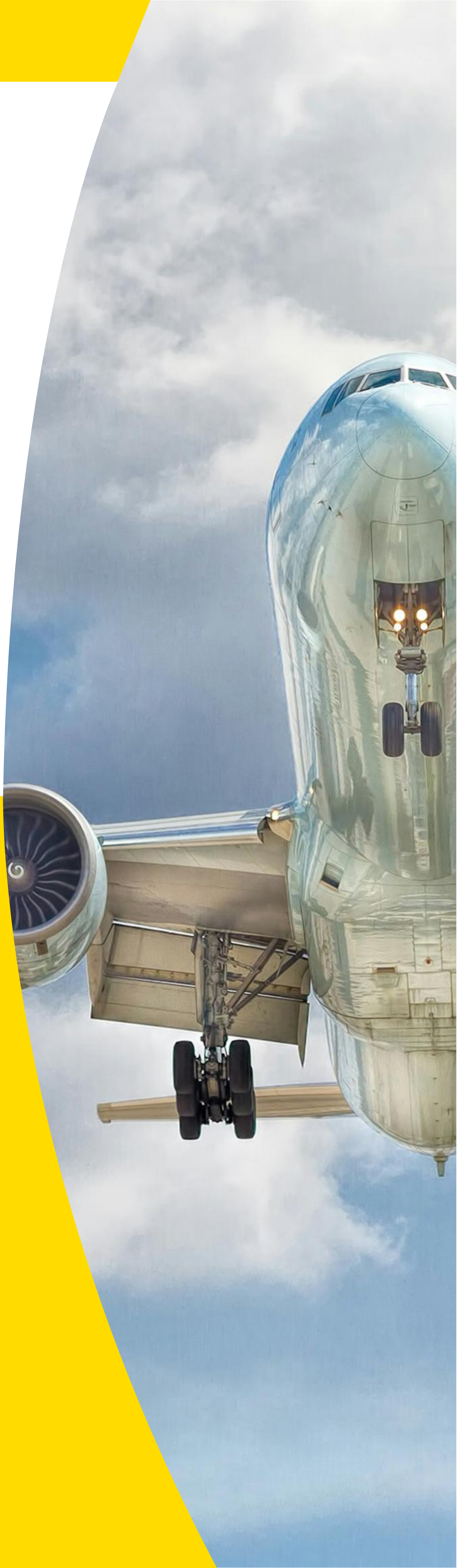
A fair share from aviation

Solidarity levies in aviation: Options for a coalition of the willing



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*This study reflects the views of the authors, and not the views of those that are mentioned as reviewer.

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Management summary

The Global Solidarity Levies Task Force (GSLTF), established by its member countries, is tasked with developing internationally coordinated levies that aim to: (1) **mobilize substantial finance** and (2) **promote climate justice** by ensuring that the most polluting sectors contribute to climate action and development.

At the request of GSLTF, CE Delft conducted an impact assessment of the aviation levies, currently under development by the GSLTF. The levies are assessed in different regimes (rates, geographical scope):

1. Jet fuel levy for commercial aviation.
2. Modular ticket levy.
3. Frequent flyer levy.
4. Private jet fuel levy.

The design of the levies differs in terms of tariff rates and the geographical areas they apply to.

Overall conclusion

Overall, we conclude that **global or regional coordinated aviation levies**, across different geographical scopes, designs, and rates, effectively serve their main dual objectives. They contribute to significant CO_2 emission reductions (4 to 10% below the baseline under middle rate, global coverage scenarios) and generate substantial revenues (€ 62 to 84 billion annually).

Among the options, the jet fuel levy for commercial aviation (hereinafter: jet fuel levy) performs best in terms of mobilizing climate finance and promoting climate justice, achieving high CO_2 emission reductions (10% reduction through both demand and supply-side effects), strong revenue potential (€ 84 billion), and limited distributive impacts, though its legal implementation is more complex and challenging. A ticket levy performs slightly less effectively, achieving a 6% reduction in CO_2 emission through demand-side effects and generating € 62 billion in revenue. However, its legal implementation is more straightforward. The private jet fuel levy, while targeting only 2% of global aviation emissions and generating modest revenues (€ 6 billion), scores well on climate justice and faces fewer legal obstacles compared to a fuel levy on commercial flights.

Although the introduction of an aviation levy in general may theoretically reduce long-term revenues through (intended) behavioural change, the continued baseline growth of the aviation sector suggests this risk is limited. A well designed levy - combining a strong price signal, a broad levy base, and targeted use of revenues - can thus provide a *double dividend*: reduce aviation emissions and secure stable funding.

Table 1 – Summary table assessment of aviation levies

	Fuel levy	**Ticket levy**	**Frequent flyer levy**	**Private jet fuel levy**
Revenue raising potential	High	High	Medium	Low
Revenue impact efficiency (revenues/ reduced passenger)	High	Medium	Medium	High
Climate impact efficiency (CO_2 reductions/revenues)	High	Medium	Medium	Low
Levy burden falls progressively on high income households	Medium	Medium	High	High
Levy burden falls progressively on high income countries	High	High	High	High
Spill-over effects – carbon leakage risks	High risk	Low risk: for a total-journey implementation Medium risk: for a first-stop implementation		High risk
Spill-over effects – effects on tourism	Countries dependent on tourism and reliant on air travel vulnerable for adverse economic effects			No assessment
Legal feasibility	Medium	High	Medium	High

Conclusion 1: Fuel levies raise revenues more efficiently than ticket levies

A fuel levy generates revenue while causing smaller reductions in passenger numbers compared to a ticket levy or a frequent flyer levy. It is also more effective in reducing CO_2 emissions. This is because the fuel levy is applied upstream, typically when fuel is sold by the supplier, thereby increasing the cost per litre of fuel and directly impacting airlines’ operational costs. As a result, airlines are incentivized to improve fuel efficiency, for example through investing in newer aircraft or accelerating fleet renewal, although the pace is slowing. These efficiency gains reduce fuel consumption and costs, which, even under a 100% cost pass-through, lead to smaller ticket price increases than under a ticket levy. In contrast, a ticket levy is paid directly by passengers, affecting demand without directly influencing airline operations. A ticket levy has a weak link with actual fuel use and is less effective in stimulating efficiency innovation.

Conclusion 2: A private jet fuel levy raises revenues without affecting passenger numbers, but revenues are low

A private jet fuel levy generates revenue without significantly reducing passenger numbers, making it a stable source of income. Given the low price sensitivity of private jet users, such a levy is expected to have very small impact on passenger demand. It also performs well from a climate justice perspective, as emissions per private jet passenger are exceptionally high, and the measure is highly progressive by targeting the wealthiest travellers who can afford private air travel. However, its overall revenue potential is limited, as private jets represent only a small fraction of total aviation fuel consumption and emissions. Additionally, the climate impact of the levy is expected to be modest, since it is unlikely to lead to a significant reduction in flight activity.

