T&E

TECHNISCHE UNIVERSITÄT CHEMNITZ
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Aviation Consulting

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Location costs in aviation

Structure, causes and effects

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Scientific report for

European Federation for Transport and Environment
Brussels

Christoph Brützel, Friedrich Thießen
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Content Overview

Objectives

- This study examines location costs in civil aviation.
- It summarises what location costs are
- It explores the background and drivers of these costs
- It explores how location costs relate to trends in aviation

Summary of Study Findings

1. Location costs in aviation refer to direct, externally imposed charges associated with operating commercial scheduled or charter flights. These costs vary depending on the airport or country of departure or arrival and are directly determined or regulated by public authorities.

2. These costs can be divided into three categories: taxes, charges, and fees.

3. The *Chicago Convention* of the International Civil Aviation Organization (ICAO) obliges all member states to apply common standards for public charges and fees. These standards, binding for all UN members, require that such costs be transparent, non-discriminatory, and at most cost-based. Aviation is to be promoted as a driver of global mobility, international understanding, and peace. To that end, the Chicago Convention states that international air transport is generally to be exempt from taxes and customs duties.

4. However, how these principles are translated into EU and national laws, regulations, and practices varies widely. Differences emerge in how states support or burden the sector, and in the methods used to determine the cost base for these charges.

5. The EU aims to establish uniform rules for location-related costs across member states, with regulations covering airport and air navigation fees, kerosene taxation, sales taxes, and airport subsidies.

6. Despite this, national practices differ significantly. Some countries pass most costs on to the aviation sector, while others levy additional taxes or cover part of the costs themselves.

7. In Germany, policy generally aims to recover the full costs of infrastructure, operational services, and public services from aviation. An aviation tax also contributes to the national budget.

8. The DLR 2025 report highlights structural flaws in the current regulatory system. It points to inefficient organisational structures and methods that push costs up.

9. For example, Germany does not offset airport infrastructure fees with revenues from non-aviation business such as retail, car parking etc., which is common under the single till approach. They run non-aviation-business as a profit center and aim at allocating indirect cost to the aviation segment to be charged at costs. As a result, location costs are systematically higher.

10. Public authorities often support regional airports, directly or indirectly. Without subsidies, fees would need to be prohibitively high due to low traffic. Support is often justified by the need to maintain local transport infrastructure, and by economic benefits such as local employment and tax revenues.

11. Tourist destinations like Spain, Italy, Greece and Turkey reduce aviation costs to strengthen their market position. In other countries, such as the UK, Scandinavia and Greece, regional airports in remote locations, including islands, receive public support to maintain access.

12. Numerous comparative studies show that these costs are a relatively minor part of airline expenses and have little effect on international passenger volumes.

13. The 2025 DLR study examined why the German aviation market has recovered more slowly after COVID. Using standard econometric models, it found that costs and competition explain at most 20% of the difference in passenger numbers compared to the European average. In short, these models cannot fully explain actual market behaviour.

14. A key reason is the time gap between scheduling and operating flights, which can be up to a year. Once flight schedules are fixed, airlines adjust prices to maximise seat occupancy, as long as the revenue per passenger exceeds marginal costs. This often leads to overcapacity and price competition, especially when airlines follow growth strategies.

15. These market dynamics, along with improvements in aircraft and engines, explain the consistent growth in low-cost travel since EU liberalisation. This growth was only interrupted by events like 9/11, the 2008 financial crisis, and COVID. It continued despite rising unit costs, taxes, and new requirements such as the EU Emissions Trading System .

16. In the German-Austrian-Swiss region, Lufthansa has reduced competition through a long-term strategy of market consolidation (as of summer 2025).

17. EasyJet has exited the German domestic market and remains the only competitor in the German-Austrian-Swiss market.

18. Condor is the only remaining domestic competitor, offering daily flights between Frankfurt and cities like Berlin, Hamburg and Munich.

19. Lufthansa focuses on hub connections (Munich and Frankfurt), flights between hubs (Frankfurt, Munich, Zurich, Vienna), and Eurowings routes from Düsseldorf, Hamburg, Berlin, Stuttgart and Cologne. Other domestic routes are served only occasionally.

20. This market dominance allows Lufthansa to manage capacity in the German-Austrian-Swiss region based on revenue targets, which helps explain the slower recovery in capacity.

21. Routes between Germany and the rest of Europe have recovered unevenly.

22. Leisure routes and those used by migrant communities have seen strong growth, driven by competition from low-cost and holiday carriers.

23. For business routes, Lufthansa has maintained a strong position with high-quality services. Only EasyJet still serves major business destinations from Berlin at suitable frequencies. Business travel demand remains lower than before COVID, and Lufthansa has adjusted its capacity accordingly. Recovery in this segment is therefore below the European average.

24. Aviation is the only sector with a global commitment to offset its additional CO_2 emissions by 2050. Although the current system could be improved, the objective is clear. Regulatory costs should be harmonised across the EU. A race to the bottom should be avoided but so should inadequate cost burdens.

Location Costs and T&E's Environmental Policy Goals[1]

T&E's work in aviation is guided by environmental objectives. The following sets out how policies on location costs can best support these goals.

1. Objective: Policy measures to curb the aviation sector's growth (for example, no airport expansion)

Charges levied on airlines by public authorities should not be kept artificially low. They should reflect the true value of the resources used. Established economic principles hold that services should not be priced below their real resource cost. Subsidising these costs undermines overall welfare unless there is a clear and specific justification.

2. Objective: Applying the polluter pays principle

This means passing on to aviation users exactly the costs their activities create. Location charges should match the actual value of resources consumed. Subsidised or inflated fees should be avoided, as should unnecessary rules or red tape. Only services that are reasonable under sound economic principles should be required, and they should be priced to cover their costs.

3. Objective: Phasing out climate-damaging subsidies

Climate damage is an economic externality, and standard theory says such costs should be borne by the polluter. While climate impacts are not tied to a single location, many aviation activities, such as construction, airport operations, and fuel use, are linked to emissions. The cost of this damage should be attributed to these activities and paid for by their users.

4. Objective: Promoting sustainable aviation fuels

Sustainable aviation fuels reduce the climate impact of flying. Public funding for their production is justified when there is market failure or a need for further basic research. All other costs should be met privately. At EU level, measures should be in place to avoid market distortions.

5. Objective: Harnessing the climate potential of the European rail network

All transport modes should be used to their full climate potential. This requires accurate assessment of climate damage. A fair CO_2 price can reflect the differences between modes.

6. Objective: Addressing the non-CO_2 effects of flying (in particular contrail avoidance)

Like CO_2 emissions, non-CO_2 effects are externalities. For maximum economic welfare, these costs should also be borne by those who cause them.

[1] See: https://www.transportenvironment.org/uploads/files/TE_Down_to_Earth_report.pdf

Location costs in aviation

Content

1. Location Costs in Aviation: Introduction

Definitions

In this report, location costs refer to:

- The direct, externally imposed charges involved in operating a commercial scheduled or charter flight.
- These costs vary depending on the airport or country of departure or arrival.[2]
- They are either directly set or regulated by public authorities.

Direct costs are costs that arise per flight or per passenger or per tonne of freight.

External costs, in this context, exclude internal value creation such as staff costs.

Location costs include taxes, fees, and charges billed directly to airlines, as well as those incurred by service providers (such as airports or ground handlers) that are passed on indirectly.

The relevant cost categories in this report are:

Taxes

- Value Added Tax
- Fuel tax
- Ticket taxes

Fees and Charges

- **Airport take-off and landing charges**
    - Base charges per flight
    - Noise surcharges
    - Pollutant charges
    - Transport related charges (per passenger or per tonne of freight)
- **Infrastructure fees**
    - Parking fees
    - Stand fees
    - Common-use infrastructure (e.g. check-in desks, gates, baggage systems, buses, fuel pipelines, de-icing facilities)
- **Security charges**
    - Passenger and baggage screening
    - Airport operator security measures
- **Air Traffic Control**
    - Airport control (tower)
    - En-route and approach control

Other Levies

[2] DLR report, 2025, p. 8

- EU Emissions Trading System
- SAF blending mandates (ReFuelEU)
- CO_2 offsetting under CORSIA

Ground handling services used by airlines at the terminal (e.g. check-in, boarding) and on the runway (e.g. baggage loading, refuelling, catering, water and waste services, cleaning, de-icing) are generally also part of location-related costs. However, the EU Groundhandling Regulation replaced the previous cost-based fee system with a competitive market framework[3]. These services are now contracted privately and no longer subject to direct political or public control, and therefore are not considered in detail in this study.[4]

A broader understanding of location costs

In broader terms, location costs refer to those costs that relate to the physical locations aviation depends on. This includes:

1. Airports where aircraft land, take off or park
2. Services ensuring safe approach and departure (e.g. air traffic control)
3. Passenger-related costs
4. Baggage handling fees and levies (e.g. security charges or air passenger taxes)

Regulatory costs, such as climate-related charges, also fall under this definition.

A distinction is often made between public and private location-related costs:

Public Sector Costs

These are categorised by how they are regulated:

- *Taxes*: levied under national tax laws
- *Fees*: charged for public services, usually based on official fee schedules
- *Charges*: for services delivered by private entities but subject to government oversight or approval

[3] Council Directive 96/67/EC (Groundhandling Regulation)

[4] According to Annex 2 of the Ground Handling Services Ordinance ground handling services include the following:

- Administrative ground handling and supervision
- Passenger handling, from ticket inspection and baggage check-in to the passenger's departure from the airport
- Baggage handling, including receipt, delivery, transport to the sorting area, storage/sorting and transport to and from the airport
- Cargo and mail handling, including customs formalities and, where necessary, security measures
- Runway services including loading and unloading of in-flight catering supplies
- Cleaning services and aircraft servicing
- Refuelling services
- Airctaft maintenance services
- Flight operations and crew services
- Ground transport services
- In-flight catering services

Private Sector Costs

For services not subject to regulation or oversight, airports set their own prices and generate private income. These include services such as parking or curbside access.

Private services are generally divided into two segments:

- *Aviation-related*, or transport-driven activities
- *Non-aviation*, or commercial activities, such as shops and car rentals

The non-aviation segment is not subject to regulation.

Different Terminology Internationally

Terminology and classifications differ across countries, making cross-national comparisons of aviation cost structures difficult at an aggregate level.

Airline Campaigns on Location Costs

Aviation involves a wide range of cost categories, with so-called "location costs" regularly at the centre of debate. These discussions are often initiated by airlines, which seek to reduce their cost burden amid competitive pressure.

Previous public debates over aviation costs took place in 2010[5] and again in 2015[6]. A new round of debate emerged in 2024, prompted by the uneven recovery of air traffic across countries following the COVID-19 crisis.

Airlines have led most initiatives against what they perceive as excessive location costs. According to industry voices, the main drivers of these costs are state-imposed charges, especially higher fees for air traffic control, security checks, and ticket taxes.

These campaigns often coincide with regulatory changes. In 2010, the trigger was the revision of Germany's airport charge regulation, following the 2009 EU directive (Directive 2009/12/EC). In 2015, airlines criticised what they saw as excessive profit margins in airports' core operations, claiming that fees and charges had reached record highs (see: BDL-Armail 2015).

[5] The 2010 debate was triggered shortly before the adoption of the revised German charges regulation, based on the corresponding EU Directive of 2009 (Directive 2009/12/EC). Beckers, Klatt and Kühling prepared an expert report for the BDF addressing complaints about excessive location costs. The focus was on airports with significant market power, which should be incentivised to minimise costs. See Beckers, T., Klatt, J.P., Kühling, J. (2010), *Entgeltregulierung der deutschen Flughäfen*, report commissioned by BDF-Aero, TU Berlin, Infrastructure Economics and Management Working Group, Berlin.

[6] The 2015 debate can be traced through the following publications by the aviation industry: ADV (2015), *Important background information from the German Airport Association (ADV) on "Airport Charges"*, Berlin; BDF (2015), *Fees and charges at a record high*, information bulletin of the BDF-Airmail association, Berlin.

2. Location Costs: Normative Perspective

Principles Governing the Collection and Use of Taxes, Fees and Charges

Taxes are levied by public authorities (federal, state, or local) and **are not earmarked for specific purposes**, including services to the taxpayer or compensation for external costs caused by aviation, such as emissions or noise.

Fees and charges, by contrast, are collected by public authorities or service providers to cover:

- the provision of infrastructure and services deemed public duties under national or international law, and
- compensation for external costs caused by aviation, especially emissions and noise.

Their level is regulated and set in accordance with laws and supporting regulations.

Legal and Policy Framework for Public Fees and Charges

Alongside shipping, aviation enables global mobility for people and goods. Its regulatory framework reflects a wide range of public interests:

- Global mobility
- International cooperation
- National sovereignty of departure and destination states
- Passenger and public safety
- National and international external costs

More than any other transport sector or industry, aviation is subject to layered regulation at global, regional and national levels.

Global Framework

The global framework for civil aviation is set by the International Civil Aviation Organization (ICAO), a UN agency. Its legal basis is the *Convention on International Civil Aviation*, signed on 7 December 1944 and now ratified by 193 states.[7]

The preamble to the Convention describes the international role of aviation and the purpose of regulation as follows:

> "WHEREAS the future development of international civil aviation can greatly help to create and preserve friendship and understanding among the nations and peoples of the world, yet its abuse can become a threat to the general security; and
>
> WHEREAS it is desirable to avoid friction and to promote that co-operation between nations and peoples upon which the peace of the world depends;
>
> THEREFORE, the undersigned governments having agreed on certain principles and arrangements in order that international civil aviation may be developed in a safe and orderly manner and that international air transport services may be established on the basis of equality of opportunity and operated soundly and economically;"

International aviation depends on cooperation between states and is considered a tool for peace and mutual understanding. The Convention obliges states to provide sufficient air transport as a public service.

The key regulatory goals are:

- safety
- order and standardisation
- equality of opportunity
- economic soundness

Safety includes both internal safety among operators, airports and service providers, and external safety such as counterterrorism measures and security screening for passengers and cargo.

Order includes standard requirements for the provision of services such as air navigation and ground handling.

[7] See Status of Convention

Equality of opportunity includes non-discriminatory access to services, as well as reciprocity in granting traffic rights between states. To ensure sound economic operation, states must provide infrastructure and services for international aviation based on published, transparent fee schedules. These must be structured in a non-discriminatory way and reflect actual costs.[8]

While **road and rail infrastructure** is often funded from public budgets as part of general service provision, aviation infrastructure is generally financed by users. This is partly because a large share of air traffic involves foreign passengers who are not within the remit of national budgets, and partly due to the elevated risk associated with flying and therefore must be covered by passengers.[9]

ICAO principles[10] require that aviation fees be calculated on a cost basis, not for profit. These rules apply equally to private service providers. Domestic and foreign users must be treated equally. The guidelines also define what services may be charged for, which types of costs are eligible, and how they may be calculated.[11]

Allocating costs between aviation and non-aviation operations affects pricing and profitability. Direct costs can be assigned clearly, while shared costs must be apportioned using allocation keys. To keep aviation costs low and promote efficiency, ICAO recommends that surplus revenue from non-aviation services should help reduce aviation charges. This is the so-called *single till* approach and reflects the view that aviation infrastructure serves the public interest.

ICAO also advises that international aviation should be exempt from taxes on fuel and tickets. Any exceptions must be agreed through bilateral or multilateral arrangements.[12]

To address the climate impact of aviation, ICAO introduced CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation).[13] This is the first global emissions scheme for a specific sector CORSIA caps net CO_2 emissions from international aviation at 85% of 2019 levels. However, the long-term goal of net-zero emissions remains voluntary rather than binding.

EU Regulatory Framework

Regional rules such as those of the European Union only apply to countries that adopt them through common legislation.

The EU has created its own framework covering both operational and economic aspects of aviation.

Operational rules have been harmonised through common laws and regulations. These interpret ICAO guidance and apply it consistently across EU airlines, airports, maintenance providers and manufacturers[14]. Oversight is

[8] See ICAO (Convention) Art. 15

[9] The example of fire risk illustrates how increased risk structures are generally dealt with. On-site fire brigades are established in response to a "particular hazard situation" within a company (see https://de.wikipedia.org/wiki/Werkfeuerwehr). The term company fire brigade refers to non-state-recognised fire services that enhance fire protection within a business, enabling the company to benefit from insurance discounts or to respond quickly and thus reduce potential damage (see https://nfv-112.org/organsiationsformen.html). State-run professional or volunteer fire brigades do not cover "particular hazard situations." Their purpose is instead to provide "self-protection for the population" (§1 Hessian Fire and Disaster Protection Act). "Effective assistance" is defined as being provided within 10 minutes of an alarm being raised (§3 HBKSchutzG).

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[10] I10 Especially ICAO's Policies on Charges for Airports and Air Navigation Services (ICAO's Policies on Charges)

[11] See https://www.icao.int/sustainability/pages/eap_docslist.aspx.

[12] ICAO's Policies on Taxation in the Field of International Air Transport (ICAO's Policies on Taxation).

[13] ICAO Annex 16 to the Convention on International Civil Aviation: Environmental Protection (ICAO Annex 16) und (ICAO CORSIA Handbook)

[14] Especially Regulation (EC) No 210/2008 (EU OPS)

managed by the European Union Aviation Safety Agency (EASA), which ensures that member states apply these rules uniformly.

Economic rules have evolved over time. The earlier model of public service provision was gradually replaced by market-based approaches following liberalisation and privatisation in the late 20th century.

The former global network of standardised, regulated airfares and bilateral agreements has given way to open competition and airline alliances. The EU replaced national bilateral agreements with its "Open Sky" policy.

Airport operators were gradually privatised, starting with the UK under Margaret Thatcher. Airports are now often managed as private enterprises with profit objectives. Ownership of airport infrastructure has also been privatised in some cases.

As a result, airport owners increasingly prioritise profitability over public service obligations. To maintain compliance with ICAO airport charge policies, the EU introduced the 2009 **Airport Charges Directive**.[15] It sets procedures for calculating and disclosing airport charges and requires user consultation. The directive permits both single till and dual till methods. Under dual till, revenues from non-aviation activities are excluded from the cost base, leading to higher charges for aviation and higher profits for owners. The method used varies between member states.

Classifying airports as commercial businesses has led to the application of competition law, including rules on state aid.[16] This classification is unique to the EU. In countries like the United States, airports are still treated as public infrastructure and funded according to local or national public interest.[17]

The Airport Charges Directive covers the provision of **airport infrastructure** and related equipment, such as IT systems or buses, as well as **security services** for screening staff, passengers, baggage and cargo. With the exception of passenger screening, responsibility for managing and collecting airport charges lies with the airport operator organisations. Passenger screening falls under the directive responsibility of public security authorities (police, military, administrative bodies), which may commission private companies to carry out these tasks.

Ground handling services are excluded from this directive and governed separately.[18]

Air traffic control services are also covered by separate legislation. The Single European Sky (SES) initiative, launched in 2004, created a unified system for managing airspace and calculating related charges.[19] Detailed methods for charge calculation are defined in Regulation (EU) 2019/317.[20] These services are publicly mandated, although charges are typically collected by the providers, and for Eurocontrol member states, billing is handled centrally by Eurocontrol.

Fuel tax exemptions within the EU are governed by Directive 2003/96/EC.[21] Directive 2006/112/EC[22] regulates VAT on goods and services in intra-EU air transport. International flights are generally exempt, although exceptions are allowed for historical reasons.

EU-based airlines must comply with climate regulations. Since 2012, intra-European flights have been covered by the EU Emissions Trading System (**EU ETS**)[23], introduced under the 2003 Directive. From January 2025, flights

[15] Directive 2009/12/EC of the European Parliament and of the Council of 11 March 2009 on Airport Charges (Airport Charges Regulation)
[16] Communication from the Commission 2014/C 99/03 Guidelines on State aid to airports and airlines (Guideline on state aid)
[17] See Brützel, C. *Ist Luftverkehr öffentliche Aufgabe oder Markt und Wettbewerb?*
[18] See above, chapter 3 last sentence
[19] Regulation (EC) No. 550/2004 (SES Service Provision Regulation), especially Art. 14 ff.
[20] Commission Implementing Regulation (EU) 2019/317 (EU-ANS-Charges-Reg.)
[21] Cf. Art. 14 of Directive 2003/96/EC (Fuel-Taxation EU)
[22] Cf. Directive 2006/112/EC (VAT-Regulation EU)
[23] Directive 2003/87/EC (ETS-Directive)

departing from EU airports must use fuel blended with **sustainable aviation fuel** (SAF).[24] EU airlines must also participate in CORSIA for flights to and from non-EU countries.[25] The ReFuelEU Aviation Regulation sets mandatory SAF blending levels for all EU-departing flights, rising to at least 70 percent by 2050.

National Regulatory Frameworks

Implementation of ICAO and EU rules on aviation fees and taxes is carried out through national legislation and regulations.

In Germany, **airport charges** must be set in line with EU directives. According to Section 19b of the Aviation Act (LuftVG), charges must be cost-based, objective, transparent and non-discriminatory.

The collection of fees for **security services** is regulated differently across EU member states. In some countries, these services are partially or fully publicly funded, depending on their classification as services in the public interest.

In Germany, Section 17a of the Aviation Security Act (LuftSiG), together with the Aviation Security Fees Ordinance (LuftSiGebVO), stipulates that users must cover the full cost of security services.

Fees for **air traffic control services** are determined nationally, based on the relevant EU implementing regulation.

- For en-route air traffic services, each country sets a uniform charge for its own airspace.
- For airport control services, cost bases are typically consolidated across all airports or grouped by size. A uniform or tiered fee is then applied, depending on the grouping.

This variation in cost allocation and the use of targeted subsidies in some countries leads to wide differences in fees, resulting in significant disparities in location-related costs.

- In Germany, a national ordinance[26] sets a single uniform fee for airport control services. This average rate is based on the cost structure of DFS (Deutsche Flugsicherung GmbH) at the airports it manages, and it also applies to all other airports where instrument flight rules are in use.
- In other countries, different methods of consolidation and targeted subsidies can result in significantly higher or lower charges, further contributing to cost variation across locations.

VAT exemptions for international flights, as provided for in the EU VAT Directive, are currently applied by all EU countries, including Denmark and Malta, both of which are entitled to levy VAT on international flights under the directive. In Germany, the exemption is granted under Section 26(3) of the VAT Act (UStG) for direct sales, and also applies to intermediary or reseller transactions under Section 4.5.3 of the VAT Implementation Decree (UStAE).

The tax exemption for **aviation fuel** used in international flights, based on ICAO taxation principles and EU Directive 2003/96, is also implemented by all EU member states. In Germany, it is set out in Section 27(2) of the Energy Tax Act (EnergieStG).

Some EU countries levy taxes on passenger transport, and France additionally applies taxes to air cargo transport. In Germany, the passenger tax is collected under the Air Traffic Tax Act (LuftVStG).

[24] Regulation (EU) 2023/2405 (ReFuelEU Aviation)
[25] (EU) Commission Implementing Regulation 2024/1879 (EU CORSIA Regulation)
[26] Flugsicherungs-An- und Abflug-Kostenverordnung (FSAAVK)

3. Location Costs: Empirical Perspective

This section examines location costs from an empirical point of view, aiming to compare the cost levels at different airport locations.

The analysis is prompted by complaints from various stakeholders in the aviation sector:

- Airports: Smaller airports in particular argue that public regulations impose excessive costs.[27] The German airports association (ADV) has, for example, criticised mandatory security fencing requirements and the associated costs, as well as fire service expenses. Airports also raise concerns over aviation security and

[27] See ADV-Pressemitteilung No. 24/2024

air traffic control charges.

- Airlines: Airlines complain about high charges imposed by airports and air navigation service providers.[28]

Methodological Challenges of Cost Comparisons

Comparing costs across airports presents several challenges:

- Complexity: Although the business models of airports and airlines may seem straightforward, they involve complex operational and strategic relationships. These affect cost structures, making location costs difficult to compare meaningfully.

- Transparency: Not all cost structures are disclosed. In Germany, for instance, under the dual-till model, cost data is published only at a highly aggregated level. This model allows wide discretion in allocating shared costs between the regulated aviation segment and the profit-oriented non-aviation segment.

- Global structural differences: International comparisons are further complicated by historically evolved structures that result in different types of costs being grouped together, making the published aggregates difficult to compare.

In summary, cost comparisons are only feasible at a general level.

