Assessing the competitive position of European airlines at the network level

Sven Maertens

German Aerospace Center (DLR e.V.) - Institute of Air Transport and Airport Research

Abstract:

Assessing an airline's competitive position is not trivial, as airlines serve many different markets with varying degrees of competition. Hence, networks compete against each other, meaning that the "typical" competition assessment at the airport- or direct route-level may not be sufficient. Fed with origin-destination data from Sabre Market Intelligence, this paper presents a modelling approach to assess the individual competitive position (CP) of airlines in intra-European air transport at the whole network level. The results indicate that LCC like Ryanair or WIZZ Air have a quite comfortable competitive position, while Lufthansa, Air France-KLM and BA/IAG are more exposed to competition.

Key Words: airline, network, competition, market power, competitive position

1. Introduction and objective

Given the increased presence of low cost carriers (LCC) and the existence of competing hubs dominated by different full service network carriers (FSNC) and their alliances, one would generally expect a high level of competition intensity and hence low degrees of market power and only limited needs for market regulation in the deregulated European air transport market. Competition analyses usually contain market structure assessments e.g. at the airport or national level, or for selected direct routes, employing concentration measures like the Hirshman-Herfindahl index (HHI). Such approaches may, however, fall short when it comes to the assessment of the overall, i.e. network-wide, competitive position of a carrier (Borenstein, 1992). The reason is that airlines serve many different (direct and indirect) origin-destination (sub)markets between which competition varies. For example, the competitive position (and hence potential market power) of airline X on a direct route from A to B will not only depend on its own (direct) supply between A and B in relation to other carriers' (Y) direct flights, but also on the latters' indirect supply from A to B via one or more hubs H_Y, if applicable, and vice versa.[1]

This paper aims at assessing the competitive position of airlines in intra-European air transport at the whole network level, which is regarded as relevant. The term "competitive position" is defined as the position an airline occupies in the whole relevant market (network), relative to its competitors (see e.g. Veldhuis, 1997, or businessdirectory.com). The modelling approach considers a carrier's actual competitive position (measured by market share) on each single OD and the relative contribution of each OD to the airline's total output (measured by passenger volume). The model is fed with traffic flow data as provided by Sabre Market Intelligence at the OD-level as main input. Output is an indicator for the airline's competitive position (CP) which shows the extent to which it is competed by other carriers, ranging from – in theory – 0.00 (all ODs purely dominated by other airlines) to 1.00 (no competition from other airlines). As many airlines are not financially or strategically independent from each other and hence should not be regarded as competitors, the analysis is also run at the airline group level, controlling for common ownership.

This approach might provide useful, additional information e.g. for policy-makers or regulators. The application of the methodology is not limited to intra-European air transport market but could also be conducted for other regions or more specific research questions, such as mergers or the overall competitive exposition of European network airlines to Gulf or low cost carriers.

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[1] Not considered here are other factors on the competitive position of carrier X on route A-B, such as competition from other airline' routes from nearby airports, or from other modes of transport.

The paper is structured as follows. Section 2 looks at the relevant literature on the role, impact and measurement of competition in the airline market. In section 3, the methodology and dataset are presented. Section 4 then contains the key findings and a related discussion, followed by a summary and remarks regarding possible future research in section 5.

2. Background and literature review

Monopolisation and resulting market power have proved to be an issue in the air transport value chain and here especially in some of the upstream markets. Examples are air traffic management (ATM), where airlines can usually not choose between more than one ATM providers (Button and McDougall, 2006); ground handling, which has – yet only partly – been opened to new competitors by EU legislation (EC, 1996; Meersman et al, 2011); and the airport landscape, where the question of monopolies and subsequent market power is a more diverse one as it depends on various factors such as overlapping catchment areas and resulting airport leakage effects, alternative hubs, or the degree of countervailing power of the airlines (see e.g. Barrett, 2000; Button, 2010; Maertens, 2012).

In many (downstream) airline markets, in contrast, deregulation steps are widely believed to have increased competition, be it in form of competing carriers serving the same or alternative routes, or indirectly via hubs (Alderighi et al, 2005; Pels, 2008). After a ten year, step-wise process, the liberalization of the intra-EU air transport sector was completed in 1997 when EU-carriers were allowed to fly almost everywhere within the union, including cabotage, at self-determined fares (Regulations (EC) No 2407-2409/92). Other countries, such as the Balkan states, Norway and Iceland, followed suit, leading to the formation of the European Common Aviation Area (Decision of the Council and of the Representatives of the Member States of the European Union meeting within the Council 2006/682/EC), and the EU-US horizontal Open Sky agreement now even allows for almost unconstrained traffic right allocation on the transatlantic market (Decision of the Council and the Representatives of the Governments of the Member States of the European Union meeting within the Council 2007/339/EC).