Conclusion 3: Progressive levies improve climate justice but reduce climate impact and legal robustness

A small share of the global population is responsible for the majority of flights and associated CO_2 emissions. Targeting specific high-income travel segments, such as long-distance travellers, business class passengers, frequent flyers, and private jet users, can enhance climate justice by shifting the burden of the levy to those with higher emissions and greater ability to pay. Since a fuel levy is applied at the point of sale by the fuel supplier, it cannot differentiate between traveller types; its effect is proportional to fuel consumption across all passengers. In contrast, a ticket levy or frequent flyer levy can be tailored to specific target groups, for instance by collecting a larger share of revenue from business class travellers or by increasing rates with flight distance or frequency. Beyond fairness, targeting high-income groups offers the advantage of revenue stability, as these travellers are less sensitive to price increases. However, this also means the climate impact is more limited. Additionally, differentiated rates may increase cost of implementation and weaken the legal robustness of the levy, particularly if they distort competition within internal markets.

Conclusion 4: Aviation levies generate most revenue in high-income countries but may disproportionately impact countries that depend heavily on air tourism

For the fuel levy, ticket levy, and frequent flyer levy, approximately two-thirds of the revenues are generated in high-income countries, while about one-fourth comes from upper middle-income countries. In the case of the private jet fuel levy, the share of revenue from high-income countries is even higher. This indicates that the burden of these levies primarily falls on countries with greater historical responsibility for aviation-related CO_2 emissions. Overall, we conclude that the aviation levies are progressive and fair from the perspective of country income levels.

However, the distributive impacts vary across countries. In nations with lower kerosene or ticket prices already in place, levies result in larger relative price increases and more pronounced declines in demand. Additionally, our analysis of the tourism impacts shows that countries highly dependent on international air arrivals, particularly Small Island Developing States (SIDS), are more vulnerable to the negative economic effects of aviation levies.

Conclusion 5: Fuel levies could pose serious carbon leakage risks in a smaller geographical implementation, ticket levies see less carbon leakage risks

Under global implementation, none of the aviation levies pose a carbon leakage risk. However, as participation narrows to a *coalition of the willing*, the risk increases, particularly through tax evasion via stop-overs in non-participating countries. Fuel levies, for both commercial and private jets, are especially vulnerable to leakage through tankering. While the EEA mitigates this risk through the anti-tankering mandate in the RefuelEU Aviation regulation, countries outside the EEA without similar measures face significant tankering risks. In contrast, a ticket levy and frequent flyer levy are not exposed to distortive tankering. Applying ticket levies to the full journey (full-journey implementation) helps minimize evasion and carbon leakage.

Conclusion 6: A ticket levy and a fuel levy for private jets face the fewest legal hurdles

A fuel levy faces legal barriers, particularly due to fuel levy exemptions in bilateral Air Service Agreements (ASAs) and regional frameworks like the EU Energy Taxation Directive (ETD), making near-term implementation difficult. A fuel levy for private jets faces fewer legal challenges as private aviation is not automatically exempted from taxation (for example within the ETD). While a frequent flyer levy is legally feasible, it involves challenges related to data collection and privacy, which also complicate short-term implementation. In contrast, a ticket levy encounters fewer legal obstacles and has already been adopted by several countries worldwide.

Recommendation 1: Consider implementing a ticket levy that mimics the characteristics of a fuel levy

A fuel levy is the most efficient type of aviation levy, as it encourages fuel efficiency, generates revenue with minimal impact on passenger numbers, and effectively reduces CO_2 emissions. However, it faces significant legal obstacles that make near-term implementation complex. In contrast, a ticket levy encounters fewer legal challenges. Therefore, our primary recommendation is to introduce a ticket levy that mimics the characteristics of a fuel levy, by linking the levy amount to distance and *possibly* seating class multipliers. This implies higher rates for longer flights and for business class travellers, creating a clearer connection between a passenger's CO_2 emissions and the levy they pay.

Two important caveats apply to this recommendation. First, unlike a fuel levy, a ticket levy does not incentivize fuel efficiency improvements, as it does not raise the cost per litre of fuel or directly affect airline operating costs. Second, legal considerations must be taken into account when differentiating ticket levy rates. For instance, applying differentiated distance-based rates within a single internal market may weaken the legal robustness of the levy and expose it to legal challenges.

Recommendation 2: Consider implementing a private jet fuel levy alongside any other type of aviation levy

A private jet fuel levy offers a stable source of funding and is highly progressive, targeting only the highest-income travellers. It also faces fewer legal obstacles than a fuel levy on commercial aviation. While its revenue potential and climate impact are limited due to the small share of fuel use, it can have a valuable complementary role within a broader package of aviation levies. An important caveat of the private jet fuel levy is that it carries significant carbon leakage risks. These risks can be lowered by requiring fuel tracking and reporting at all airports, including those serving private aviation. As an alternative or supplement, converting the levy into a ticket-based charge for private flights could also help reduce leakage, as ticket levies are less influenced by fuel uplift location.

Recommendation 3: Redistribute part of the revenues to economies disproportionately affected by the aviation levies, such as those reliant on air tourism

Countries whose economies depend heavily on air tourism, such as SIDS, may experience disproportionate economic losses from the introduction of aviation levies.

Allocating a share of the revenues to these countries can improve the fairness of such measures and support a just transition in the global travel and tourism sector. Additionally, part of the revenues could be directed back into the aviation industry to help accelerate the shift toward more sustainable aviation.

Recommendation 4: Start with a low levy rate and gradually increase it to allow the aviation sector time to adapt

Introducing the levy with a low initial rate gives the aviation industry time to adjust its operations, pricing strategies, and investment planning. A gradual rate increase supports smoother implementation, helps avoid economic shocks, and improves political and public acceptability. The levy rate could be reviewed every five or ten years.

Similarly, launching the levy within a smaller coalition of willing countries enables early implementation while building international momentum. Gradually expanding participation over time increases revenue potential, strengthens climate impact, and helps reduce carbon leakage. Also, it can be investigated how over time a ticket levy can be transformed into a frequent flyer levy. For this the challenges of a frequent flyer levy related to data collection and privacy have to be addressed.

1 Introduction

Background

The Global Solidarity Levies Task Force (GSLTF) is mandated by its member countries to explore options for internationally coordinated levies with a dual objective to mobilize finance at scale and promoting greater climate justice and fairness within existing tax systems by ensuring the most polluting industries and activities contribute to financing climate action and development.

The European Climate Foundation (ECF) has requested CE Delft to conduct an impact assessment on aviation levies that are under development by the Task Force:

- fuel levy on commercial flights (hereinafter: fuel levy);
- modular air ticket levy;
- frequent flyer levy;
- private jet fuel levy.