Discounts and Incentives

Using published fee schedules to determine location costs can be misleading. It is rarely clear which airlines actually pay full rates. Complex discount schemes exist, and some fee systems or environmental surcharges may be designed in ways that favour certain carriers.

Although discount systems are meant to be non-discriminatory, some are clearly tailored to specific users.[29]

How Location Costs Are Analysed

Location costs can be analysed from both airline and airport perspectives.

Eurocontrol distinguishes between "Flight", "Ground", and "System Operating Costs", as well as between "direct" and "indirect operating expenses". According to IATA, flight and ground operating costs made up around 75% of total airline costs in 2019.

However, Eurocontrol's structure is not widely used or compatible with most data sources.[30]

A more practical approach is to look at 'turnaround costs', which reflect the actual costs of a specific aircraft return flight. These include all relevant location costs and can be calculated per passenger for further analyses.

Turnaround costs are divided into:

[28] See BDF-Pressemitteilung from 25.06.2025
[29] See Gramlich, L., Thießen, F., 2016, Entgeltsysteme.
[30] See: DLR, 2025, 9 and EUROCONTROL 2024a.

- Passenger-related costs: airport charges and services per passenger, security screening, infrastructure security fees, passenger taxes, and extra fuel use due to passenger weight.

- Flight-related costs: take-off and landing fees, air navigation and ground handling services, variable technical costs, and fuel costs unrelated to payload.

- Fixed operational costs: depreciation, financing, maintenance, and crew costs, which are not depending on the location.

Example: Return Flight from Düsseldorf to Palma de Mallorca

To show how these costs play out in practice, the report examines a return flight from Düsseldorf to Palma de Mallorca[31]:

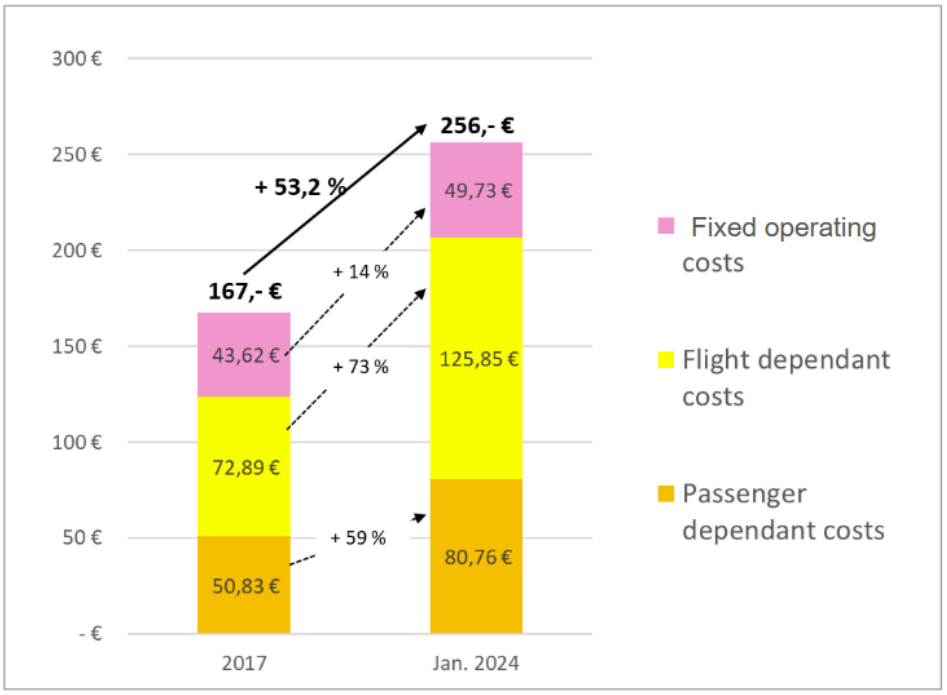


Fig. 3.1 Turnaround costsA320 DUS-PMI-DUS per each passenger

[31] See. Brützel, C., *Wie viel mehr kostet fliegen nach Corona,with detailed information on individual cost elements and discussion.*

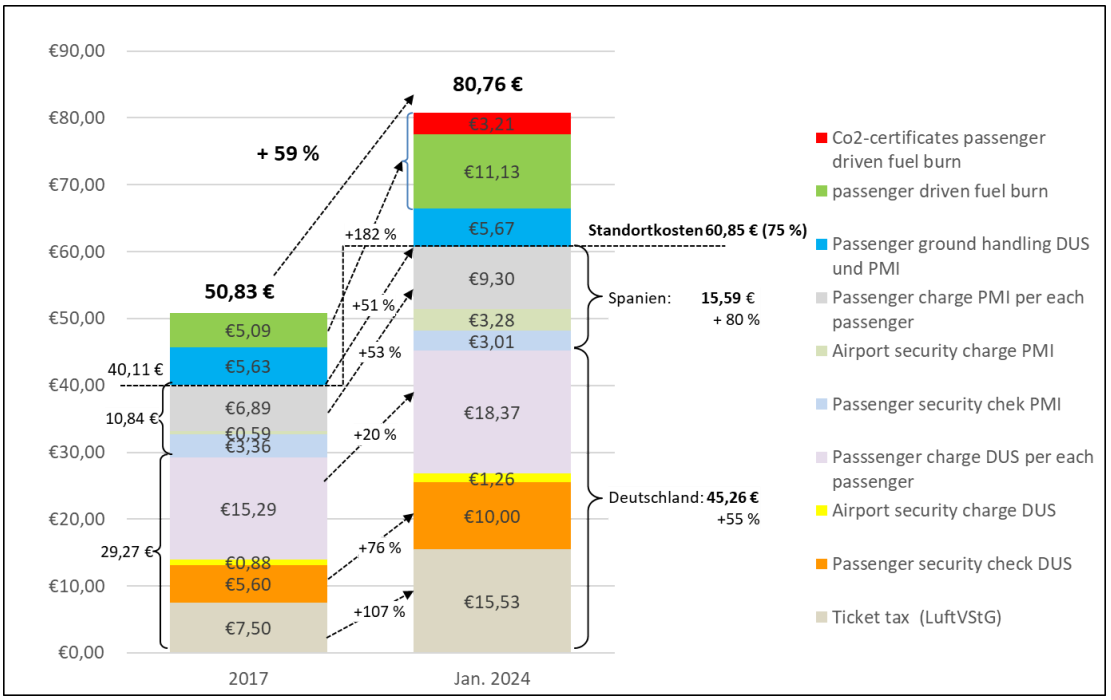


Fig. 3.2 Passenger-related turnaround costs A320 DUS-PMI-DUS

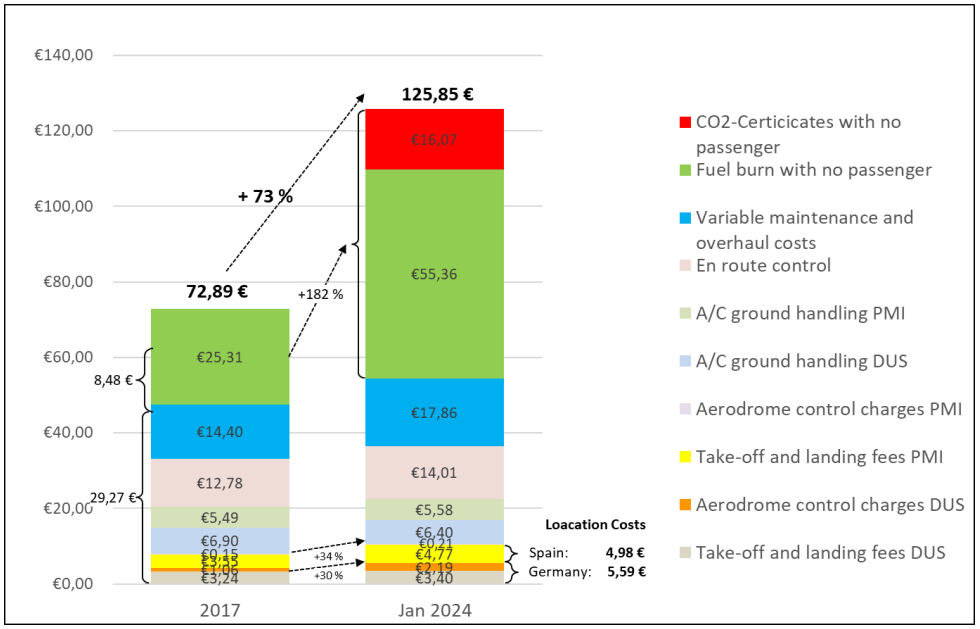


Fig. 3.3 Flight-related turnaround costs A320 DUS-PMI-DUS per each passenger

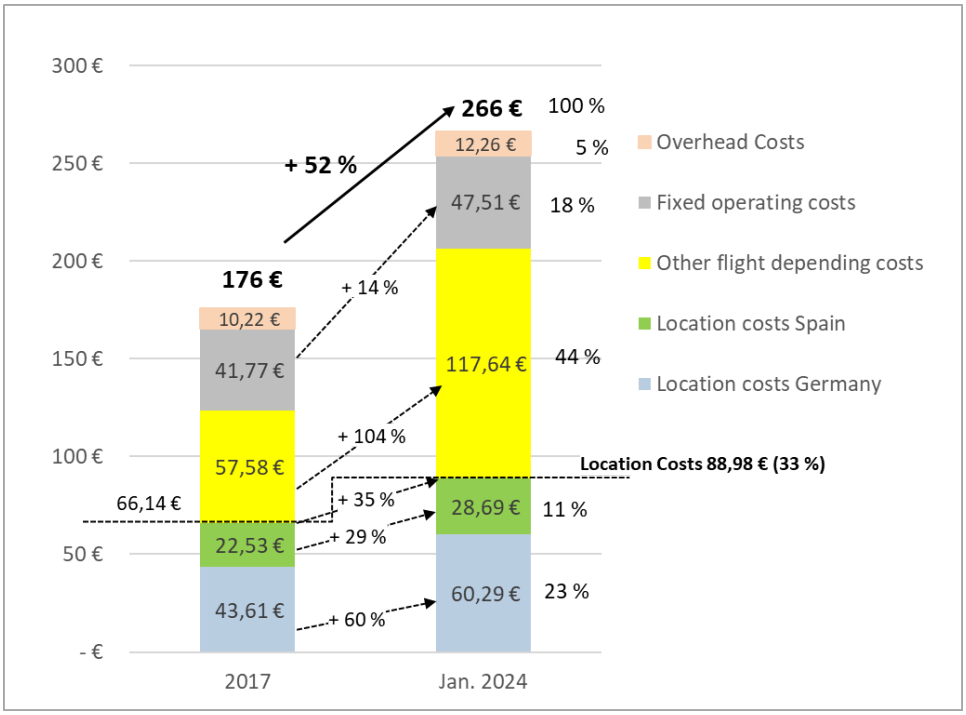


Fig. 3.4 Total turnaround costs A320 DUS-PMI-DUS per each passenger

Location-related costs account for **34%** of the total flight cost, including an allocation for general overheads such as administration, IT and marketing. Of this, **23%** arises in Germany alone.

In January 2024, location costs per passenger in Düsseldorf were nearly three times higher than in Palma de Mallorca.

Flight-related costs are largely independent of airport location, even on a medium-length route.

Analysis Using DLR Data

The study also draws on findings from a 2025 DLR report.

The DLR divides costs into flight-related and ground-related components. Flight-related costs include:

1. Fuel
2. Crew
3. Aircraft depreciation
4. Air traffic control
5. Environmental levies such as emissions certificates or CORSIA

Ground-related costs include:

6. Take-off and landing fees

7. Security charges for passenger and baggage screening

8. Departure taxes such as the air passenger duty

According to the DLR, location costs can be regarded as that portion of turnaround costs which, regardless of the distance flown, depends solely on the specific airport or country where landing and take-off take place. The DLR includes in this category airport charges and government-imposed levies (air traffic control, aviation security, ticket tax, environmental charges).

The DLR analysis is based on data from RDC Airport Charges, covering more than 100European airports. Six cost components were compared: air passenger tax, security fees, other government charges, slot fees, air traffic control charges, and additional airport charges. All were calculated using a standardised flight scenario. Airline-specific discounts or subsidies were not included.[32]

Figure 3.5 compares location costs across Europe's main hub airports.

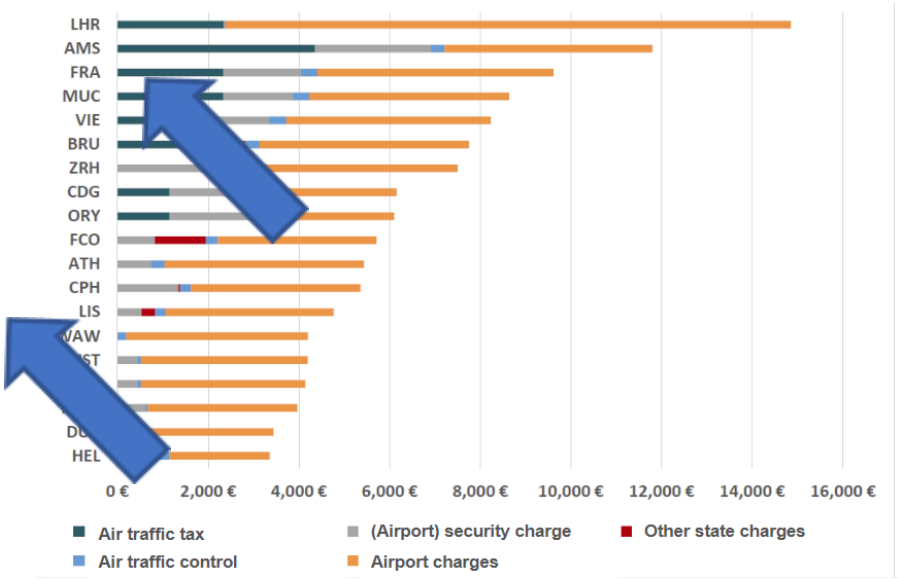


Fig. 3.5 Location costs of hub airports in Europe[33]

Clarification: The two arrows mark the airports at the boundaries of the first and fifth quintiles – a method used to eliminate outliers.

What does Fig. 3.5 show?

[32] See DLR, 2025, 17: The European and time period-based comparison is based on the turnaround costs of a typical short- to medium-haul aircraft, an Airbus A320, carrying 150 arriving and departing passengers and with a maximum take-off mass (MTOM) of 73.5 tonnes, operating on intra-European routes. The turnaround begins with landing at 12:00 local time and ends with departure at 12:45 after 45 minutes on the ground. The reference date in each case is 15 May of the year in question. This operational scenario is considered highly representative of the intra-European market: between October 2023 and September 2024, various Airbus A320 models and similarly sized Boeing 737s with 160–200 seats accounted for 56% of intra-European departures (source: Sabre MI). The analysis includes both location-based costs set by public authorities, such as aviation taxes, air navigation charges (approach and departure), and aviation security charges, as well as airport charges that are largely set by the operators themselves. For the calculation of the aviation tax, a distance of 1,000 km between the departure airport under review and the destination is assumed. Other parameters, such as check-in opening times, the share of passengers using self-service check-in, the use of passenger boarding bridges, the share of mobility-impaired passengers, and the number of checked baggage items, were standardised as far as possible.

[33] Source: DLR, 2025, p.25

- Costs vary widely.
- Among major hubs, total location costs per flight range from **EUR 3,500 to EUR 15,000**.
- Excluding the top and bottom 20 percent, often done to eliminate outliers, the range remains broad: between **EUR 4,000 and EUR 8,100**.
- Much of the difference is due to state-imposed charges. For example, Vienna's taxes and fees are several times higher than Istanbul's.

Similar findings were observed at secondary and regional airports:[34]

- At airports with over 10 million passengers per year, costs range from **EUR 2,700 to EUR 9,200**.
- After removing outliers, the range narrows to **EUR 3,900 to EUR 7,800** (e.g. Budapest to Stockholm Arlanda).
- Among the 31 smaller airports, the spread is even larger: from **EUR 2,100 to EUR 12,200**.
- Within the middle 60 percent of cases (e.g. Gdańsk to Eindhoven), the range is still **EUR 2,400 to EUR 6,600**.

What have other research institutes found?

Figure 3.6 shows the average per-passenger location costs by country, for countries with at least two airports, based on a study by the French transport ministry. This analysis also confirms significant differences between countries.

Moyenne pondéré par pays	€ 2023	€ 2022	indice 100 (2023)	variation 2023/2022
Pays-Bas	67,8	44,7	178	52%
Royaume-Uni	57,0	56,1	150	2%
Allemagne	50,1	48,7	132	3%
Autriche	50,5	48,2	133	5%
Suisse	41,3	37,5	109	10%
Ensemble Panel (hors France)	38,1	35,5	100	7%
Ensemble Panel	37,6	35,1	99	7%
France	33,5	32,0	88	5%
Belgique	31,2	28,3	82	10%
Italie	30,6	30,1	80	2%
Turquie	30,0	27,2	79	10%
Grèce	28,8	27,7	76	4%
Danemark	24,3	24,4	64	0%
Suède	24,2	25,3	64	-4%
Pologne	22,0	21,1	58	4%
Portugal	22,5	20,8	59	8%
Norvège	21,7	16,2	57	34%
Espagne	21,4	21,3	56	0%
Irlande	16,2	13,6	43	19%

Fig. 3.6 Weighted location costs per country per passenger[35]

[34] See DLR, 2025, p.21 ff.

[35] Methodology**:** The basis is a sample flight with an A320 TBC 2023. In the study, location costs for a single aircraft turnaround are defined as "the totality of services charged to an airline in the form of taxes or fees to enable the landing, ground movement, parking and take-off of the aircraft, as well as the disembarkation and boarding of passengers." Ground handling services that are the subject of commercial

Source: Ministère Chargé des Transports[36]

Figure 3.7, from the same study, shows the change in location costs between 2013 and 2022. Germany is among the countries with relatively high growth rates, though not the highest overall.

	Evolution 2013-2023
> 50 %	Pays-Bas, Turquie, Hongrie
> 30 %	Allemagne, Portugal, Belgique, Royaume-Uni,
> 20 %	Suisse, Autriche, Tchéquie, Italie, Finlande,
> 10 %	Suède, Grèce, France
> 5 %	Pologne, Chypre, Malte, Danemark,
> 1 %	Norvège
Stabilité	
< - 5 %	Espagne
< - 10 %	Irlande

Fig. 3.7 Location costs increases per country
Source: Ministère Chargé des Transports[37]

In summary, there is a strikingly wide range in location costs among Europe's airports. The gap between "low-cost" and "high-cost" airports is extremely large, with differences of up to five times compared with the lowest-cost airports. If outliers are removed (i.e. the highest and lowest quintiles), the cost differences among the remaining airports in all three airport groups are around €4,000 per sample flight.

Despite these substantial cost differences, it is clear that even in countries with high location costs, airports still serve as key transport infrastructure for air services and are used by airlines as home bases.

The next step, therefore, is to examine whether, and to what extent, differences in the level or development of location costs affect the supply of services and the growth in passenger numbers.

Location Costs and Passenger Numbers

This section looks at whether there's a meaningful link between an airport's location costs and the number of passengers it handles.

contracts, the negotiated terms of which are not publicly available, are not included. Air navigation charges are taken into account for terminal air traffic services (RSTCA). En-route control charges are excluded (see Ministère Chargé des Transports, 2024, p. 9).

[36] See Ministère Chargé des Transport, 2024

[37] See Ministère Chargé des Transport, 2024, p.32

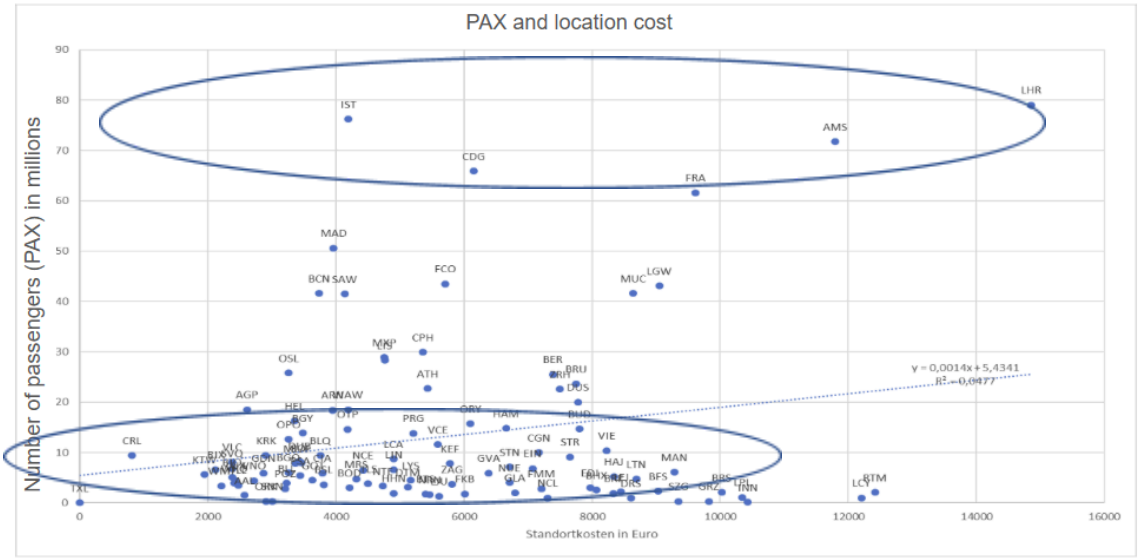


Fig. 3.9: Relationship between location costs and passenger numbers 2024 for 101 European airports[38]

Clarification: Location based costs are on the x-axis; passenger numbers are on the y-axis

Figure 3.9 shows the relationship between location costs and passenger numbers. The result is a scattered cloud of data points, with only the faintest upward trend. In other words, airports with higher charges tend to have slightly more passengers, but the effect is minimal and not statistically significant.

- For **smaller airports** (up to 10 million passengers per year), the spread in cost levels is enormous, yet it has no clear impact on traffic. Some airports with four times the costs of the cheapest in their category still attract just as many passengers (see lower oval in Figure 3.9).
- The same pattern holds for **Europe's largest airports** (upper oval in Figure 3.9). Costs vary dramatically — in some cases by up to EUR 11,000 per flight — yet passenger volumes remain similar. There's no consistent link between how much an airport charges and how many people use it.

[38] See DLR, 2025. The source of the passenger (PAX) data is https://de.wikipedia.org/wiki/Liste_der_Verkehrsflugh%C3%A4fen_in_Europa. Passenger data from 2024 were used; where these were not yet available, the most recent year for which data existed was taken.

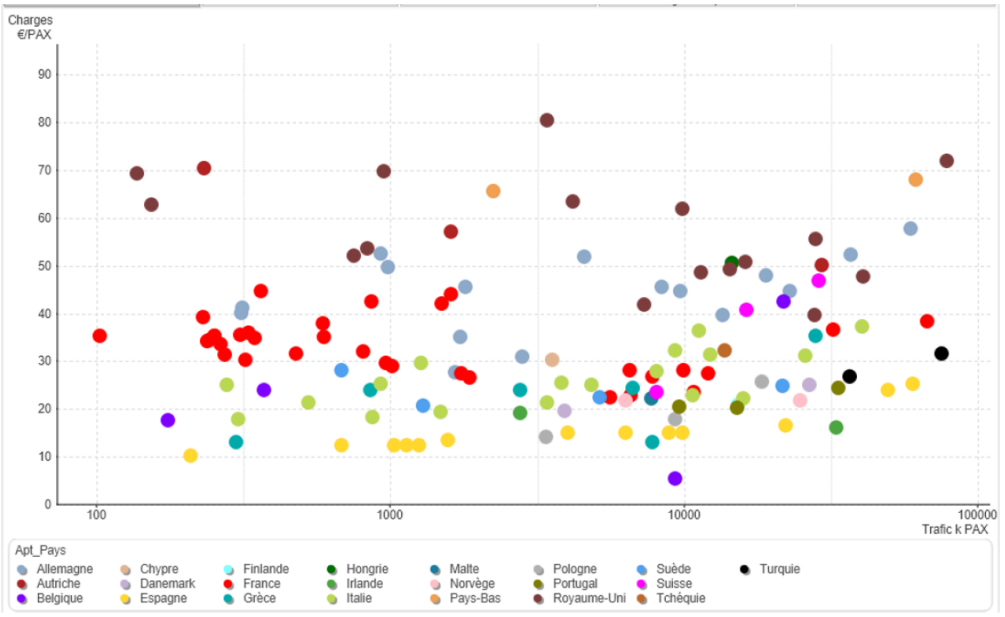


Fig. 3.10 Relationship between location costs and passenger numbers 2024 for 137 European airports[39]
Source: Ministère Chargé des Transports[40]

This finding is backed up by a separate study from the French civil aviation authority.