This new policy regime paved the way for a more competitive air transport market which is now characterized by more routes and lower fares, mainly driven by the emergence and subsequent growth of LCC such as Ryanair, easyJet and a changing number of smaller firms (Dobruszkes, 2013). Most of the FSNC have developed differently. Some had to downsize (e.g. CSA, JAT, LOT, Olympic, SAS…) or disappeared completely (e.g. Balkan, Malev, Swiss, Sabena,…), while others intensified their hubbing activities at their main airport(s), often in close cooperation with alliance partners, and strengthened especially their supply in long haul services. In addition, some FSNC founded low-cost subsidiaries in attempts to get a foot into the low cost sector and to benefit from cheaper operating platform for intra-European operations. Examples include Lufthansa (germanwings/Eurowings), IAG (Vueling) and Air France-KLM (Transavia).

However, there are still air transport market segments that seem to be characterized by only limited degrees of competition:
- Due to slot constraints or for other reasons, some *airports* are dominated by one or few airlines and/or are not yet served by a noteworthy number of low cost services (e.g. Frankfurt, Heathrow). The hub carriers operating here are supposed to have a strong market position at least in the local, direct flight market where they seem to be able to charge "hub premiums" – an issue which has however been discussed controversially in the literature: While some authors found empirical evidence for hub premiums stemming (partly) from market power (e.g. Borenstein, 1992; Evans and Kessides, 1993; Lijesen et al, 2001), others shows that higher fares charged by hub carriers for flights from their hubs can be explained with e.g. higher service levels rather than market power (e.g. Dresner and Windle, 1992).
- *A number of nonstop routes* are exclusively served by one or two carriers, often even (alliance) partners, which may reduce competition. Examples are Frankfurt-Brussels or Frankfurt-Zurich, which have been exclusively operated by the Lufthansa Group, following Lufthansa's acquisitions of Brussels Airlines and Swiss, respectively.
- In international air traffic, a number of *direct country-pair markets* are still monopolistic or duopolistic as many restrictive bilateral air service agreements only allow few carriers to operate a usually restricted number of frequencies.
- And even *indirect ODs* are not always competed by alternative routings. For example, the airport of Graz is dominated by feeder services to hubs of airlines of the Lufthansa Group, meaning that indirect routings from most places via e.g. Frankfurt (Lufthansa) or Vienna (Austrian) to Graz cannot really be considered to be in competition with each other.

As most (network) airlines serve not only isolated nonstop routes but many different "submarkets" with varying degrees of competition (Obermayer et al, 2013), it is not trivial to assess an airline's "overall" competitive position. A quite simple approach would be to look at aggregated airline market shares at the regional (e.g. national) level, such as the US domestic market. Such approaches do however neglect the degrees of actual competition in the relevant origin-destination markets or at the airport levels. Borenstein (1992) argues that "measures of national concentration" are hence just "convenient reference points". Also common are papers (e.g. Borenstein, 1992; Dresner et al, 1996; Ben Abda et al., 2012; Detzen et al, 2012) assessing the level of competition in air transport markets (mostly the US domestic market) at the direct route or airport level, employing indicators like the Hirshman-Herfindahl index (HHI). Examples for relatively recent papers in this context, but with a European focus, are Obermayer et al (2013) who estimated HHI-competition levels (based on carrier-specific frequency shares) and resulting price dispersion at the direct route level, and Gaggero and Piga (2010) who assessed route-specific competition in the UK-Ireland market to assess the impact of a potential Ryanair-Aer Lingus merger on route domination. The consideration of nonstop route level competition only was also subject of some regulatory decisions. For example, in the Lufthansa-Eurowings merger case, the Bundeskartellamt (German Federal Cartel Office) defined only the German domestic market as being relevant and not the indirect markets from German spokes via hubs to the rest of the world (Bundeskartellamt, 2001).

This paper aims at providing an approach for the assessment of the competitive position of individual airlines at the total network level, considering actual competition in terms of market shares on all direct and indirect routings. This network perspective is not new, but most of the earlier papers either tackle the role of network competition from a theoretical or conceptual perspective (e.g. Adler, 2001; Aldeighi et al, 2005) or focused at the US market. An example for the latter is Borenstein (1992) who showed that HHI-concentration at the city-pair route level (incl. indirect routings) has decreased following the US deregulation act as airlines have switched their business models to hub&spoke network operations that tend to compete at the city-pair level. Veldhuis (1997) also looked at the network competition perspective. However, he applied a (supply-based) connectivity model to assess the relative connectivity performance of airports (incl. Amsterdam), while this paper takes a demand-perspective and bases the approach on actual passenger flows.