Focus areas of this study

For each aviation levy, the following aspects are being analysed:

- **Revenue generating potential**: Which types or variants of levies raise most revenues for the purpose of financing international climate action? What is the relationship between revenues raised and the potential adverse economic effects on travel demand and GDP associated with the levy?
- **Climate impact**: What is the CO_2 emission reduction potential? What is the behavioural impact of the levies? An aviation levy can reduce demand for air travel by increasing ticket prices and particularly in the case of a fuel levy can spur innovation and improve fuel efficiency. This may lead to greater operational fuel efficiency, discourage non-essential flights and shift passenger choices toward more sustainable transport options.
- **Distributive effects**: Are the costs of levies absorbed by airlines or passed on to passengers? Does the levy burden fall more on low- or high-income travellers? Which countries are most and least affected by the levies, and which contribute the most to revenue generation?
- **Spill-over effects**: Is there a risk of carbon leakage (tankering, rerouting, hub-switching)? Are there potential adverse effects on local economies that depend significantly on an inflow of international airborne tourism? A global levy could

decrease intercontinental tourism (where travel alternatives lack), especially from price-sensitive travellers and could affect destinations that rely heavily in their national income on air travellers (small island states, remote natural attractions).

- **Legal feasibility:** What legal aspects should be taken into account when implementing the levy? Legal feasibility is depending on international law, bilateral and multilateral air service agreements, sector-specific regulations and national legislation. Global implementation would require international coordination of the levy with national authorities, as states retain sovereignty over their airspace and taxation systems, making the enforcement of any binding global levy particularly complex. A multilateral approach would therefore require broad consensus and at least a 'critical mass of countries' willing to adopt and implement the levy. The coalition formed by the GSLTF could serve as a foundation for such a coalition.

Aim of the Levies

The aviation levies serve two key objectives. **First, they aim to provide a sustainable source of funding for international climate finance.** This requires minimizing tax erosion, particularly avoiding a decline in passenger numbers, as fewer flights result in lower revenues. A key approach could be to target travellers with low price sensitivity (low demand elasticity) and to maintain revenues. This could typically lead to target groups such as business or premium class passengers, frequent flyers, and/or private jet users. For these groups, aviation levies are less likely to significantly reduce travel behaviour, thereby preserving the levy base. This will affect distributional and climate justice as well, as air travel is highly unequal. A small share of the global population accounts for the majority of flights and these flights are more carbon-intensive per passenger-km than regular flights (Hopkinson & Cairns, 2020)[1].

Unlike the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), where revenues, based on CO_2 emissions above 2019 levels, are directly linked to offsetting those emissions, this study does not establish a clear connection between the revenues raised and how they are spent.

The second objective is to reduce the climate impact of the global aviation sector. This goal is closely linked the economic-grounded principle of internalizing the environmental externality, in this case, aviation's CO_2 and non-CO_2 emissions. A levy raises the price of carbon-intensive behaviour thereby incentivizing behavioural change

[1] In countries like the UK or US, 10-15% of people take over 50% of flights. A first flight per year could be exempt with higher rates for each additional flight (frequent flyer levy). Around 40-60% of all inhabitants do not fly at all.

(flying less often, alternative transport and supply-side effects of investments in cleaner aircraft technologies and fuels). This can be achieved by designing levies that aim to influence behaviour and lead to fewer flights and passengers. In this context, the focus is on travellers with a high price sensitivity (high elasticity of demand), for whom price increases are more likely to result in reduced flying.

As these two goals show, the objectives can be potentially at odds with one another, in particular on the long term. A levy that effectively changes behaviour may undermine its own revenue base on the long term. However the above contradiction can be seen as largely theoretical: the aviation sector is expected to growth fast and will continue to grow. According to ICAO/ACI global passenger traffic is projected to reach 19.5 billion in 2042, representing a twofold increase compared to the levels recorded in 2024 (ACI, 2025). Achieving a so-called *double dividend* can be achieved when there is clear price signal (internalizing environmental costs), a broad levy base (avoiding loopholes like exempting private jets) and targeted use of revenues (especially for high-impacted sectors and equitable and climate purposes).

This study explores both aspects: the potential of aviation levies to generate revenue with minimal distortions (Chapter 2), and their role in achieving climate impact reduction (Chapter 3).

Overview of design of global aviation levies

Table 2 presents the core design features of the main policy variants considered in the study. To examine the effects of changes in design characteristics and geographical coverage, several sub-variants have been included.

Table 2 – Key design options of the variants

Levy	Levy base	Levy rate (middle)	Administration
Fuel levy	**Volume of fuel** bunkered on international flights departing from participating countries.	0,368 €/litre	Jet fuel suppliers act as the point of collection[2], simplifying administration and enabling integration with current excise duty systems for e.g. road fuels.
Ticket levy	**Tickets sold** for international flights, distance-base and class-based. The levy base includes international air transported cargo based on a weight-equivalent proxy.	**Economy:** Short/medium/long haul: 10/20/30 € **Business:** Short/medium/long haul: 20/70/120 € **Cargo**: 0,05 €/ton-km	The levy is typically collected by airlines or ticketing agents at the point of sale and remitted to national tax authorities.
Frequent flyer levy	**Tickets sold** for international and national flights from second yearly bought ticket and beyond.	Rates increase progressively with number of tickets bought with a surcharge on ticket-class and ticket-distance	Tickets are administered centrally in global database via loyalty programs or unique (anonymized) traveller ID for each traveller.
Fuel levy for private jets	**Volume of fuel bunkered** for dedicated use in private jets.	0,720 €/litre	Jet fuel suppliers act as the point of collection, simplifying administration and enabling integration with current excise duty systems for road fuels.

In total, we assess fourteen different variants of aviation levies in this study. There are different levy variants included based on important policy design elements, such as levy rates, coalitions of countries that introduce the levy and the inclusion/exclusion of domestic flights and sustainable aviation fuels (SAF).

[2] A fuel levy can, in principle, be applied at various points in the supply chain, including the fuel supplier, airports, or airlines. In this study, we assume the levy is applied at the point of sale by the fuel supplier.

The levy rates presented in Table 3 reflect the levels applied after a potential phase-in period, during which the levy would start low and gradually increase to give the aviation sector time to anticipate and adapt. As such, the model used in this study does not incorporate a phased implementation.

Table 3 – Overview of aviation levies assessed in this study

Levy	Variant	Levy rate
Fuel levy	**Middle rate - All int. flights**	**0,368 €/litre**
	Low rate - All int. flights	0,170 €/litre
	High rate - All int. flights	0,548 €/litre
	Middle rate - Geo scope Variant 2	0,368 €/litre
	Middle rate - Geo scope Variant 3	0,368 €/litre
	Middle rate - SAF exemption	0,368 €/litre
Ticket levy	**All int. flights**	**S/M/L haul economy[3]: 10/20/30 €** **S/M/L haul premium: 20/70/120 €** **Cargo: 0,05 €/tonne-km**
	Geo scope Variant 2	Identical to above
	Geo scope Variant 3	Identical to above
	International + domestic flights	Identical to above
Frequent flyer levy	**International + domestic flights**	**Return flight 1/2/3/4/5+: 0/4/8/24/96 €** **Surcharge for M/L per flight: 10 €** **Surcharge premium per flight: 20 €**
Fuel levy - Private jets	**Middle rate - International + domestic flights**	**0,720 €/litre**
	Low rate - International + domestic flights	0,368 €/litre
	High rate - International + domestic flights	1,840 €/litre

For the fuel levy, the middle rate equals the proposed kerosene tax rate of €10.75/GJ under the Fit for 55 package in the EU (EC, 2021). The middle rate is close to the social cost of carbon, a widely used indicator for the damage costs of one ton of CO_2 emissions (CE Delft, 2024).[4] The high rate for the fuel levy equals the average gasoline

[3] Short haul: 0-1,500 km; Medium haul 1,500-4,000 km; Long haul: > 4,000 km.
[4] Social costs of carbon in 2021 equalled € 133 per ton of CO2 ≈ €0.33 per liter of kerosene.

tax for cars in the European Union in 2024 (Macumber-Rosin. & Hoffer., 2024). The lower rate is roughly the difference between the middle- and higher rate.

