Intercontinental regions (Intercontinental)
- > Europe - Europe via Germany (transfer passengers only)
- > Europe - Intercontinental via Germany (transfer passengers only)
- > Intercontinental - Intercontinental via Germany (transfer passengers only)

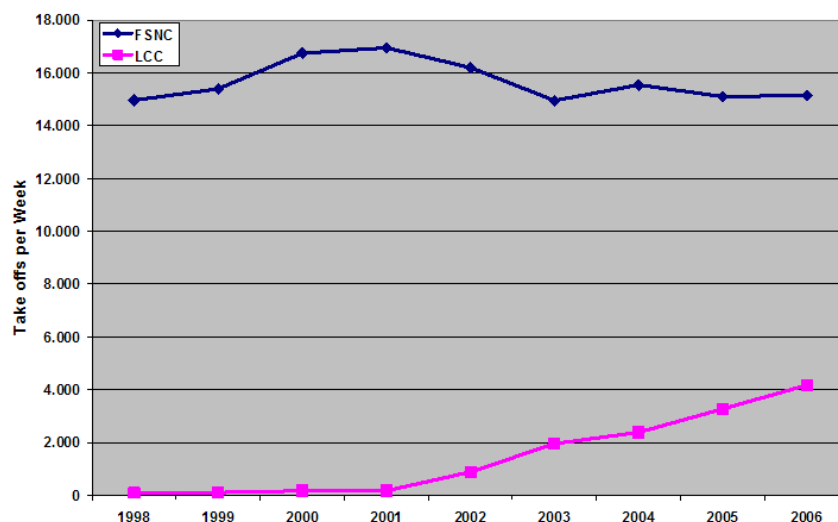
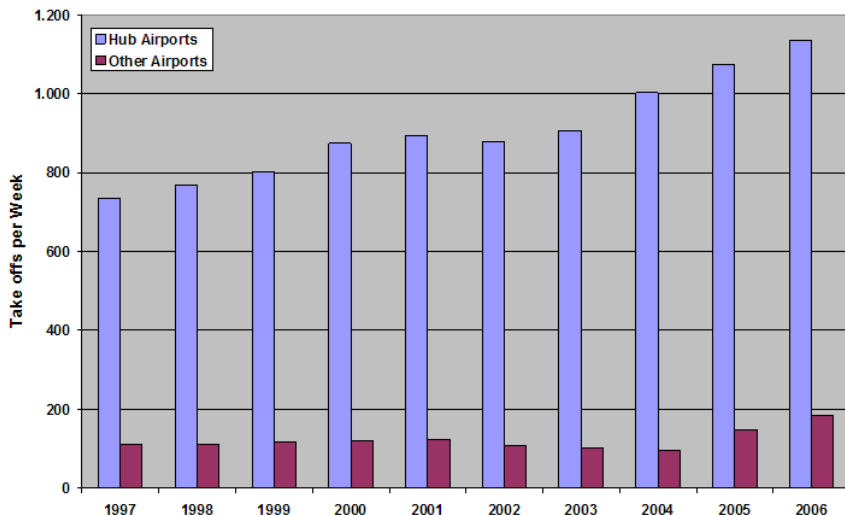


Figure 3: Development of Flights Offered by Full Service Network Carriers and Low-cost Carriers in the German Market



**Figure 4: Development of Flights from Hub and Other Airports in the German Intercontinental Market.** Source: OAG

An assessment of the development of the overall O-D and transfer passenger volumes of Germany already gives a clear indication of the change in growth of these two demand groups, before we get to the single markets. These trends are shown in Fig. 5 for 2002 to 2006. As can be seen, the O-D volume has grown stronger than the transfer volume, in particular during the last two years. While the O-D demand grew more or less constantly over time, the number of transfer passengers has increased significantly from 2002 to 2004 (21 per cent) and has increased more than the O-D demand (15 per cent), and only slightly afterwards (4 per cent; O-D demand: 16 per cent).

**Domestic German Market:** The portion of passengers transferring on domestic routes in Germany is very small with just one per cent. The number of transfer passengers – primarily at the two hub airports - has decreased from 2002 to 2006 by 12 per cent. Passengers can normally select direct services on domestic routes, and substantial transfer markets, thus, do not exist.

**Germany - Europe Market:** While the O-D demand in European travel has grown by over 40 per cent in four years, the number of corresponding passengers has not grown at all, but has remained constant. Clearly, the growth has been greatly enhanced by the proliferation of LCC services. It can be assumed that the stagnation of transfer passengers is also caused to a great extent by the enormous growth of direct services in the European market.

Passengers have many more choices of traveling directly, whereas these choices did not exist before 2002.

