

ECONOMIC IMPACT OF
BUSINESS AVIATION IN EUROPE



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» CHAPTER 2: BUSINESS AVIATION ENABLES BUSINESS EFFICIENCIES

This study's economic impact analysis identifies:

- *The average time that can be saved using a Business Aviation flight rather than the fastest commercial counterpart is 127 minutes per trip;*
- *About 20% of Business Aviation flights are more than 5 hours faster than their closest commercial alternative (though most trips save time, with the average of 127 minutes per trip);*
- *With time savings of 127 minutes/trip, an average company saves about 1,380 man-hours annually, about 0.75 of a full-time equivalent;*
- *The productive work time produced by each employee flying with Business Aviation per single trip is 155 minutes higher than the productive work generated flying on a commercial flight; and*
- *Approximately 16,000 multi-trip Business Aviation itineraries with three or more flights per day were performed. This saved on the order of 75,000 overnight hotel stays and € 15M in hotel costs.*
- *Business Aviation may, in some cases, be less costly than commercial travel, given an average cost per passenger of € 1,793 for a Business Aviation flight leg.*

BUSINESS AVIATION EFFICIENCIES

EMPLOYER BENEFITS	EMPLOYEE BENEFITS	CLIENT & CUSTOMER BENEFITS
<ul style="list-style-type: none"> • <i>Increased employee productivity in transit</i> • <i>Increased reach in expanding markets</i> • <i>Increased client interaction and satisfaction</i> • <i>Reduced hotel and airfare costs</i> 	<ul style="list-style-type: none"> • <i>Faster travel allowing employees to return home sooner</i> • <i>Perception of increased safety and security</i> • <i>Increased comfort and reduced stress when traveling</i> 	<ul style="list-style-type: none"> • <i>Faster access to business partners and support</i> • <i>Seamless connection of partners and vendors through increased transport reliability</i>

As discussed in the Literature Review in the Preface, a cornerstone benefit of Business

Aviation is enabling efficiency in transportation. Business Aviation reduces both travel times and travel burdens, allowing Business Aviation users to complete their travel objectives more quickly, securely, and smoothly. Business Aviation may also reduce cost as compared to commercial aviation, especially in cases where many executives are traveling on first class or business class tickets. For business and employee travel, Business Aviation leads to increased business efficiency, which leads to the flow of millions of Euros annually into the European economy.

While teleconferencing technology continues to improve, previous studies, such as the ones by Andersen [2,3] and Oxford Economics [8], have reported that face-to-face meetings are integral to the success of business deals. For example, Oxford Economics [8] conducted surveys of executives and reported that two thirds of respondents stated that face-to-face contact was integral in deal-making.

Business Aviation generates business efficiencies that impact three key stakeholder groups: Employers, Employees, and Customers/Clients.

- **Employers:** Using Business Aviation, employees spend less time traveling and are able to reach new markets, may visit multiple sites in a short timeframe, and may work to complete more business deals, all serving to drive the European economy;
- **Employees:** Business Aviation reduces travel times and burdens and allows employees to travel in more comfort and return home to their families sooner; and
- **Customers/Clients:** Business Aviation allows support to arrive more quickly so customers are able to get their problems resolved much faster, allowing European businesses to operate at high efficiency.

In short, increased employee productivity, elevated employee happiness and increased customer satisfaction all arise from increased business efficiency and lead to increased economic value.

Impacts on each of these stakeholders are briefly described.

Employer Benefits

Business Aviation allows for increased productivity in transit and increased productivity from reduced transit times.

- With Business Aviation's shorter travel times, employees are more productive as they can work additional hours instead of spending time in long transits to commercial

airports or in long layovers between commercial airports; and

- Project teams are able to work in the security of the aircraft and discuss sensitive topics without fear of being overheard and on-board facilities are better suited to meetings and collaborative work than public commercial airport areas.

Business Aviation provides expanded reach to and increased connectedness with current and potential customers.

- Commercial aviation travel times and published flight schedules limit the number of customers employees can reach in one day (if long travel times are required to get to a site) or on any given day (if no commercial flights are available on that day);
- Business Aviation enables companies to stay connected with their plants located in remote regions, which enables them to organize their businesses in the most efficient ways and to leverage cost saving potentials and competitive advantages from various regions across Europe; and
- Previous studies, such as that by Andersen [2], have demonstrated that reduced travel times make it economical for executives to travel to new markets, bringing additional business to Europe and allowing Europe to compete in the global economy.

Business Aviation increases client interaction and drives client satisfaction.

- Additional face-to-face meetings that executives are able to have as a result of Business Aviation are considered as being tremendously important to driving business. In other words, according to Business Aviation users, teleconferencing technology is not sufficient to replace face to face meetings;
- Employees are able to visit multiple sites in a short timeframe, allowing a company's project team to meet a customer every day of the week, driving customer satisfaction up and increasing returns to the company; and
- Employees can meet many clients in different cities through one-day multi-city trips. Such travel is impossible with commercial aviation and forces employees to stay in hotels overnight while traveling instead of returning home.

Business Aviation enables businesses to reduce costs.

- Employers may reduce hotel costs and associated per diem expense through one-day multi-city trips; and
- Employers may avoid purchasing expensive business and first class tickets for traveling executives.

In short, employers benefit from Business Aviation through increased productivity, increased reach in expanding markets, increased client interaction, and potentially reduced costs. These benefits increased business efficiency of Business Aviation over commercial aviation.

Employee Benefits

Business Aviation reduces travel times and allows employees to return home sooner.

