Economic impacts of Business Aviation in Europe

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Picture: Sven Maertens

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Overview

1. Motivation & Research questions
2. Definition of Business Aviation & previous research
3. Employment and GVA effects of Business Aviation in Europe
4. Connectivity-related benefits
5. Conclusions & Scope for further research

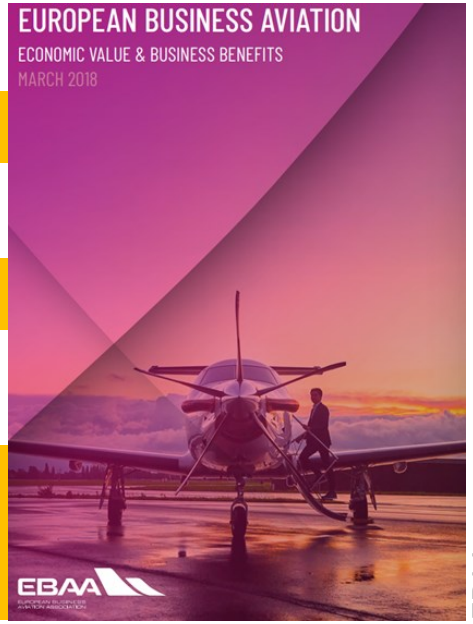
1. Motivation / Research questions

- **Economic footprint** of scheduled air transport (=mainline aviation) well discussed in the academic literature and other studies
- **Business Aviation** hardly dealt with at the academic and political levels
- Lack of knowledge on the sector‘s impacts, except for some outdated studies

→ Completion of an EBAA-financed study on the sector

→ Scope: Europe (EU/EFTA) 2015, update: 2017

→ **„What is Business Aviation, and what benefits does it provide for the society and its users?“**



Picture: EBAA

2. Definition of Business Aviation & previous resaerch

What is Business Aviation (BA)?

Civil Aviation

Commercial Aviation		Non-commercial Aviation	
Scheduled services and holiday charters	On-demand air (transport) services by commercial operators	In-house, own-account air services of firms	Other private, leisure and hobby flying
Examples: Air France Paris-New York, Logan Air Barra-Glasgow, BH Air charter Düsseldorf-Varna...	Examples: Air taxi service, medical flights, aerial work on behalf of third parties...	Examples: Employee air shuttle operated by employer, commercial flight school...	Examples: non-profit sightseeing flights, flight school activities...
Typical aircraft: Regional aircraft and airlines (20-500+ seats)	Typical aircraft: Helicopters, small turboprops and business jets (<20 seats)	Typical aircraft: Helicopters, small turboprops and business jets (<20 seats)	Typical aircraft: Piston and (ultra) light aircraft, balloons, gliders...

BUSINESS AVIATION



Pictures: Sven Maertens, Paul Hailday (Wikipedia)

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BUSINESS AVIATION

Additional stake-holders in the BA system:

- aircraft owners
- maintenance, repair and overhaul ("MRO") firms
- fixed-base operators ("FBO")
- airports and airfields with BA focus
- air charter brokers
- consultants and market intelligence
- manufacturers of business aircraft and parts

Possible definitions:

- "non-scheduled and non-military flying for business purposes" (NBAA)
- On-demand, non-public air services except for private and leisure flying (own)

2. Definition of Business Aviation & previous resaerch

Previous research on BA

Coverage of business aviation in the academic literature on (air) transport economics, management and geography (based on the keywords "Business Aviation" and "Business Charter") (as of Oct, 2018)

Journal	Focus	Total # of research articles	Of which on business aviation	Of which on "Low Cost Carrier", "Commercial Airline" and "Airport"
Journal of Air Transport Management	"major economic, management and policy issues facing the air transport industry"	1,301	3	136/15/583
Journal of Transport Geography	"geographical dimensions of transport, travel and mobility"	1,693	1	25/0/125
All ~3,800 journals listed in ScienceDirect		~15 Mio.	7	310/108/4,753

Specific BA topics like:

- Worldwide distribution of business aircraft fleet (Budd and Graham, 2009)
- Impact of slot shortages and capacity constraints on BA airport choice (Berster, Gelhausen and Wilken, 2011)
- User awareness and preferences (Kaps, Gardner and Hartung, 2001; Yen and Chen, 2017).
- BA flight operations issues (Pazourek and Václavík, 2017)
- Only marginal focus on BA, e.g. in the context of a Delphi-study on the future of the aviation industry (Linz, 2012) or of a study on the development of Warsaw Airport (Tloczynski, 2016).