**Germany – Intercontinental Market:** More than 20 per cent of all intercontinental passengers to and from Germany transfer at one of the two hubs in Germany (in addition, there are passengers that transfer at other hubs in Europe, particularly at Paris, Amsterdam and London). Similar to the European market, intercontinental O-D travel has grown from 2002 to 2006 (24 per cent), but the number of passengers transferring on their intercontinental routes in FRA or MUC did not so. From 2004 onwards, when the transfer volume reached a maximum so far, volume slightly decreased. This stagnation and decrease respectively is likely to be due to more direct intercontinental services from non-hub airports in Germany, like Hamburg, Düsseldorf, Berlin, Stuttgart, and Cologne/Bonn, or more attractive services from other European hubs, like Amsterdam, Paris, London, and Zürich.

**Europe - Europe via Germany Market (Transfer Passengers only):** About one fifth of all transfer passengers in Germany have both a European origin and destination. The number of passengers in this segment has strongly grown, since 2002 by over 40 per cent, and thus more than the German O-D demand (33 per cent) in that period. This indicates that via-connections through the German hubs have been, and still are, attractive for travelers from Europe. LCCs so far did not have much of an influence on passengers' choices in these markets.

**Europe - Intercontinental via Germany Market (Transfer Passengers only):** The Europe – intercontinental passengers form the largest market segment of all transfer passengers with almost 40 per cent. Their number has grown in similar fashion as the Europe–Europe market, by 38 per cent since 2002. First of all, however, this growth has occurred during the years 2002 till 2004, and has stagnated since then. Here again, we would assume that the hub connectivity in FRA and MUC for Europe – intercontinental travelers has so far been attractive. It is possible, however, that new non-hub intercontinental services in Europe have had a positive influence on passengers to choose from more direct services since two years ago.

**Intercontinental - Intercontinental via Germany Market (Transfer Passengers only):** The strongest growth of passenger volumes occurred in the intercontinental – intercontinental market via Germany; 74 per cent more passengers used the hub services in Germany for their intercontinental journeys in 2006, compared with 2002. This growth is thus much stronger than that of all other segments, including the O-D demand of Germany. This clearly demonstrates that the hub-connectivity in FRA and MUC is regarded as a good product and is well-accepted by passengers from abroad, more so than in the other via-Germany market segments.

### Effects of LCC and Decentralized Intercontinental FSNC Services on Transfer Passenger Flows

Next, we will attempt to correlate the demand and supply developments and deduct effects of LCC and new intercontinental services on the transfer flows at the hub airports in Germany.

**Domestic German Market:** LCCs have substantially increased their domestic services to the detriment of FSNC services, and have thus attracted passengers from the established carriers, and have – more importantly - generated new demand. The effect of LCC services on transfer passengers on domestic routes is negligible.

**Germany – Europe Market:** LCCs started to build up networks and flights on European links to and from Germany in 2002 and reached a volume of around

2,700 flights per week in this market in 2006, whereas FSNCs offer a rather constant flight volume of around 9,000 flights per week since several years. As in the short-haul domestic market, LCCs have generated considerably new demand, but, in addition, have attracted passengers from FSNCs and have given passengers a wider variety of direct European services, so that they were not forced to use corresponding services via FRA or MUC. The role of the two hubs has not grown with the demand in this market segment, but has gone down in relative terms.

**Germany – Intercontinental Market:** Intercontinental routes are still (for a number of reasons, like the size of aircraft on long-haul routes) concentrated on hubs. This, thus, necessitates feeder services and causes passengers to transfer at these airports. Nevertheless, hub carriers have not succeeded in attracting more transfer passengers in recent years. Many passengers that originated from German regions took advantage of new services from secondary airports, like DUS, BER, HAM, STR and also CGN in recent years.

An example of the acceptance of new intercontinental direct and hub-bypassing services is given in Fig. 6, which shows the development of O-D demand of Düsseldorf to Asia from January 2000 till January 2007 on direct services as well as via different hubs. While all flows via German and European hubs to Asian destinations, including Dubai, stay more or less constant over time, the demand for new services from DUS to Dubai and via Dubai to other Asian destinations (in this case with Emirates Airlines) has grown strongly. Similar to the demand generation of new LCC services, Emirates has considerably stimulated the demand of passengers of the Düsseldorf region to Dubai by new direct services and to other destinations accessible through the via-Dubai services of this carrier.

**Other European and Intercontinental Markets via Germany:** As has been described, the via-Germany market segments of total transfer passenger volume have grown strongly. This growth indicates that the hub connectivity in FRA and MUC is a good product and is well-accepted by travelers from abroad.

European LCC services have so far have not affected travelers with both origin and destination in Europe and corresponding in one of the German hubs. And new intercontinental services that bypass hubs in Europe have only modestly affected passengers from Europe to intercontinental destinations, and have not at all affected passengers to and from intercontinental origins and/or destinations.