- Direct point-to-point flying allows employees to return home earlier, especially if they are able to complete the week's travel schedule in fewer days by visiting more destinations in a single day; and
- Employees more reliably return home at times planned for and expected due to reduced likelihood of travel delays from airport and airspace congestion.

Business Aviation increases perception of security for employees.

- Employees avoid public areas of commercial airports, potentially allowing employees to feel more secure; and
- A smaller number of passengers are transported with a Business Aviation flight than a commercial one, allowing greater care and attention afforded to the safety and the security of the crew [12]

Business Aviation provides employees with increased comfort and reduced stress.

- Employees travel in comfortable conditions, often surpassing commercial alternatives;
- Employees fly point-to-point with no connections and are likely to be using less congested airports with quick check-in and security times. Along with reduced delays, employees have a less stressful traveling experience; and
- The increased comfort and reduced stress drive employee happiness and leads to a higher quality of life than a "road warrior" employee frequently flying commercial.

For employees, Business Aviation promises the ability to return home earlier and more reliably, increases the perception of safety and security, and allows employees to travel in comfort, empowering the excellent work-life balance that distinguishes Europe in the global workplace.

Customer and Client Benefits

Business Aviation allows for increased agility in responding to client's needs.

- Third-party contractors, vendors and support staff are much more responsive to any issues arising at an office, plant, or work site;
- With no risk of flights being sold out and a much reduced chance of delays due to strikes or other disruptions, a customer can reliably get help immediately when needed. Dedicated maintenance personnel can be dispatched to any site at any time and vendors can respond quickly to product difficulties; and
- Customers may be reassured that their issues are heard as partner executives can quickly respond to emerging problems or explore new directions for work, building the client/vendor relationship.

Business Aviation allows for the seamless connection of partners and vendors through a transportation schedule that revolves around the business.

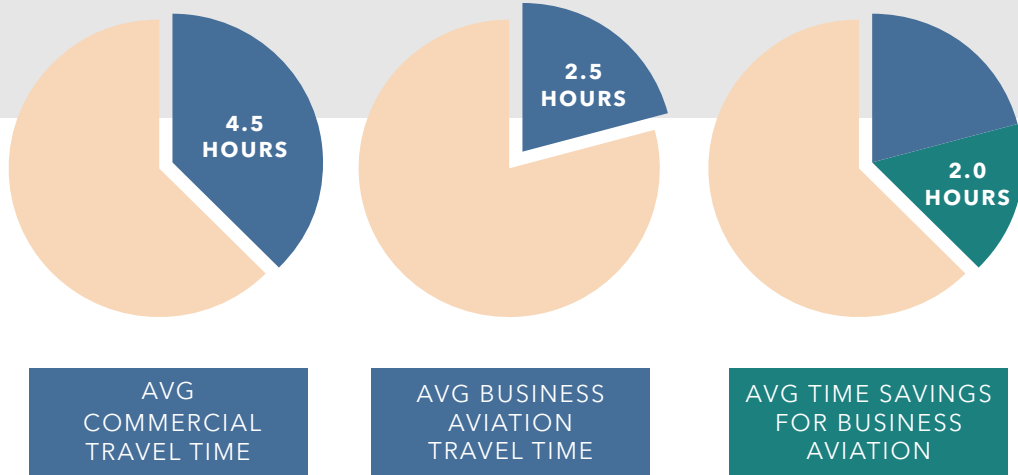
- Without the constraints of commercial aircraft schedules and the increased reliability of transportation options, Business Aviation users can stay on site as long as necessary to work through problems or generate ideas; and
- Business Aviation allows customers and clients to be connected to the global economy, wherever they may be located in Europe or abroad.

For customers and clients, Business Aviation provides business agility and seamless partnerships on a global level, providing a major advantage over other means of travel.

Efficiency Metrics

KEY FINDING

Business Aviation leads to large time savings for its users, saving an average of 127 minutes per flight over commercial aviation



Business Aviation itineraries were analyzed in order to quantify key metrics representing much of the value of Business Aviation. These metrics are described in the beginning of this report. Summarized here, results are presented in greater detail in the Detailed Discussion and Methodology Section.

Business Aviation in Europe saves an average of 127 minutes over commercial travel, or just over 2 hours. 800,000 fixed-wing Business Aviation flights in Europe in 2014 are compared against the fastest commercial alternatives, averaging the time savings per flight. Figure 6 summarizes the total trip time for Business Aviation.

BUSINESS EFFICIENCY METRICS

Total time saved allows users of Business Aviation to be as efficient as 2,600 FTE

In 20% of trips, Business Aviation saves **more than 5 hours** over commercial travel

