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Toward a consolidation of the European Airline Sector: the potential merger between ITA and LuftHansa

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Motivation

After a wave of mergers in the US airline industry

- Two waves of mergers in the last twenty years in the USA.
- A first wave post 09/11. A second after the financial crisis:
 - 2005: America West + Us Airways,
 - 2008/10: Delta + Northwest,
 - 2010/12: Continental + United,
 - 2010: SouthWest + AirTran,
 - 2013: American Airlines + US Airways,
 - 2022: Jet Blue + Spirit, **blocked**.

... a new wave of mergers in the European Sector

- 2004: Air France + KLM,
- 2005/2007: Swiss + LuftHansa,
- 2010: British Airways + Iberia (IAG).
- Currently, two mergers are under investigation: LH-ITA and IAG-Air Europa.
- Other mergers will also have an impact on routes between Europe and far-flung destinations (see Korean Air's acquisition of Asiana).
- Looking forward, major carriers like TAP Air Portugal and SAS are likely to be acquired by large airline groups.

LH - ITA merger

- ITA Airways took over from Alitalia (which had a series of financial problems) during the Fall 2021. It inherited the brand name, the slots, part of the fleet and part of the working force.
- Beginning of 2023, Italian Ministry of Economy (MEF) and LH conclude the Lufthansa's investment agreement in Ita Airways to acquire a minority stake.
- Lufthansa is likely to execute the takeover in a few steps: acquiring about a 41% stake of ITA Airways (325 millions euros); will have the option of taking over the remaining part of ITA Airways.
- According to MEF, this merger will *"allow the growth and renewal of the fleet, which at the end of 2027 will count on 94 aircraft compared to the current 71, with an average age of five years, and will guarantee the optimization of consumption and environmental impact. The workforce, which is expected to grow to 4,300 employees this year as a result of the 1,200 hires currently being finalised, will rise to over 5,500 units at the end of the Plan."*

- On January 2024, the Commission opened an in-depth investigation (case M11071).
- On short-haul route, the merger may reduce competition, in particular the OD markets between Italy and countries in Central Europe (also considering routes where one of the parties is already offering services and the other is expected to enter soon).
- On long-haul routes between Italy and North America, the Commission will assess further whether the activities of ITA, Lufthansa and its joint venture partners United Airlines and Air Canada should be treated as those of a single entity after the merger. Merger could reduce competition between Italy and the US, Canada, Japan and India, due to close competition between ITA, Lufthansa or Lufthansa's joint venture partners.
- Merger could strengthen ITA's dominant position at the airport Milan-Linate (ITA: 45.5%, LH:54.5% on Linate-Frankfurt but LH 3.5% of pax in Linate vs 56% for ITA).
- The green light decision should be announced today !

Horizontal merger analysis

Our objective

- Estimate a structural model of demand and supply in order to simulate post merger scenarios and evaluate the impact of this merger on future European travelers, especially on markets to/from Italy. This work is still at a preliminary stage. We focus on the intra Europe market.
- Two main challenges:
 - Find the right model for the demand and supply. Today, I present preliminary results with a nested logit for the demand part and a standard Bertrand-Nash pricing for the supply part. We work on improvements (introducing heterogeneity, modeling alliances, etc.)
 - Repositioning of products post-merger. There exist some works, recently developed for the airline industry. They are still challenging in terms of inference procedure. Here, we aim at constructing coherent post merger scenarios to alleviate the numerical burden.
- We use data purchased from IATA, which are similar to OAG and provide us, for each quarter, which airlines sell how many tickets on which market. See more details in the data summary section.

(Small) Literature review

- Vast theoretical literature on merger evaluation. Williamson (1968), Farrell and Shapiro (1990), Werden and Froeb (1994, 2003), Miller and Weinberg (2017).
- Ex-ante merger analysis with structural model: Hausman, Leonard and Zona (1994), Nevo (2001), Ivaldi and Verboven (2005), Bjornerstedt and Verboven (2016), Benkard, Bodoh-Creed and Lazarev (2020), etc.
- Structural models for the airline industry: Berry, Carnall and Spiller (2006), Armantier and Richard (2008), Berry and Jia (2010), Ciliberto and Williams (2014), Ruiz-Perez (2019), Gayle and Yimga (2018), Bontemps, Remmy and Wei (2022), Bontemps Martini and Porta (2024).
- Repositioning in the airline industry: Ciliberto, Murry and Tamer (2022), Yuan (2020), Li et al. (2022), Bontemps, Galdani and Remmy (2024).
- other references including quality, like Forbes and Lederman (2010), Prince and Simon (2017), Rupp and Tan (2019) etc .