For the ticket levy, levy rates are based on proposed rates in international literature (Zheng. & Kellog., 2024) (Ricardo et al., 2021). The rates for the frequent flyer levy are set such that the weighted average levy, accounting for the distribution of passengers by travel frequency, class and distance, approximately matches the weighted average ticket levy based on travel class and distance.

For the fuel levy for private jets, the lower rate equals the central levy rate for the regular fuel levy. The middle rate bridges the gap to bio-SAF. Sandford. and Malins. (2024) show that bio-SAF would be 2 to 3 times the price of fossil jet fuel, implying tax rates between €0.5 per liter and €1 per liter. For the higher rate, we base the rate on the difference in carbon intensity (per traveler) between commercial aviation and private aviation. T&E (2021a) concludes that private jets are 5 to 14 times more polluting than commercial jet on a per passenger basis. We took a conservative estimate by applying a multiplier of 5 to the lower levy rate of €0.368 per liter, which equals €1.84 per liter.

Geographical scope

The study explores several variants of a global aviation levy with different geographical scopes, to examine how the extent of participation influences climate impact, economic outcomes, and revenue generation. Three implementation variants are considered:

- **Variant 1:**
  Global implementation covering all international flights, eliminating carbon leakage.

- **Variant 2:**
  International flights departing from GSLTF/EEA countries, plus key countries relevant to the Task Force's political landscape: Brazil, Canada, Japan, South Korea, South Africa, Türkiye, and the United Kingdom.

- **Variant 3:**
  International flights departing from GSLTF/EEA countries and the top 20 countries ranked by international aviation revenue tonne-kilometres (RTKs), based on flight departure origin.

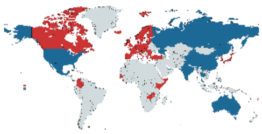


Table 4 – Countries included in geographical scope Variant 2 and 3

Countries in Variant 2 (GSLTF + EEA + 7 additional countries)	**Countries in Variant 3** (GSLTF + EEA + Top 20 countries in terms of aviation activity)
Africa	**Africa**
Djibouti, Kenya, Senegal, Sierra Leone, Somalia, South-Africa, Zambia	Djibouti, Kenya, Senegal, Sierra Leone, Somalia, Zambia
Asia Pacific and Oceania	**Asia Pacific and Oceania**
Fiji, Japan, Marshall Islands, Republic of Korea	Australia, China, Fiji, India, Japan, Marshall Islands, Thailand, Singapore, Republic of Korea,
Europe	**Europe**
EEA, Turkey, UK	EEA, Russian Federation, Turkey, UK
Latin America and Caribbean	*Latin America and Caribbean*
Antigua and Barbuda, Barbados, Brazil, Colombia	Antigua and Barbuda, Barbados, Colombia, Mexico
Middle East	**Middle East**
-	Qatar, United Arabic Emirates
North America	**North America**
Canada	Canada, United States

Modelling approach

The aviation levies (excluding the private jet fuel levy) are being analysed using the AERO Modelling System (AERO-MS). The model is suited for long term projections to assess the impacts of global policy measures to reduce GHG emissions of aviation. The reference scenario used in this assessment is the ICAO Post-COVID-19 mid-growth baseline scenario for international and domestic traffic (ICAO, n.d.). For this study analyses have been carried out for the year 2028. Data for private jets are not included in AERO-MS. Therefore, the private jet fuel levy scenarios have been assessed separately using data from literature (CE Delft, 2023), (Gössling et al., 2024), (T&E, 2021b).

2 Revenue generating potential

The geographical scope has a big impact on the levy base

One of the main objectives of the aviation levies is to raise revenues for international climate finance. To better understand the size of the potential levy base, Table 5 presents key figures from the mid-growth baseline scenario. It shows that the number of flights, passengers, and fuel use is significantly higher for all international flights compared to geographical scope Variant 2. This difference is largely due to the exclusion of major aviation countries like the United States and China from Variant 2. In Variant 3, which includes these countries, the levy base expands considerably. Table 5 also highlights that including domestic flights leads to a substantial increase in the number of passengers and flights, while the increase in fuel use is more moderate due to the shorter average flight distances.

Table 5 – Mid-growth baseline scenario for international traffic in 2028

	All international flights	Geographical scope Variant 2	Geographical scope Variant 3	All domestic flights
Flights (x 1,000)	15,219	7,704	11,571	28,453
Economy class passengers (million pax)	2,064	1,026	1,589	3,070
Business class passengers (million pax)	134	49	100	140
Fuel use (Mton)	204	78	161	106

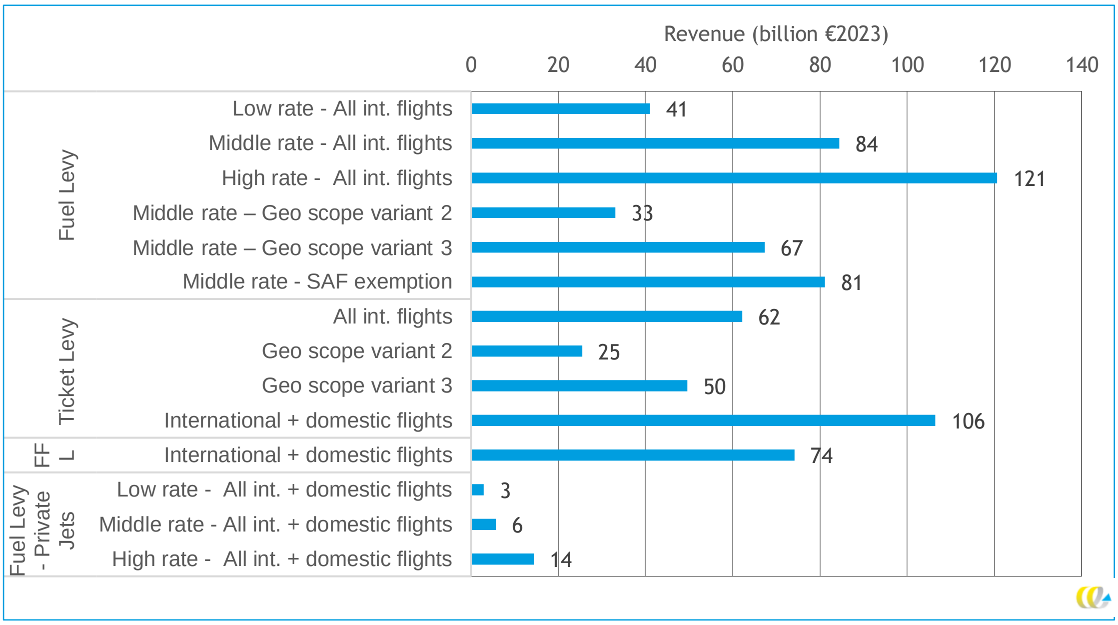
Source: AERO-MS model.