Business Aviation saved **€ 1.20bn** of employee time in 2014

From reduced delays, Business Aviation users **save about 1,825** days annually

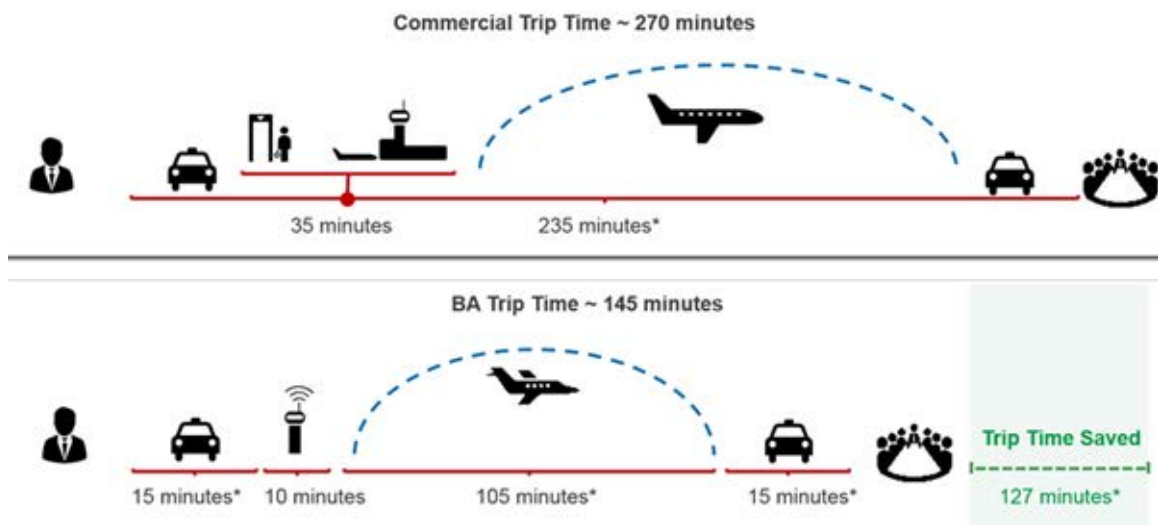


Figure 6: Average travel times for Business and Commercial Aviation, highlighting longer commercial travel time and 127 minute time savings for Business Aviation

Figure 7 shows that the aggregated time savings over 800,000 fixed-wing flights is 539 years. The calculation uses proprietary data from a major Business Aviation broker which specifies an average of 4.7 passengers per Business Aviation flight as well as EBAA data indicating that 41% of all Business Aviation flights in 2014 were empty leg flights, which cannot be considered in this analysis. [13]



Figure 7: Aggregated time savings for users of Business Aviation

While the average time savings of Business Aviation over commercial aviation is approximately 2 hours, it is important to consider the distribution of the time savings in order to form a clearer picture of the value of Business Aviation. The time savings histogram is shown in Figure 8 and highlights the large fraction of trips in which time savings far exceed 2 hours.

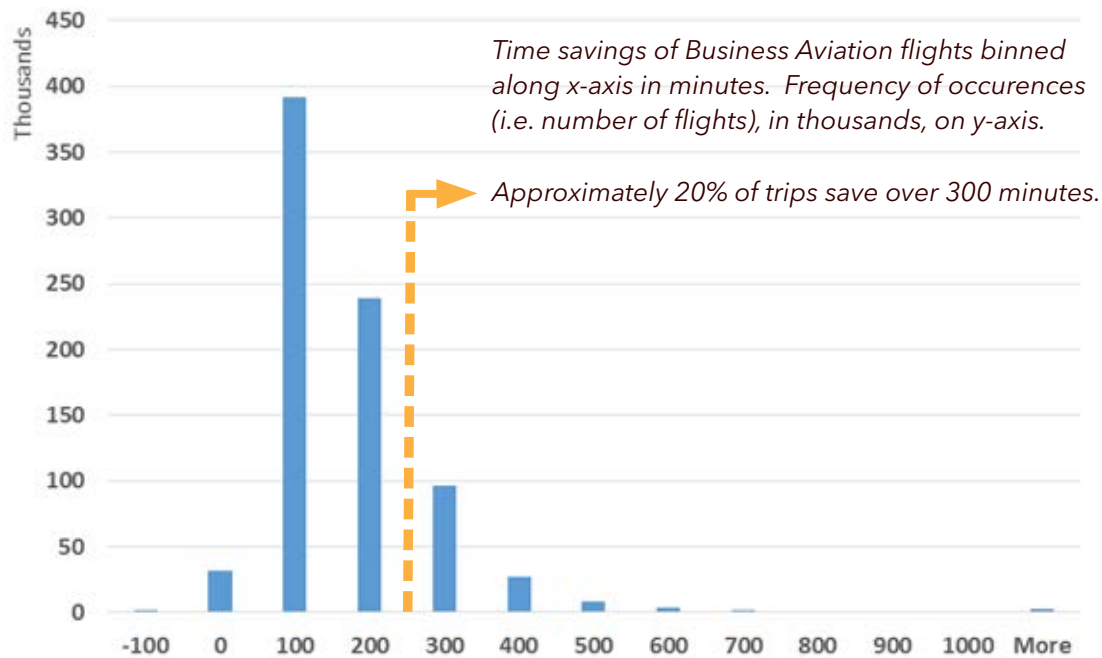


Figure 8: Time savings histogram for Business Aviation. While many flights save between 100 and 200 minutes over commercial trips, approximately 20% of trips save over 300 minutes (5 hours)

Additional efficiency findings include:

- Using a weighted average of employee levels who would use Business Aviation (executives, middle managers, and technicians) and their associated average salaries, the value of the total time saved was found to be € 1.20 bn annually;
- The time savings of Business Aviation can be broken out by company. With an average of 654 passengers transported by Business Aviation per company, each company saves on the order of 57 days per year using Business Aviation. This is a baseline order of magnitude estimate; time savings are likely to be larger in reality;
- Harris [14] has shown that employees consider time on a Business Aviation aircraft to be more productive than time on a commercial aircraft or even time in the office. Taking into account this increased productivity, Business Aviation users generate an additional 5.7 million hours of additional work output over commercial transport users annually; and
- Given Business Aviation tends to use less congested airports and airspace, Business Aviation flights are less likely to be delayed. Using Eurocontrol delay statistics, the total Business Aviation time savings resulting from reduced delays were found to be on the order of 1,825 days annually. This time is in addition to time savings obtained from

Business Aviation's faster travel over commercial alternatives.