BA is virtually non-existent in the academic transportation literature.

2. Definition of Business Aviation & previous resaerch

Previous research on BA

Selected (industry) studies on BA

Content / Category	Authors, Year	Regional Focus
Forecasts	Business Aircraft Market Forecast, Bombardier, 2016 Global Business Aviation Outlook, Honeywell, 2017 10 year business aviation market forecast, Jetcraft, 2017	Global
Market overview, geography, trends	The Role of Business Aviation in the European Economy, Oxford Economics, 2012 Business Aviation in Europe 2009, Eurocontrol, 2010	Europe
Market overview and trends, key economic benefits	Business Aviation Factbook series, NBAA, 2014	USA
Macro-economic impacts (I-O-analysis)	The economic impact of business aviation in Europe, PricewaterhouseCoopers, 2008	Europe

→ Up to date economic impact data for Europe needed

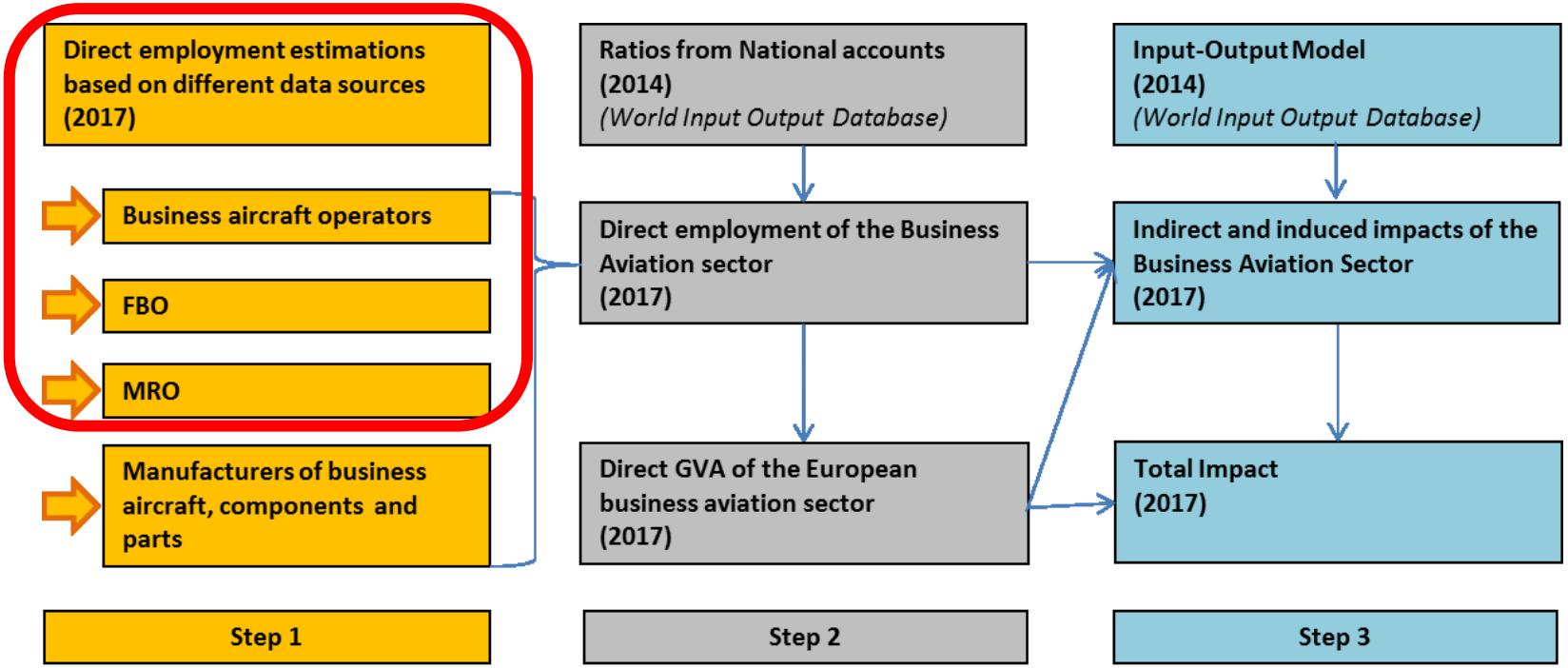
→ Joint Booz Allen Hamilton / DLR studies on behalf of EBAA in 2016 and 2018