Revenues vary from € 3 billion to € 121 billion annually, depending on levy type and design

Figure 1 presents the annual revenues for each levy variant, highlighting several key insights. First, for the fuel levy, the revenue strongly depends on the chosen levy rate, higher rates yield significantly more revenue (increasing revenues from € 41 billion to € 121 billion). Second, in the case of the ticket levy, including domestic flights broadens the levy base significantly and leads to a substantial increase in revenues (from € 62 billion to € 106 billion). Third, for both the fuel levy and the ticket levy, narrowing the geographical scope from all international flights to Variant 2 causes a sharp decline in revenues, while expanding it from Variant 2 to Variant 3 results in a significant revenue increase. Lastly, the revenue potential of the fuel levy on private jets is limited, due to the minor share of private jet fuel consumption in total aviation (about 2%). If we multiply the levy rate of the private jet fuel levy by ~10 though to 5.48 €/litre, the revenue potential increases to € 41 billion. All in all, we see that geographical scope has a big impact on revenue generating potential.

In Annex A.2, presents revenues broken down by economy class passengers, business class passengers, and cargo, for both the ticket levy and the frequent flyer levy.

Figure 1 – Revenue generating potential of the different aviation levies



Source: AERO-MS model and CE Delft private jet analysis.

The levy rate, levy base, geographical scope and targeted traveller segment determine the revenue raising potential of aviation levies

Based on the results in Figure 1, we identify four key design elements that determine the revenue-generating potential of aviation levies. These elements are summarized in Table 6 and discussed in detail further below.

Table 6 – Key factors determining revenue raising potential

Key factors determine revenues	Description	Effect on revenues	Design variants in this study
Levy rate	The height of the levy, e.g. €/litre for a kerosene levy or €/passenger for the ticket levy and frequent flyer levy	Higher levy rate increases revenues	Low/middle/high levy rate for fuel levy and private jet fuel levy.
Levy base	Total amount of fuel or total number of tickets that are being levied	Broader levy base increases revenues	Including domestic flights increases levy base. Private jet fuel levy has very small levy base.
Geographical scope	Number of countries where levy is applied	Broader geographical scope increases revenues	All international flights biggest scope possible. Variant 2 much smaller scope. Variant 3 bigger scope compared to Variant 2.
Traveller segments	Different traveller segments react differently to levies, based on elasticity of demand	Targeting segments with inelastic price elasticity increases revenues due to smaller reduction in passenger demand	Business class travellers, frequent flyers, private jet users inelastic demand compared to economy class travellers.

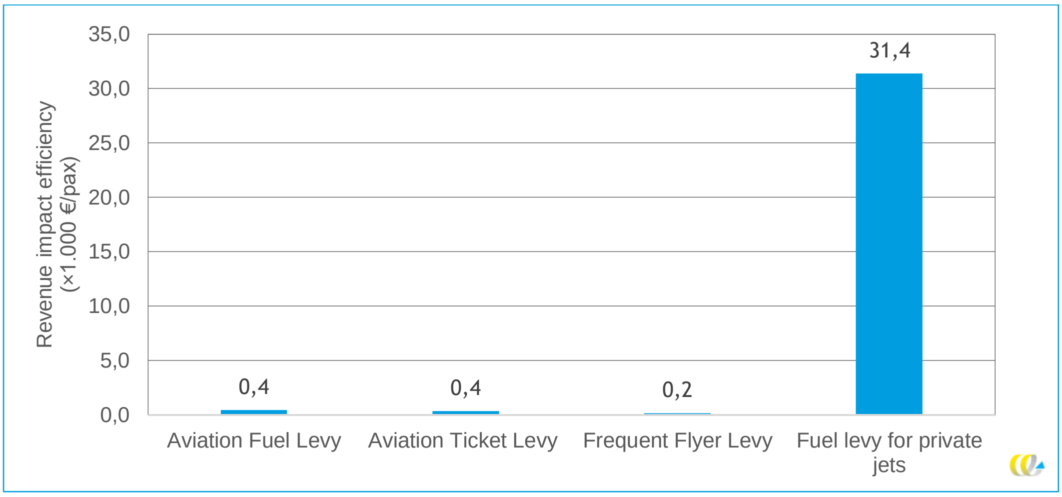
The revenue impact efficiency is highest for a fuel levy on private jets

One of the core objectives of the GSLTF is to provide a sustainable source of funding for international climate finance, which can be achieved by raising revenues with minimal impact on passenger numbers. This objective supports a levy design that sustains revenues (fiscal consolidation), and is often seen as the second *double dividend* argument (first dividend: climate impact).

To assess the extent to which a double dividend of a global levy could take place, we use the indicator **revenue impact efficiency**, defined as the *ratio of levy revenues to the reduction in passenger numbers (revenues/reduced passenger)*. A high revenue impact efficiency indicates that a levy generates substantial revenue with only a small decline in passenger numbers. Conversely, a low revenue impact efficiency suggests that revenue is raised at the cost of significant reductions in passenger numbers. The metric thus serves as a proxy for evaluating the extent to which the levy can be a stable source of revenues.

Figure 2 presents the revenue impact efficiency of the main levies considered.[5] Among them, the fuel levy on private jets stands out with a significantly higher revenue impact efficiency, meaning that it raises revenue with limited reductions in passenger numbers. This is due to the low price elasticity of demand among private jet users—meaning that the levy has little effect on their travel behaviour. As a result, passenger numbers remain largely unchanged. From this perspective, the levy base of the private jet fuel levy can be considered as stable.