Detailed Discussion and Methodology

Methodology

Figure 6 illustrates the data science approach for estimating overall time savings, showing an average time savings of 127 minutes of Business Aviation over commercial aviation. Figure 7 shows the total aggregated time savings of 539 years for all European Business Aviation users in 2014.

In short, the data science analysis estimates the time savings associated with Business Aviation as compared to commercial aviation. This time savings estimate is then used to quantify the value of time saved by Business Aviation which contributes to the total economic benefit of Business Aviation over commercial aviation. In this context, the analysis focuses on the time savings of a single flight only - an estimate of time savings for multiple city itineraries is provided later in the chapter. Appendix C describes the complete methodology for estimating time savings of Business Aviation.

Time savings are computed for every Business Aviation flight in 2014. Each airport is resolved to the nearest major city such that every Business Aviation itinerary is mapped to a journey between two cities. The fastest commercial alternative may be any means of travel. For farther journeys, this is usually a surface sector from the origin city to an origin airport, any number of flights to a destination airport, and a surface sector to the final destination. The surface sector may be a train, taxi, ferry or any other mode of transportation. Additionally, especially on shorter distance journeys, the best commercial alternative may be entirely a train or car ride with no flying suggested. Commercial time also includes time for check-in (arriving at airport or train station in advance of departure). This best commercial alternative is compared against 800,000 WingX-provided Business Aviation flight itineraries. Travel

Business Aviation Offers Increased Levels of Security

When examining destinations around the world, aviation safety does not always follow the same standards as in the European Union. For instance, flying into certain geographies with commercial aviation will require using airliners and aircraft that would not be allowed into European airspace. When business opportunities are located in regions that can only be accessed by certain local flights, business travelers would be required to put themselves at a higher risk than necessary. Business Aviation can provide a viable alternative here, as aircraft airworthiness and pilot training follow the highest standards when chartered in the EU.

Similarly, security can be of concern when traveling with public transportation into regions where the geopolitical risk is high. Alternatively, health risks should be considered when traveling in regions where outbreaks of rare and dangerous diseases are present.

Business Aviation offers the greatest security and safety possible and ensures that employees reach their destinations in the most reliable and secure way possible.

time from origin city to Business Aviation origin airport and from Business Aviation destination airport to destination city is added, as well as a smaller minimum check-in time. An estimate of the time savings is produced for every Business Aviation flight in the data set.

Time Savings Results

Of the over 800,000 fixed-wing trips analyzed, the **average commercial trip time is 272 minutes**. This trip time represents an average of the best (shortest) commercial alternatives if not for the Business Aviation alternative. In effect, this is an average travel time for a European business trip. Of trips that included flying, the average flight time was found to be 163 minutes, with an average surface transit time of 94 minutes, such that the flying portion of a trip is almost twice as long as the surface portion. Note “flight time” includes connecting at airports and captures the time from take-off in the first (origin) airport of a trip to landing at the trip destination airport.

The Business Aviation average trip time is 145 minutes. An important finding of the analysis is that the average travel time from a city to a Business Aviation airport is only 15 minutes. This is a 30 minute total surface travel time, only a third of the 94 minute commercial alternative surface travel time. Therefore, even for routes in which good commercial service is available, the short travel time to Business Aviation airports results in substantial time savings and drives business efficiency.

With an average Business Aviation trip time of 145 minutes and an average commercial trip time of 272 minutes, **the average time savings is 127 minutes for Business Aviation over the shortest commercial alternative**, or just over two hours.

This time savings estimate represents the absolute minimum time a business traveler could expect to save – business travelers will often be unable to select the shortest flight because that flight may not be with a preferred corporate airline, may be outside of business hours, or may require travel through a country for which the traveler does not hold a valid visa.

Time Savings Distribution

The time savings of most flights are between 100 and 200 minutes (with an average of 127 minutes). Some flights are faster by commercial aviation: these are long-haul journeys where wide-body commercial jets simply fly faster than business aircraft do. However, the distribution has a long tail, and many Business Aviation itineraries are substantially faster than commercial alternatives. **Just under 20% of Business Aviation itineraries are at least 5 hours faster than the fastest commercial alternative**, representing a major boost to productivity.

Time Savings by Company

Harris reports in 2009 [14] that 327 passengers per company were flown by Business Aviation over a six-month period. Harris data are based on US surveys. The Harris data may be extended to an annual basis such that the average company transported 654 passengers by Business Aviation. **Given that each trip saves the user an average of 127 minutes, each company saves on the order of 1,380 hours, or about 57 days, by using Business Aviation for its employees. Assuming an employee works 1,840 hours per year⁷, this average company saves about 75% of a full time equivalent by using Business Aviation.**

It should be noted that while the Harris data are based on US surveys and may be used to generate an order of magnitude estimate of time savings by company in Europe, users of Business Aviation tend to be smaller companies in Europe than in the US, such that many users will not have 327 employees in the company. With smaller companies, a higher proportion of employees benefit from Business Aviation, while at larger firms, economies of scale improve cost effectiveness and amplify productivity gains. Thus, the estimates provided here of time savings by company should be considered conservative and, in reality, time and cost savings are likely higher, especially for smaller European companies, especially given the overall time savings of 2,600 FTEs in Europe and the smaller estimate of time savings per company here.