Figure 3.10 shows the costs per passenger rather than per flight, but the overall picture is the same: wide variation in cost, no clear connection to passenger numbers.

Figure 3.10.2 takes a new approach.
It ranks 101 airports (from the DLR 2025 study) by their location costs, shown by the blue line.

- Heathrow, the most expensive, is used as the reference point, set at 100% (or 1).
- All other airports are shown in relation to Heathrow's costs. For instance, a value of 0.5 means the airport's costs are half those of Heathrow.
- Passenger volumes are plotted on a logarithmic scale to make differences between airport sizes easier to compare.

The dotted red line is a regression line. It runs flat, indicating no general relationship between costs and passenger numbers.

Even so, two patterns stand out:

[39] Methodology: The study is based on a sample flight with an A 320 TBC 2023. The location costs for one aircraft rotation are defined in the study as "the totality of services charged to an airline in the form of taxes or fees to enable the aircraft to land, move on the ground, park, and take off, as well as for passengers to disembark and board." Ground handling services that are subject to commercial contracts whose negotiated terms are not publicly available are not included. Air traffic control charges are taken into account for air traffic terminal services (RSTCA). Charges for en route control are excluded (see Ministère Chargé des Transports, 2024, p. 9).

[40] See. Ministère Chargé des Transport, 2024.

- On the left, sharp peaks suggest that **very large airports and hubs** tend to have higher costs (left oval).
- On the right, there are hardly any peaks, meaning that **airports with low costs tend to be small** (right oval).

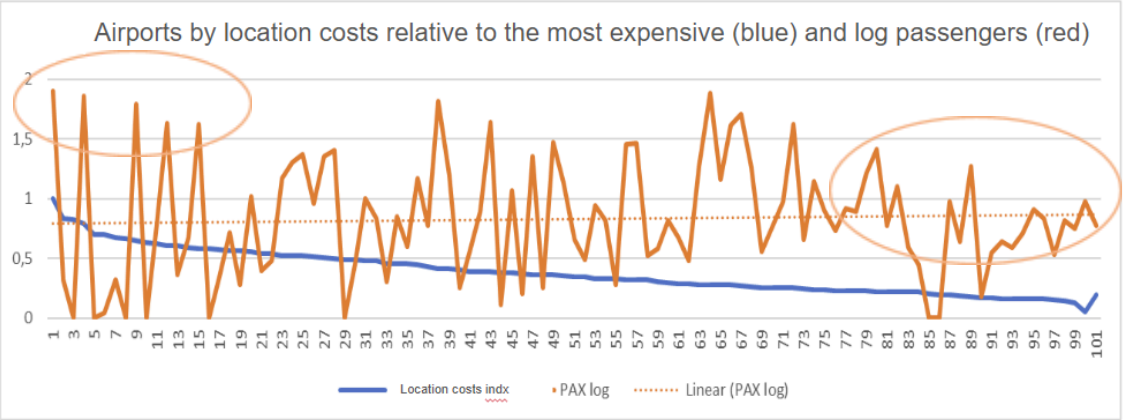


Fig. 3.10.2: 101 European airports according to aviation costs and passenger numbers

In summary, there is no discernible relationship between an airport's location costs and its passenger numbers. At the same level of location costs, airports can be found with both very high and very low passenger volumes. This holds true for both the total cost of a flight and the cost per passenger.

Understanding the Causes

What explains the patterns observed so far?

At the most basic level, **passenger volumes are shaped primarily by the availability of flights**. In Europe, apart from business aviation, almost all commercial flights are scheduled services. This means capacity is largely fixed well in advance through the publication of airline timetables.

Once flight schedules are set, airlines behave as price setters within that framework. Their aim is to maximise load factors — filling every seat as long as the fare paid by the next passenger covers the marginal cost of carrying them. These marginal costs, shown in Figures 3.1 and 3.2, set the lower boundary for pricing. The more capacity is released into the market, the more seats are offered at low fares.

This is why passenger volumes are essentially a function of airline supply decisions, which in turn depend on the airports used.

Internationally, airlines choose their home bases and destinations based on their business model, target market (leisure or business travellers), and potential market share.

For **network carriers**, switching international hubs is not an option due to global traffic rights. In large airline groups with multiple hubs (e.g. Lufthansa Group, Air France–KLM), choices are about how to allocate long-haul and connecting capacity within the limits of existing bilateral air service agreements.

For **point-to-point carriers**, the decision about where to base aircraft depends on catchment area, available capacity and traffic rights, achievable market share, and operational conditions.

International low-cost carriers like Ryanair, Wizz Air and easyJet base their aircraft across multiple countries, choosing airports with strong catchment areas, market growth potential and operational flexibility. They avoid major hubs used by network carriers, meaning their airport choices are narrower from the outset. In cases where two airports are close together — such as Eindhoven and Weeze — location costs may indeed tip the balance.

Subsidiaries of network carriers (such as Eurowings, Vueling or Transavia) and **regional airlines** also tend to avoid hubs, focusing instead on larger secondary airports in their home countries.

Leisure carriers typically operate out of their home market. Groups like TUI allocate capacity across source markets according to demand, often concentrating resources at a few key bases to maximise economies of scale. Destination-focused carriers base their operations at airports in tourist regions.

For network airlines and mixed leisure-business point-to-point operators, the choice of destination airport depends on catchment area size, economic structure and strength, and the potential to attract inbound traffic.

International low-cost airlines serve not only the routes between their own bases, but also holiday and city break destinations, along with countries that are home to large migrant communities.

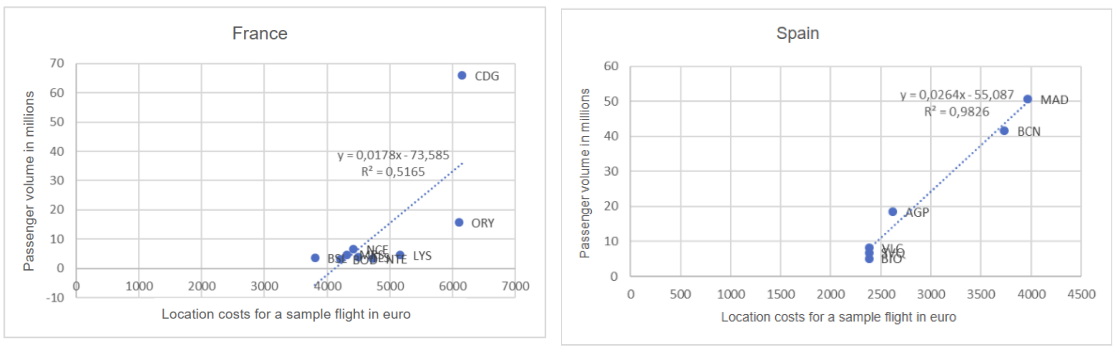
For **leisure carriers**, the choice of destination depends mainly on the strength and capacity of the tourist offering, as well as the distance from source markets.

Location Costs: Within-Country Comparison

This section moves from the European level to examine the relationship between location costs and passenger numbers within individual countries.

Figure 3.11 compares this relationship across six European countries.

Relationship between location costs and passenger numbers for 6 European countries 2024



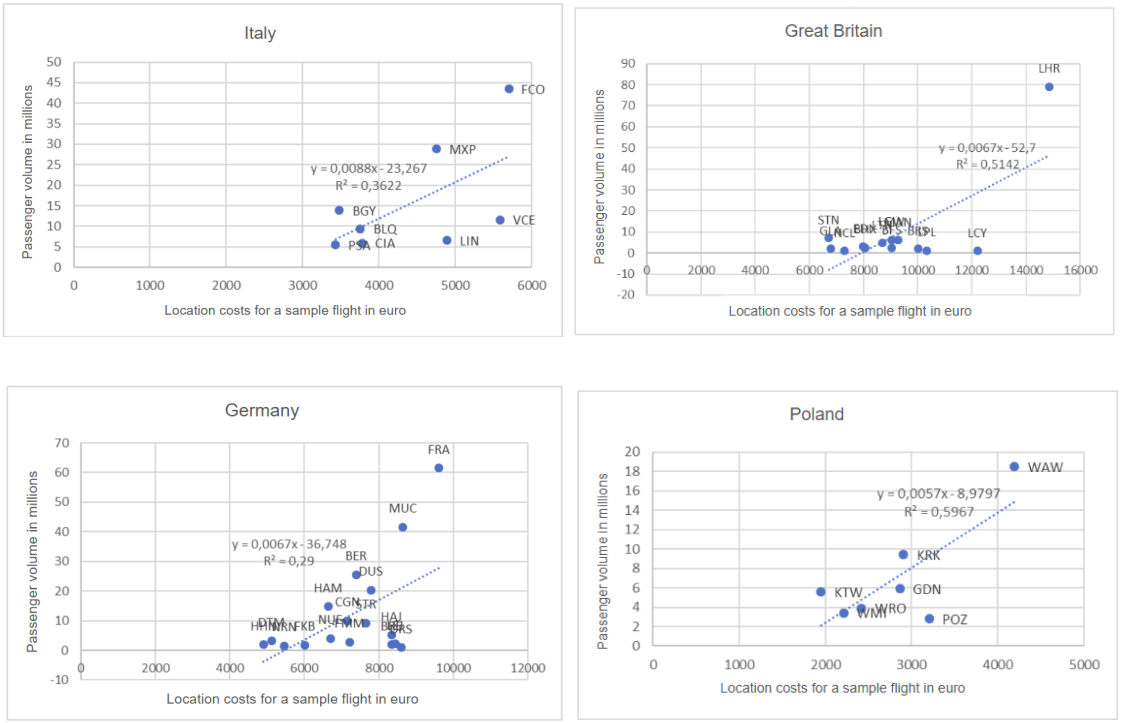


Fig. 3.11 Relationship between location costs and passenger numbers 2024[41]

Clarification: The vertical axis shows passenger numbers in millions. The horizontal axis shows the location costs for a sample flight in euros.

What does Figure 3.11 show?

In every country analysed, larger airports tend to have higher location costs than smaller ones.

This suggests that larger airports offer services that are valued by both airlines and passengers and that they are willing to pay for.

- Smaller airports display a wide range of cost structures, but these variations are not linked to passenger numbers. Even the cheapest small airports attract no more passengers than their more expensive counterparts.
- Air passenger taxes cannot explain these differences, as they are applied uniformly within each country.
- Public authorities may, however, influence cost levels by charging different rates at larger and smaller airports.[42]

Overall, there appears to be no positive correlation between lower location costs and higher traffic volumes at the national level. In fact, it is often the airports with the highest location costs that handle the most flights and passengers.

[41] Source: RDC Airport Charges for cost data; source of the PAX data is: https://de.wikipedia.org/wiki/Liste_der_Verkehrsflugh%C3%A4fen_in_Europa

[42] Example: If a schedule of charges requires the same prices for the same services, this can benefit smaller airports, as they may have fewer economies of scale.

Understanding the Causes

At national level, the factors influencing passenger volumes and flight availability closely follow the same logic as on the international stage. Airlines choose their home bases based on their business models, applying the same decision criteria in both contexts.

For **network carriers**, hub selection is not flexible. Operational constraints and traffic rights effectively rule out alternatives. In Germany, for instance, Lufthansa operates two main hubs: the traditional one in Frankfurt and a second in Munich. These hubs serve as key national gateways to the global aviation network. Regardless of how they compare in terms of location costs, they remain by far the country's busiest airports for both passenger and cargo traffic.

For **leisure airlines** focused on domestic source markets, such as Condor, key factors include the size of the catchment area, potential market share, operational scale, and the airport's connections to road and rail networks. For **destination-based carriers**, such as SunExpress, the attractiveness of the location itself is what drives the choice of base.

Point-to-point carriers that serve both leisure and business travellers — including Eurowings, easyJet and Vueling — need large airports with broad catchment areas. These airports are typically located outside the network carriers' hubs.

Leisure-oriented, internationally active low-cost carriers such as Ryanair and Wizz Air can also work with smaller airports, provided the basic infrastructure is in place.

Airport Choice in Practice: Düsseldorf vs. Weeze

- For **Eurowings**, Düsseldorf offers the capacity and infrastructure needed to support a home base, including frequent connections tailored to business travellers.
- **EasyJet** withdrew from Düsseldorf because of Eurowings' dominant position in the local market.
- For **Condor**, Düsseldorf's capacity and strong intermodal transport links outweighed any cost advantages that Weeze might offer.
- **Ryanair**, by contrast, found Weeze to be the better fit. The airport offers greater operational flexibility, fewer competitors, and significantly lower location costs. As a result, Ryanair ended its short-lived operations at Düsseldorf, previously run through Lauda Air.

Location Costs and Passenger Volumes by Airport Type

How does the relationship between location costs and passenger volumes change when airports are grouped by type?

This section follows the format used in Figure 3.10.2. European airports are divided into three groups:

1. Large airports and hubs
2. Airports in southern Europe with a strong focus on tourism
3. Smaller European airports with over one million passengers per year

Figure 3.10.3 presents the findings.

The figure shows four categories:

- Group 1: Large airports and hubs
- Group 2: Airports in southern Europe with a strong share of tourist traffic
- Group 3: Other smaller airports in Europe
- Group 4: Very small airports with fewer than one million passengers

The aim of the grouping is to examine whether location costs have any influence on passenger numbers within airport categories that may be competing with each other.

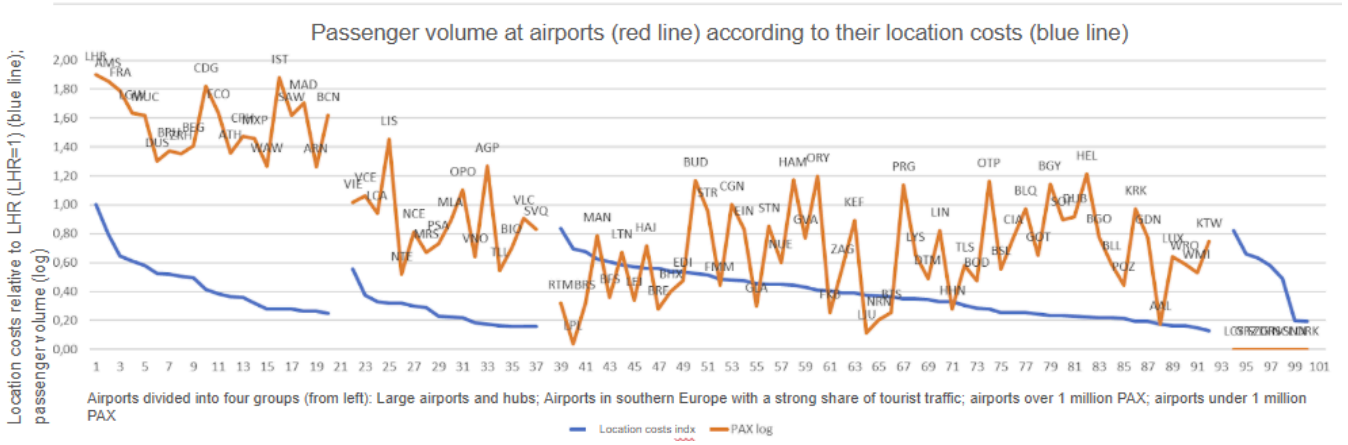


Fig. 3.10.3: European airports in 4 groups by location costs and passengers

For the **largest airports and hubs** (Group 1), there is no link between costs and passenger volumes.
The same is true for **tourist-focused airports in southern Europe** (Group 2), where no clear pattern emerges

In **Group 3** (smaller European airports) a slight trend is visible: airports with lower location costs tend to have slightly more passengers. These airports appear on the right-hand side of the graph. However, the relationship is very weak, and the explanatory power is limited (see Figure 3.10..4 below).

One notable pattern is that some tourist-heavy airports have particularly low location costs. This reflects a trend discussed earlier in this report: tourist regions in southern Europe compete fiercely for air traffic and often use low flight-related charges as a strategic advantage.

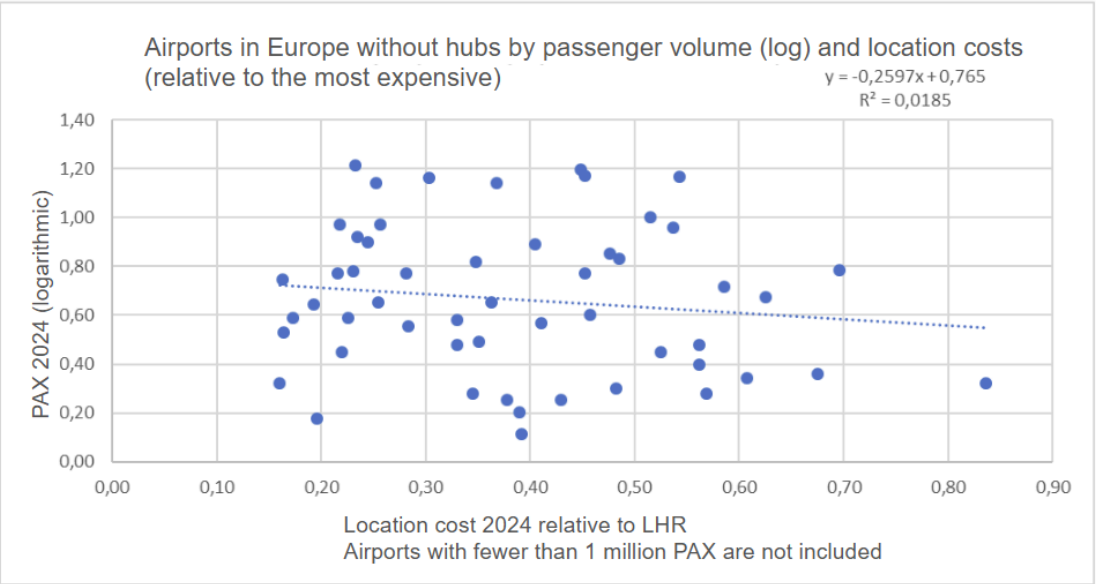


Fig. 3.10.4: European airports with over 1 million passengers that are neither hubs nor southern European tourist airports, by location costs and passenger volume.

Closer Look at Smaller Airports

Figure 3.10.4 focuses on **Group 3** of Fig. 3.10.3**:**: smaller European airports with more than one million passengers, excluding hubs and southern European tourist airports.

- The vertical axis shows passenger volumes on a logarithmic scale.
- The horizontal axis shows location costs, with Heathrow used as the reference point (100 percent or "1"). A value of 0.30, for example, means an airport's location costs are 30 percent of Heathrow's.

The regression line is very slightly downward-sloping, which suggests that more expensive airports in this group have slightly fewer passengers. However, the explanatory value is minimal: the coefficient of determination is below 2 percent ($r^2 = 0.0185$).

In other words, location costs have no real explanatory power for passenger volumes in this group.

Summary

In summary, there is no empirical evidence at either national or international level of a positive relationship between low location costs or low charges and the scale of supply (airline route choices) or passenger volumes (demand based on available services).

Instead, location choice is determined by business model–specific factors alone, namely available capacity, the catchment area, the market position that can be achieved, and the operational framework conditions.

4. Location Costs and Demand for Air Travel

Introduction

This chapter explores the question of how location costs influence demand for air travel. In particular, it looks at whether national differences in these costs have any impact on traffic growth, both in terms of flight supply and passenger numbers.

The chapter is structured as follows:

1. It begins by outlining the key factors that influence demand for air travel, based on existing studies and literature.

2. It then takes a critical look at the concept of price elasticity, which underpins many of the econometric models used to analyse demand.

3. Findings from previous research on the price elasticity of demand for air travel are presented.

4. This is followed by a discussion of the results from the DLR study and a French study conducted by the DGCA.

5. The analysis then explains why these classical, model-based approaches — including those used by DLR and DGCA — fail to explain how supply and passenger volumes have developed in practice.

6. Finally, the chapter outlines the real-world factors that do drive changes in flight supply and passenger demand.

Key Factors Influencing Demand

Based on the research reviewed, the main factors affecting demand for air travel are:

- Disposable income (GDP per capita; data based on Eurostat's TIFstatistic)
- Ticket prices

Other relevant factors include:

- The level of capacity made available by the aviation industry
- Alternative travel options such as trains or private cars
- Time and cost of getting to the airport
- Travel experience, including comfort, waiting times, and overall journey duration
- Availability of flights at convenient time
- Distance between departure and arrival points
- Type of travel, for example business, holiday or visiting family

- Type of airline, such as low-cost or traditional carriers
- The structure of the market, including the level of competition between airlines

Methods: Analysing Price Elasticity

Price elasticity is one of the most widely used indicators in economics for explaining changes in supply and demand. The concept is based on utility theory and measures the effect of marginal changes. It looks at how a change in one variable affects another dependent variable.[43]

In the case of price elasticity of demand, the analysis focuses on how changes in price influence the quantity demanded. The elasticity coefficient shows by how many percent demand changes when the price increases or decreases by one percent.

Other types of elasticity can also be calculated, such as cost elasticity or income elasticity. Some studies also look at how demand for one product changes when the price of another product changes. In the context of aviation, the cost elasticity of supply, pricing and passenger volumes is particularly relevant.

Demand Elasticity in Aviation: Literature Review

How much do ticket prices, location costs or income levels affect demand for air travel?[44]

Price Elasticity

The DLR study, based on a review of previous literature, assumes an overall price elasticity of demand of minus 1.1. This means that a one percent increase in ticket prices would lead to a 1.1 percent drop in demand. The study estimates elasticity at minus 0.5 for business travellers, and around minus 1.9 for leisure travellers.[45]

However, these figures are based on aggregate averages for specific routes and offer limited insight into actual pricing behaviour. Since the deregulation of airfares, airlines now price tickets dynamically, varying by booking date, expected load factors and travel class. This high degree of price dispersion makes it difficult to apply average elasticity values meaningfully to real-world price changes.[46]

Income Elasticity

According to the DLR study, income growth is positively correlated with demand for air travel. The income elasticity is estimated at plus 1.3, using GDP as the measure of income.[47] This implies that a one percent rise in a country's GDP leads to a 1.3 percent increase in air travel demand.

In the aviation sector, GDP forecasts are widely used as a key indicator of future demand. Under the traffic rights system established by the Chicago Convention, expected GDP growth often forms the basis for bilateral agreements and projections of capacity needs. This approach has generally produced demand forecasts that are seen as broadly accurate.

[43] For the history of utility theory see Neumann, M., 1988.
[44] The following numbers are taken from the 2025 DLR study
[45] See DLR, 2025, p. 31 f.
[46] See Evangelinos, C., et. al.
[47] Cf. DLR, 2025, p. 32

In liberalised markets such as the EU or the United States, however, capacity decisions are no longer guided by traffic rights. Instead, they are based on strategic, decentralised decisions by individual airlines. Growth strategies and market entry by new point-to-point carriers have frequently resulted in overcapacity since liberalisation.

Cost Elasticity

What does the research say about the relationship between location costs and demand for air travel?

The DLR study finds that, on average, cost increases are not fully passed on to passengers.[48]Airlines typically pass through less than 50 percent of cost increases that affect them individually. Industry-wide cost increases are more likely to be passed through to a greater extent.[49]

In practical terms, passenger-related costs set the minimum fare level in the market. As shown in Figure 3.2, for the example return flight between Düsseldorf and Palma de Mallorca, location costs per passenger rose by 51 percent. This increased the minimum fare by around 20 euros per round trip, or roughly 10 euros per flight.

To fully cover its operating costs, the airline on this route would need an average yield of at least 256 euros per passenger per round trip. This means the raised minimum fare only becomes relevant in cases of severe overcapacity.

Rising locationcosts also increase overall costs. Figure 3.4 shows that location costs rose by 23 euros, while total costs for the flight increased by 90 euros. Most of this overall increase was driven by flight-related costs, particularly fuel and emissions certificates under the EU ETS.

Elasticities and Capacity Planning

In elasticity analysis, it's often claimed that the relationship between price and demand is being measured. But that's not quite accurate. In practice, demand is difficult to quantify and is rarely measured directly.