- Not only assessment of direct, indirect and induced effects along the value chain
- But also estimations for the actual travel time savings and for the increase in productive work time

3. Employment and GVA effects

Methodology and Data

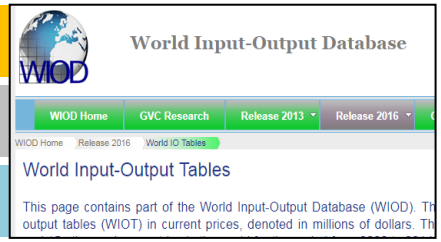
Overview



Bottom-up collection of BA employees (2017)

Use of WIOD (2016 release, 2014 data) to estimate GVA

Use of WIOD to estimate indirect and induced effects

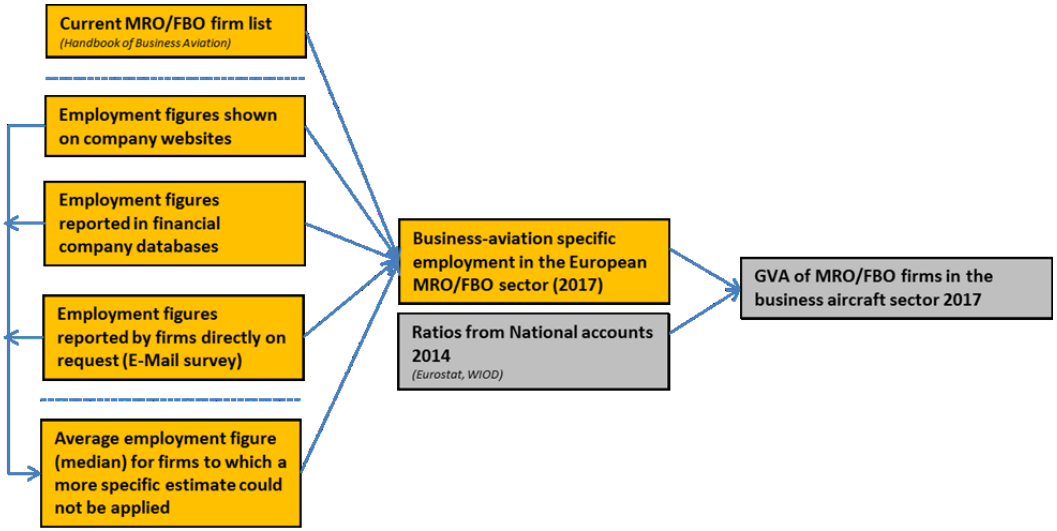