Figure 2 - Revenue impact efficiency across main variants (revenues x 1,000/reduced passenger)



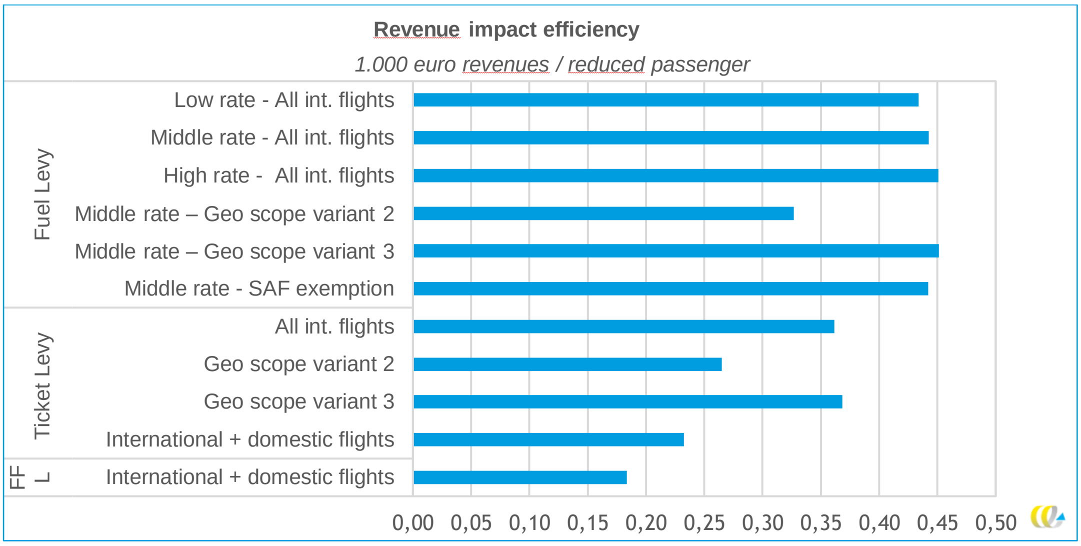
Source: AERO-MS model and CE Delft private jet analysis.

A fuel levy raises revenue more efficiently than a ticket levy or a frequent flyer levy due to fuel efficiency improvements

Figure 3 shows the revenue impact efficiency across all levy subvariants. The subvariants for the private jet fuel levy are excluded from the figure to be able to compare the fuel levy, ticket levy and frequent flyer levy. An important finding is that the fuel levy shows a higher revenue impact efficiency compared to the ticket levy and the frequent flyer levy. This means that a fuel levy raises revenues with less reductions in passenger numbers compared to the other two levies.

[5] For the fuel levy and ticket levy, Figure 2 is based on all international flights. In addition, for both the fuel levy and the private jet fuel levy, the middle levy rate has been used.

Figure 3 - Revenue impact efficiency across subvariants (revenues x 1,000/reduced passenger)



Source: AERO-MS model.

The reason that a fuel levy has a higher revenue impact efficiency compared to ticket levies is because a fuel levy is applied upstream at the level of fuel suppliers, and triggers **supply-side effects**. A fuel levy increases the cost per litre of fuel consumed, directly affecting airlines' operating costs. Since fuel costs represent a significant portion of total costs, incentives are created for airlines to respond in ways that reduce fuel consumption per passenger-kilometre. This creates supply-side effects, i.e. fuel-efficiency improvements, such as shifts towards new aircraft capacity, new aircraft technology and accelerated fleet renewal. How supply-side effects are integrated in the AERO-MS model is explained in Text box 1.

Text box 1 – Supply-side effects of a fuel levy in the AERO-MS model

> In the AERO-MS model, introducing a fuel levy leads to several supply-side effects that increase fuel-efficiency.
>
> **New aircraft technology shift:** change in purchase behaviour of airlines towards (available) environmentally more efficient new aircraft.
>
> **Accelerated fleet renewal:** replacing the older part of the fleet earlier than in the situation without a fuel taxation, based on financial considerations of airlines.
>
> **New aircraft capacity shift:** Shifting to larger aircraft that achieve lower fuel consumption per passenger kilometre.

> Energy efficiency measures are costly, contributing to overall abatement costs. This is illustrated in Figure 4 of Black et al. (2024). In the AERO-MS model, the supply-side effects are calculated as follows:
> “In the situation with a fuel levy, in the AERO-MS the various cost components are re-computed to reflect the possible cost changes brought about by this policy measure. For both the situation with and without measures, the total operating costs per unit of demand (i.e. per passenger and per kg of freight) are computed by aircraft type and flight stage. This is the basis for the cost comparison between the 'with' and 'without' measures situation, which determines the shifts in the use of aircraft types. In case of a fuel levy, clearly the fuel costs go up. A shift towards the use of more fuel-efficient aircraft will only take place if this reduces the total operating costs per unit of demand. The additional costs of more fuel-efficient aircraft will also lead to higher ticket prices for travellers, but are lower compared to the reduction in fuel costs resulting from the deployment of the more fuel-efficient aircraft.”

A ticket levy is added directly to the ticket price and therefore directly targets air passengers. This triggers **demand-side effects**: higher ticket prices lead to a reduced number of passengers and flights. However, as the levy is applied downstream at the passenger level, it does not directly affect airlines’ operational costs and therefore does not incentivize fuel efficiency.

A fuel levy also triggers demand-side effects, as the AERO-MS model assumes a 100% cost pass-through rate, meaning that the levy is fully passed on to air passengers. However, due to efficiency improvements and resulting reductions in fuel costs, the ticket price increase under the fuel levy is lower than under the ticket levy. As a result, the reduction in passenger demand is also smaller for the fuel levy compared to the ticket levy. That said, the difference between the two should not be overstated.

Levies under geographical scope Variant 2 are less revenue-efficient due to the dominance of short-haul flights and bigger share of economy class passengers

The revenue impact efficiency declines sharply when the geographical scope shifts from all international flights to geographical scope Variant 2. This is primarily due to the overrepresentation of short-distance flights in Variant 2, as intra-EEA flights make up a larger share compared to the other variants. For the ticket levy, this leads to a relatively high surcharge in relation to the base ticket price on short-haul flights, whereas for long-haul flights, where ticket prices are generally higher, the ticket levy results in a smaller relative price increase. The larger relative price increase on short-haul routes leads to a stronger reduction in passenger numbers, lowering overall efficiency. Additionally, Variant 2 has a bigger proportion of economy class passengers, who typically are more price sensitive, further reducing the revenue impact efficiency.

Targeting travellers with lower price elasticity of demand raises revenues more efficiently

Figure 3 shows that including domestic flights in the levy base lowers revenue impact efficiency, even though this subvariant increases the levy base in itself. This is because passengers on domestic routes tend to have a higher price elasticity of demand, i.e. they are more responsive to price increases. The increased elasticity can be attributed to the broader range of transport substitutes for domestic air travel, such as cars, trains, or buses. This leads to a stronger reduction in passenger numbers relative to the revenue raised. Additionally, domestic flights are generally shorter and cheaper than international ones, meaning that a fixed levy represents a larger relative price increase. This leads to a greater drop in passenger numbers relative to the revenue generated, thereby reducing the overall efficiency.