Value of Time Saved

The time savings analysis may be extended to provide a baseline estimate of the value of time saved by Business Aviation over commercial aviation. **The average time savings of Business Aviation is 127 minutes per flight, which, when multiplied over the approximately 800,000 Business Aviation flights taking out 41% of empty legs, is 41,897 days.** Given the **average of 4.7 passengers per flight**, the **total time saved by Business Aviation in Europe is 196,914 days, or just over 4.7 million hours.** Assuming 1,840 annual hours worked per employee, **Business Aviation allows its users to be as efficient as 2,600 full-time equivalents.**

According to Harris [14], Business Aviation users are primarily top executives (22%), middle managers (50%) and technicians (20%). Harris data are based on US surveys but there is no reason results would differ significantly in Europe. For simplicity in the calculations here, it may be assumed that the 8% of other users fall into the same pay band as technicians, such that the assumed mix for Business Aviation users is 22% top executives, 50% middle

⁷ Assumes employees have six weeks' vacation resulting in a 46 week work-year at 40 hours worked per week. This is a conservative estimate of annual working hours for the European Union. See OECD statistics at <http://stats.oecd.org/index.aspx?DataSetCode=ANHRS>. Many countries, such as Germany, France, and the United Kingdom, have employees working less than 1,840 hours.

managers, and 28% technicians.

To estimate the total value of time saved by Business Aviation, average salaries are considered for the three groups. According to Statista, executives average € 745 per hour [15]. Over 40 hours per week and 52 weeks per year, this translates to a € 1.55 million annual salary. Statista also reports that middle managers, who, for the purposes of the analysis, may be defined as MBA holders 3 years after graduation, earn an average of € 140,000 per year [16].

It may be assumed technicians earn an average salary based on a completed diploma or single degree program. Considering European salaries in [17], an annual salary of € 25,000 may be used for technicians.

Furthermore, the value of an employee's time in terms of productivity is not simply equal to his or her salary. PRC Aviation found that in a 1995 study, an employee's value of time was equal to 5.7 times his or her salary for a senior executive and 3.8 times his or her salary for a middle manager or professional employee [18].

Given the above data, the total value of time saved by Business Aviation in Europe may be computed according to the table below⁸. **Thus, the average annual value of time saved by Business Aviation in Europe is approximately € 1.20 bn.**

Table 4. Total value of time saved by Business Aviation in Europe

Category	Salary (€)	Amount over 539 years (€)	Fraction of Users	Value of Time Multiplier	Total Value of Time Saved
Executive	1,550,000	0.84 bn	22%	5.7	1.05 bn
Middle Manager	140,000	0.08 bn	50%	3.8	0.14 bn
Technician	25,000	0.01 bn	28%	3.8	0.01 bn
				Grand Total	1.20 bn

Business Aviation Productivity Advantages

Increased productivity is a major benefit of Business Aviation over commercial aviation. Business Aviation allows users to work in privacy and comfort on board business aircraft and reduces unproductive time spent waiting at or transiting through commercial airports.

Business Aviation users are 20% more productive in flight than in the office, and so they generate 105 minutes × 1.2 = 126 minutes of productive work time per flight.

⁸ Note that the weighted hourly average for the Value of Time across the three user groups can be computed as $0.22*(€ 745*5.7)+0.5*(€ 76.01*3.8)+0.28*(€ 13.59*3.8)$ and equates to €1,093.25 where € 745 is the hourly salary for the executives, € 76.01 the one for mid-level managers and € 13.59 the one for technical staff, when assuming 1,840 hours per year worked.

Harris reports in 2009 [14] that Business Aviation users are 20% more productive on board than when in the office and are 40% less productive on commercial flights than when in the office. Harris data are based on US surveys though there is no reason results would differ significantly in Europe.

To quantify the increased productivity afforded to users of Business Aviation, average flight times of Business Aviation against commercial aviation may be considered. European Business Aviation users average approximately 105 minutes in flight. It may be assumed that both business and commercial users work immediately after take-off, continue throughout the whole flight, and stop just before landing, such that entire flight times may be considered as time spent working. It may be similarly assumed that surface travel times to and from airports are not productive time, such that it is only the actual flight time that contributes to productive time.

If Business Aviation users are 20% more productive in flight than in the office, they generate $105 \text{ minutes} \times 1.2 = 126 \text{ minutes}$ of productive work time per flight leg. Further, as Business Aviation users save an average of 127 minutes over commercial aviation, they may spend an additional 127 minutes of productive time in the office. **In total, Business Aviation users generate 253 minutes of productive time by taking a business flight.**

The average commercial flight time is 163 minutes, of which $163 \text{ minutes} \times 0.6 = 98 \text{ minutes}$ may be considered productive time, given the 40% productivity penalty reported by Harris. Recall Rome2Rio reports total flight times, such that commercial flight times include layover times. Layover time is unlikely to be spent working, such that the 98 minute estimate of commercial travel productive time is generous and the productivity advantage of Business Aviation over commercial aviation is likely to be larger than estimated here.

It may be assumed that commercial aviation users are not productive when traveling to or from airports or when transiting between them, such that the total productive time of a commercial trip is 98 minutes. Thus, **for every trip, Business Aviation generates, on average, a 253 - 98 = 155 minute productivity advantage over commercial aviation.** In other words, Business Aviation users have 155 more minutes of work time when traveling by Business Aviation. For the 800,000 trips in the WingX data set minus the empty leg flights the total productivity advantage is approximately 1,200,000 hours. With 4.7 passengers per flight, Business Aviation generates approximately 5.7 million

According to Eurocontrol:

- *13.4% of Business Aviation flights were delayed in 2005*
- *The average delay for Business Aviation flights was 12.8 minutes*
- *19.0% of commercial aviation flights were delayed in 2005*
- *The average delay for commercial aviation was 10.4 minutes*

additional productive hours over commercial aviation. With a full-time employee working 1,840 hours per year, the extra productivity output from Business Aviation is approximately 3,100 full-time equivalents. These additional productive hours flow into Europe's economy and are a tremendous benefit of Business Aviation to Europe.