3. Employment and GVA effects

Methodology and Data

Example A: Step 1 – Direct employment and GVA of Business Aircraft Operators

Example B: Step 1 – Direct employment and GVA of MRO/FBO

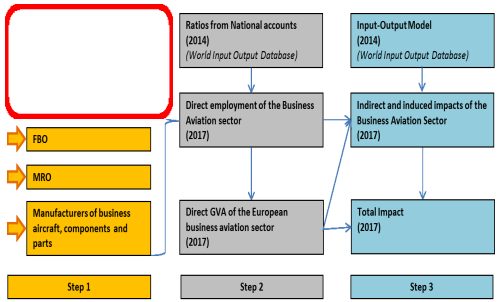


Bottom-up collection of employees

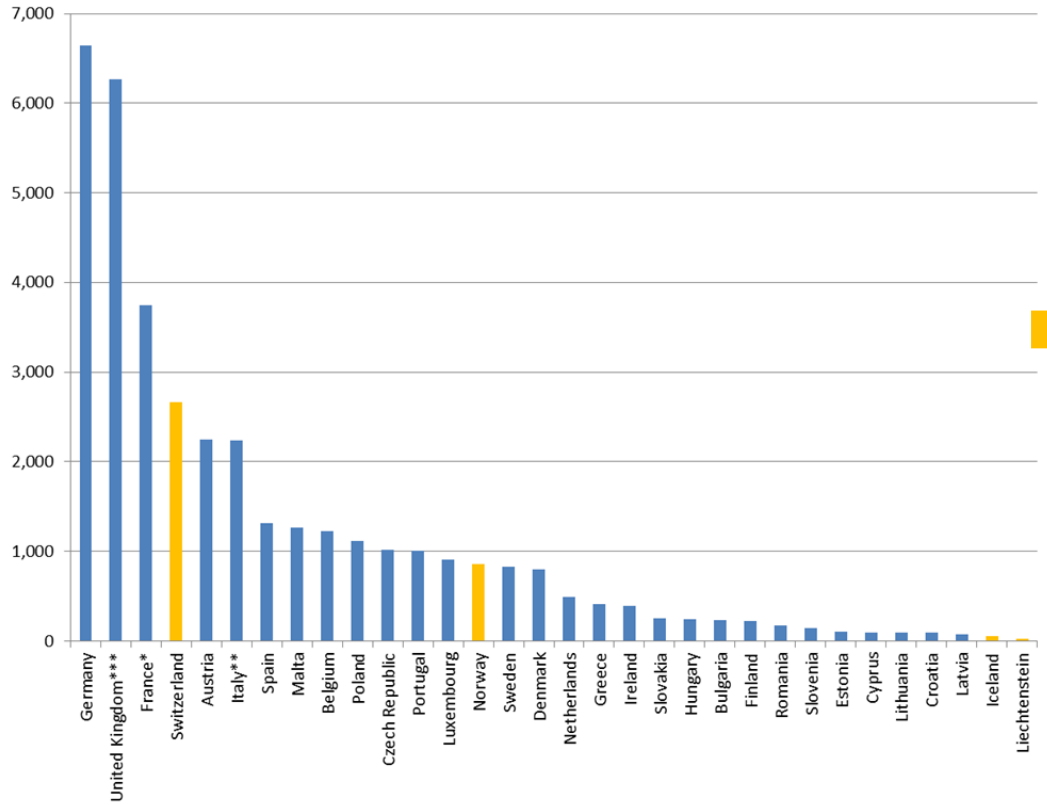
Use of WIOD (2016 release) to estimate GVA

3. Employment and GVA effects

Results



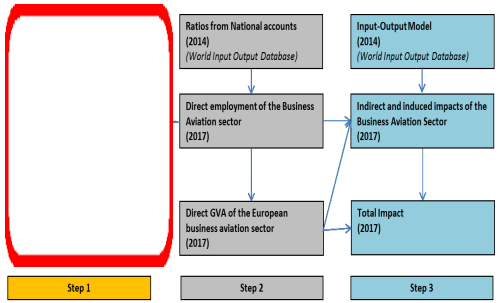
Example A: Direct employment of Business Aircraft Operators (2017)