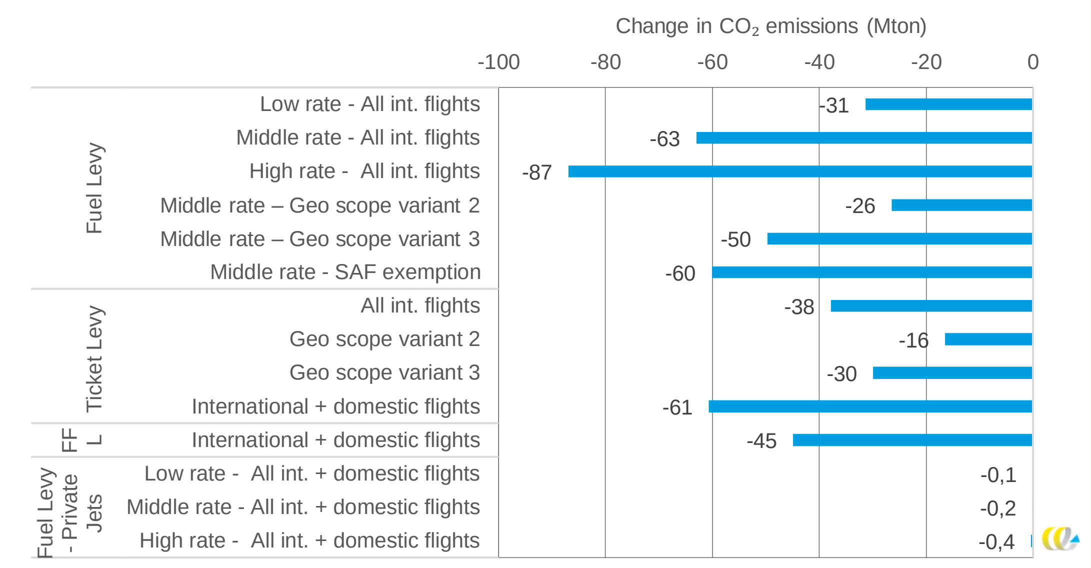
3 Climate impact

There is a strong positive correlation between revenues and climate impact

Next to revenue generation, the second main objective of introducing aviation levies is to reduce the climate impact of the global aviation sector. Figure 4 presents the estimated CO_2 emission reductions for different levy types. Fuel levies deliver higher impact, reducing emissions by 63 Mton under the middle rate, all international flights scenario, compared to 38 Mton for ticket levies. Changing the geographical scope from all international flights to geographical scope Variant 2 significantly lowers climate impact, while including domestic flights increases climate impact. The climate impact of private jet levies is minimal due to their small share in total emissions and low reductions in the number of passengers.

There is a strong positive correlation between revenues (Figure 2) and climate impact (Figure 4): higher revenues are generally associated with greater CO_2 reductions. This relationship is expected, as higher levies tend to increase fuel prices or ticket costs more substantially, which in turn incentivizes fuel efficiency, reduces demand, or both leading to greater emission cuts.

Figure 4 – Climate impact (change in CO_2 emissions) of aviation levies



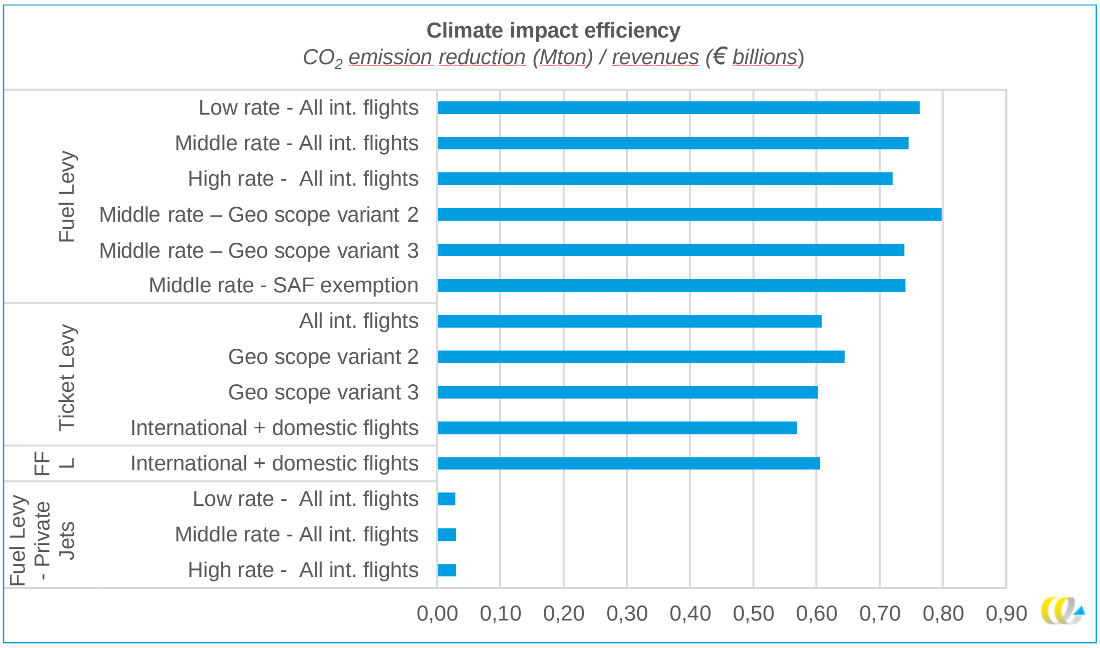
Source: AERO-MS model and CE Delft private jet analysis.

To compare levies, it is useful to assess their climate impact relative to the revenues they generate. We use the indicator **climate impact efficiency**, defined as the ratio of CO_2 emission reduction to levy revenue (CO_2 reduction/revenue). A high efficiency means significant emission reductions per euro raised, while a low efficiency indicates limited climate benefits for the same revenue. This metric provides a proxy for how effectively a levy contributes to climate per euro collected.

A fuel levy reduces CO_2 emissions most efficiently due to improved fuel efficiency and higher passenger load factors

Figure 5 presents the climate impact efficiency of the levy subvariants, highlighting three key findings. First, the fuel levy achieves the highest climate impact efficiency. This is driven by fuel efficiency improvements that reduce fuel consumption per passenger and lowers CO_2 emissions effectively for each euro of revenue raised. However, the difference compared to the ticket levy and frequent flyer levy should not be overstated. Second, the fuel levy on private jets shows the lowest climate impact efficiency. Because private jet users have highly inelastic demand, the levy has little effect on flight behaviour and therefore results in minimal CO_2 reductions. Finally, we conclude from the figure that adjustments to levy design, such as changing the levy rate, modifying the geographical scope, excluding SAF from the levy base, or including domestic flights, have limited influence on climate impact efficiency.

Figure 5 – The climate impact efficiency across all aviation levy variants



Source: AERO-MS model and CE Delft private jet analysis.

4 Distributive effects

Distributive effects focus on fairness and equity of aviation levies. Distributive effects describe how the costs and potential benefits of the levy are distributed across different groups. In this study, we focus on two elements:

- **Levy burden**: whether the levy is primarily paid by passengers (e.g. through higher ticket prices), airlines, or specific traveller segments (e.g. economy vs. business class, frequent vs. occasional flyers).
- **Equity across country-income groups and regions**: Whether the levy is regressive (disproportionally affecting lower-income countries) or progressive (affecting higher-income countries).