We can expect networks in Europe to continue to become even denser with more frequent services by LCCs. This would also mean that, in the future, more Europe to Europe transfer passengers can switch to direct flights, so that transfer volumes at the hubs in this segment will grow more slowly or will stagnate or will even become smaller. US and Asian carriers have all indicated that they want to enlarge their intercontinental networks. Finally, there might be some Asian LCCs like Oasis Hongkong who will succeed in opening up intercontinental low-fare services to Germany, as they have at least announced to do so.

### Conclusions and Expectations

It has been shown that the growth of hub traffic will probably not follow the overall growth pace, but that it will be slower due to a slower growth of transfer passenger traffic. Indeed, passengers travel more directly on their European journeys by using LCC services, and thus bypass hub airports, so that the latter lose transfer passengers. Passengers in intercontinental travel choose more direct services of secondary airports and affect hub airports in a similar way as in European travel. A statistical analysis of both the supply and demand side of FSNC and LCC services and of O-D and transfer passenger flows has proven these changes.

The market success of LCCs shows up most clearly when the developments of flights of both full-service network carriers and (FSNCs) and LCCs are compared. The number of FSNC-flights has remained more or less constant over time since 2002, whereas the flight volume of LCCs has continuously increased since their market entrance in 2001/2002.

Intercontinental services have been concentrated on hub-to-hub airport routes for a long time. Airlines have only

recently begun to add flights on hub-to-secondary-airport links, like from New York to Berlin. The number of intercontinental flights that bypass the German hubs has almost doubled in the short time span of two years between 2004 and 2006.

The demand analysis has shown that passengers have responded to the new services by changing travel frequency, airport choice and airline type, and thus route choice. The market share of LCCs has reached a level of about 25 per cent of the total passenger volume in Germany. The fact that LCCs have greatly increased the number of direct routes offered in Europe has led to a partial reorientation of passengers from indirect routes via FRA or MUC to direct hub-bypassing routes.

An assessment of the development of the overall O-D and transfer passenger volume of Germany from 2002 to 2006 has shown that the O-D volume has grown more strongly than the transfer volume, particularly in the last two years. The Europe-Intercontinental segment is with almost 40 per cent the biggest one of the six market segments identified, whereas passengers corresponding on domestic services account for only about one per cent. The portion of transfer passengers from foreign origins to foreign destinations has grown to the detriment of the share of passengers with a German origin or destination. Forty per cent of all transfer passengers in Germany in 2002 had a German trip origin or destination. In four years time, this portion went down to 33 per cent. This indicates that the hub services in Germany are still very attractive for foreign travelers on their European and intercontinental journeys, but less so for travelers with an origin or destination in Germany.

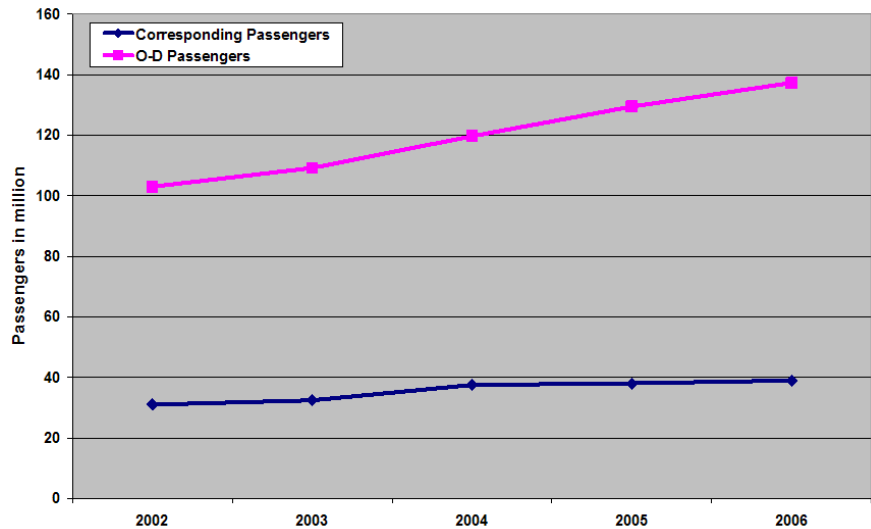
The effect of new type services like LCC services on transfer passengers on domestic routes is negligible. While the O-D demand in the Germany – Europe market has grown by more than 40 per cent in four years, the number of corresponding passengers has not grown at all, but has remained constant. Clearly, the growth has been enhanced to a great deal by the proliferation of LCC services. Additionally, the stagnation of transfer passengers is also caused to a great deal by the enormous growth of direct servic-

es in the European market. In the Germany – Intercontinental market hub carriers did not succeed in attracting more transfer passengers, many passengers originating from German regions took advantage of new services from secondary airports like DUS, BER, HAM, STR and also CGN in recent years.

