

# Code-share agreements' effects on airline frequency of flight and airfare in the intra-African air markets

Andrea Gualini<sup>1\*</sup>, Gianmaria Martini<sup>1</sup>, Laura Ogliari<sup>1</sup>, Davide Scotti<sup>1</sup>

<sup>1</sup> *Università degli Studi di Bergamo, Italy*

## 1 Research question

Airline consolidation is currently remodeling the international airline industry. Cooperation (in its various forms) is generally found to be beneficial by air carriers. Among these various forms, cooperative marketing agreements are among the most pervasive and policy relevant (Bilotkach and Hüscherlath, 2013). Interestingly, it is precisely the lack of cooperation that has been recognized as responsible for the largely failed attempts to remove bilateral barriers to international air service in Africa (Njoya, 2016), where the enhancement of cooperation among African airlines is now recognized as one of the strategies for aviation sustainability (AFRAA, 2021).

This research project proposes examining the impact of airline cooperation on both the fares and the frequencies of service in the intra-Africa aviation markets over the 2017-2019 period. We examine the fare and the frequency levels associated to the different forms of cooperation with a focus on code-share agreements (CSAs), and particularly, in the case of frequency, on parallel code-share agreements. Parallel code sharing is intended as a code-share agreement on a route that is operated by both airlines (overlapping service). In our analysis we also focus on the complementary type of code sharing where the partner airlines do not overlap their services on the route in question. To the best of our knowledge, no previous paper on CSA focused on frequencies of intra-African flights and the evidence on African aviation industry is limited in general compared to the ones on EU and US air transport industries.

## 2 Context

Africa has an environment suitable for the development of air services. Its demography (about 15% of the world's population, spread in more than 50 countries) combined to its geography (huge distances and larger and larger urban concentrations) and to the underdevelopment of alternative transport modes are in fact ideal conditions for successfully developing aviation (Lubbe and Shomikova, 2017; Button et al., 2015).

Despite that, African continental airline markets are underdeveloped (only about 2% of global traffic) and concentrated in a few countries, with most of the airlines characterized by local orientation and

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\* Corresponding author: Andrea Gualini

inefficiency (Button et al., 2022). In other words, African airlines (and this is especially true for the Sub-Saharan ones) benefit little from economies of scope and density, and, on top of that, are often subjected to significant political interference. A contribution to make airlines' business particularly costly is also given by aspects like the high costs of aircraft acquisitions, the lack of connectivity and liberalization, the high costs of jet fuel, and the high aviation fees and charges.

As a result, air tickets in Africa cost much more compared to more developed industries like in Europe or US. When also the GDP per capita is considered, the real cost increases to the point that an African middle-class citizen cannot bear more than 1 air trip per year, compared to the about 26 in Europe and 33 in North America (The Africa Logistics, 2022).

The fact that airlines are unprofitable and unable to offer competitive fares to passengers is a dramatic obstacle to the development of the industry in many African countries. To improve the situation of airlines in Africa, the enhancement of the liberalization process of the African Skies promises to be the right way forward. In this regard, several efforts have been made over the last 30 years to improve connectivity and remove many of the rigid bilateral constraints. The Yamoussoukro Decision (YD) of 1999 is the most important agreement in this direction. Although the efforts have not been sufficient to date, the launch of the Single African Air Transport Market (SAATM) in 2018 represents a further clear attempt toward the full implementation of the YD.

As pointed out by the African Airlines Association (AFRAA), the implementation of the liberalization is important also to guarantee a favorable environment for airlines cooperation allowing them to enter into agreements providing the required commercial and operational flexibility.

Globally, the benefits from commercial cooperation (especially strategic alliance memberships and code sharing agreements) have been remarkable. On the contrary, there is currently lack of cooperation across African airlines (Button, 2022). Njoya (2016) attributes part of the failure to the past effort toward liberalization to this lack of cooperation between African carriers and airlines from elsewhere. Commercial cooperation is therefore seen as one of the keys to make intra-Africa travel convenient and affordable thanks to fare reductions and revenue increase for African carriers.

### 3 Methodology

We look at monthly traffic data combining OAG Traffic Analyzer and OAG Schedule Analyzer. We focus on one-segment and two-segment itineraries distinguishing by domestic and international flights. For each itinerary OAG provides information on (i) the operating and the marketing carriers, (ii) the average, (iii) the monthly frequency, and (iv) the number of seats. Variables identifying the type of cooperation are generated and econometric analysis is performed controlling for several factors (e.g., route and airline fixed effects, level of competition, origin/destination GDP and population, and other market and product characteristics). Endogeneity issues (i.e., route selection bias and endogenous independent variables) will be carefully addressed.

### 4 Expected results

Evidence on the distribution of the different forms of cooperation is provided through descriptive and empirical results.

Our results on fare suggest that CS generate a significant reduction in airfares with a magnitude larger than any previous results. This suggests that the impact of double markup is strong in Africa where the lack of cooperation among the airlines generates too high prices. Also, a spillover effect on airfares of interline products is identified meaning that when code sharing is introduced on a route by at least a pair of operating carriers, interline prices drop on average.

Our preliminary results on frequency, obtained ignoring endogeneity issues, suggest that, both complementary and parallel codeshare frequencies are not lower than non-codeshare ones, despite the higher level of integration that in the case of parallel codeshare we expected to result in frequency optimization, hence in a decreasing effect on it. This may suggest that African carriers, and in general airlines operating in the intra-African market, may not be able to optimize operations (i.e., frequency of flights). However, further investigation is needed to confirm/reject our preliminary findings. Possible extension of our analysis might regard the inclusion of itineraries connecting other market outside Africa as more developed markets may show different results.

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