3.   Methodology and data

Airline i is assumed to have an uncontested competitive position (CP_i) if it was free from any competition on all markets it serves, while it would be heavily contested if its market shares on all relevant ODs were small. The relevant market is defined as all OD-relations an airline actually sells tickets for, and hence not only the nonstop routes. Otherwise, large shares of the total traffic volumes of network carriers that fly passengers over their hubs would not be considered.

The overall competitive position (CP_i) of carrier i at the network level is defined as the sum over all OD-specific market shares (MS_{ij}) of carrier i in the origin-destination markets j multiplied by the airline-specific relevance of each OD_j, which is measured by e.g. the number of passengers of airline i on OD_j (PAX_{ij}) divided by the airline's total passenger number PAX_i[2]:

$$CP_i = \sum_{j=1}^{n}(MS_{ij} * PAX_{ij} / PAX_i) \text{ where } MS_{ij} = \frac{PAX_{ij}}{PAX_j}$$

If an airline had a market share of 100% on all ODs it serves, the CP index would take the value of 1, which would mean that the carrier was free from any intra-modal competition (not counting competition from similar routes from alternative airports, though). If the carrier's market shares on most of the ODs were small, the CP index would take a low value.

Passenger numbers at the origin-destination level are provided by the Sabre Market Intelligence (Sabre-MI) database (Sabre, 2014) for each carrier and intra-European route. This database uses validated raw bookings from MIDT (market information data tapes) data from the global distribution systems as its main source of data, combined and adjusted with data from external sources and with estimations for increasingly important direct bookings and charter operations.

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[2] Alternatively, airline- and origin-destination-specific revenue passenger kilometres (RPK) or total revenues (REV) might be used to model the airline-specific relevance of each OD.
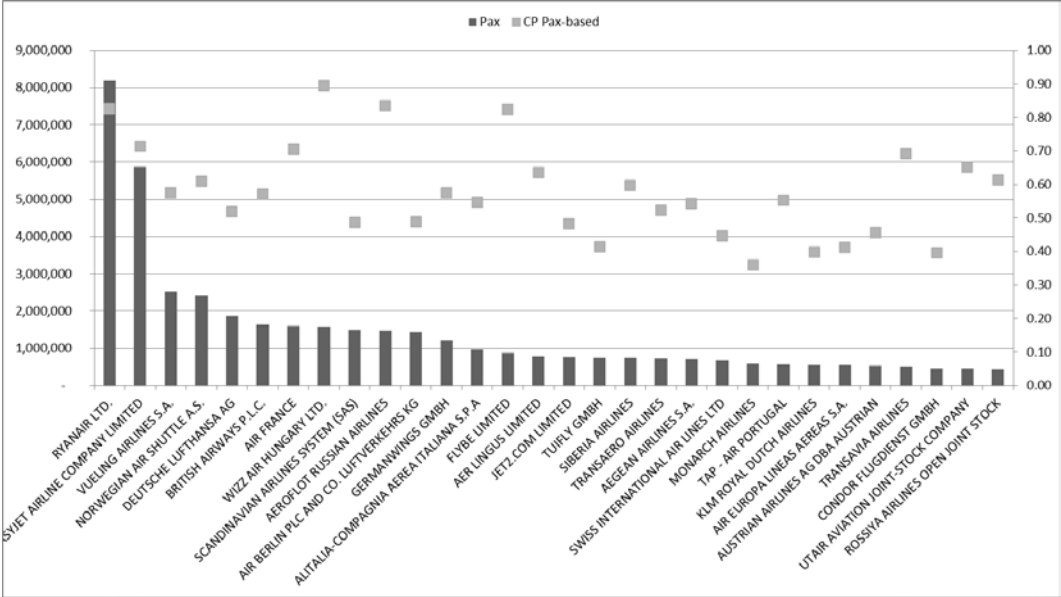
In a first step, the analysis is run at the individual airline level, not controlling for groups of airlines under the same ownership (which might not really compete against each other). In a second run, a modified dataset is used in which airlines have been aggregated to airline groups, where applicable (Table 1).

To scale the massive amount of data down, September 2015 is chosen as reference and not a full year. September is believed to be a good proxy for the annual average as this month is characterized both by solid business and leisure demand. Also, only intra-European traffic from, to and within the Sabre-MI regions Eastern Europe and Western Europe (including basically all of geographical Europe including Russia but excluding Turkey) is considered, as it is the aim of this paper to assess the competitive situations of airlines in the intra-European market. This will also allow for comparisons between LCC (which hardly serve any long haul routes) and the intra-European business of the FSNC.