Delay Statistics

Business Aviation is less susceptible to travel delays as compared to commercial aviation, a key component of its enabling of business efficiency. The amount of time saved as a result of avoided delays is estimated here. As delay statistics for Business Aviation are not complete, the analysis endeavors to complete an order of magnitude analysis here.

Eurocontrol studied Business Aviation delays in 2013 using 2005 data [19]. Eurocontrol considered only Air Traffic Flow and Capacity Management (ATFCM) delays, that is, delays that arise out of air traffic constraints at airports, given the availability of only this data for Business Aviation flights. Eurocontrol notes that ATFCM delays make up only 10-20% of the total delays, which may include weather, baggage delivery delays, security delays, and so on. However, ATFCM delays would impact commercial aviation much more so than Business Aviation as commercial aviation uses the most congested airports. Therefore, it is still valuable to estimate the time savings of Business Aviation resulting only from reduced ATFCM delays.

Eurocontrol reports that 13.4% of Business Aviation flights were delayed in 2005, as compared to 19.0% of commercial aviation delays. The average delay for Business Aviation flights was 12.8 minutes, as compared to 10.4 minutes for commercial aviation. Eurocontrol explains that Business Aviation flights are less frequently delayed as these flights avoid congested airports; however, if a flight is delayed, the average delay is larger for Business Aviation. This is because Business Aviation primarily uses the highest flight levels in the airspace. Commercial traffic has begun to encroach upon these flight levels, such that when there is congestion at these flight levels, it primarily affects Business Aviation traffic. With these statistics, the time savings over the annual 800,000 Business Aviation flights may be

According to Eurocontrol Central Office of Delay Analysis 2014 Report:

- *37.4% flights were delayed by an average of 26 minutes in 2014*
- *The average reactionary delay in 2014 was 4.32 minutes while the average airline delay was 3.04 minutes*
- *Business Aviation users save 7.35 minutes per delayed departure over commercial aviation*
- *With an assumed 37.4% of the 800,000 departures delayed, Business Aviation saves a total of 1,308,537 minutes, or 1,908 days (with the 41% empty leg flights not considered as they do not largely impact users of Business Aviation)*
- *Given the average of 4.7 passengers on board and 41% empty-leg flights, the total time saved by Business Aviation users is approximately 11.5 years*

computed.

Given 13.4% of flights are delayed by 12.8 minutes, the **total time lost to delays for Business Aviation is 1,383,852 minutes, or 961 days**. For commercial aviation, given 19.0% of flights are delayed by 10.4 minutes, **the total time lost is 1,594,270 minutes, or 1,107 days**. Note it is assumed that a delay impacts a commercial itinerary overall and not necessarily individual flight segments on that itinerary. Thus, Business Aviation flights save 146 days, or just under 5 months, over commercial aviation as a result of reduced delays. Given the average of 4.7 passengers on board and considering the 41% of empty leg flights, **the total time saved by Business Aviation users is 405 days**. As discussed, this estimate includes only the time saved by ATFCM delays at airports and accounts for only 10-20% of total delays.

As an alternative analysis, consider Eurocontrol's Central Office for Delay Analysis 2014 report on aviation delays in Europe [20]. In 2014, 37.4% of flights were delayed by an average of 26 minutes; these values are considerably larger than the 2005 data above. It can be reasonably inferred that commercial aviation delays will continue to increase as European airports and airspace get increasingly congested with the continued growth of air traffic. While Eurocontrol's report does not call out the differences between Business Aviation and commercial aviation delays, it lists reasons for delays and the associated averages. Delay types include airline delays, ATFCM delays, weather delays, airport delays, reactionary delays, and so on. Note reactionary delays are flights delayed from late arriving aircraft or crew, or from airlines holding aircraft for connecting passengers. As an order of magnitude estimate, it may be assumed that Business Aviation users are not affected by airline delays or reactionary delays, but are affected by other delays, such as government delays, weather delays, and airport delays.

Business Aviation Enables Offshoring to Eastern Europe

Since the fall of the Iron Curtain, Eastern European markets have become attractive regions for offshoring production facilities from for instance Western European firms. This is especially relevant due to comparably low-cost labor and cheap land, which enables firms to achieve lower production cost and makes them more competitive on International markets. One good example that demonstrates these benefits is Romania, where in 2007, CNN reported already 90% of some 1,000 Information Technology (IT) companies in the country were foreign-owned. However, with the exception of its capital Bucharest, Romania has not been able to get connected to the International air traffic network in a way that ensures that foreign companies that decide to open facilities here are able to easily travel to their facilities, frequently meet with their employees and ensure that standards are met.

The business processes of these firms therefore heavily rely on the availability of Business Aviation and Business Aviation ensures that Foreign Direct Investments can be made in remote areas of the world.