In aviation, what's actually recorded is the number of passengers transported. This figure, however, is not the same as demand. Passenger numbers also depend on the available seat capacity. If flights are fully booked, any additional demand simply isn't captured. Nor is that part of demand taken into account which has been diverted to other forms of public transport or to car use.

In scheduled air traffic, airlines typically finalise their flight schedules around six months before the start of each season (summer: April to October; winter: November to March). This means that flights toward the end of a season may be planned up to a year in advance. This lead time is necessary for publishing flight schedules and opening ticket sales, but it also reflects internal planning needs, such as aircraft and crew rotations. On top of this, take-off and landing slots at congested airports are coordinated globally during the IATA slot conference, which takes place six months ahead of each season. As discussed earlier, airlines act as price-takers once schedules are set, adjusting prices to maximise load factors.

Following deregulation, the open access to intra-European traffic rights led to aggressive market expansion strategies among legacy carriers, alongside the rise of new entrants such as low-cost airlines and former charter carriers entering scheduled services. As a result, capacity planning was no longer guided by long-term economic growth and underlying travel demand. Instead, it became detached from the organic development of aviation based on travel needs. From a purely methodological perspective, this decoupled capacity trends from the elasticity-based relationships assumed in econometric models.

[48] Cf. DLR, 2025, p. 32
[49] Cf. DLR, 2025, p. 32

Growth strategies based on this approach led to persistent overcapacity and, as a result, low-cost offers. This was referred to as price-induced demand (arising from the need to fill excess capacity) as opposed to the natural demand for air travel, for example driven by GDP growth. Against this backdrop, the rapid expansion of Europe's air transport supply despite continuously rising resource costs up to the 2020 COVID-19 crisis can be explained.

Between 2000 and 2007, the price of jet fuel tripled, yet over the same period the number of passengers at German commercial airports grew by 30 percent. By 2019, 75 percent more passengers boarded at German airports than in 2000. The 2019 jet fuel price was more than double its 2000 level.

These cost increases had the effect of sharply reducing the use of smaller regional aircraft, which have comparatively high fuel consumption and fixed crew costs per passenger kilometre, and thus the associated routes. At the same time, the use of larger aircraft, particularly the Airbus A320/321 and Boeing B737-800 and -900, boomed. As a result, the number of commercial flight movements increased by only 17 percent. Figure 4.1 shows the indexed development of jet fuel prices, passenger volumes and flight movements.

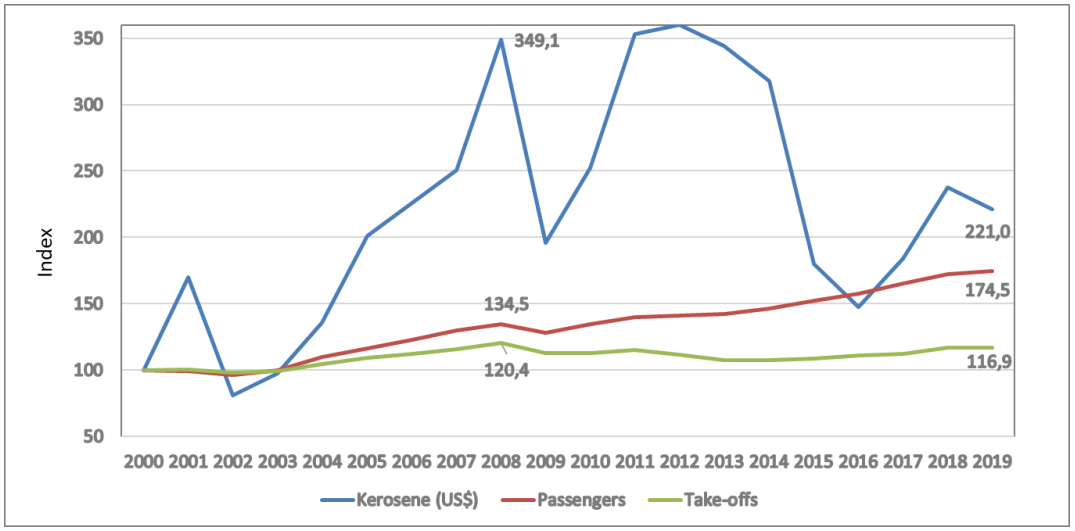


Fig. 4.1 Development of jet fuel prices, passenger volumes and departures at German commercial airports (Sources: indexmundi.com, ADV)

Elasticities and Changing Market Conditions

Beyond prices and costs, aviation demand and supply are also shaped by broader societal, political and economic shocks, including recessions, political instability and pandemics.[50]

When elasticities are calculated over short time periods that include such shocks, the results are distorted. In the short run, capacity is fixed and cannot easily be adjusted. This means that the response of traffic volumes to changes in price, cost or income is limited by existing seat availability. This distortion became especially apparent during the COVID-19 pandemic. During the pandemic, passenger numbers plummeted entirely independently of fares. Structural disruptions like these can break the link between price and quantity altogether, rendering elasticity estimates meaningless.

In short: elasticity analysis loses much of its explanatory power under conditions of structural market change.

[50] See DLR, 2025, p. 33 f.

One clear example is business travel. Sustainability campaigns, combined with the pandemic and the widespread use of virtual meetings, have triggered lasting shifts in travel behaviour. On short routes, rail and road are now preferred for environmental reasons. Business meetings and conferences increasingly take place online, saving time and costs. These changes in travel patterns undermine the assumptions of earlier elasticity models and distort results even when more recent datasets include both pre- and post-shock periods.

Consider this example: in the 2023/24 financial year compared to 2018/19, airfares in Europe rose significantly, by around 20 percent on average (22 percent in Germany). Yet passenger numbers fell in eight countries and rose in seven others. In Spain, a 38 percent fare hike was accompanied by an 8 percent increase in passenger volumes. In Germany, a 22 percent fare increase was met with a 27 percent drop in passengers. This contrast highlights how structural shifts can outweigh pure price effects.

In summary: structural changes in the market can render elasticity analysis ineffective, particularly if the measurement period is too short to reflect the full picture.

DLR Study Results: Analysis Based on Price Elasticity

As discussed earlier, there are fundamental reasons why classical elasticity analysis fails to meaningfully explain developments in air traffic. Unsurprisingly, the DLR study does not produce any significant insights from this method either.

The DLR applied elasticity concepts derived from academic literature, using them to test how ticket price changes correlate with changes in passenger numbers across European countries. Figure 4.2 presents these findings graphically.

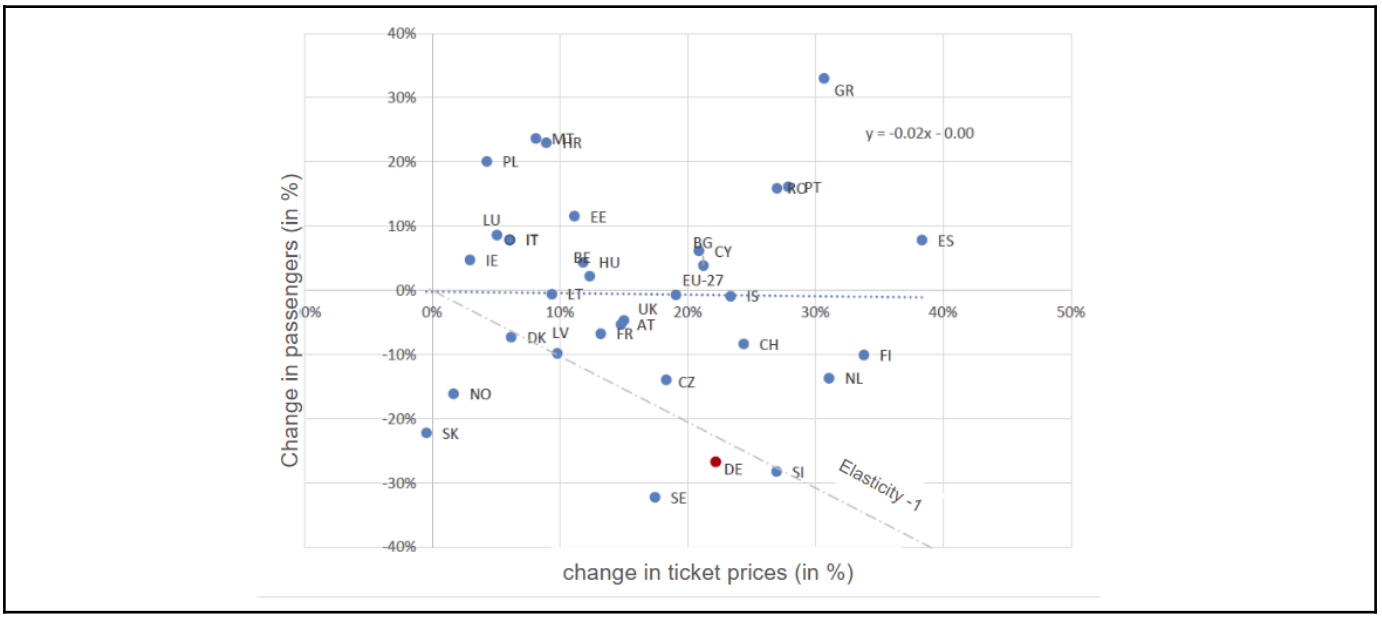


Fig. 4.2 Changes in ticket price and passenger numbers (Winter 23/24 vs.18/19)[51]

Explanation: Figure 4.2 shows an unstructured scatter plot. What do we find: (i) Above the horizontal zero line are countries that experienced passenger growth during the observation period, despite in some cases significant increases in ticket prices. (ii) Between the zero line and the diagonal are countries where passenger volumes fell slightly, again despite in some cases substantial ticket price increases. (iii) Below this area are countries where

[51] See DLR, 2025, p.36

passenger volumes declined more sharply. The elasticity value of minus one, often cited in the literature, applies only to countries on or close to the diagonal – and, as is easy to see, these are very few.

The result shows no indication of even a roughly linear relationship between increases in ticket prices and passenger volumes.

DLR therefore dispenses with further elasticity analyses and instead adopts regression analyses based on empirical data as a complementary approach to quantifying causal relationships. The results of these analyses are explained further below.

Summary of Findings on Elasticity Analysis

All things considered, what can we conclude? The DLR study confirms that standard models of price and cost elasticity in aviation offer limited insight under real-world conditions. They often lead to incorrect conclusions:

- **Flight demand is influenced by far more than just price.** Simple correlations between fares and passenger volumes ignore these broader factors and produce misleading results.

- **Income and growth matters**. In the 2025 DLR study, economic growth had a seven times greater influence on passenger numbers than location costs.

- **Elasticity studies often overlook supply-side effects.** This leads to distortions. Capacity changes can affect fares without being driven by demand. As a result, the elasticity measured is not a true reflection of price sensitivity. These models end up producing "figures that are a confused mix of supply and demand effects, which cannot be meaningfully interpreted."[52]

- **Controlling for supply effects requires very long measurement periods**, which the DLR study did not cover. No long-term studies are currently available.

- **Even long-term studies face problems**, as the structure of the air travel market has changed significantly since liberalisation. This limits their relevance.

- **The only way to isolate pure demand-side price sensitivity is to conduct passenger surveys.** As far as we are aware, no such studies currently exist.

- **The COVID-19 crisis fundamentally changed the supply structure of air travel.** Any elasticity analysis that does not account for these effects cannot deliver meaningful results.

- Page 36 of the DLR 2025 study states clearly that there is “no identifiable relationship between fare increases and passenger numbers at the European level.” Figure 21 of the DLR-study (see above Fig. 4.2 in this study) illustrates this point. This contradicts what elasticity models would predict and highlights their methodological limitations.

Conclusion: Elasticity analysis provides little to no explanatory value when it comes to understanding cause-and-effect relationships in air transport. Over short periods, it fails to consider key variables. Over longer periods, structural shifts distort the data. As a result, existing elasticity studies on air travel demand produce no credible or useful conclusions.

[52] See Gerfin, Heimann, 1988, p. 535

"Demand for flights depends on more than just prices."

In July 2025, *t-online.de*, a German news platform, reported on a downturn in Mallorca's restaurant trade: "This year, hundreds of restaurants will close. The summer is miserable." What were the reasons? The number of holidaymakers was stable, and their holiday budgets unchanged. But spending habits had shifted: more was being spent on higher-priced hotels and more expensive flights, while dining out was cut back – "fewer dishes, no wine, no extras."

This episode illustrates the complexity of the relationships involved. More expensive flights (for example, due to location costs) are still being taken despite price increases. The extra spending is offset by savings on other travel components. The relevant product is the "trip" as a whole, not the "flight" in isolation. Measuring only the price elasticity of demand for flights yields no actionable insights.

Source:
https://www.t-online.de/nachrichten/panorama/mallorca/id_100833716/mallorca-gastronomie-in-schwerer-krise-dieser-sommer-ist-das-ende-.html

DLR Study Results: Regression analysis

A regression analysis is used to estimate the relationship between one dependent variable and one or more independent variables. It can account for multiple factors at the same time, giving a more complete and integrated picture of how each factor influences the outcome. This also makes it possible to compare the *relative* strength of different drivers of air transport demand.

The following section first focuses on the link between ticket prices and passenger numbers.

The Relationship between Ticket Prices and Passenger Growth

Figure 4.3 shows how passenger numbers at various European airports have changed (vertical axis) in relation to the change in ticket prices (horizontal axis) for flights to and from those airports.

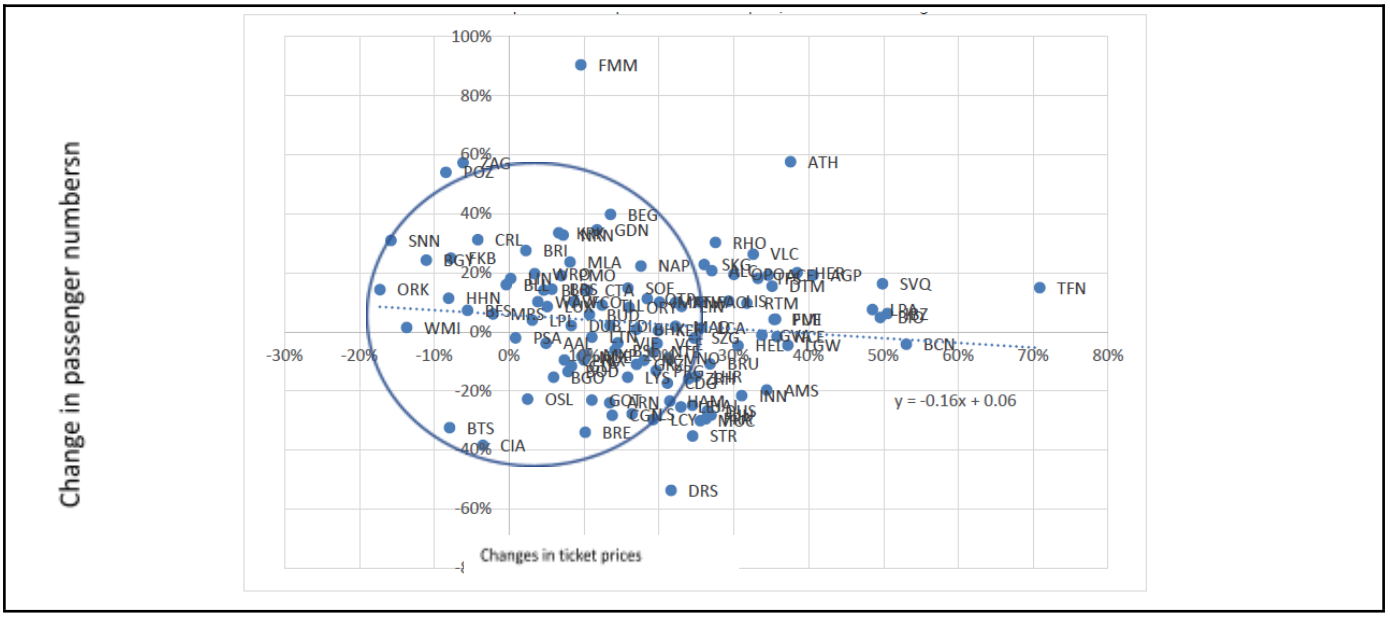


Fig. 4.3 Changes in ticket prices and passenger volumes for various airports
Explanation : Change in passenger volumes (vertical axis), change in ticket prices (horizontal axis)
Data source: SabreMI. Measurement period: 2018/19 vs. 2023/24 October to September.[53]

The scatterplot shows that there is virtually no correlation. For nearly every level of passenger growth, there are airports where ticket prices either fell or rose sharply. Likewise, for any given increase in ticket prices, there is a wide range of airports with both rising and falling passenger numbers.

The trend line is nearly flat, and the correlation is statistically insignificant (not shown in the figure).

Conclusion: The regression analysis examining the relationship between ticket prices and passenger growth at individual airports confirms the findings of the elasticity analysis: there is no meaningful link.

Other Factors Influencing Ticket Prices and Passenger Numbers

What other variables might influence ticket prices and passenger volumes?

The model used by DLR is based on monthly data for airport pairs. The two main dependent variables are ticket prices and passenger numbers. The key explanatory factors are:

- Real GDP in the country of departure
- Location costs at the departure airport
- Market concentration, measured using the Herfindahl-Hirschman Index (HHI) for each airport pair

Seasonal effects were accounted for using fixed correction factors tailored to each airport. The impact of COVID-19 was included via a separate dummy variable. SabreMI served as the data source for airport location costs, while other aviation-related data were taken from Eurostat. The dataset covers monthly passenger flows from January 2018 to September 2024, excluding the years 2020 and 2021.

The regression results are presented as coefficients (see Table 4.1). The interpretations of these results are quoted verbatim from the DLR 2025 report in the following section.

[53] See DLR, 2025, p. 81

	Ticket price			Passenger number		
	(1)	(2)	(3)	(4)	(5)	(6)
Location costs	0.091***	0.081***	0.082***	-0.053*	-0.102***	-0.093***
	(0.010)	(0.010)	(0.010)	(0.029)	(0.030)	(0.030)
GDP		0.157***	0.154***		0.765***	0.745***
		(0.015)	(0.015)		(0.038)	(0.039)
HHI			-0.035***			-0.316***
			(0.003)			(0.012)
control variables:						
airport pair FE	✓	✓	✓	✓	✓	✓
Monthly FE	✓	✓	✓	✓	✓	✓
Adjusted R^2	0.57	0.57	0.57	0.88	0.88	0.88
Observations	3780	723780	723780	723780	723780	723780

Quelle: Eigene Berechnungen auf Basis von Sabre MI und Eurostat. Regression von Ticketpreisen (Spalte 1-3) bzw. Passagierzahlen (Spalte 4-6) auf die Variablen der linken Seite. Von links nach rechts wurden jeweils zusätzliche Variablen in die Regressionen aufgenommen. In jeder Regression sind fixe Effekte für Flughafenpaare und Monate enthalten, wodurch die Vergleichbarkeit der einzelnen Flughafenpaare sichergestellt wird. Standardfehler, geclustert auf der Ebene der Flughafenpaare, werden in Klammern angegeben. Signifikanzniveaus: ***: p<0.01, **: p<0.05, *: p<0.1$.

Table 4.1 Results of a regression analysis on further influencing factors[54]

Location Costs

Figure 4.4 shows the relationship between absolute ticket prices and location costs. The graph does not show changes over time but compares absolute values. German airports are highlighted.

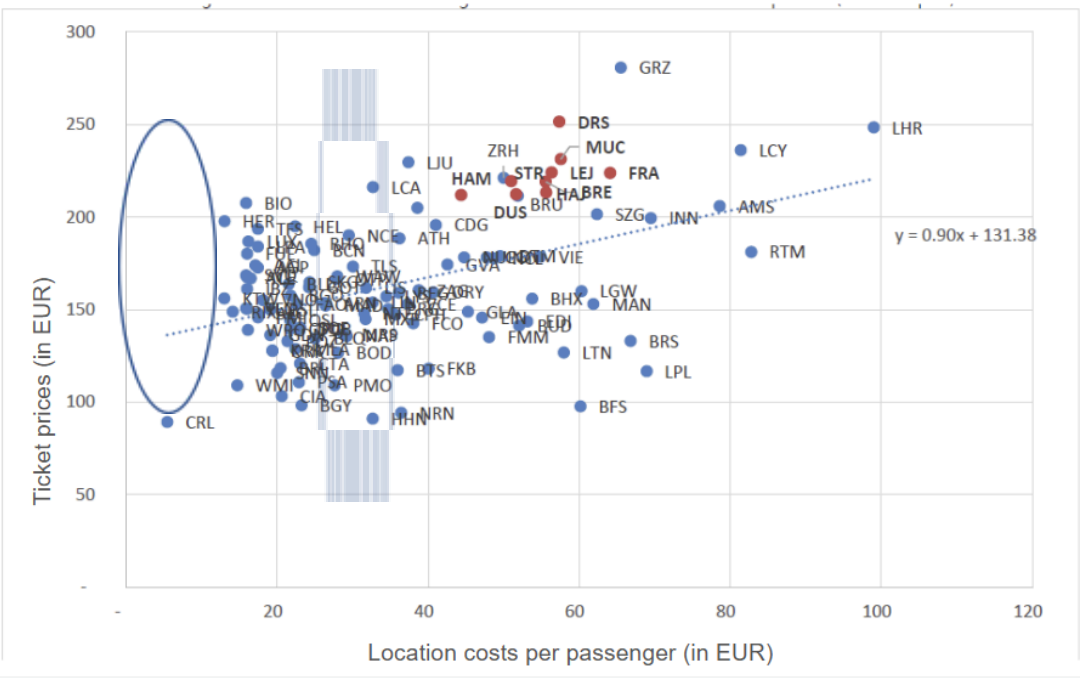


Fig. 4.4 Location costs per passenger (absolute, in euros) and ticket prices (absolute, in euros) for various airports;

Data sources: SabreMI, RDC Airport Charges. Measurement period: May 19 to May 24
[55]

[54] See DLR, 2025, p.83
[55] See DLR, 2025, p. 39

The scatter plot reveals a weak positive trend.

Airports in Europe with the same location costs can have ticket prices that differ by up to 100 percent. The spread in ticket prices is particularly large among airports with the lowest location costs. Many of these airports have significantly higher ticket prices than some airports whose location costs are three times as high.

At German airports, ticket prices are on average more than €50 higher than the European average, even where location costs are the same. Apart from Dresden, price levels across German airports vary little, despite differing cost structures. For example, Munich has lower location costs than Frankfurt but higher ticket prices.

In summary, difference in ticket prices in Europe, and particularly in Germany, cannot be explained by differences in location costs.

The coefficient of determination shown in Table 4.1, at just 1 percent, indicates a very weak relationship.

Despite this, the DLR study concludes the following:

> *"On average, location costs account for around 16% of ticket prices. If these costs were fully passed on to passengers, a 1% increase in location costs would lead to a 0.16% rise in ticket prices. This suggests that only about half of the increased costs are passed on to passengers … In Germany, location costs rose by roughly 38% between 2019 and 2024, resulting in a 3.12% increase in ticket prices. This accounts for around 13.8% of the overall rise in ticket prices in Germany…"*[56]

The assumed causal relationship, and in particular the calculated degree of influence given to two decimal places, appears questionable in view of the marginal coefficient of determination and the lack of correlation described above.

Even the basic assumption of a 50 percent pass through of increases in location costs to explain price effects appears implausible in light of the explanations given in chapter 3 of this report. Moreover, in the case of the Düsseldorf to Palma de Mallorca airport pair, location independent costs, particularly for fuel consumption, have risen much more sharply, both in absolute and relative terms, than location costs. A linear explanation of price increases based solely on location based costs is therefore of limited value.

To examine the impact on passenger volumes, the development of location costs at individual airports is compared with passenger traffic trends.