4. Key Findings and Conclusion

The results show that the average CP of the Top 30 airlines (based on intra-European passenger numbers) have an (unweighted) average Competitive Position of 0.58, which however varies between 0.36 and 0.90 (Figure 1). The airlines for which a high CP value (>0.8) is reported are WIZZ Air (0.90) and Ryanair, flyBE and Aeroflot (0.83 each) implying that a large share of the passengers of these airlines have no alternative flight option between the same origin and destination airports. These results sound logical as LCCs WIZZ Air and Ryanair still operate many routes from airports that are neither served directly nor indirectly by any other carrier. Of course, especially with Ryanair who use secondary airports in some of their key cities (e.g. Stansted for London, Ciampino in Rome, Charleroi for Brussels…), the CP is supposed to decline if multiple airport regions instead of single airports are regarded as ODs. Aeroflot is the only network carrier (among the Top 30) with a CP higher than 0.80 which might be explained by the "remote" location of the carrier's hub and the large number of cities served in Russia which are not served by many other, non-Russian airlines.

Figure 1: Competitive Position of Europe's 30 largest airlines (airline-level)

It comes with no surprise that easyJet's CP (0.71) is below Ryanair's and in the same league as e.g. Air France, Transavia or Aer Lingus as these airlines serve more "mainstream" airports where route competition is higher. Air France seems to score relatively high due to a strong (monopoly) position on many French domestic routes. British Airways, Lufthansa, Alitalia or TAP are network carriers whose CP is between 0.5 and 0.6, meaning that they have a market share of slightly above 50% in the average market they serve.

Airlines with a CP below 50% have only a minor market share on the average origin-destination relation they serve, which may mean that their fares and revenues are more exposed to competition (although this paper does not contain any assessment of the relation between an airline's CP and their pricing power). Examples are holiday airlines Monarch (0.36) which has a high degree of overlapping routes with easyJet (given that Luton and Gatwick are among the biggest bases for both of them), or Condor (0.4) and TUIFly (0.41) which compete

with many carriers on routes from Germany to the Mediterranean. A surprising result is the relatively low CP of KLM (0.41). One explanation may be that Amsterdam is now well served by LCC on trunk routes.
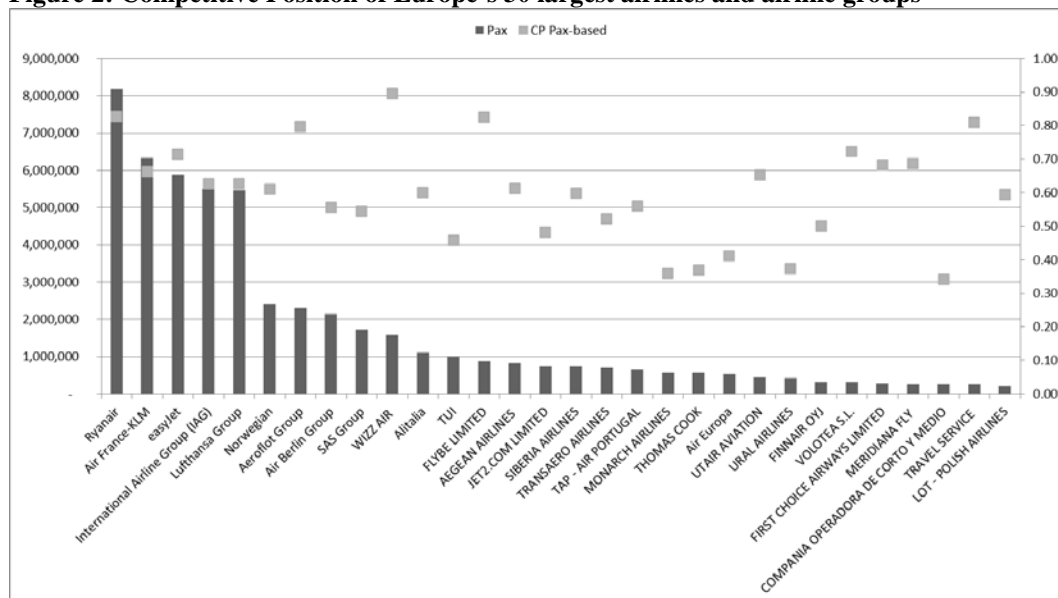
One drawback of this approach is the analysis at individual airline level, meaning that all other carriers are treated as competitors. However, in reality, many carriers are part of the same airline group, following a series of mergers, acquisitions or as a result of the formation of subsidiaries. Hence, a second model run was done, this time for a modified dataset in which airlines were merged into airline groups (Table 1):