Model and data

Our data set

- Data provided by IATA. We collect the OD passengers from 1st of July 2022 to 30st of June 2023.
- Information given for each product (a trip from city O to city D with a given airline with or without one stop) is: ticketing airline, operating airline, identity of the connecting airport, distance, origin, destination, quantity of passengers and mean price paid to the airline.
- We focus on the top 84 cities and collect population of the metropolitan areas from Eurostat (pop, > 1 million inhabitants).
- Markets are directional, i.e. TLS-LIS and LIS-TLS are two different markets.
- We show some summary statistics in the next slide

City market averages

	Mean	Std.
No. of products	2.334	1.613
No. of carriers	2.114	1.288
No. of direct passengers	77,651	143,919
No. of connecting passengers	1,236	2,473
No. of FSC passengers	33,109	75,218
No. of LCC passengers	45,778	90,757
Prob not flying	0.973	0.038
Dist. in 000 kms	1.258	0.603
No. of city arrivals	41	16
No. of city departures	41	16
No. of city markets	3,478	

Product averages

Variable	Unweighted		Weighted by pax	
	Mean	S.D.	Mean	S.D.
pax	33,797	46,848		
price	120.016	43.490	108.365	41.859
direct	0.821	0.383	0.984	0.124
direct_fsc	0.351	0.477	0.405	0.491
distance (000)	1.304	0.602	1.117	0.548
hub_origin	0.223	0.416	0.311	0.463
lcc	0.478	0.500	0.580	0.494
s_j	0.012	0.015	0.029	0.028
$s_{j f}$	0.428	0.345	0.456	0.286
ryanair	0.193	0.394	0.263	0.440
easyjet	0.072	0.259	0.120	0.325
other_non_allied_lcc	0.177	0.382	0.166	0.372
oneworld	0.066	0.249	0.090	0.285
star	0.286	0.452	0.195	0.396
skyteam	0.098	0.297	0.102	0.303
lufthansa	0.102	0.303	0.053	0.224
ita	0.021	0.143	0.022	0.147

- Nested Logit demand with 2 nests (airline products, outside option)
- Market: undirectional city-pair (PAR-LIS)
- Product: airline-itinerary combination (CDG-LIS via MAD by IB)
- Utility that individual gets from buying in market m

$$\text{product } j: U_{i,j,m} = X_{j,m}^T \beta - \alpha P_{j,m} + \xi_{j,m} + \nu_{i,m}(\lambda) + \lambda \epsilon_{i,j,m}$$

$$\text{outside option } 0: U_{i,0,m} = \epsilon_{i,0,m}$$

- $X_{j,m}$ includes (so far) distance, dummy for direct flight - FSC, dummies for LCCs

Demand Equation

- With $\delta_{j,m} = X_{j,m}^\top \beta - \alpha P_{j,m} + \xi_{j,m}$, the model predicts the market shares of the outside option, $s_{0,m}$, as well as the market shares of the air products, $j = 1, \dots, J_m$, $s_{j,m}$:

$$s_{0,m} = \frac{1}{1 + \left(\sum_{k=1}^{J_m} e^{\delta_{k,m}/\lambda} \right)^\lambda}, \quad \text{and} \quad s_{j,m} = \frac{e^{\delta_{j,m}/\lambda}}{\sum_{k=1}^{J_m} e^{\delta_{k,m}/\lambda}} (1 - s_{0,m}).$$

- It yields to a demand equation which links equilibrium quantities, i.e., prices and market shares:

$$\xi_{j,m} = \log \left(\frac{s_{j,m}}{s_{0,m}} \right) - \left(X_{j,m}^\top \beta - \alpha P_{j,m} + (1 - \lambda) \log \frac{s_{j,m}}{1 - s_{0,m}} \right).$$

- The demand parameters are estimated from the normal equations

$$E(\xi_{j,m} Z_{k,j,m}) = 0, \quad k = 1, \dots, K. \quad (1)$$

in which the Z_k s are instruments, e.g., the X s, (at least) a cost shifter and some BLP instruments.

Bertrand-Nash pricing with constant marginal costs

- Complete information
- Firms simultaneously set prices to maximise variable profits

$$\text{profits of firm } f: \sum_{m=1}^M \sum_{j=1}^{J_{f,m}} (P_{j,m} - MC_{j,m}) \times s_{j,m}(X_m, P_m, \xi_m; \theta_d) \times Msize_m$$

- F.O.C.

$$MC_{f,m} = P_{f,m} + \left(\frac{\partial s_{f,m}(X_m, P_m, \xi_m; \theta_d)}{\partial P_{f,m}} \right)^{-1} s_{f,m}(X_m, P_m, \xi_m; \theta_d)$$

$$\text{where } \left(\frac{\partial s_{f,m}(X_m, P_m, \xi_m; \theta_d)}{\partial P_{f,m}} \right)_{j,k} \equiv \frac{\partial s_{j,m}(X_m, P_m, \xi_m; \theta_d)}{\partial P_{k,m}}$$

- It allows us to estimate marginal costs of the products proposed in a given markets and to regress them on observed characteristics

$$MC_{j,m} = W_{j,m}^T \psi + \omega_{j,m}.$$

Remark that OLS is possible at this stage.