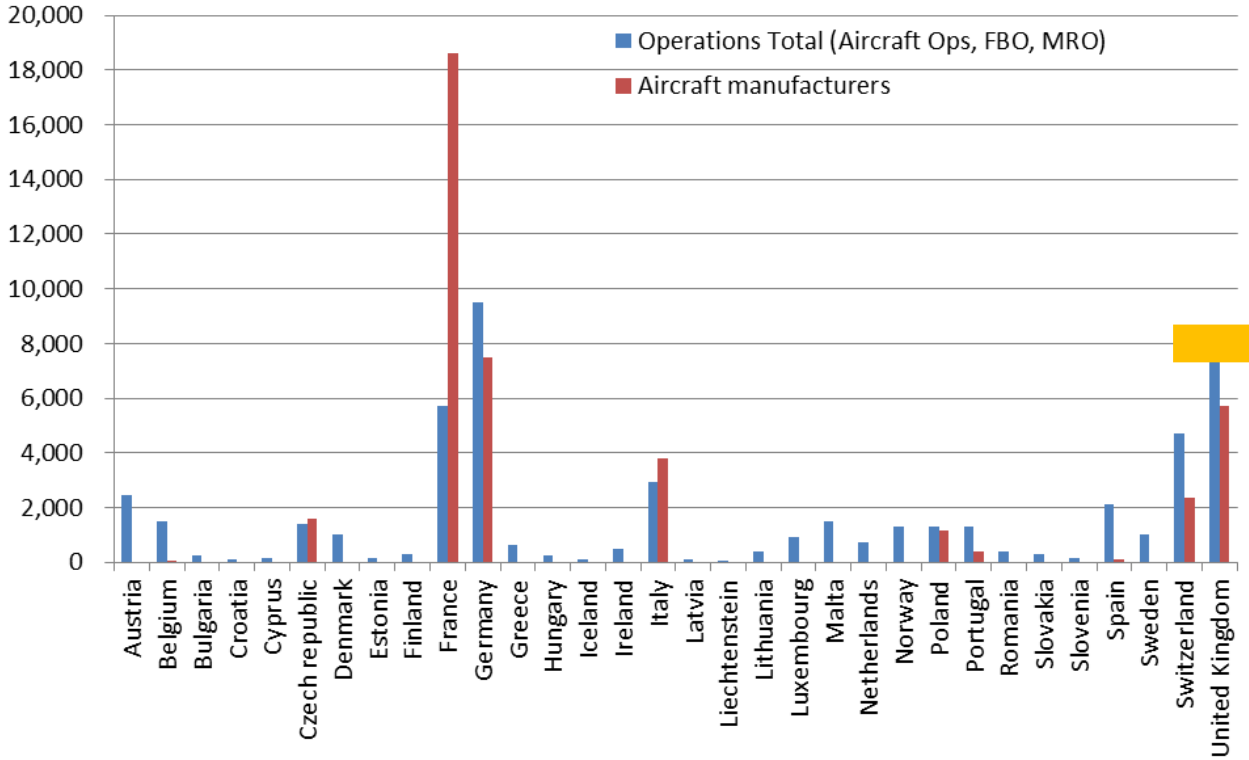
37,233 employees with business fixed-wing aircraft and helicopters in 2017
(33.6k of which in EU28)

3. Employment and GVA effects

Results



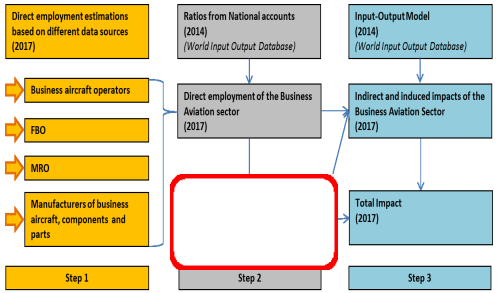
Total direct employment in the European business aviation sector (2017)