[56] See DLR, 2025, p.45

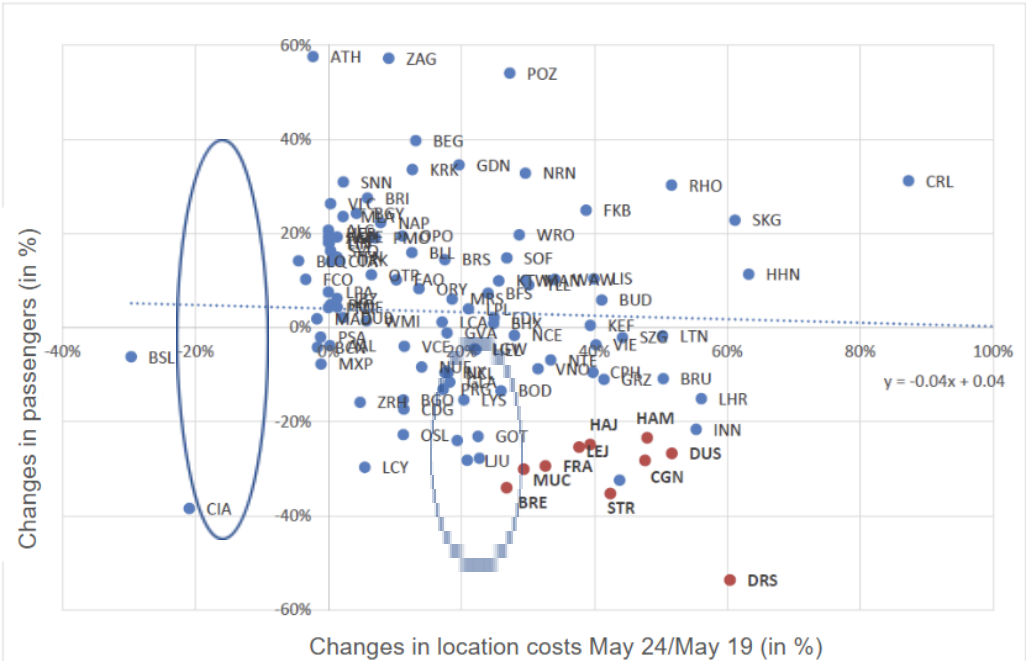


Fig. 4.5 Changes in location costs and passenger numbers for various airports

Explanation: Vertical axis = change in passenger numbers; horizontal axis = change in location costs. The vertical oval highlights airports that show wide variation in traffic growth despite identical changes in cost. The horizontal oval shows German airports, which display relatively small differences in traffic despite substantial cost divergence. Data: SabreMI, RDC Airport Charges. Measurement period: May 2019 to May 2024.

Figure 4.5 reveals a similar scatter pattern to the one observed between location costs and ticket prices, with a nearly flat trendline. On average, traffic growth appears unaffected by the wide variation in cost developments across airports. The flat trendline indicates no clear relationship between rising location costs and changes in passenger numbers.

German airports are highlighted in the graph and are mostly situated well below the trendline. In other words, despite having similar increases in location costs as other European airports, German airports saw far sharper declines in passenger numbers. While average passenger numbers at comparable airports increased by about 5%, German airports recorded declines of 20 to 35%.

The DLR summarises the situation as follows:

> *"Between October 2018 and September 2019, and October 2023 to September 2024, the number of passengers departing from Germany for intra-European flights fell by 20 million. Only 10.6% of this decline can be attributed to higher location costs. In other European countries, these costs rose by 26% on average. If Germany had matched that increase, the resulting decline in passenger numbers would have been 2.4%, rather than 3.5%. This corresponds to 0.64 million additional passengers who might have travelled intra-Europe from Germany. In this scenario, only 3.2% of the weaker passenger development in Germany can be explained by above-average cost increases."*[57]

For the causal relationships assumed here, the same points apply as those outlined above regarding the impact on ticket prices. Using a European average as the reference measure overlooks the fact that the location-specific values it contains have produced very different, and in some cases opposing, effects on passenger volume trends. As a result, the cited result has limited evidential value.

[57] DLR, 2025, p.45

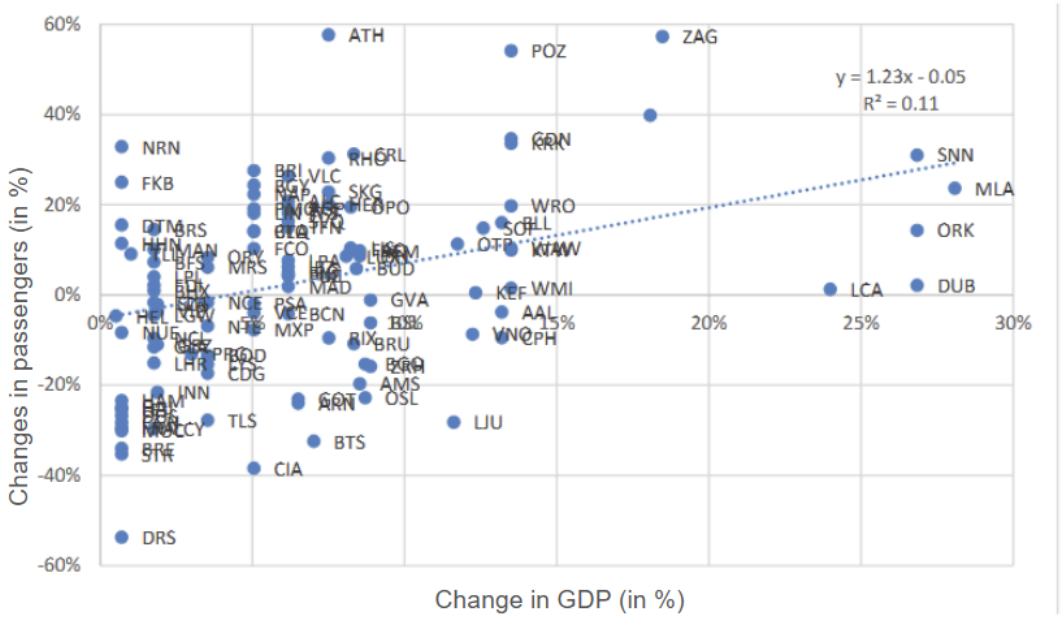
Finally, the significance levels shown in Table 4.1, with coefficients of determination of just 1 to 3 percent, indicate that the regression line has only very limited value as an indicator of quantitative causal relationships. This limitation is not overcome by the qualifying remarks contained in the report itself.[58]

Income

The DLR report describes the impact of income development as follows:

> *"If GDP in the departure country of an airport pair rises by 1%, then passenger numbers on that airport pair also increase by 0.745%, while ticket prices rise by 0.154%. The resulting income elasticity of 0.745 falls short of the 1.3 value that would be expected based on the literature … One possible explanation for this difference is the relatively low consumption rate during the observation period. The fact that economic growth increases demand for air travel and, as a result, pushes prices up is not surprising. If Germany's GDP had grown by 4.6% between 2019 and 2023 – the EU average – instead of only 0.7%, passenger numbers would now be 2.9% higher. That equates to around 1.72 million additional passengers in the period from October 2023 to September 2024. In other words, 9% of the weak passenger growth in Germany can be attributed to the lack of economic growth."*[59]

Although the relationships identified by the regression analysis appear plausible, their deterministic presentation once again seems unconvincing. The chart in the annex to the report[60] shows that the majority of airports lie within a broad scatterplot, displaying high variability. Even among countries with similar GDP trends, some airports recorded passenger growth while others saw declines (e.g. vertical ovals). The coefficient of determination (R^2) confirms this uncertainty. At 11%, it reflects only a modest explanatory power and highlights the limited robustness of the conclusions drawn.



[58] *"However, selecting an appropriate reference scenario is subject to uncertainty. Instead of, for example, taking the average of 10.6 percent and 3.2 percent, it is therefore assumed that 9 percent of the weak intra-European air traffic growth from Germany can be explained by higher location costs. This corresponds to 1.8 million fewer departing passengers. The aim is to avoid underestimating the effect of location costs."* (DLR, 2025, p. 46).

[59] See DLR, 2025, p. 46

[60] DLR, 2025, p. 81

Figure 4.6 Changes in economic growth and changes in passenger volumes
Notes: DLR analysis based on SabreMI, Eurostat, World Bank. Various European airports.Winter season 18/19 to 23/24.
Source: DLR, 2025, p.81.

Market Competition

To measure competition levels on individual routes, the DLR study uses the Herfindahl-Hirschman Index (see Table 4.1, row "HHI").

This index reflects market concentration, calculated as the sum of the squared market shares of all airlines operating on a given route.

In theory, greater competition should lead to lower ticket prices, and vice versa.[61] This means the level of competition on a given route is a factor influencing ticket prices. Location costs are therefore not the only factor (and perhaps not even the decisive one) for ticket prices and passenger growth, or so the assumption goes.

Figure 4.7 illustrates how market concentration has evolved at selected airports.

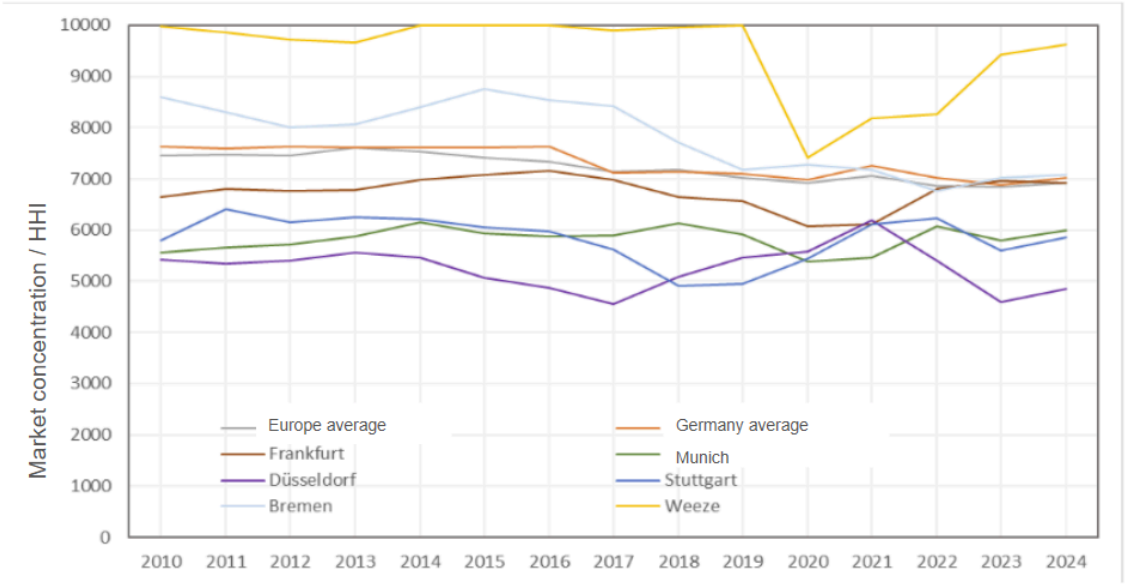


Fig. 4.7 Development of market concentration at selected airports
Note: Market concentration is measured using the HHI. Period: 2010 to 2024.
Source: DLR, 2025, p. 41

A comparison of concentration levels Figure 4.7 with ticket prices in Figure 4.3 shows that the airport with the highest market concentration (Weeze) records the lowest ticket prices. At other German airports, ticket prices remain within a narrow range, despite large differences in market concentration. Across all European airports, the average concentration level is higher than in Germany, yet average ticket prices are noticeably lower.

According to Table 4.1, higher market concentration is weakly associated with slightly lower prices during the observation period. The study itself acknowledges that this finding has little explanatory value and runs counter to basic principles of market theory: less competition should not result in lower prices. [62]

[61] See DLR,2025, p. 40
[62] See DLR, 2025, p. 46

The low coefficient of determination in Table 4.1 confirms that these results do not allow for statistically significant conclusions.

The results of the regression analysis on the impact of the level of competition on passenger growth are of only very limited significance, given the low coefficient of determination (1.2 percent). According to the findings, higher market concentration is associated with lower passenger numbers. In light of the earlier observations on the relationship between supply development and traffic growth, this relationship appears at least plausible.

In summary, the DLR regression analyses also produce no significant results in explaining Germany's lagging air traffic development. According to DLR, the factors of location costs and income growth account for only about 20 percent of the gap compared with other countries, and even then with low coefficients of determination and high uncertainty.[63]

As the DLR report concludes:

> *"This model-based analysis of influencing factors shows that classical economic approaches fall short when explaining Germany's comparatively slow recovery in air travel. Higher airport-related costs and weak macroeconomic performance can only account for around 20% of the decline in passenger numbers. This indicates that price developments are not necessarily driven by airport costs, and that structural changes in travel behaviour and airline services are likely playing a far greater role."*[64]

In short: there is no evidence of a significant link between the level or development of location costs and trends in air traffic or passenger demand.

Further Demand- and Supply-Side Drivers

In light of the limited explanatory power of its own elasticity and regression analyses, the DLR study identifies additional potential factors that may influence flight activity and passenger numbers:

> *"Other factors can influence flight movements and passenger volumes. On the demand side, these include, among others, a country's demographics and the distance travelled. On the supply side, they include the degree of liberalisation of bilateral or multilateral air service agreements – that is, the level of market openness or protectionism – slot availability and other capacities, the competitive environment and compatibility with an airline's existing network, marketing support, infrastructure quality, and environmental restrictions such as night flight bans (Graham 2023). In addition, air transport can be directly affected, both on the demand and the supply side, by social, political, and economic shocks such as economic crises or pandemics."*[65]

While the study touches on some of these factors in substance, it neither quantifies their impact nor classifies their relative importance.

Demand-Side Drivers

As noted previously, passenger numbers reflect only the portion of demand that was actually met. They do not account for unmet demand due to a lack of available flights or travelers switching to other modes of transport. Therefore, they only give a partial picture of underlying demand.

[63] See: DLR, 2025, p. 46
[64] DLR, 2005, p. 47
[65] DLR, 2025, p. 32

Fundamentally, demand for air travel is not an independent purchase decision. It arises only as a consequence of a travel purpose. Depending on the destination's distance, flying may be the only viable or time-efficient option. In such cases, air travel demand is driven by the need to travel in the first place.

For business travel, this need may be eliminated if meetings are moved online.

In leisure travel, price and the overall quality of the trip are what matter most. This is evident in package holidays, but it also applies to individually planned trips where the flight is only one part of the overall experience.

The DLR study identifies the following demand-side factors:[66]

- The widespread adoption of online meetings as a substitute for in-person business travel
- National demographics
- Trip distances
- A stronger competitive position for rail, which may have led some former air travellers to switch permanently
- Growing public discussion of "flight shame" and stricter travel policies regarding air travel

During the COVID-19 pandemic, the long-anticipated shift from physical meetings to online alternatives became the norm. According to the German Business Travel Association (VDR), business trips in 2024 fell by 44 percent compared to 2019 (from 195.4 million to 107.1 million)[67]. That same year, departing passenger numbers at German airports were 14.5 percent below 2019 levels (211.9 million versus 248.1 million)[68]. The share of business travellers among all air passengers dropped from 35 percent to 20 percent.[69] This implies a decrease of around 45 million business passengers (approximately 35 percent). Compared to the overall decline in business travel, the drop in air traffic was relatively moderate. Still, the fall in business-related air travel accounts for around 120 percent of the total passenger loss.

Demographics also play a role. For example, demand for leisure travel beyond low-cost destinations around the Mediterranean and Black Sea tends to come from people with above-average disposable income. A larger migrant population increases demand for flights to home countries. In addition, marketing support for certain routes or airports can influence both demand and price sensitivity.[70]

International destinations are typically not interchangeable with those reachable by rail or road. In those cases, the demand for a flight may disappear if the trip is cancelled altogether or redirected. For leisure or family visits that could feasibly be done by train, coach or private car, substitution may occur depending on cost and travel time.

Although the DLR report describes rail's growing appeal as a demand-side factor, it is more accurately classified as a supply-side development.

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[66] See DLR, 2025, p. 33 and p. 66

[67] See Verband Deutsches Reisemanagment e.V.: Live presentation of business travel analysis 2025, Ingolstadt 21.05.2025, p. 5; https://www.youtube.com/watch?v=UK9in-lxlTA, accessed 15.07.2025 (VDR analysis 2025).

[68] BDL: Entwicklung des Luftverkehrs im Jahr 2024; Berlin 13.02.2025, p. 8; https://www.bdl.aero/wp-content/uploads/2025/02/Praesentation-BDL-Pk-Jahreszahlen-2024.pdf; (accessed 15.07.2025).

[69] See ADV: Umfassende repräsentative Fluggastbefragung: Neue Trends im Luftverkehr zeichnen sich ab, ADV-Pressemitteilung Nr. 14/2025, Berlin, 13.05.2025, h https://www.adv.aero/wp-content/uploads/2025/05/14-2025-Umfassende-repr%C3%A4sentative-Fluggastbefragung.pdf; (accessed 15.07.2025).

[70] See Graham 2023; in DLR, 2025, p. 33.

At the peak of public debate around flight shame shortly before the pandemic, its actual effect on travel behaviour appeared limited.[71] Only 6.1 percent of German air travellers reported feeling ashamed. In 2020, 18 percent said they planned to fly less in response to the debate, while 8 percent said they would fly more. The stigmatisation of flying as environmentally harmful appears to have affected behaviour only for short distances, such as domestic routes or international trips under 400 km.

Beyond what is covered in the DLR study, the growing dominance of private leisure travel has had a structural impact on air transport. Business travellers usually fly to economic centres, whereas leisure travel is concentrated on holiday destinations and locations with large diaspora populations.

Figure 4.8 illustrates the resulting shift, showing changes in air traffic volumes across Eurocontrol flight information regions. It clearly shows that southern countries with more leisure-focused travel have experienced growth, while flight activity in northern Europe has declined.

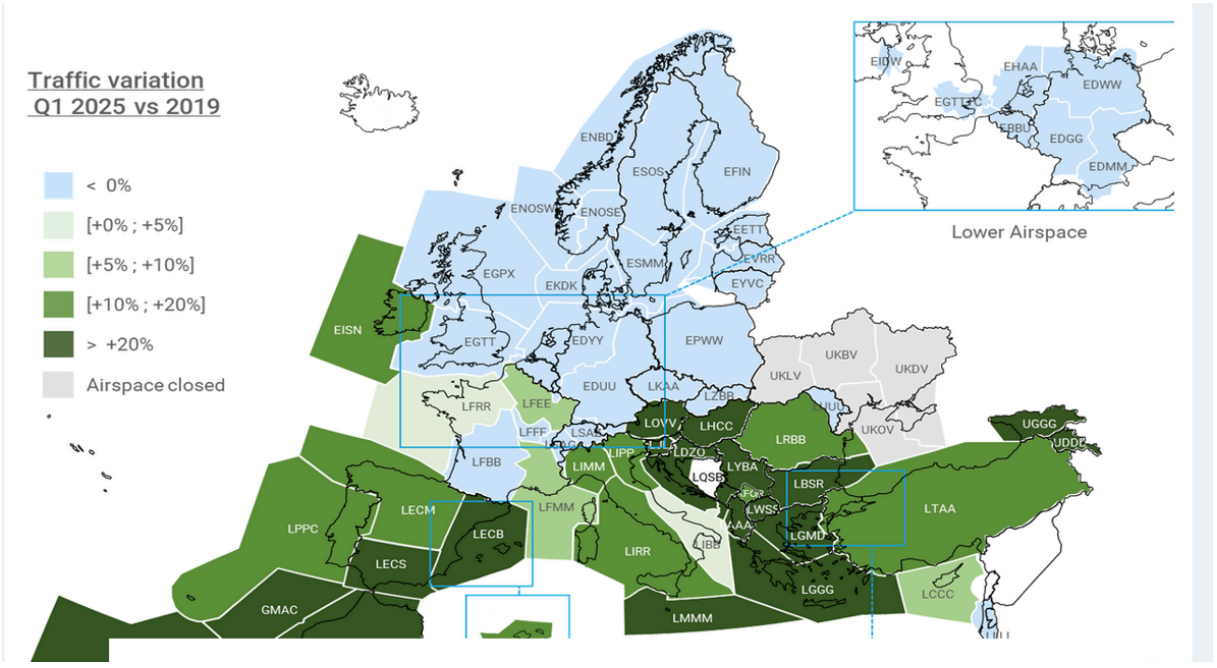

Fig. 4.8 Number of flight movements in control zones of Eurocontrol 2025 Q1 vs 2019[72]

The structural shift in Figure 4.8 closely mirrors the north–south divide in passenger growth already observed in Figure 4.1. This pattern can be seen as a major driver of diverging national trends in air traffic development.

[71] See See Flugscham, 2020, p. 6 ff., https://www.pressrelations.com/files/de/prmagazin/prmagazin_2004_Flugscham.pdf; (accessed 15.07.2025).

[72] See https://www.airliners.de/flugverkehr-erholt-ueberall/80291

Supply-Side Factors

On the supply side, the DLR study identifies the following influences:[73]

- Improved competitiveness of rail as an alternative for domestic travel
- Airspace closures as a result of Russia's war of aggression against Ukraine
- Industry-specific challenges, such as staff shortages and delayed aircraft deliveries
- The consolidation of domestic air services following Air Berlin's exit from the market

The rail sector has gained ground particularly due to increased frequencies and fast direct connections between major cities. The routes Berlin–Frankfurt and Berlin–Munich have benefited most. EasyJet's complete withdrawal from domestic air services out of its Berlin base is likely a direct result of these developments. This move alone represents a significant reduction in Germany's domestic air service offering.

The airspace closures due to the war in Ukraine, by contrast, play only a minor role because the affected routes account for a very small share of total traffic.

Industry-related factors such as staff shortages and delayed aircraft deliveries can only partially explain the slower supply growth in the German market. Delayed deliveries can generally be offset by extending the operation of existing fleets, many of which were grounded during the COVID-19 pandemic but not scrapped.[74] As for staffing, it is reasonable to assume that former employees released during the pandemic or following the Air Berlin collapse could be reactivated in the short term. Given that flight schedules and resource requirements are known at least six months in advance, and often earlier, staffing can in principle be planned well ahead.

In reality, the main reason for the sluggish development of domestic air traffic is the consolidation of the domestic market. This is reflected in passenger numbers.

The latest forecast from the German Aviation Association (BDL) for June to November 2025[75] shows that international services have almost completely recovered. Domestic air traffic, however, remains at just 53 percent of pre-pandemic levels. Recovery of feeder services to international hubs stands at 67 percent, whereas decentralised domestic traffic lags at only 21 percent.

The BDL's attempt to attribute this trend to airport-related charges appears[76], in view of the DLR's findings, to be more of a lobbying position to support industry demands for lower charges than a reflection of actual causal relationships.[77]

Overall, the development of flight supply closely mirrors trends in passenger numbers.[78] This applies across domestic, European and long-haul markets. Load factors (seat load factor, SLF) remain high, at over 80 percent as in 2019.

As noted earlier, airlines plan capacity six to twelve months in advance. They then adjust prices in real time to maximise load factors and yield.

[73] See DLR,2025, p. 33f. & p. 66.
[74] See Brützel, C.; 2020 (Die Welt steht voller Flugzeuge).
[75] BDL: Vorausschau auf das Luftverkehrsangebot Juni – November 2025, Berlin 23.06.2025, https://www.bdl.aero/themen/wirtschaft-wettbewerb/branchenreport/vorausschau/, (accessed 15.07.2025).
[76] See BDL, 2025, p. 12
[77] See BDL, 2025, p. 12
[78] See DLR, Touristik Report 2025, p. 3 ff.

Following liberalisation and the entry of new carriers, alongside expansion strategies by traditional flag carriers, the European market was characterised for many years by overcapacity and low fares. In the aftermath of COVID-19, however, a quasi-monopoly has emerged in the German-Austrian-Swiss region, dominated by the Lufthansa Group. This is largely the result of sustained competitive pressure and displacement strategies by Lufthansa in this market.

Air Berlin's prolonged loss-making position in the German-Austrian-Swiss region was ultimately a result of these strategies.

- Ryanair entered the domestic market in 2016 with services between Cologne/Bonn and Berlin, but withdrew within a year due to heavy losses.
- EasyJet took over parts of Air Berlin's Berlin network following the latter's collapse. The takeover had been cleared with Lufthansa, which had been barred by the European Commission from taking over the entire Air Berlin domestic network. Despite this, EasyJet also recorded continuous losses on domestic routes and fully withdrew from Germany's domestic market after the pandemic. Within the German-Austrian-Swiss region, EasyJet now only operates limited cross-border flights between Germany (Berlin and Hamburg), Austria and Switzerland.
- Condor operates domestic routes connecting Berlin and Hamburg with Frankfurt and Munich. In addition, only Danish Air Transport (DAT) offers regional domestic services between Saarbrücken and Berlin or Hamburg.
- As of July 2025, Lufthansa and Eurowings together hold a 96 percent share of the domestic market.[79] This dominant position allows the Lufthansa Group to optimise capacity in the German-Austrian-Swiss region for maximum yield. This is one of the main reasons for the gap in recovery. The Group focuses on hub connectivity (FRA and MUC) and on routes between its hubs (FRA, MUC, ZRH, VIE). Regional departure points with limited traffic volumes are no longer connected by air to the hubs of other alliances.[80] Travelers must instead use train or road options, such as Rail&Fly. Decentralised domestic routes are concentrated on Eurowings bases in Düsseldorf, Hamburg, Berlin, Stuttgart and Cologne. Only a few additional domestic routes remain, such as Düsseldorf–Dresden or Stuttgart–Bremen. These are operated at a scale optimised for profitability in a monopoly setting. In line with Cournot competition theory, capacity is set so that demand at prices below full operating costs is deliberately excluded.