Eurocontrol reports that the average reactionary delay in 2014 was 4.32 minutes, while the average airline delay was 3.04 minutes. If Business Aviation is not affected by these delays, Business Aviation users save 7.35 minutes per delayed departure over commercial aviation. With an assumed 37.4% of the 800,000 Business Aviation departures delayed, and not considering the 41% of flights that are empty, **users save a total of 1,308,537 minutes, or 908 days.** Given **the average of 4.7 passengers on board and 41% of empty leg flights, the total time saved by Business Aviation users is 4,267 days or approximately 11.5 years.** This analysis is optimistic given that Business Aviation users will still occasionally be affected by airline and reactionary delays.

These two methods produce total delay time savings of Business Aviation of just over 1 year and 11.5 years, respectively. As an order of magnitude estimate, it may be stated that the **Business Aviation time savings that arise as a result of decreased delays are on the order of 5 years, or 1,825 days annually, splitting the estimates.**

Multi-Trip Itineraries

When traveling three or more legs on a single day, Business Aviation offers unique advantages over commercial airliners. An analysis of Eurocontrol-provided tail numbers for 151 aircraft that flew through 2014 was performed in order to identify multi-trip itineraries that were flown with these aircraft. On these missions, Business Aviation offered an average time saving of 6 hours and 33 minutes over commercial aviation. The 151 business aircraft completed 792 multi-trip itineraries in total. Proprietary broker data indicate that there are 3,080 active business aircraft in Europe. Assuming that these 151 aircraft were drawn randomly out of this 'population,' it can be estimated that 2014 saw 16,156 multi-trip itineraries. It may be assumed that replicating these itineraries with commercial travel would require at least one hotel night. Therefore with an average of 4.7 passengers on each flight, the total number of hotel nights required with commercial travel is 75,933. Finally, given an average assumed overnight hotel cost of € 200, European businesses saved at least €15,186,600 in hotel costs by using Business Aviation.

It should be noted that multi-trip data were limited to these 151 aircraft. With an estimate of 16,156 multi-trip itineraries, 2% of European Business Aviation trips make up multi-city itineraries.

Potential Cost Savings of Business Aviation

The use of Business Aviation may lead to cost savings over commercial fares. An analysis of business aircraft block hour operating costs and average passenger numbers allows for an order of magnitude estimate of Business Aviation costs per passenger and provides a baseline comparison to commercial fares.

An analysis of proprietary data for a large private Business Aviation broker provides monthly block hour operating costs of various types of Business Aviation aircraft, as well as the associated average passenger counts by type. As the WingX data set analyzed in this study reports operating aircraft type, using this in combination with the broker data, an operating cost estimate for every flight can be computed⁹. Given the average number of passengers per flight leg, an average cost per passenger can be obtained. For example, the broker reports the January 2014 operating cost per block hour of a super light jet is € 3,239 per hour and the January 2014 average passenger count for a super light jet to be 3.8 passengers. A 53 minute flight leg from Barcelona El Prat to Madrid Barajas may therefore be estimated to have an operating cost of € 2,861, or a € 753 cost per passenger. These rates are comparable to another broker's rates, igojet. igojet has published a white paper citing average total operating costs per block hour for a fully-owned mid-size jet to be \$4,900 / hour [21].

Averaging over all 800,000 fixed-wing Business Aviation flights in the WingX data set **yields an average cost per passenger per flight leg of € 1,793.**

It is important to note that this cost is an order of magnitude estimate based on proprietary data from one broker (who naturally would like to advertise its low fares and may be including discounted empty legs that would drive down costs). This analysis is not sufficient for drawing a complete comparison between commercial aviation and Business Aviation costs and is meant only to illustrate that the usage of Business Aviation may be a cost-conscious service for many companies and employees.

This one-way average cost per flight leg per passenger is not out of line with full-fare commercial ticket prices, even for economy class, when considering business travelers are likely to purchase their tickets close to the date of departure. The cost effectiveness of this average price per passenger becomes even more obvious when compared against the savings discussed in previous sections:

- For every trip and passenger, Business Aviation generates, on average, 155 minute productivity advantage over commercial aviation by shorter trip times and higher productivity en-route. Using an average Value of Time of € 1,093, this benefit alone equates to gains of **€ 2,788 per passenger.**
- As Business Aviation flights are, on average, 2.64 minutes less delayed than commercial flights, this time saving is equivalent to **€ 48 per passenger.**
- 2% of all Business Aviation passengers experience the benefit if saving hotel room costs as they are on multi-trip itineraries that return on the same day to the origin. Compared

⁹ It should be noted that the average cost per passenger will vary widely across the different segments in European Business Aviation. Utilizing for instance fully-owned aircraft will lead to significantly different cost than fractional ownerships or charter

to Commercial Aviation and assuming a conservative € 200/room, **this benefit leads to savings of € 4 per passenger over commercial aviation.**

As such, Business Aviation leads to efficiency gains to European companies of € 2,840 per passenger relative to using Commercial Aviation. Comparing these gains against the average one-way cost per passenger of € 1,793 demonstrates the business case for choosing Business Aviation over Commercial Aviation and showcases why Business Aviation is an affordable service when purchased in a responsible fashion. The use of Business Aviation should therefore not be considered a luxury good, but a prudent purchase and an accepted cost of doing business.

Note on Environmental Costs of Business Aviation

It is important to note that, while Business Aviation aircraft carry fewer passengers than commercial aviation aircraft do, Business Aviation has several ways in terms of reducing its environmental impacts. Firstly, most Business Aviation travel is point-to-point, without fuel-consuming takeoffs and landings at connecting airports, leading to a relative reduction of emissions. As Business Aviation often avoids large, commercial airports, aircraft are not subject to the holding patterns and indirect air traffic control routings which can lead to increased fuel burn. Finally, Business Aviation aircraft tend to be less subject to tarmac and taxi delays, avoiding burning excess fuel on the ground.