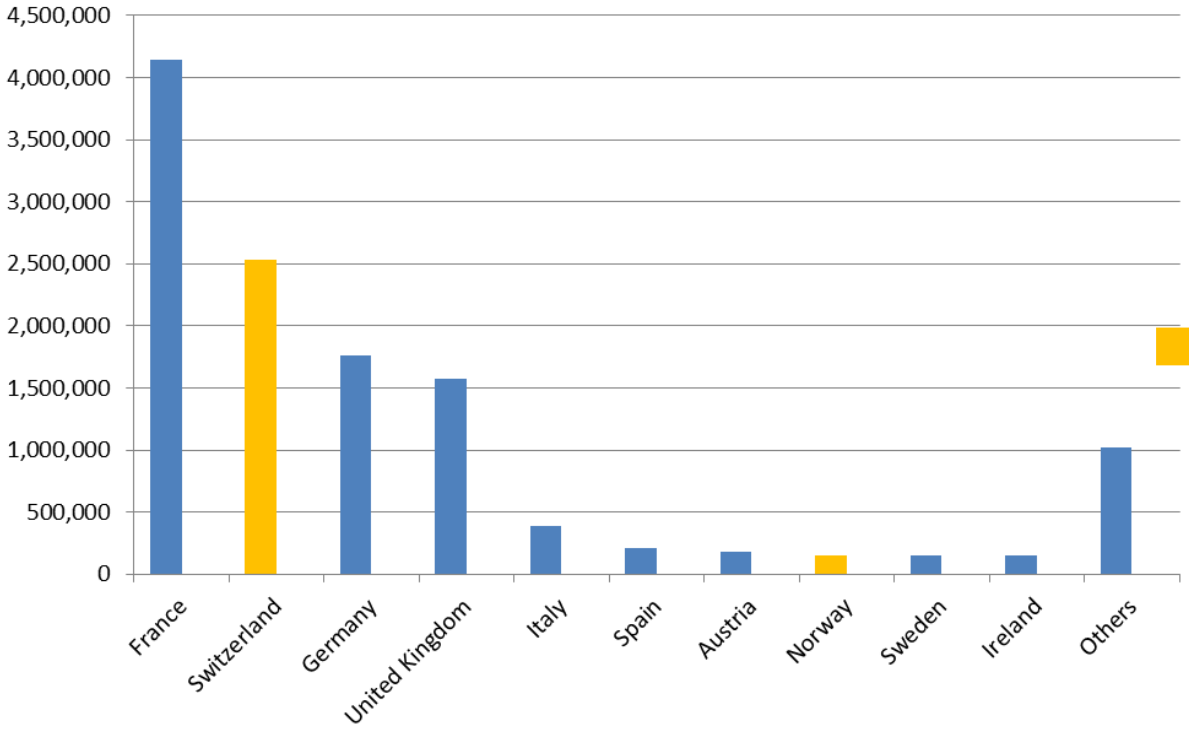
France is leading in BA manufacture, while Germany and the UK have the highest shares in employment in BA operations

3. Employment and GVA effects

Results



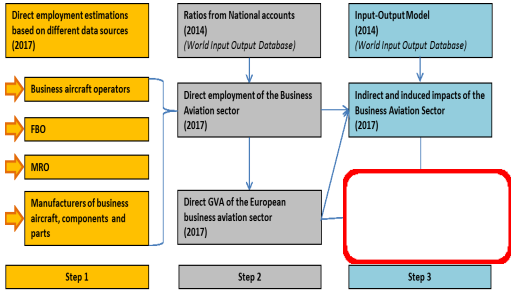
Total GVA in the European business aviation sector (2017)



France ranks first with a GVA of more than EUR 4 bn, but Switzerland follows with a GVA of about EUR 2.5 bn, which may reflect a relatively high labor productivity of the Swiss business aviation sector.

3. Employment and GVA effects

Results



Total employment in the European business aviation sector (direct, indirect, induced; 2017)

Level	Aircraft ops	FBO/ Handling	MRO	Ops (total*)	Aircraft & parts	Total
Direct	37,233	2,683	11,644	51,560	41,238	92,798
Indirect	100,737	2,749	10,788	114,274	113,337	227,610
Induced	23,048	712	2,714	26,475	27,161	53,635
Total	161,018	6,144	25,147	192,309	181,735	374,044

In total, some 374,000 European jobs are directly or indirectly dependent on the European Business Aviation sector, a number which exceeds the total number of jobs e.g. in Cyprus.

4. Connectivity-related benefits

- Impact of BA on **business efficiency** of its users discussed in a number of studies (e.g., Andersen, 2001, PricewaterhouseCoopers, 2008, or Oxford Economics, 2012).
- **Travel time savings** and **more seamless connections**, stemming from…
  - “à la carte” nonstop connections on city pairs that are not sufficiently served (directly) by scheduled air transport,
  - higher flexibility.
- We present and apply a methodology to quantify these effects for the European Business Aviation sector.