Summary

The DLR's analysis, along with the cause-and-effect relationships outlined above, clearly shows that changes to airport charges or the introduction of new fees and taxes in Germany have no significant impact on air traffic growth. Only in extreme cases might higher charges lead to traffic shifting to nearby foreign airports or foreign hubs, which in turn distorts competition.

The assumption that political decisions to increase or reduce airport charges can effectively steer traffic development lacks empirical support. It also fails to reflect the actual mechanisms that shape air traffic growth.[81]

If policymakers wish to intervene, then targeted limits on capacity growth through the allocation of traffic rights would be a more effective measure for influencing traffic development than changes to location costs.

[79] See DLR, Touristik Report 2025, p. 11.
[80] See Brützel, C., 2024 (Regionalflug in Deutschland).
[81] For a comprehensive explanation see Brützel, C., 2019 (Zur politischen Begrenzung des Klimaschadens durch den Luftverkehr).

5. Location Costs in Practice

The preceding analyses have shown that country-specific location costs have had, at most, only a secondary impact on traffic development in the past. As part of operating costs, and in particular passenger-related costs, however, they have a direct effect on the average prices or ticket revenues needed to generate a profit, as well as on the minimum price at which even low-cost tickets still contribute to covering costs.

If air transport is understood, in line with the United Nations, as a public mode of transport that serves a common good, then the political goal should be to minimise public charges, fees, and taxes to a level that reflects actual causation.

The following sections therefore explain the individual components of location costs and highlight the potential for their design, along with the effects that can be achieved as a result.

Taxes

Value-Added Tax (VAT)

The exemption of international commercial air travel from VAT is frequently debated as a form of indirect subsidy for the aviation sector.

This exemption is grounded in international law (ICAO) and EU regulations. Within Europe, cross-border air travel is exempt from VAT in all participating countries.[82] Some states (Germany among them) do apply VAT to domestic flights.[83]

In principle, VAT could be levied on the following types of air travel revenue:

1. The entire ticket price for international flights departing from the home country, regardless of where the ticket is sold

2. The entire ticket price for international flights sold within the country

3. A proportional share of the fare that reflects the entire flight route, excluding the destination country (i.e. including transit over third countries)

4. A proportional share based on the domestic leg of an international flight

5. Full fares for purely domestic flights

According to the German Environment Agency (UBA), the exemption from VAT on international tickets amounted to around 4 billion euros in 2017.[84]

The ICAO policy on VAT in aviation states:

> *"Sales taxes, excise duties or value-added taxes (VAT) on tickets purchased for international air transport, if levied, increase the cost of flying. Since such taxes are typically applied broadly by national tax authorities, with few exemptions, the standard practice is to apply a zero VAT rate rather than formally exempting international air transport."*[85]

[82] See p. 18 (ICAO) and 20 (EU)
[83] UBA, 2019, Umweltschonender Luftverkehr, p. 82.
[84] UBA, 2019, Umweltschonender Luftverkehr, p. 97; UBA, 2016, Umweltschädliche Subventionen, p. 45.
[85] ICAO Policies on Taxation, No. 16.

IATA supports this position. It argues that international flights generally fall outside the scope of national tax jurisdictions and that applying a uniform global zero VAT rate ensures fair competition worldwide.[86]

Nonetheless, countries are legally permitted to tax airfares for international flights. In practice, however, EU rules provide a blanket exemption. Outside the EU, Mexico imposes a 4% transport tax on international air travel, and both the US and Canada apply VAT or transport taxes on flights between the two countries and on flights from the US to Mexico.[87]

Introducing VAT unilaterally on the total turnover of all international flights departing domestically (Options 1–3) would entail claiming tax on the portion of the flight taking place abroad or in international airspace. This, however, conflicts with the territorial principle of tax jurisdiction.[88] Within the EU, the relevant VAT Directive, Article 2(1)(c), permits taxation of services only to the extent that they are supplied by a taxable person within the territory of a Member State. Services provided outside the EU therefore fall outside the scope of VAT.

In practice, even within the EU, a harmonised and competitively neutral arrangement would only be feasible and enforceable if agreed at EU level, similar to the reciprocal arrangement in the only case worldwide where VAT is levied on international flights – between the USA and Canada.

Past political efforts to introduce VAT on international flights have focused on taxing only the domestic portion of the journey (scenario 4).

When the German air travel tax was introduced in 2012, the government estimated that exempting the domestic leg of international flights amounted to a subsidy of around 80 million euros per year.[89] A similar proposal in 2003 had assumed a much larger figure of 500 million euros.[90]

Key concerns raised included the administrative burden of collecting the tax, especially from foreign carriers selling tickets abroad for flights with a domestic leg. This alone could exceed the expected revenue of 80 million euros. There would also be practical enforcement issues, especially when taxing tickets sold outside Germany.

The VAT exemption also applies to domestic feeder flights (if included on international tickets), but not to rail travel to airports included in combined tickets ("Rail & Fly"). In these cases, airlines purchase VAT-liable train tickets from the rail operator.

Germany's VAT practice is in line with the rest of the EU. Introducing VAT on domestic feeder flights to international services would put German network carriers at a disadvantage compared to foreign competitors. The Lufthansa Group would be most affected, followed to a lesser extent by Condor. Lufthansa would have a clear incentive to reroute connecting traffic away from its hubs in Frankfurt and Munich toward Zürich, Vienna, Brussels or, in the future, Milan resulting in a loss of domestic value creation and tax revenue. From a fiscal standpoint, such a unilateral move would likely be uneconomical.

By contrast, an initiative at the EU level could create a fairer competitive environment across European airlines.

Any introduction of VAT on international flights to Asia or Africa would also further distort competition with network carriers based in the Middle East or Turkey.

[86] IATA, Value Added Tax
[87] EU, Taxes in the Field of Aviation, p. 26.
[88] EU-Regulation 2006/112/EG
[89] See BT Drucksache 17/10724, 17. Wahlperiode, p. 7
[90] See BT Drucksache 15/398, 15. Wahlperiode, p. 4

Kerosene taxes

Aviation fuel tax refers to a levy on aircraft fuel used in air transport. Within the EU, fuel used on flights is not taxed. However, national governments are allowed to tax fuel used for domestic flights under the EU Energy Tax Directive and, in Germany, under the Energy Tax Act.

Exempting aviation fuel from taxation is often viewed as a subsidy compared to other modes of transport, resulting in lost revenue for tax authorities.

In a 2019 study, the German Environment Agency (UBA) estimated that this tax break amounted to €8.1 billion in 2017. This figure is based on applying the 2019 German energy tax rate for low-sulphur petrol (65.45 cents per litre) to the full volume of kerosene sold in Germany that year: roughly 9.9 million tonnes or 12.4 billion litres.[91]

Taking the earlier example of a round trip from Düsseldorf to Palma de Mallorca (DUS–PMI–DUS), and assuming half of the required fuel (about 7.5 tonnes per flight, or roughly €46 per passenger) is refuelled in Germany, the additional cost would be about €4,900 per round trip, or €30 per passenger (€15 per leg). If VAT were applied on top, the costs would rise further.

Under ICAO guidelines[92], aviation fuel for international flights is globally exempt from taxation. EU legislation on energy taxation aligns with these guidelines, but it still permits member states to tax fuel used on intra-EU flights.[93] In Germany, however, the introduction of such a tax is effectively ruled out by more than 100 bilateral air service agreements and the existing EU–US Air Transport Agreement.[9495] These agreements make it practically impossible to introduce a kerosene tax on international flights.

Domestic flights are not bound by such restrictions. In 2023, the German government considered introducing a kerosene tax on commercial domestic flights.[96] The idea was ultimately dropped in favour of raising the existing aviation tax instead. The government estimated the forgone revenue from not taxing domestic aviation fuel at €570 million in 2017. This figure only accounts for domestic fuel consumption.

[91] UBA, 2019, Umweltschonender Luftverkehr, p. 96
[92] See ICAO Policies on Taxation, No. 1. a)
[93] SeeCouncil Directive 2003/96/EC, Art. 14, No. 1, b).
[94] Ausarbeitung WD des Bundestages WF IV -019/06, p. 9.
[95] EC Decision2007/339/EC, Art. 11, Nr. 2., (c)
[96] SeeBerichterstattung zur Haushaltsplanung 2024, e.g. Naumann, F. in Merkur.de, 14.12.2023.

Ticket Taxes

Air passenger taxes are general levies that are not earmarked for specific purposes. Airlines collect the tax and must show it separately in ticket prices, as they are required to refund it if a ticket is cancelled.

This raises the question of whether general taxes should apply to air travel. The standard principles of taxation apply here. Taxes that perform well against these principles are generally seen as justified.

The key taxation principles are:

1. *Equity*: Taxpayers should be treated fairly.
2. *Certainty*: Tax collection should be transparent and predictable.
3. *Efficiency*: Taxes should be inexpensive to collect and easy to pay.
4. *Ability to pay*: Taxes should reflect the taxpayer's capacity to contribute.
5. *Welfare optimisation*: Taxes should avoid resource misallocation or excessive avoidance costs.

By all these criteria, Germany's aviation tax is a well-designed instrument. It is inexpensive to administer, not arbitrary, and aligns well with the principle of ability to pay, since it mainly affects higher-income groups. People in the top income decile spend 18 times more on air travel than those in the lowest decile[97], meaning the tax burden is largely borne by higher earners.

Germany introduced its aviation tax on 1 January 2011. It is collected by the customs authority at the point of departure from a German airport and goes to the federal government. The tax is regulated by the Aviation Tax Act (LuftVStG) of 9 December 2010.

Since then, the tax has been increased several times. As of 1 May 2024, the current rates per departing passenger are:

- €15.53 for flights to European destinations
- €39.34 for medium-haul destinations
- €70.83 for long-haul flights

At present, nine European countries levy aviation taxes:[98]

[97] See Microcensus of German Federal Office of Statistics, https://www.destatis.de/DE/Presse/Pressemitteilungen/2020/01/PD20_027_122.html.
[98] For detailed surveys, see EU (ed.), *Taxes in the field of Aviation*, pp. 19 ff. and pp. 32 ff., as well as German Bundestag (ed.), *Current status of taxes and charges for aviation in Europe*, p. 4 ff

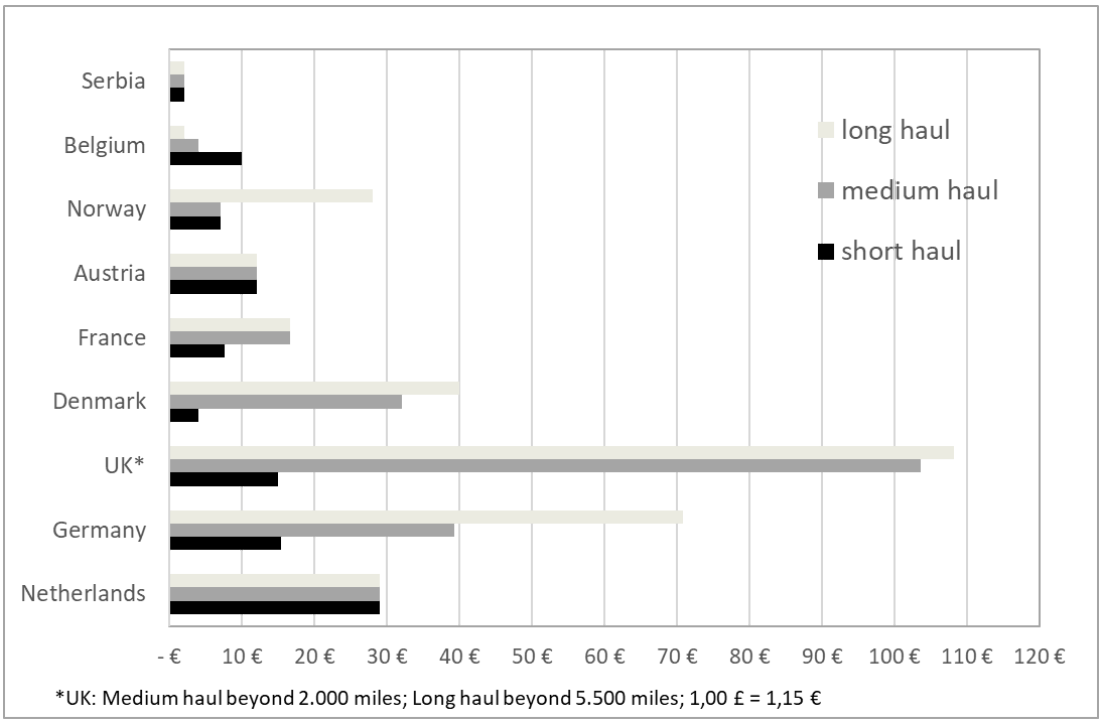

Fig. 5.1 Aviation ticket taxes (As of 01.07.2025)

The classification into "short", "medium", and "long" distances in Figure 5.1 refers to flights of up to 1,000 km, between 1,000 and 3,000 km, and over 3,000 km, respectively. In some countries, the rates are based on country lists, with the lowest rate applying to EEA routes and selected others. Rates apply for seats in lowest service class. Some countries raise higher charges for business class passengers.

Sweden had an aviation tax until 30 June 2025, at a level matching the new Danish tax introduced on 1 July 2025.

Italy has abolished its previous nationwide tax on scheduled commercial flights but continues to charge local fees at many airports, generally between €5 and €8, regardless of distance.[99]

Italy and France apply much higher aviation taxes on charter flights using small aircraft (fewer than 20 seats), which are not included in this comparison.

Only France applies aviation taxes to freight transport as well.

In general, aviation taxes apply only to departing passengers. The return leg is not taxed, because the legal basis for taxation is the act of departure, usually the sale of a ticket. This means that return journeys do not incur an additional tax at the point of return if no new ticket is purchased there.

The levels of aviation tax across Europe vary widely. Notably, southern tourism destinations often charge little or no aviation tax. By contrast, countries that do impose such taxes are typically those from which most tourists depart.

This observation points to a systematically different assessment of the impact of location costs on the public interest. As explained above, the level of location costs in international comparison and the price elasticity of demand have, at most, only a secondary influence on the choice of departure airport and, consequently, on country- and airport-specific passenger trends.

[99] The information is based on a sample survey conducted by the authors. It is not clear whether the charge is also levied to cover the cost of public services (for example, security checks).

- Outgoing passengers do not choose their departure airport based on location costs, but rather on proximity and the available service (routes, availability, frequency).

- In contrast, in the tourism market the destination countries (incoming passengers) compete with each other. Location costs in aviation are part of the total cost of the journey and are therefore fully incorporated into the cost base of the tourist stay, influencing the choice of holiday destination. In this decision, price is an important factor. Destination countries thus have a systematic public interest in minimising the location costs of travel to and from their territory in order to promote tourism as a key sector of the economy.

International Agreements

What do international agreements tell?

The collection of aviation taxes conflicts with the principles set out in the ICAO Convention and its associated policy documents, which call for international air transport to be kept free from charges that are not cost-based. The rationale behind this is that the availability and growth of air transport should be promoted in the interest of the global common good (see ICAO Policies, pp. 16–17).

- The behaviour of tourism destination countries is more in line with these considerations.

- In countries where aviation taxes are levied, the departure from the objectives set out in the Chicago Convention is justified in different ways.

A supposedly higher-level objective cited is the equal treatment of different modes of transport. The exemptions from VAT and fuel taxes are described as distortive subsidies. Since exempting aviation from a kerosene tax is not open to change due to existing international legal and treaty obligations, an alternative is sought.

This line of argument can be countered by noting that transport subsidies in general are applied inconsistently. For example, railway infrastructure, policing and security, and in some cases even operating costs (especially in regional services) are largely funded from public budgets. Inland waterways charge users for only around 5 percent of the infrastructure costs. So differential treatment is the norm, not an exception to be avoided. This applies both to the types of subsidies involved and to the overall scale of support provided to maintain services deemed to be in the public interest.

In summary: The decision to impose certain charges ultimately comes down to political judgment about the public interest. This includes not only the economic benefits (value creation, tax revenue), but also the external costs, such as climate impacts.

History of the Aviation Tax in Germany

Germany's aviation tax was introduced in 2011 with the sole aim of helping to reduce the public budget deficit. The tax rate was originally based on an overall revenue target and was subject to a cap. That cap was later lifted, in line with a recommendation from the German Environment Agency (UBA).[100] Subsequent changes to the tax rates were linked to fuel consumption and CO_2 emissions, as well as to participation in the EU Emissions Trading System (ETS). When the tax was increased in 2019, the government stated that the goal was to create incentives for reducing greenhouse gas emissions and to encourage climate-friendly behaviour. It argued that the previous tax structure had not adequately reflected the climate and environmental harm caused by air travel, particularly in comparison to other modes of transport.[101]

[100] See UBA,2019, Umweltschonendes Fliegen, p. 98f.
[101] See DLR, 2025, p. 60

In the current debate over the aviation industry's demand to repeal the tax, careful consideration is needed. Specifically, how far does the national view of aviation's contribution to the public interest diverge from the global (ICAO) and European (EU) consensus? Both levels have agreed that international air transport should remain exempt from kerosene taxes and that the climate impact of aviation should be addressed through globally coordinated agreements like CORSIA and EU-wide initiatives such as the ETS and SAF mandates.

If Germany wishes to impose a national levy to compensate for aviation's climate impact, an alternative to the existing tax could be a dedicated charge. Unlike a general tax, such a fee would be earmarked for research and development into low-emission propulsion technologies, sustainable fuels, or other climate mitigation measures.

Climate and Environmental Charges

Climate and environmental charges fall into two categories.

Individual Airport Charges

Airports apply emissions-related charges for noise and air pollution as part of their take-off and landing fees, in line with their individual pricing policies.

These include noise surcharges and particulate matter fees, which are intended to encourage airlines to invest in cleaner aircraft. These charges are often not an additional cost but are instead integrated into existing airport fees, meaning that airlines with newer, more efficient aircraft may actually benefit from reduced overall charges. Airlines that have already invested in such aircraft may gain a cost advantage over competitors still operating older fleets. This has led to the criticism that environmental charges of this type can be used as a strategic tool of airport policy to favour specific airlines.

Broader Environmental Charges

The second category includes broader, regulatory environmental charges. The DLR refers to these as *environmental regulatory charges*. Two complementary systems are in place:

- For flights within the European Economic Area (EEA), the EU Emissions Trading System (EU ETS) applies.
- For other international flights, the international climate protection scheme CORSIA is used.

EU Emissions Trading System (EU ETS)

EU ETS has applied to intra-European aviation since 2012. It requires emitters of greenhouse gases (GHGs) to purchase allowances for their emissions. The system also covers emissions from electricity and heat generation as well as energy-intensive industry, which together account for around 40% of the EU's total GHG emissions. Shipping was added in 2024.[102]

A politically determined emissions cap creates a market price for GHGs, influenced by economic growth, technological developments, and global competition. Emitters that exceed their allowances must buy additional rights on the market. The resulting price signal incentivises investment in low-emission technologies. All emissions are converted into CO_2 equivalents to ensure comparability across gases.

[102] On its functioning see https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/about-eu-ets_en; in addition: https://www.umweltbundesamt.de/daten/klima/der-europaeische-emissionshandel.

When the cost of allowances exceeds the cost of technical abatement measures, companies are incentivised to reduce their own emissions rather than purchasing additional allowances.[103]

EU-ETS 1 and EU-ETS 2

The EU ETS 1 covers emissions from around 9,000 installations in the energy sector and energy-intensive industries across Europe. Together, these installations account for about 40 percent of Europe's greenhouse gas emissions. From 2027, a supplementary EU ETS 2 will be introduced for fuels, applying in particular to the transport and building sectors.

How it works: EU ETS 1 operates under the "cap and trade" principle. A cap sets the total amount of greenhouse gas emissions permitted from installations subject to emissions trading. Member States issue a corresponding number of allowances to these installations – partly free of charge and partly through auctions. Each allowance permits the emission of one tonne of CO_2 equivalent (CO_2-eq).

Intra-European aviation has been included in the EU ETS 1 since early 2012. Free allocation will end in 2025. From 2026, all allowances will be auctioned, except for up to 20 million allowances that can be allocated free of charge on application for the use of sustainable aviation fuels (SAF). These allowances are intended to offset the additional costs to aircraft operators arising from the mandatory SAF blending quota from 2024 (ReFuelEU Aviation).

In addition, from 2025, the so-called non-CO_2 effects of intra-European aviation will first be subject to monitoring, and later are expected to be included in the EU ETS with a requirement to surrender allowances.

SAF – ReFuelEU (EU-VO 2023/2405)

The *ReFuelEU Aviation* regulation introduces indirect charges through mandatory quotas for blending sustainable aviation fuels (SAFs) into kerosene. As of 2025, a minimum of 2% SAF must be blended, increasing to 70% by 2050.

SAF includes:

- Synthetic fuels produced from renewable hydrogen and captured carbon,
- Biofuels derived from waste and residual materials,
- Recycled carbon aviation fuels.

A specific quota applies to synthetic fuels: from 2030, they must make up at least 1.2%, rising to 35% by 2050. Airports are required to provide the necessary infrastructure to ensure airlines can access and refuel with SAF-compliant blends.

Foreign airlines that only use EU airports for a turnaround must also refuel the required amount of SAF needed for their outbound flights.

CORSIA

The EU cannot unilaterally set rules for international aviation. In 2021, the global market-based scheme CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation) was introduced under the leadership of the International Civil Aviation Organization (ICAO).

[103] See https://www.vdi.de/energie-und-umwelt/emissionshandel

CORSIA aims to offset all CO_2 emissions from international aviation that exceed 85% of 2019 levels. However, several major countries do not participate. As of 2025, 127 states were part of the scheme. Notable non-participants include Brazil, Russia, India and China.

Unlike the EU Emissions Trading System (EU ETS), which is based on trading emission allowances, CORSIA relies on a compensation mechanism. Airlines must offset the growth-related share of their CO_2 emissions through certified climate projects outside the aviation sector.

Flights within the European Economic Area (EEA) remain covered by the EU ETS, which takes precedence over CORSIA in this context.[104] CORSIA applies to aircraft operators in ICAO member states that emit more than 10,000 tonnes of CO_2 annually from international flights with aircraft that have a maximum take-off weight (MTOW) above 5.7 tonnes. ICAO has issued a set of Standards and Recommended Practices (SARPs), which provide guidance for compliance with the system.

However, CORSIA has several shortcomings[105]:

- It does not apply to domestic flights.
- Only emissions above 85% of 2019 levels must be offset. By contrast, the EU ETS uses a baseline from 2004–2006 and includes a steadily declining cap, which also reduces the number of free allowances.
- The effectiveness of the climate projects used for offsetting has been questioned, especially regarding their additionality.

Climate-Neutral Airports

Airports, too, have set out to become climate neutral. The German airport association ADV has announced the goal for all airports in the country to achieve climate neutrality by 2045.

What does that involve?

According to the association's website, the airports are pursuing a "joint" CO_2 reduction strategy by 2030.[106] A four-point plan outlines their overall approach:

1. Buildings
2. Energy supply
3. Airport-specific facilities
4. Vehicle fleet

Energy supply: This includes a wide range of measures to reduce energy consumption and switch to renewable sources. Examples include optimising heating, cooling and ventilation systems, using combined heat and power units and offshore wind power, installing solar and photovoltaic panels, adopting district heating and cooling, and switching to green electricity.

Buildings: Airports are focusing on energy-efficient building renovations and improved insulation, along with continuous upgrades to building systems. Equipment for heating, ventilation, air conditioning and cooling is being assessed, replaced where needed, and optimised. New buildings are constructed to high energy standards.