The via-Germany market segments of total transfer passenger (Europe – Europe, Europe – Intercontinental and Intercontinental – Intercontinental) volume have grown strongly, indicating that the hub connectivity in FRA and MUC is regarded as a good product and is well-accepted among travelers from abroad. European LCC services have so far not affected travelers with both origin and destination in Europe and corresponding in one of the German hubs. New intercontinental services that bypass hubs in Europe have only modestly affected passengers from Europe to intercontinental destinations and have not affected passengers to and from intercontinental origins and/or destinations at all.

Looking into the future, we can expect networks in Europe to continue to become even denser with more frequent services by LCCs. This would also mean that in the future more Europe-to-Europe transfer passengers would switch to direct flights, so that transfer volumes at the hubs in this segment will grow more slowly or will stagnate or will even become smaller.

It is a well-known fact that more interna-



**Figure 5:** Development of O-D Passengers and Corresponding Passengers in Germany (Source: Federal Statistical Office, Germany, and DLR)

tional carriers have decided to open up new inter-continental services from German airports, like Düsseldorf, Hamburg, Berlin and Stuttgart. Among those carriers, there are first of all those from the United Arab Emirates. The big US Carriers intend to enlarge their networks after a long period of consolidation and stabilization by adding more intercontinental connections to their hubs in the States. The new US – Europe North Atlantic Air Service Agreement will also create new opportunities for flights between Europe and the US from 2008 onwards. Finally, new long-haul LCCs are coming up, in particular in Asia, like Oasis in Hongkong, Jetstar in Australia, and Air Asia in Malaysia, which all plan to realize low-fare services between Asia and Europe, in Germany to Cologne/Bonn and Berlin.

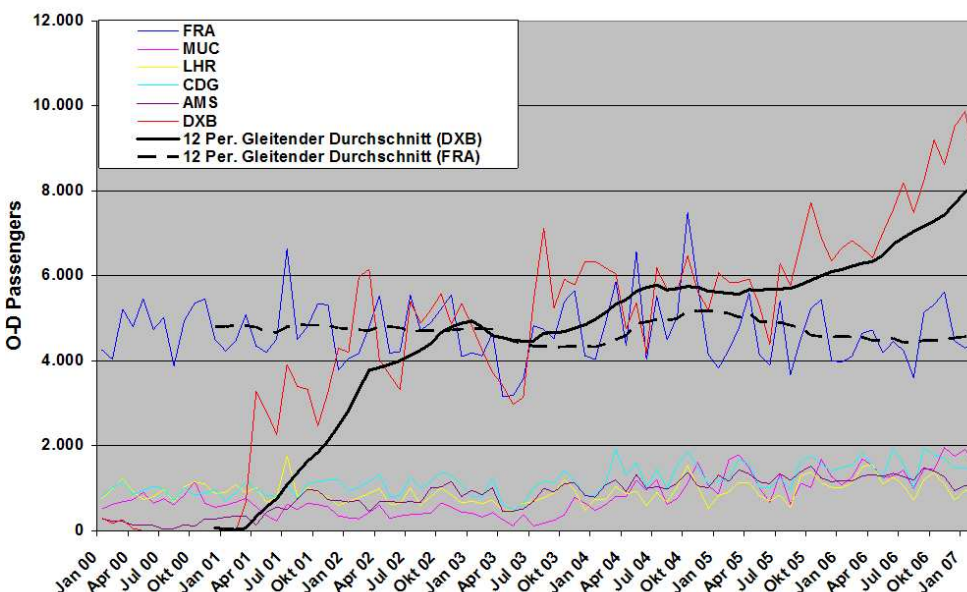
On the technological side, two-engine aircraft will be more and more available that will allow to commercially operate bypassing or decentralized routes in intercontinental markets. As demand for air transport worldwide grows, this means that hub airports will not grow as in the past, but have to rely more on the demand that comes from their catchment area for further growth.

## References

Arbeitsgemeinschaft Deutscher Verkehrsflughäfen (ADV), Airport Traffic Statistics, of different years, Berlin.

DLR (2007), Low-cost Monitor 1/2007, German Aerospace Center, Köln.

Federal Statistical Office, Germany, Air Transport Statistics, of different years, published and unpublished data, Wiesbaden.



**Figure 6:** O-D Passengers from Düsseldorf to Asia via different Hubs (Source: Federal Statistical Office, Germany, and DLR)

Love, R., Goth, J., (2006), “Decline of the Megahub”, in *Airline Business*, October, 2006.

OAG Worldwide, Airline Schedule Data, of different years, Bedfordshire, UK.

Wilken, D., Berster, P. (2006), “The Development of Low-cost Carrier Services in Germany”, G.A.R.S.-Workshop on: “Liberalisation of Air Transport, Airport Regulation and Benchmarking”, London.

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