»» CHAPTER 3: BUSINESS AVIATION ENABLES CONNECTIVITY

Business Aviation improves connectivity over Europe. Key findings from the analysis include:

- *25,280 airport pairs served by Business Aviation were never connected by nonstop commercial flights, approximately 31% of all airport pairs analyzed;*
- *Of the 800,000 fixed-wing Business Aviation itineraries examined, approximately 27% do not have nonstop service between them;*
- *Time savings enabled by better connectivity are larger in Eastern Europe and in the continent's periphery; and*
- *2.5% of all Business Aviation flights in Europe are operated for fast transportation of critically ill or transplant organs*

Summary of Results

Business Aviation improves connectivity over Europe by connecting cities that are underserved by commercial aviation to the global aviation network. As part of the analysis of Business Aviation efficiencies, Business Aviation itineraries and time savings by region were examined to explore the connectivity benefits provided by Business Aviation. The results are summarized here and described in further detail throughout this section.

- Analysis shows that 25,280 European city pairs are not connected by nonstop commercial flights;
- Of the 800,000 Business Aviation trips, 27% do not have any nonstop commercial service on any day of the week;
- Time savings of Business Aviation are much larger in Eastern Europe and in the continent's periphery in general: Central and Western Europe time savings are smaller; and

Business Aviation Enables Decentralized Corporate Structures

Some companies implement a corporate structure that is decentralized, where a holding has several strong brands that are located in different regions across a country, a continent or the globe. For instance, among others, a major automobile manufacturer operates brand headquarters in varying locations, requiring coordination of senior management and a respective number of business trips. Business Aviation enables corporations to reduce the efforts and time consumed traveling between several locations and thus enables them to implement the corporate structure that enables the most appropriate and efficient business processes.

- When looking at the results for specific countries, it can be noted that the largest time savings can be found in remoter and/or more rural regions of the country or within the congested areas, such as London, where the entire door-to-door trip times are massively increased by congested roads and long drive times to commercial airports outside of the city.

It should be noted that while the connectivity Business Aviation provides is fundamentally important to the European economy, this connectivity also provides significant societal benefits, such as allowing air ambulances and medical evacuations in remote regions of Europe. This enables important services to the society by ensuring that critically ill or injured patients or organs can be transported quickly and safely between medical centers, even to and from the most remote locations. Flexibility and speed are key here, which makes the option that aircraft are available 24/7 and can be dispatched within 1 to 1.5 hour notice invaluable. Business Aviation operators can mobilize specialist medical teams as required, which can include experts in the fields of cardiology, pediatrics, neo-natal and intensive care. Aircraft are typically equipped with the most advanced medical technology and can be adapted to suit the needs of a patient. This includes carrying infant incubators or intensive care equipment.

Based on EBAA data, almost 20,000 ambulance flights are being operated in Europe every year, which is about 2.5% of all Business Aviation flights. The European airports with the highest number of ambulance departures are Zurich, London Oxford, Le Bourget and Biggin Hill.

Discussion

25,280 European city pairs that make up part of the Business Aviation network are never connected (any day of the week) by nonstop commercial service. The value of Business Aviation to these communities is clear - Business Aviation keeps these cities connected to the European and global economies. These airport pairs represent 31% of all pairs analyzed: a sizeable airport of the European aviation landscape.

Further, of the over 800,000 Business Aviation itineraries (markets) analyzed, 27% did not have nonstop commercial service on any day of the week. These markets benefit most from Business Aviation and allow employees

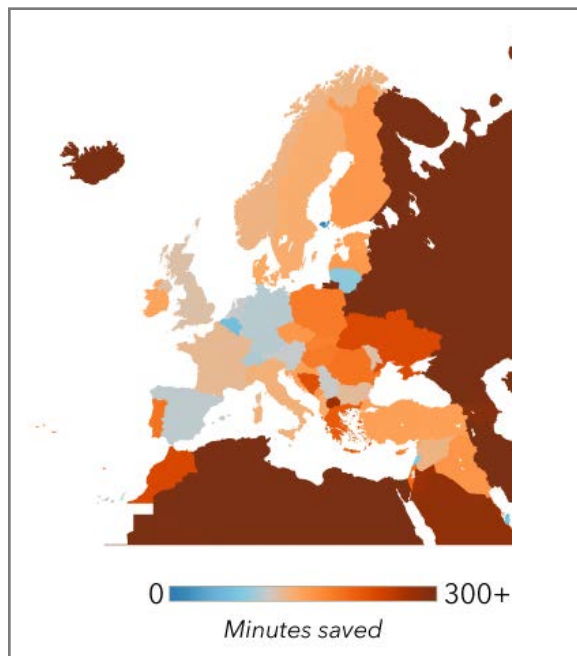


Figure 9: Average Business Aviation time savings for Europe. Larger time savings are seen in Eastern Europe and on the continent's periphery in general

traveling in these markets to be much more efficient and agile in their business travel.

General European Connectivity

This section highlights connectivity insights resulting from the time savings analysis the team performed. This discussion of connectivity completes the picture of the value and benefits of Business Aviation in Europe.

Figure 9 shows the average time savings by European country. Time savings are much larger in Eastern Europe and in the continent's periphery in general, illustrating the more limited connectivity of these regions to the global aviation network. Conversely, time savings are much lower in Central and Western Europe, especially Germany and France, as these are much larger global aviation hubs and are well connected.