[104] Source: BDL https://www.bdl.aero/themen/klima-und-umweltschutz/klimaschutz/.
[105] See DLR, 2025, p. 11
[106] See https://www.adv.aero/fachbereiche/nachhaltigkeit/klimaschutz/

Airport-specific facilities: These include baggage handling systems, passenger boarding bridges, ground power units for parked aircraft, and runway lighting. Modern technologies, including LED lighting and the use of alternative drives and renewable energy, can significantly reduce electricity consumption and emissions.

Vehicle fleet: Airports are increasingly relying on electric vehicles and alternative fuels for their ground operations.

Environmental Strategy of the European Aviation Industry

In its "Roadmap 2025–2050"[107], the European aviation industry has outlined the framework conditions and the steps it believes are needed to achieve climate neutrality by 2050. Figures 5.2 and Table 5.1 set out the range of measures intended to deliver this goal.[108]

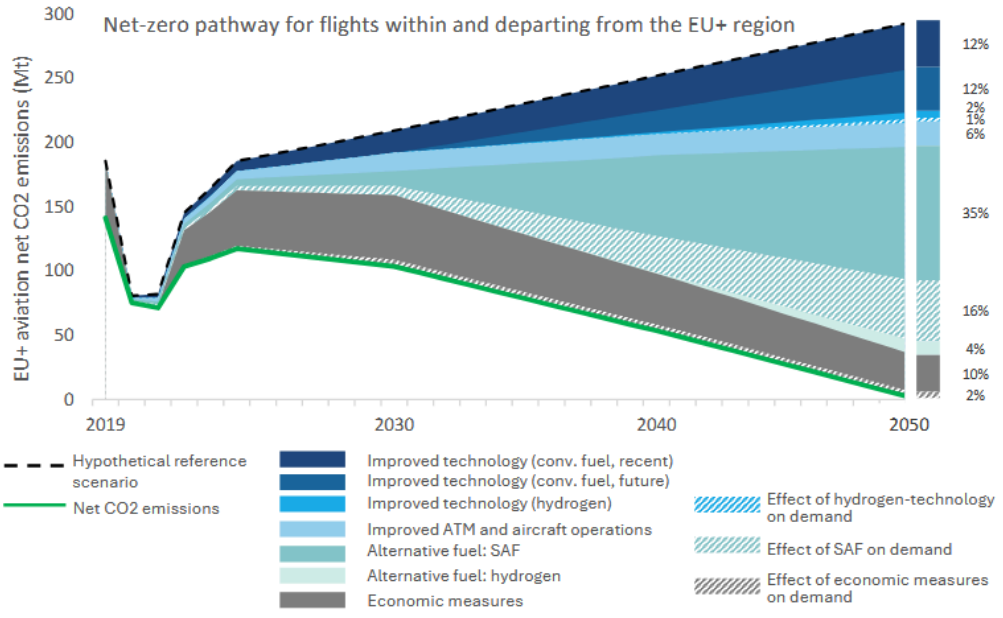

Fig. 5.2 Package of measures to reduce net-CO_2 emissions of European aviation. *Source*: Airlines for Europe (Destination 2050), p. 7

Total emission reduction per pillar by 2050

Pillar	Total Emission Reductions		Components	
Aircraft and Engine Technology	-27%	-79 MT CO_2	Recent Technology Future Technology Hydrogen Technology Demand reduction	12% 12% 2% 1%
ATM and Aircraft Operations	-6%	-19 MT CO_2	Airline operations Improvements in ATM Ground operations at airports	6%
Alternative Fuels and Sustainable Energy	-56%	-163 MT CO_2	Alternative Fuel SAF Alternative Fuel Hydrogen Demand reduction	35% 4% 16%
Economic Measures (EU ETS & CORSIA)	-12%	-35 MT CO_2	Economic Measures Demand reduction	10% 2%

[107] A4E (Airlines for Europe), ACI, ASD, CANSO Europe, ERA
[108] Airlines for Europe, 2025, (Destination 2050).

Tab. 5.1 Measures to reduce the net-CO_2-emissions of European aviation. *Source*: Airlines for Europe (Destination 2050), p. 7

The industry calls on policymakers to implement the following actions:[109]

1. Prioritise the European aviation sector as a critical and essential sector within the Clean Industrial Deal.
2. Implement a coherent EU strategy for the development of Sustainable Aviation Fuels (SAFs).
3. Accelerate innovation, support research, and promote financing for the decarbonisation of air transport.
4. Prepare the European aviation ecosystem for hydrogen and electric aircraft.
5. Support the modernisation and digitalisation of air traffic management, led by the SESAR Joint Undertaking.
6. Create incentives for the use of carbon capture and utilisation (CCU) technologies in aviation.
7. Strengthen CORSIA and international cooperation to enable future technologies and align international standards with those of the EU within ICAO.
8. Reflect the specific characteristics of the aviation sector in EU regulations.
9. Strengthen the industrial ecosystem for the development and deployment of low-carbon aviation technologies.
10. Reduce and simplify regulatory burdens.
11. Ensure the necessary resources to maintain value chains and support the relevant sectors and technologies needed for a functioning ecosystem.

Each of these demands is accompanied by specific proposed actions. Provided that these are met, the industry would in turn be willing to commit to its share of the measures laid out in the roadmap. The industry stresses the need for a consensus between policymakers and the aviation sector, based on the following principles:

1. The aviation industry will shoulder the financial burden of the required investments to the extent that the benefits are specific to the sector and not shared across others.
2. Uniform, earmarked levies may be introduced at European level.
3. General, non-earmarked taxes such as passenger taxes should be abolished.
4. A target for total CO_2 emissions should be set. If deviations from this target occur, they would be balanced through verifiable offsetting measures by or on behalf of the roadmap partners.
5. The projected growth in air traffic volumes used as the basis for the roadmap must be realised.

The projections for net CO_2 emissions are based on a traffic scenario that assumes much lower annual growth rates between 2024 and 2050 than in previous decades. Figure 5.3 illustrates this. It is worth noting that the

[109] See Airlines for Europe,(Destination 2050), p. 10 ff.

average growth rate between 2019 and 2050 is even lower than the already modest rate shown in Figure 5.3 for the period from 2024 onwards, as it takes into account the Covid-related decline in demand.

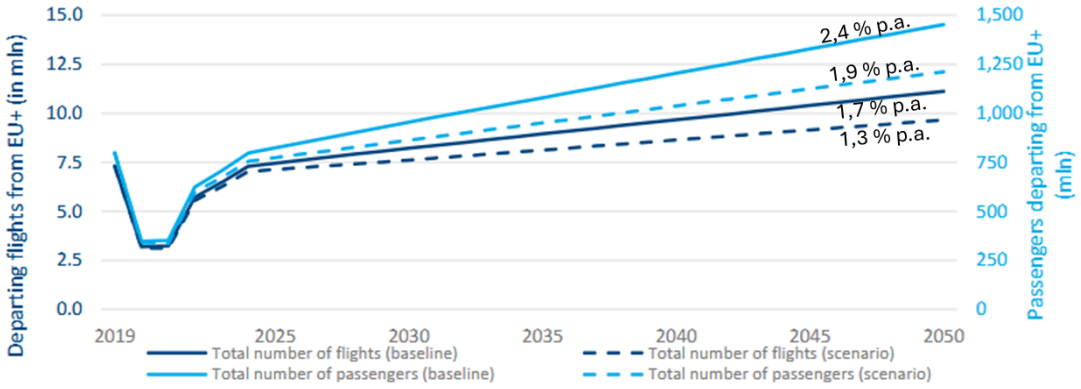

Figure 5.3 Traffic projections (Source: A4E, Destination 2050, p. 7)

These low growth assumptions could present a challenge, given that the aviation industry has previously been committed to maximising growth.

This raises a key question: how can such low growth rates be achieved in practice?

One possibility would be to regulate the market through caps on supply, for example by reinstating a system of traffic rights or by introducing caps on growth at the level of individual operators. Alternatively, airlines would need to purchase additional emissions allowances on the market or provide credible evidence of effective offsetting measures in cases where allowances are unavailable.

Aviation Security Charges

General Principles

Protection against security threats in aviation is referred to as “external security”, in contrast to “internal security”, which relates to the safe operation of the value chain. Ensuring external security is a public responsibility. In the context of aviation, all states are obliged to guarantee this external security.

Although responsibility for external security cannot be delegated, operational tasks may be outsourced, provided that they do not encroach on the state's monopoly on the use of force. In Germany, the *Aviation Security Act* (*LuftSiG*) defines the responsibilities and content of measures to safeguard aviation security. Section 17a permits the collection of cost-covering fees for individually attributable services, which include, in particular, passenger screening.

Security charges are levied separately for screening passengers and cargo at airport access points on the airside, and for securing the airport perimeter against unauthorised intrusion.

According to Section 8 of the *Aviation Security Act*, responsibility for securing airport premises lies with airport operators.[110] The associated costs are passed on to airlines either as part of general passenger charges or as

[110] See LuftSiG,2005

separate cost-based fees, typically calculated per passenger. Figure 5.4 provides an overview of the fees charged at German airports.

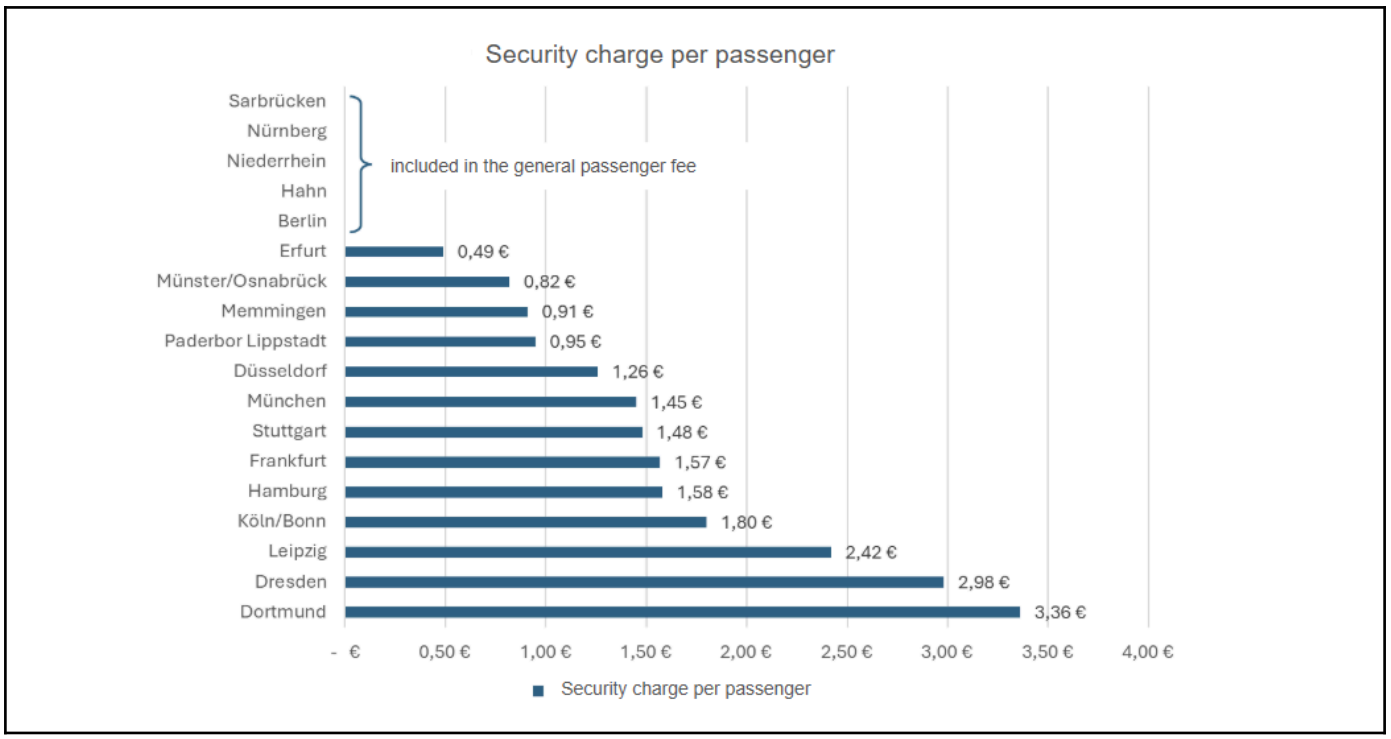

Fig. 5.4 Security charges at German airports
Source: Charges regulations (As of. 21.07.2025)

Discussions on airport-related costs focus in particular on charges for passenger and baggage screening.

In Germany, responsibility for passenger screening lies with the aviation security authorities of the federal states. However, these authorities have transferred responsibility for the 12 out of 15 international airports to the Federal Police. At the airports of Munich, Nuremberg, and Münster/Osnabrück, responsibility remains with the state governments and is handled by regional district authorities.[111]

Under Section 16a(1) No. 1 of the *Aviation Security Act*, aviation security authorities may delegate specific screening tasks to private individuals, legally dependent associations, or legal persons under private law, who are then vested with public authority. With the exception of Frankfurt Airport, security screening is usually carried out by private companies whose staff are formally authorised to exercise these public powers. At Frankfurt, the authorisation also applies at the organisational level.

With the exception of Frankfurt, the power to set fees for passenger screening and to contract service providers remains with the aviation security authorities or the Federal Police. At Frankfurt, these responsibilities are also held by the airport operator.

In other countries, public authorities sometimes delegate the organisation of security screening to airports. In such cases, they also grant airports the power to contract service providers and collect the related fees. As in Germany, security charges are sometimes included in general passenger fees and sometimes shown separately.

[111] For a detailed presentation, see WD 5 – 3000 – 164/22 (2023), study by the Scientific Service of the German Bundestag – *Status of the privatisation of aviation security checks at German international airports*.

In Germany, the *Aviation Security Charges Ordinance* (*LuftSiGeV*) governs how fees for security screening are set. Annex 1 to Section 1 of the ordinance limits the fee range to between €4.50 and €15.00 from 1 January 2025 to 31 December 2027, and up to €20.00 thereafter. The Federal Ministry of the Interior publishes the current fee rates. The most recent list, issued on 30 June 2025, shows charges between €4.80 and €15.00 at 28 airports.[112]

Flughafen	Gebühr ab 01.01.2024 bis 31.12.2024	Gebühr ab 01.01.2025 bis 31.05.2025	Gebühr ab 1. Juni 2025
Berlin-Brandenburg	9,87 €	9,37 €	9,37 €
Braunschweig	10,00 € [1]	15,00 € [2]	15,00 € [2]
Bremen (BPOL)	10,00 € [1]	11,88 €	11,59 €
Dortmund	5,82 €	6,47 €	8,82 € [4]
Dresden (BPOL)	10,00 € [1]	15,00 € [2]	15,00 € [2]
Düsseldorf (BPOL)	10,00 € [1]	10,70 €	10,45 €
Erfurt (BPOL)	10,00 € [1]	15,00 € [2]	15,00 € [2]
Frankfurt/Main	10,00 € [1]	11,86 €	11,86 €
Friedrichshafen	10,00 € [1]	10,00 € [3]	10,00 € [3]
Hahn	8,26 €	8,56 €	8,56 €
Hamburg (BPOL)	7,65 €	8,17 €	7,86 €
Hannover (BPOL)	10,00 € [1]	15,00 € [2]	15,00 € [2]
Heringsdorf	8,21 €	8,21 €	8,21 €
Karlsruhe/Baden-Baden	8,95 €	9,64 €	9,64 €
Kassel-Calden	10,00 € [1]	15,00 € [2]	15,00 € [2]
Köln/Bonn	10,00 € [1]	14,00 €	14,00 €
Leipzig/Halle (BPOL)	10,00 € [1]	12,82 €	12,63 €
Lübeck	10,00 € [1]	10,00 € [3]	10,00 € [3]
Memmingen/Allgäu	4,56 €	4,80 €	4,80 €
München	9,39 €	8,97 €	8,97 €
Münster/Osnabrück	10,00 € [1]	11,70 €	11,70 €
Niederrhein	7,60 €	9,07 €	9,07 €
Nürnberg	8,84 €	8,71 €	8,71 €
Paderborn/Lippstadt	9,57 €	10,90 €	10,90 €
Rostock-Laage	6,99 €	6,99 €	6,99 €
Saarbrücken (BPOL)	10,00 € [1]	15,00 € [2]	15,00 € [2]
Stuttgart (BPOL)	10,00 € [1]	13,96 €	13,70 €
Westerland/Sylt	10,00 € [1]	10,00 € [3]	10,00 € [3]

Fig. 5.5 Security charges at German airports
Source: Charges regulations, BMI (As of. 21.07.2025)

In other European countries, rules differ. Security charges are not always disclosed separately and are sometimes included under other categories.

The Cost-Recovery Principle

The aviation industry has criticised the practice of passing on the costs of passenger screening to users, arguing that ensuring security is fundamentally a state responsibility and that the associated costs are typically covered by the public purse. For example, railway policing is mostly funded through general taxation.[113]

[112] See BMI, 2025, p. 2
[113] BDL, 2005

However, it is important to note that, unlike other modes of public transport, there is an international consensus that aviation-related public services may be financed through user charges, up to the level of full cost recovery.[114] Reference should also be made to earlier discussion on fuel taxation and the different forms of state support provided to transport sectors.

Following the events of 11 September 2001, stricter security screening was made mandatory worldwide. In the EU, Regulation (EC) No 300/2008 set out common standards for the screening of passengers. Based on this regulation, a report was issued on the core principles for funding aviation security, confirming the principle that users may be charged for screening costs up to the level of full cost recovery. The regulation and the report also acknowledge that protecting the public from external threats primarily falls under state responsibility, and that each state may choose to contribute public funding.[115]

The report highlights the lack of transparency and consistency in cost allocation across member states, and calls for harmonised standards to ensure fair treatment of users. These recommendations have not yet been fully implemented. As a result, meaningful comparisons between countries in terms of aviation security costs and the extent of public funding remain difficult.

In order to evaluate the differences in national approaches, it would be important first to push for implementation of the transparency measures recommended in the Commission's report. Based on the insights this would provide, policymakers could, as with aviation taxes, assess whether national practices deviate significantly from the international norm. A move towards harmonised rules across the European Union would be desirable in the interest of creating fair and consistent operating conditions.

Air Traffic Control Charges

Air traffic control charges cover the costs of air traffic service providers and their oversight. These charges are divided into en-route charges (for route-level control) and terminal charges (for approach and departure control at airports) (Federal Office of Air Traffic Control 2024; and DLR, 2025, p. 9).

Air traffic control is indisputably a public responsibility. Under Article 18 of the ICAO Convention, all states commit to providing air traffic control services in accordance with international standards. These services are delivered either directly by state institutions or by organisations authorised by the state.

In Germany, responsibility for air traffic control rests with the federal government. It may also commission foreign air traffic control providers, provided they are licensed under EU law.[116] Administrative responsibility lies with the Federal Office of Air Traffic Control.

En-Route Services

Organisation in Germany

[114] It should also be recalled that this user-financing principle is in line with traditional practice. In the case of fire services, for example, the usual protection against general hazards is funded by the state, while companies engaged in particularly hazardous activities (such as chemicals or the storage of dangerous goods) must provide their own protection against these specific risks. The same applies to aviation: many risks stem from the particular hazards inherent in air transport. The demand by smaller German airports (ADV) that the state should pay for perimeter fencing because of the security risk is therefore unjustified. Here too, it is the specific hazards of aviation that make such fencing both sensible and necessary.

[115] See KOM(2009) 30 from 02.02.2009, Chapter Sicherheitsentgelte und Kosten, No. 20 ff.

[116] See Art 87d Grundgesetz

En-route services in German airspace are primarily provided by DFS. In the upper airspace (above 24,500 feet) of northern German states, control is handled by EUROCONTROL's Maastricht centre, which also covers upper airspace over Belgium and the Netherlands.

Charge Rates

En-route charges are calculated across Europe on a full cost-recovery basis, in accordance with Regulation (EC) 1794/2006.[117]

In 2025, the German en-route Service Unit Rate is €99.91 (up from €80.14 in 2024).[118]. For an A320 from Hamburg to Munich, en route chargeamounts to roughly €680.

Germany's rate is the highest among the larger European states.

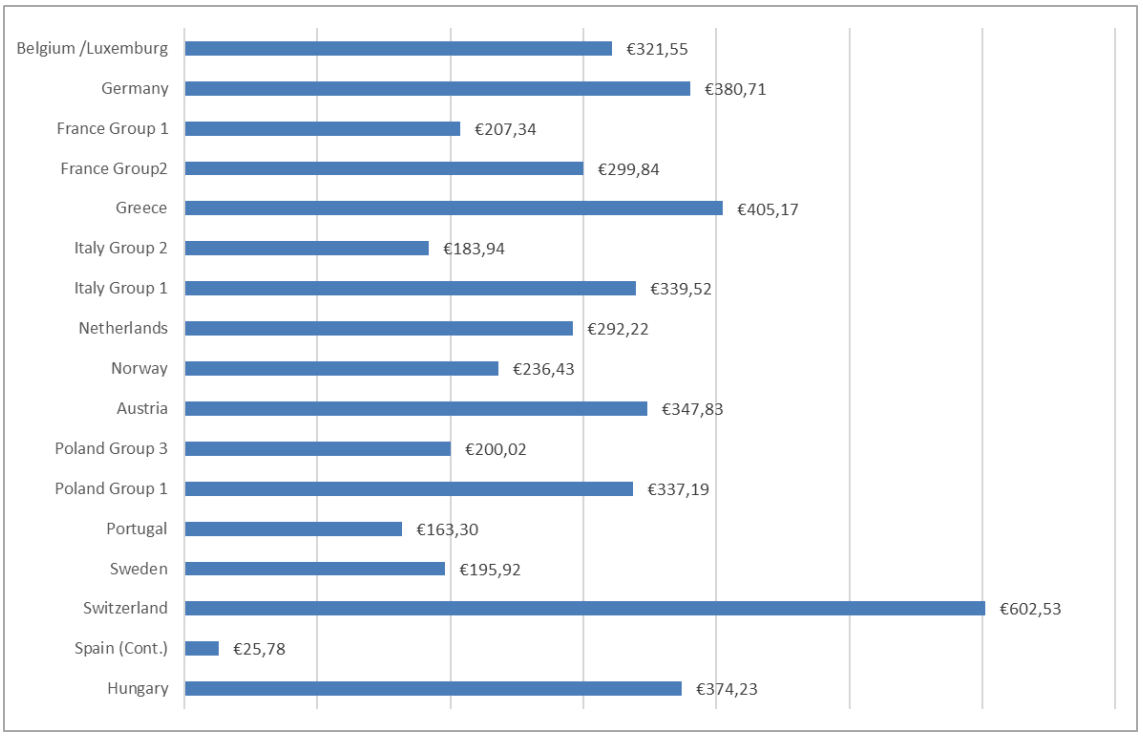

Figure 5.5 Air traffic control charge en route per each service unit (June 2025)
Source: EUROCONTROL

Compared to 2019, the en-route charge has increased by 57%. This puts Germany in the mid-range of European developments. The sharp increase in 2025 relative to 2024 reflects adjustments following losses incurred during the COVID years.