Table 1: Airline groups

Airline Group	Airlines
Aeroflot Group	Aeroflot, Rossiya, Orenburg Airlines, Donavia
Air Berlin Group	airberlin, NIKI, Belair, LGW
Air France-KLM (AF-KLM)	Air France, Transavia Airlines, Transavia France, Brit Air, KLM, Regional, KLM Cityhopper
easyJet	easyJet, easyJet Switzerland
International Airline Group (IAG)	British Airways, Iberia, Aer Lingus, Vueling, BA Cityflyer, Open Skies
Lufthansa Group	Lufthansa, Germanwings, SWISS, Austrian, Brussels Airlines, Lufthansa Cityline, Eurowings, Edelweiss, Air Dolomiti, Tyrolean
Norwegian	Norwegian Air Shuttle, Norwegian Air International
SAS Group	SAS, Blue1, Wideroe
Sunexpress	Sunexpress, Sunexpress Germany
Thomas Cook	Condor, Thomas Cook Airlines (UK), Condor Berlin, Thomas Cook Airlines Scandinavia
TUI	TUIFly, TUI Airlines Belgium, TUIFly Nordic, Thomson Airways, TUI Airlines Nederland, Corsair

At airline group level, AF-KLM is 2nd in terms of passengers and easyJet slips to third place. The CP of AF-KLM reaches 0.66, which is higher than KLM's CP of 0.40 and smaller than Air France's CP of 0.71 when calculated separately. The CPs of the big three FSNC groups, AF-KLM, Lufthansa and IAG, are relatively close (0.66, 0.63 and 0.63, respectively).

Figure 2: Competitive Position of Europe's 30 largest airlines and airline groups

5. Conclusion

Measuring an airline's competitive position is complex as airlines serve many different (direct and indirect) markets with varying degrees of competition. Hence, networks compete against each other, meaning that the "typical" competition assessment at the airport- or (direct) route-level may not be sufficient in all cases.

Based on traffic flow data at the OD-level, provided by Sabre Market Intelligence, this paper presents an approach to assess the competitive position (CP) of airlines at the network level, considering the actual competitive positions on each single OD in relation to competing carriers, as well as the relative importance of each OD in terms of OD passengers in relation to the airline's total passenger number. Large OD markets where an airline can operate free from competition contribute with a high value to the overall CP (which can take a maximum value of 1.00), while small OD markets where an airline has only a small market share will contribute only marginally.

Results for Europe for September 2015 indicate that low cost carriers like WIZZ Air (0.90), Ryanair or hybrid carrier FlyBE (0.83 each) score highest. This means that they only face limited competition on the ODs they serve. This does also apply to Aeroflot which serves many OD pairs for which most passengers do not chose other carriers, probably for geographical reasons. Heavily exposed to competition are leisure carriers like Monarch (0.36) which has a high degree of overlapping routes with easyJet, or Condor (0.4) and TUIFly (0.41) which compete against each other and many fellow carriers on routes to the Mediterranean.

The paper also considered the airline group level, to control for common ownership of carriers. It was found that Lufthansa Group (0.63), Air France-KLM (0.66) and IAG (0.63) all score at a similar level. Our results are expected to change soon, e.g. due to the airberlin-Eurowings and airberlin-TUIFly cooperations envisaged for 2017.

Our approach might be useful e.g. for policymakers or regulators. For example, in cartel cases on mergers that might result in route or airport dominance, it could be worth looking at an airline's overall CP value (and at the simulated CP value for the merged firm) before e.g. imposing route- or airport-specific limitations. Other, topical cases for the application of this approach could be questions such as on the competitive impact of low cost carriers or gulf carriers on the European network carriers. The latter tend to complain that more and more traffic rights for Gulf carriers would mean more (and unfair) competition for them, but it should be investigated if there really is that much competition at the actually relevant OD-levels, given that the focus of FSNC like Lufthansa is on the Europe-North East Asia axis while Gulf carriers are strong to South East Asia and Oceania.

There is a range of limitations to the approach. First, only the competition intensity on the same OD-pairs is considered, neglecting any competition from similar routes operated from and/or to alternative airports. Hence, the model should be enhanced to account for this, e.g. in defining multiple airport regions. In addition, the relative importance of the ODs at the carrier level could be modelled in weighting the OD-specific competitive positions CP_{ij} with revenue shares (REV_{ij}/REV_i) rather than passenger shares, as those might better serve as proxies for the importance of each OD from the carrier's perspective. What is more, the role of alliances and joint ventures is not (yet) modelled.

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