4. Connectivity-related benefits

Travel time savings

- Data science approach
- Comparing each trip from a sample of over 800,000 BA flights (2014) against the best scheduled alternatives

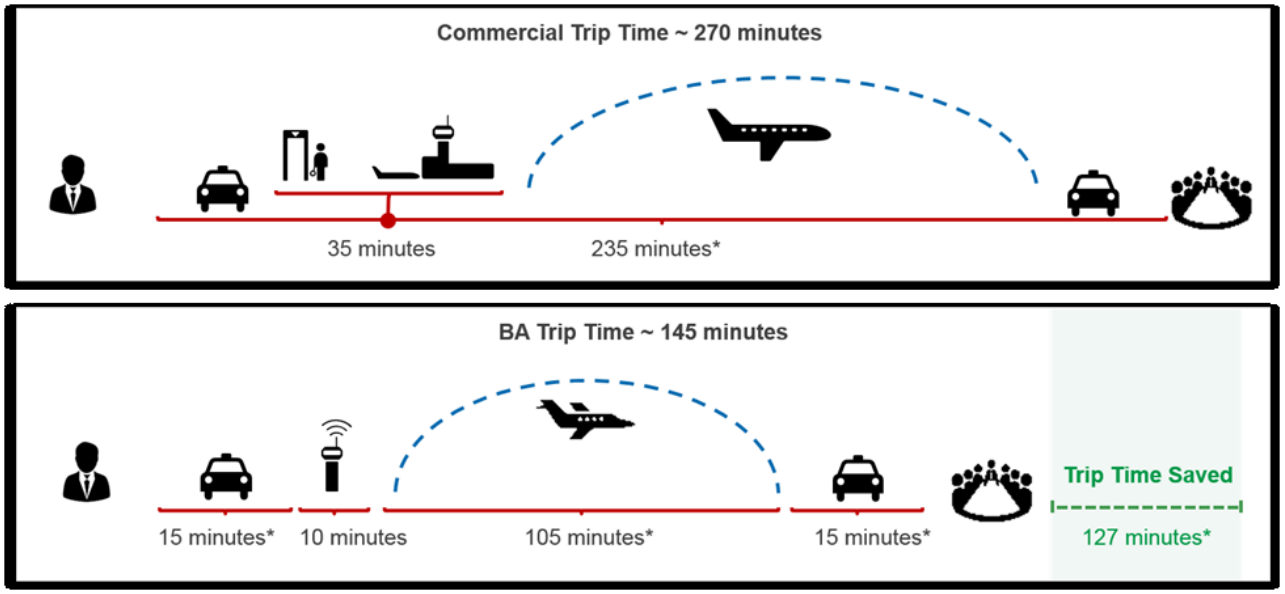
Biz Aviation itineraries	Scheduled alternatives
• Dataset: Full sample of BA flight 2014 from WingX • Total trip time estimation: Ground access/egress time estimate + handling/waiting time estimate + actual flight time	• Travel times provided by Rome2Rio.com. • Consideration of ground transport like HST • Addition of 35min check-in time to scheduled flight times

- Computation of cumulative and average time savings

4. Connectivity-related benefits

Travel time savings

Results (2014)