[117] See (EC) 1794/2006, Art. 3, Abs. (2)
[118] Charge = $(MTOW/50)^{0,5}$ x Charge rate x (km Großraumdistanz/100).
https://www.dfs.de/homepage/de/flugsicherung/rechtlicher-rahmen/flugsicherungsgebuehren/

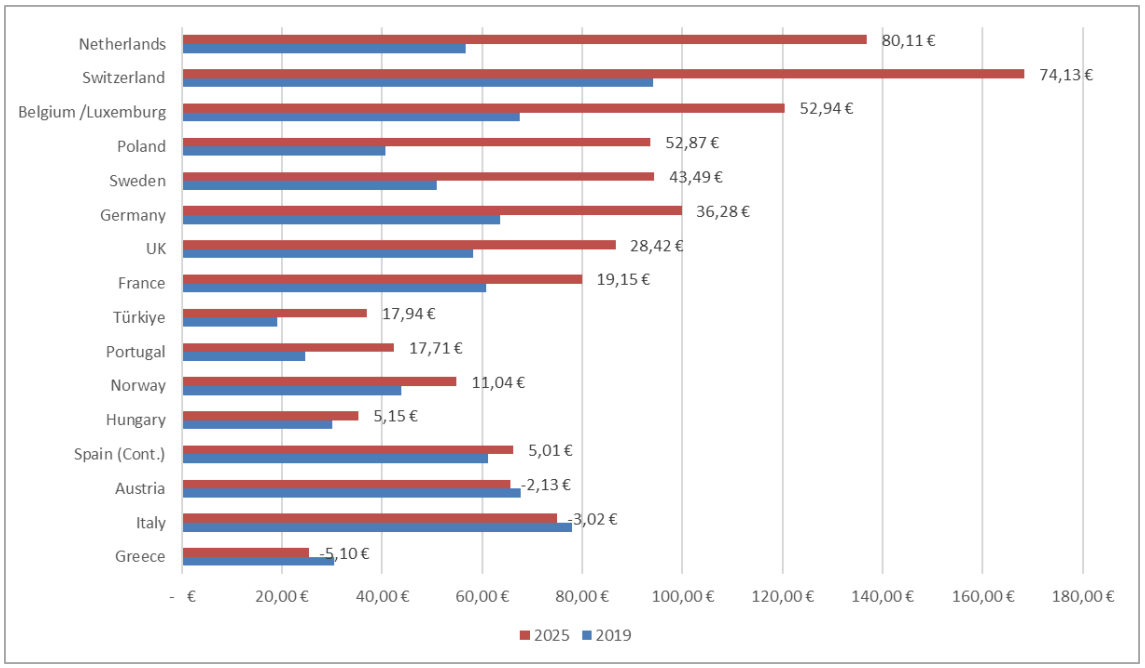

Fig. 5.6.1 Development ratesenroute service unit rate 2025 versus 2019
Source: EUROCONTROL

In a year-on-year comparison, the increase in Germany's charge rate is striking, although it still ranks in the middle range.

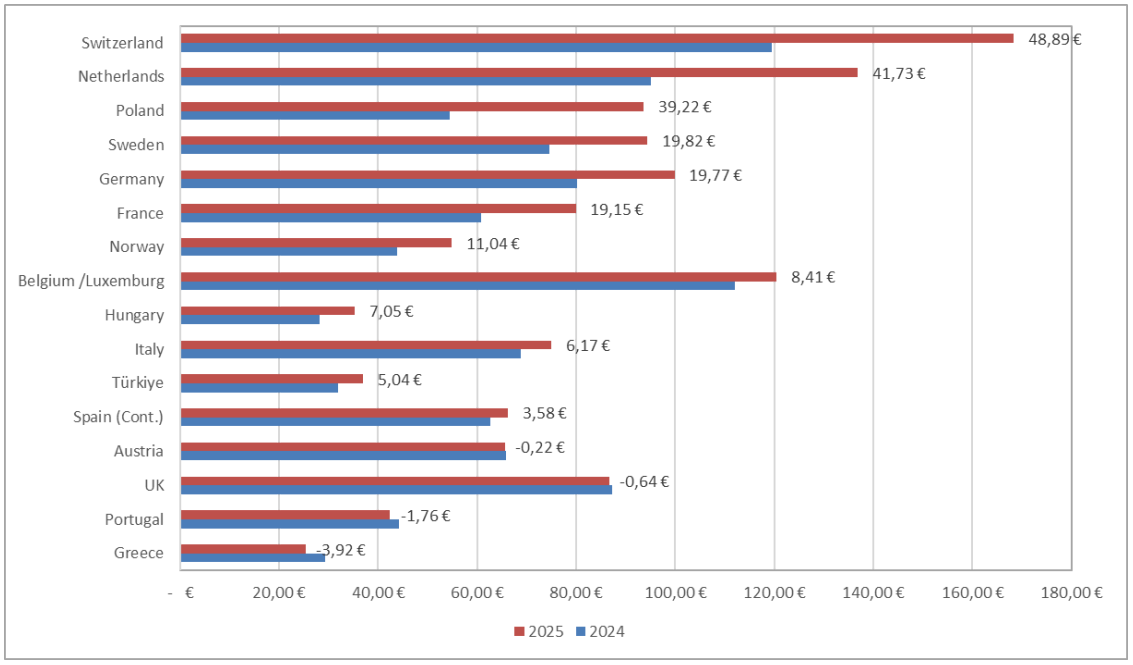

Fig. 5.6.2 Development enroute service unit rate 2025 versus 2024
Source: EUROCONTROL

According to the DFS:

> *"If traffic develops differently than forecast, the financial risk is shared between air traffic control providers and airlines. If deviations exceed a certain margin, DFS must adjust charges after a two-year delay, lowering them in the case of excess revenue, or raising them if revenue falls short."*[119]

This mechanism suggests that charge levels may fall again in 2026 as pandemic-related losses are recovered.

Notably, some states (e.g. Greece, Italy, Austria, Spain) covered pandemic losses through public subsidies. This explains their relatively modest rate increases.

Implications for Location Costs

En-route charges have a relatively minor influence on airport-related location costs. Nonetheless, southern European destination countries (except Turkey) have seen smaller increases than the tourism-originating countries. Since air traffic control costs are largely fixed, the difference partly reflects stronger traffic growth in those regions.

Charge levels are not a reliable indicator of service efficiency, as they are heavily influenced by traffic density in the relevant airspace. Central European airspace (Netherlands, Belgium, Germany, Switzerland) is significantly busier than peripheral areas.

It is also worth noting that the efficiency gains promised under the **Single European Sky** initiative (launched in 2004), specifically, a 50% cut in charges by 2025, have not materialised, despite repeated pushes by the European Commission.

Terminal (Approach and Departure) Services

Organisation
The Federal Office of Air Traffic Control has designated 34 German airports that must maintain terminal control services (tower services) for arrivals and departures.

For approach and departure control services (aerodrome control services) at the 15 airports designated as international commercial airports under §27d until the implementation of harmonised European regulations for air navigation services (Berlin Brandenburg, Bremen, Dresden, Düsseldorf, Erfurt-Weimar, Frankfurt Main, Hamburg, Hanover, Cologne/Bonn, Leipzig/Halle, Munich, Münster/Osnabrück, Nuremberg, Saarbrücken, Stuttgart) and at Karlsruhe/Baden-Baden Airport, DFS Deutsche Flugsicherung GmbH is the appointed service provider. At a further eight commercial airports, DFS Aviation Services, a subsidiary of DFS, is responsible (Braunschweig, Dortmund, Friedrichshafen, Lahr, Memmingen, Mönchengladbach, Paderborn, Weeze), while Austrocontrol, the Austrian national air navigation service provider, covers another eight (Augsburg, Frankfurt-Hahn, Hamburg-Finkenwerder, Heringsdorf, Hof-Plauen, Kassel-Calden, Lübeck-Blankensee, Sylt). Two smaller organisations are appointed at Mannheim and Munich-Oberpfaffenhofen airports.[120]

With these service delegations comes the right to collect the relevant air traffic control charges.

Charge Rates

In Europe, the levying of approach and departure charges is governed uniformly by EU Regulation (EC) No 1794/2006. It states:

[119] See https://www.dfs.de/homepage/de/flugsicherung/rechtlicher-rahmen/flugsicherungsgebuehren/
[120] See BAF ANSP Webkarte (Map)

"The costs of approach and departure services shall be financed from the approach and departure charges levied on users of air navigation services and/or from other revenues, including cross-subsidies in compliance with Community law.".[121]

In Germany, this is regulated by the Ordinance on the Charging of Costs for the Use of Air Navigation Services and Facilities for Approach and Departure (FS-An- und Abflug-Kostenverordnung – FSAAKV). The charge rate is the same for all 34 airports where the BAF has declared the provision of approach and departure services to be necessary (see FSAAKV § 2).

In 2025, the charge is €380.71 per service unit (up from €271.24 in 2024). For an A320 (MTOW 74t), this results in a fee of about €499.[122]

Setting a nationwide uniform charge rate is standard practice in almost all Member States. Only occasionally are the rates divided into groups in order to differentiate them by airport size (number of movements). An international comparison shows a wide range of charge levels across Europe.

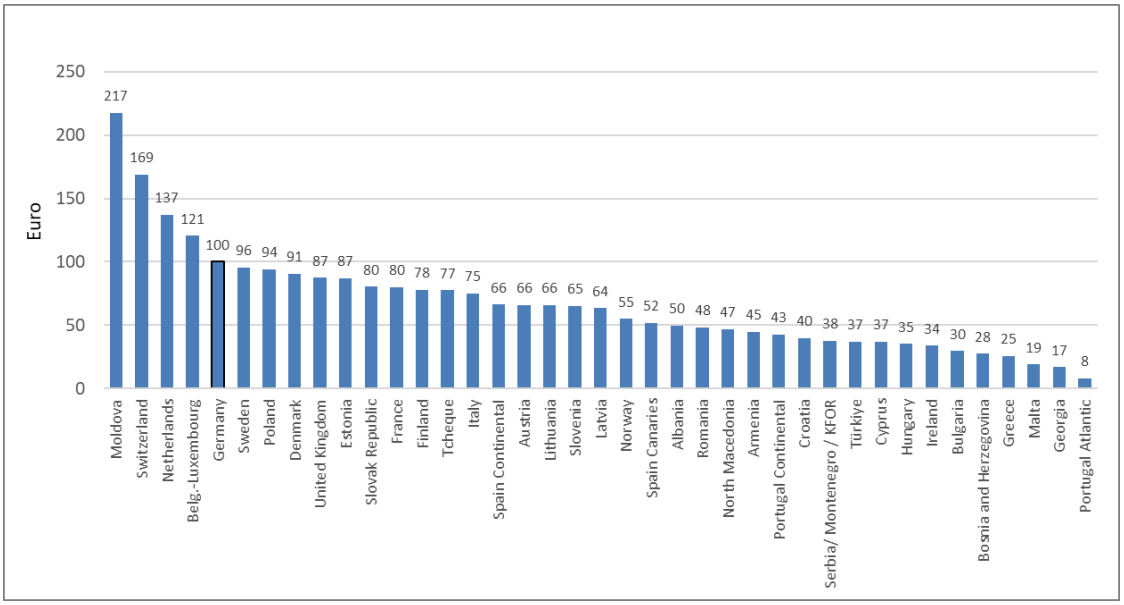

Abb. 5.7 Aerodrome Control charges per each service unit,June 2025
Source: Eurocontrol

International comparisons reveal wide differences in terminal charges. This is often due to how many small airports are included in the national system. Since tower operations have high fixed costs, unit costs at smaller airports can be several times higher than at larger hubs.

If charges were calculated on a purely cost-recovery basis, terminal services at smaller airports would become prohibitively expensive. Uniform charge levels therefore imply built-in cross-subsidization. In Germany, this cross-subsidization ensures full cost recovery only for DFS. The single rate is calculated based on the costs at major DFS airports (zone 1). At smaller airports (zone 2), it does not cover full costs. According to §2(2) FSAAKV, the federal government makes up the difference using public funds.

Cost Developments

In 2019, DFS charges were broadly in line with standard European levels, roughly comparable with those in Austria. By 2025, however, DFS is applying significantly higher fees, whereas Austria has maintained its 2019 rates.

[121] (EC) 1794/2006, Art. 3, (3)
[122] Charge= $(MTOW/50)^{0,7}$ x Charge rate. https://www.dfs.de/homepage/de/flugsicherung/rechtlicher-rahmen/flugsicherungsgebuehren/

Assessment for location costs

Cross-subsidization within the airports in fee zone 1, along with the additional systematic subsidies for airports in fee zone 2, amounts to a substantial economic subsidy for smaller airports. In the short term, its continuation conflicts with the 2014 EU Guidelines on State Aid to Airports and Airlines, which deem operating aid to airports incompatible with the internal market after a ten-year transitional period. This transitional period has since been extended by three years due to COVID-19, but in practice implementation is likely to fail because of the political will to maintain even smaller airports as elements of regional transport infrastructure, and because of the widespread open and covert resistance of Member States.

Air navigation charges were within the usual European range until the COVID-19 crisis, but have since risen because the air navigation service provider has retroactively recovered costs that were not covered during the crisis period. Once this phase is over, costs are expected to return to normal levels. If there is any doubt as to what constitutes “normal” costs, economic studies on the appropriate cost levels of an air navigation service provider can easily be conducted. There are several competitors in the provision of air navigation services, which allows for cost comparisons.

The blanket criticism of air navigation costs by the BDL and other associations is unfounded. It should be stated more specifically which cost components are particularly open to criticism.

Airport charges

The ICAO obligation for all States to provide public transport infrastructure for international aviation on a non-discriminatory basis (in terms of access and user charges) and without a profit margin implies that airports are public infrastructure and that providing them to users is a public responsibility.

Accordingly, the general principle is to limit user charges to the cost of provision. Worldwide, international airports – and in most cases smaller airports as well – are publicly owned. In some cases, the public owners contract private companies to operate the airport, and almost exclusively in Europe, ownership of individual airports has also been partially or fully privatised. The trigger was the privatisation of the former British Airport Authority airports under the government of Margaret Thatcher. The main motivation was to relieve public budgets of the need to finance investments and, in some cases, to cover ongoing operating losses.[123]

In Germany, all airports where approach and departure control services are provided also handle international air traffic. All airports are operated as privately organised companies. In most cases, the public sector (federal, state, municipal) owns the airport operating companies or holds an equity stake in them, usually a majority stake. Federal holdings have been steadily reduced in recent years and currently exist only for the airports of Munich, Berlin Brandenburg, and Cologne/Bonn.

Only the airports of Frankfurt-Hahn, Memmingen, Weeze, and Lübeck (100 percent) are majority privately owned. Düsseldorf Airport is split equally between public ownership (City of Düsseldorf) and private ownership. Hamburg Airport (30 percent) and Friedrichshafen Airport (15 percent) have private minority shareholdings.

Public services and government-supervised services at airports

Overall, the involvement of the state in airport revenues can be categorised as follows:

[123] For a more comprehensive analysis see Brützel, 2017, (Flughafenpolitik und Verkehrspolitik im Spannungsfeld).

1. *Fees:* Payments charged for public services. These include payments for air navigation services, meteorological services for aviation, security screening and assurance, airspace monitoring, and various official actions (see §32 LuftVG).

2. *Charges:* Payments for airport services whose rates are legally regulated and supervised (in particular under §19b LuftVG and the former Ground Handling Services Ordinance).

3. *Private revenue*: Payments for freely determined services not specifically regulated by law, referred to in standard business terms such as revenue, income, etc. At airports, these services mainly comprise those not provided for aviation (the so-called non-aviation business).

These categories are not applied consistently everywhere. Even the Ground Handling Services Ordinance switches between the terms “charges” and “fees” without substantive reason. In English literature, a distinction is often made between “rates,” “charges,” and “fees,” with “fee” frequently used for legally supervised charges. Overall, the terminology is inconsistent and lacks clear boundaries. Many authors alternate between “fee,” “charge,” “revenue,” and “income.” Notably, the commonly used term “price” is generally avoided. The most frequent usage for payment of core aviation services, in line with §19b LuftVG, is the term “charge.”

Principles of charge regulation

The ICAO policies, the relevant EU directives on airport user charges, and their transposition into national law form the framework for the schedules of charges that airports must publish for the use of the infrastructure they provide.

In these schedules, the services are listed as the “regulated area.” This covers all “charges for the use of facilities and services connected with the lighting, take-off, landing and parking of aircraft, and with the handling of passengers and cargo.”[124] Excluded under section (2) no. 2 of the LuftVG are charges for ground handling services, which, under the relevant EU regulation, have been provided competitively by operators since 1997. Accordingly, these were excluded from consideration in this report.[125]

Section 19b LuftVG requires an airport’s schedule of charges for its services to be approved. Approval must be granted if certain conditions are met. The federal government has delegated airport administration in Germany to the Länder (regions, départements). The Länder’s aviation authorities, under the technical and legal supervision of the Federal Ministry of Transport, are responsible for operational oversight as well as for reviewing and approving the schedules of charges.

Approval is granted if the charges in the schedule are set according to suitable, objective, transparent and non-discriminatory criteria. In particular, it must be ensured that the services and facilities subject to charges are clearly specified, that the calculation of charges is cost-related and determined in advance, that all airport users are granted equal access to the services and facilities of the airport or aerodrome, and that users are not charged different rates without objective justification.

The criteria laid down in the LuftVG and Directive 2009/12/EC lack precision as to which costs should be allocated to which charge element. The principle of cost orientation ensures that, in total, the revenue from charges does not exceed total costs, but it does not prevent individual charge elements from producing surpluses or deficits if costs are not allocated appropriately. In addition, the valuation of a cost-covering return on capital allows room for discretion.

[124] § 19b (1) LuftVG
[125] See p. 13 of this report

Since airports regularly provide services in addition to those for aviation (the so-called non-aviation business), such as leasing space to tenants or operating retail, catering, office and conference facilities, parking areas, etc., the absence of clear rules allows scope for allocating overheads, provided the non-aviation business is operated as a separate segment:

- ***Single till*:** Where airports are in public ownership and the principle of cost recovery applies to their operations as public facilities, contributions from the non-aviation business are credited to the charges base. In practice, this means that revenue from non-aviation activities is subtracted from total costs to determine the charge base, making a separate cost allocation by segment unnecessary. This is still regularly applied where airports are exclusively publicly owned.

- ***Dual till*:** To create incentives for private investors during privatisations – investors who typically expect a return on capital exceeding costs – affected countries have separated the non-aviation business into its own segment. The non-aviation business is not regulated and may be run for profit. Under the dual till approach, indirect costs must be allocated to the separate segments. If allocated to aviation, they become part of the cost-recovery charges base; if allocated to non-aviation, they must be covered by market revenues, reducing the profit in that segment.

Challenges in Airport Charge Regulation

Consistency of Application

Under the current regulatory framework, several problems arise. One key issue is the lack of uniform application. National implementation of the relevant EU directives leaves room for interpretation, leading to disparities in airport charges and, in turn, distorted competitive conditions across different locations. In some cases, certain services are provided to airports but not invoiced, effectively amounting to hidden subsidies. Such practices, which go against the EU's guidelines on state aid to airports and airlines, are still common across Europe. Examples include publicly funded fire services, approach and departure control services, or partial coverage of costs related to military use of airport infrastructure.

Where member states diverge in their view of aviation as public infrastructure, it is to be expected that they will find ways to support their airports according to national priorities. Whether the recent extension of the transition periods in the state aid guidelines — justified by the pandemic — will be the final concession to national resistance remains to be seen.

In Germany, despite shared oversight by the Federal Ministry for Digital and Transport (BMDV), responsibility for implementing the regulatory framework lies with the aviation authorities of each federal state. As a result, there are discrepancies in the application of the rules. State-level political interests can also vary significantly, especially where states are airport shareholders. In such cases, the scope of federal oversight is limited.

For smaller regional airports, the principle of full cost recovery would result in prohibitively high charge levels. Yet their value to public owners is not measured solely by operating profit. Airports often contribute to public finances in other ways, for example through tax revenues or social security payments. If a state decides that the public interest in maintaining an airport outweighs its operational losses, this will be reflected in how regulatory rules are applied.

Conflicts of Interest from Combining Ownership and Oversight

Political interests already influence regulatory practice — regardless of airport ownership. This conflict becomes even more pronounced when a state serves both as the airport's regulator and its owner. The need to separate these roles has long been recognised. In2016, the German Monopolies Commission called for such a separation, and the DLR report supports this position.[126] It recommends the establishment of a central, independent regulatory authority.

Use of the Dual Till System

Under Section 19b(3) no. 9 of the German Aviation Act (LuftVG), airports are free to decide whether and to what extent they include revenues and costs from non-aeronautical activities in charge calculations. This legal basis underpins the dual till approach. When this system is used, private airport owners have an incentive to allocate overhead costs to the aviation business, thereby raising the regulated charges.

While profit maximisation is not the objective of public airport owners, in practice they are not indifferent to the financial returns from their airport holdings — whether to generate dividend income for public budgets or to strengthen equity reserves for future investments.

This incentive structure, and the challenges of overseeing cost allocation, casts doubt on whether the dual till approach is appropriate for publicly owned airports. The DLR report concludes that there should be a broader debate on "what kind of regulatory framework can deliver better market outcomes"[127], though this framing seems questionable in the context of the public interest. Where airports are privately owned, and where profit motives are legitimate, it would be appropriate to define clear, economically sound rules for allocating overhead costs. This would ensure consistent and transparent methods for determining the charge base — both for regulators and users.

Inefficiency Risks of the Cost-Recovery Principle

As in broader debates about cost-recovery principles in public services, the ICAO and EU regulations based on this model have been criticised for failing to incentivise efficiency — especially in a context where most airports enjoy natural monopoly positions. In fact, where capital cost allowances exceed the actual financing costs incurred by owners, the framework can even encourage overinvestment at the expense of users.

To address this concern, Section 19b(3) no. 5 of the LuftVG prescribes a formal consultation process between airports and users. One of the core elements is alignment on investment planning and airport operations that meet user needs. This structured consultation is designed to provide a counterweight to excessive costs and ensure users have meaningful influence in charge-setting procedures. Of course, there should also be a firm commitment of airlines to stay at an airport for a certain time so that the agreed upon investments can be amortized.

The DLR report explores the possibility of replacing pure cost-based regulation with an incentive-based approach that includes efficiency factors. It outlines the advantages and drawbacks discussed in the literature without making a firm recommendation.[128] One argument is that operators could reap additional profits if they manage to cut costs beyond agreed efficiency targets. On the other hand, extra profits can also arise when actual traffic volumes exceed the assumptions underpinning the regulatory period. This can create growth incentives that run counter to public goals — for instance, limiting the environmental impacts of noise and emissions.

[126] See DLR, 2025, p. 50
[127] DLR, 2025, p. 52
[128] For a discussion seeDLR, 2025, p. 51f.

Airport Charges and Airline Market Power

The German Airports Association (ADV) argues that airports are increasingly unable to recover their full costs from users. It claims that the market power of airlines forces charges below cost-recovery levels, making it impossible to refinance past investments.[129]

The market power of airlines is evident across Europe in the fact that a small number of large airline groups are matched by 480 independent airports, between which the airlines can switch at any time.

At every airport in Germany, the two largest users together have a market share of more than 60 percent. Across Europe, 84 percent of all airports have a dominant main customer with more than 40 percent of flight movements.

The DLR adds that most low-cost carriers in the EU operate pan-European networks from multiple bases rather than a single home market. This structure further strengthens their bargaining power in negotiations with airports.[130]

Airports are calling for mechanisms to defend their interests against dominant airline groups. According to the ADV, even when negotiations succeed and tariffs are approved by the relevant aviation authorities, airlines do not always honour the agreements. In practice, approved charges are one thing, what is actually paid is often another. In many cases, airports are forced to pursue outstanding payments through legal action.

The Airport Association also complains about asymmetric pricing leeway. Airport charges in Germany and Europe are regulated by law, with one important aim being to prevent monopolistically excessive prices. In this respect, regulation has been largely successful. The picture is different, however, when it comes to lowering prices. Airlines exert every possible pressure on airports to reduce charges, and the legal framework offers too little protection against this. Such pressure also underlies the demand that revenue from commercial activities (the non-aviation sector) be factored into the charge structure of the aviation business.

The ADV further accuses airlines of questionable conduct. One example involves cancelled flights for which passengers had already booked tickets. Airlines typically reimburse passengers for such cancellations, but they often retain airport charges and other “ticket box” components. Airports argue that they do not levy charges for cancelled flights, so airlines are keeping money for services never rendered. According to the ADV, this practice results in airlines wrongly retaining up to €3.5 billion from passengers each year.

These criticisms are based on the assumption that airlines’ ability to choose their operating bases and destinations gives them considerable market power. However, both the DLR report commissioned by the federal government and the present study suggest that this flexibility is largely theoretical, at least in terms of switching home bases. Even for point-to-point carriers, relocating a base generally means abandoning established routes and markets, which is a major strategic decision.

Implications for Airport Location Costs

Airport charges do represent a notable cost factor, but their influence on network planning is relatively limited, especially in terms of regional differences. In this context, political lobbying power within the economically regulated airport sector may play a more decisive role than airline market power.

[129] This and further information come from the ADV, 2015 (Wichtige Hintergrund-Informationen des Flughafenverbandes ADV zum Thema ‚Flughafenentgelte‘.
[130] DLR, 2025, p. 8

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