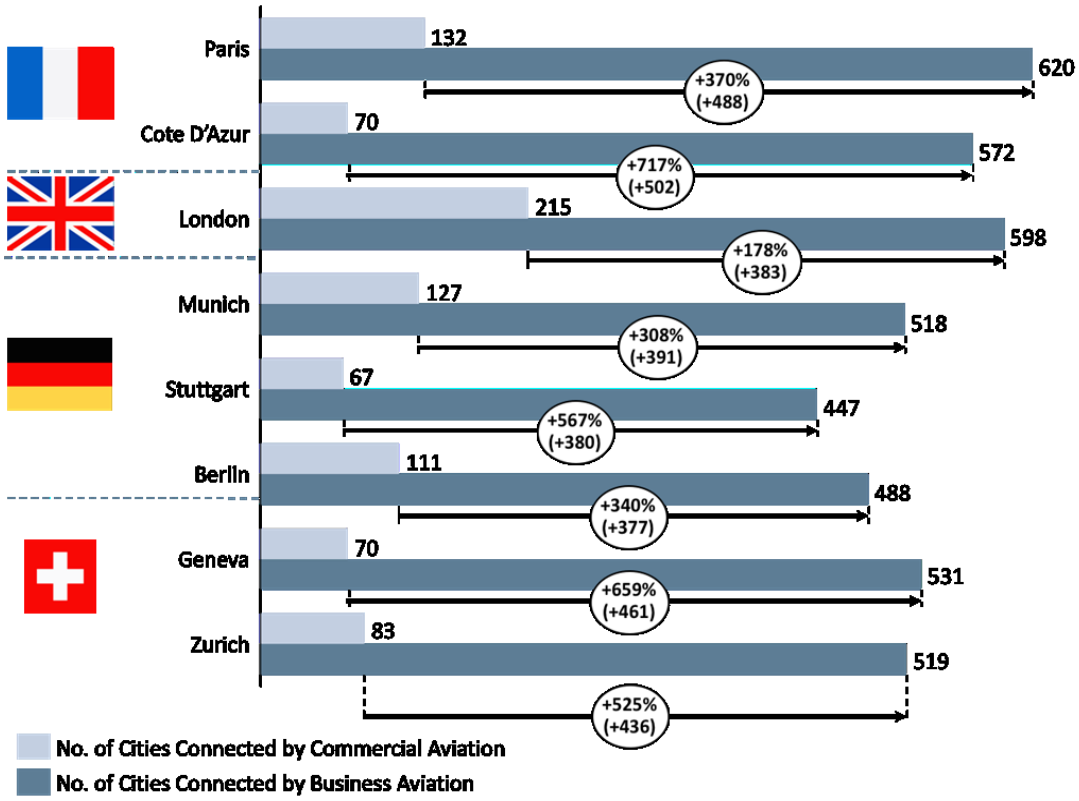
- Average travel time saving stemming from business aviation of about 127min.
- Average time savings for multi-city trips of 6 hours and 33 minutes + 15 Mio. € for hotel cost savings.
- More productive worktime (153min per flight; 800k trips; 4.7 pax/flight) = 3,100 full-time equivalents

Picture: Booz Allen Hamilton

4. Connectivity-related benefits

Improved regional connectivity

Results (2014)



800,000 BA flights on some 81k different European city pairs, of which 25,280 (31%) are not connected nonstop by scheduled air transport.

Strong connectivity benefit even for large metropolitan regions, ranging from 178% (London) to over 700% (Côte d'Azur).

Picture: Booz Allen Hamilton

4. Conclusions and Limitations (1)

- **European business aviation supports some 374,000 jobs** - directly or indirectly.
- These create **EUR 32bn in GVA**, which equals the total GVA of Latvia (0.19% of the EU GDP).
- **France, Switzerland, Germany and the UK as main locations** for the sector, representing 76% of the total GVA.
- BA enables **travel time savings of ~127 min per trip** compared to scheduled transport, plus additional advantages like higher flexibility.
- 1/3 of all BA flights provides **connectivity to city-pairs not directly served** by scheduled (air) transport.
- **BA even improves connectivity of large metropolitan areas** like London, Paris or Munich (by, on average, 450%).

4. Conclusions and Limitations (2)

- Certain **limitation of I-O results** as national account **data for superordinate sectors had to be applied to the BA sector**.
- **“Classical” limitations of I-O**, like the risk of misuse for investment decisions.
- **Underestimation of travel time benefits**
  - **No modelling of additional advantages** like higher flexibility
  - E.g., we have assumed that the fastest commercial alternative would leave the point of origin at exactly the same time as the BA option. In reality, so-called scheduled delay is likely to occur.
- **Better knowledge on the actual purpose and structure of BA flights needed** (*“traveller survey”*) for the modelling of **user benefits**

Thank you!