In addition to cost-related aspects, aviation levies may also bring climate benefits that are especially relevant for developing countries. These countries are often more vulnerable to the adverse impacts of climate change - such as rising sea levels, extreme weather events, and disruptions to agriculture -despite contributing relatively little to global aviation emissions.

Levy burden is expected to fall on passengers for all levy types

For the ticket levy and the frequent flyer levy, the levy is paid directly by passengers, meaning the levy burden falls by definition on travellers rather than airlines. In contrast, a fuel levy is imposed more upstream and is paid directly by fuel suppliers, and indirectly by airlines.

Airlines may respond by improving operational efficiency, such as renewing their fleet or increasing load factors, thereby absorbing part of the cost. A fuel levy increases the value of fuel savings from efficiency measures. As a result, certain efficiency measures that are not cost-effective without a fuel levy become economically viable when fuel prices rise[6]. However, it is likely that a substantial share of the levy (the part of the levy that will not trigger cost-effective efficiency) is still passed on to passengers through higher ticket prices.

The extent to which airlines can pass on these costs depends on market conditions and the type of cost increase. Koopmans and Lieshout (2016) find that airline-specific cost increases (e.g. those affecting only one carrier) tend to be passed through at a rate of less than 50%, as competitive pressures limit pricing power. In contrast, sector-wide cost increases, such as those resulting from a uniform fuel levy, can be passed on more easily, with pass-through rates exceeding 50%. In this study it is assumed that the pass through rate is 100%. This aligns with Black et al. (2024), which also assumes a 100% pass through rate for aviation. A pass through rate of 100% means that the additional costs associated with the levy are fully passed on to passengers.

Ticket levies, frequent flyer levies, and private jet levies allow for more progressive levies than fuel levies

As a fuel levy is applied upstream at the level of fuel suppliers, by design it cannot differentiate between traveller types. All passengers, regardless of travel segment or

[6] These are the types of efficiency measures that, according to AERO-MS, are implemented in response to a fuel levy - assuming the levy is announced sufficiently in advance, allowing airlines to adjust their fleet deployment accordingly.

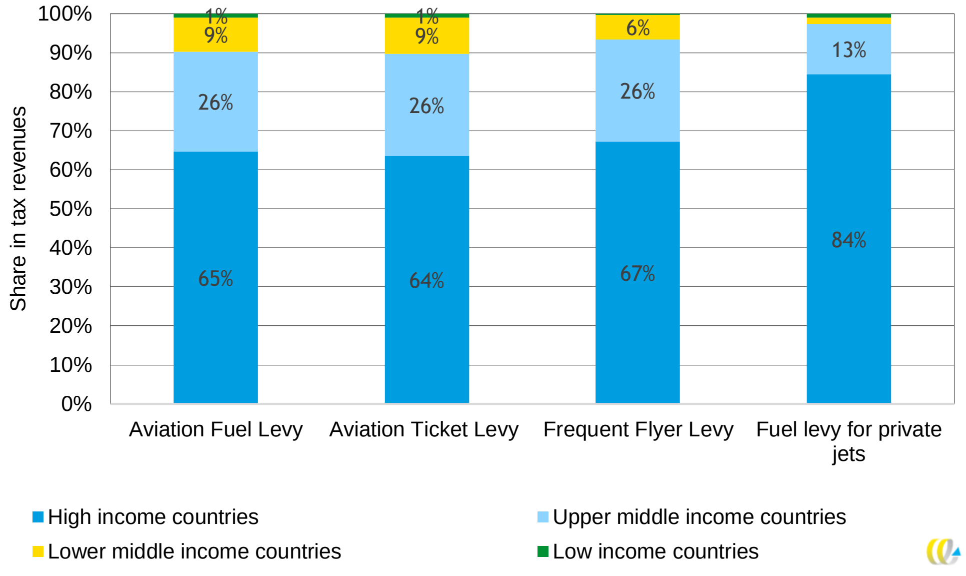
travel frequency, are affected proportionally to their fuel consumption. In contrast, a ticket levy and a frequent flyer levy can be designed to target specific traveller segments. For example, ticket levies can be designed with higher rates on business or first-class tickets, and frequent flyer levies can increase rates with travel frequency. Since business class travellers and frequent flyers are typically higher-income individuals, these levies can be designed progressively. Similarly, a fuel levy on private jets specifically targets (ultra) high-income passengers, strengthening the progressivity of the levy even more.

We note that, in the case of a fuel levy, a charge proportional to fuel consumption results in higher costs for business class travellers compared to economy class travellers, and for long-haul flights compared to short-haul flights, a fuel use per passenger is greater on these flights. CO_2 emissions from business class travel are approximately three times higher than those from economy class travel (Government of New Zealand, 2025). Taking this into account, and given the levy rates used in this study, the difference in progressivity between the ticket levy and the fuel levy is limited.

Revenues are primarily raised by high-income countries

Figure 6 presents the distribution of levy revenues across country income groups. For the fuel levy, ticket levy, and frequent flyer levy, approximately two-thirds of the total revenues are generated in high-income countries, while around one-quarter comes from upper-middle-income countries. In the case of the private jet fuel levy, the share of revenue from high-income countries is even larger, reflecting the concentration of private jet use in wealthier nations. This distribution indicates that the levy burden falls predominantly on countries with higher income levels and greater historical responsibility for aviation emissions.

Figure 6 – Share of levy revenues for country-income groups



Source: AERO-MS model and CE Delft private jet analysis.

5 Spill-over effects

Spill-over effects refer to the indirect or unintended consequences of aviation levies. Spill-over effects of an aviation levy without sufficient coverage can extend beyond national borders, influencing global markets and flight patterns. As the number of participating countries implementing the levy decreases, the risk of carbon leakage increases. Spill-over effects of introducing global aviation levies can be positive and negative. Global levies can positively contribute to innovation in the aircraft design and solutions to reduce fuel consumption (lighter materials, improved aerodynamics, novel propulsion), apart from solutions as seat density and load factor. However, there are also negative spill-over effects. In this study we will elaborate on two types of negative spill-over effects:

- **Carbon leakage:** Occurs when airlines or passengers shift flights to untaxed routes, hubs or airports in countries without a levy.
- **Effects on tourism**: Aviation levies may reduce tourism demand, potentially causing negative economic impacts in low or middle-income regions that depend on international air travel for tourism.

Carbon leakage

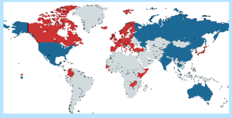
Due to the introduction of the aviation levies, ticket prices will increase for flights departing from the participating countries. This cost increase may not only lead to a reduction in demand but also to potential evasion to airports located in non-participating countries. We will define carbon leakage here, in line with CE Delft (2025), IEA (2008) and IPCC (2007), as an increase in emissions outside a region as a direct result of mitigation action in this region.

In this section we will give a qualitative description of the potential carbon leakage effects for the different aviation levies and geographical implementations. A quantitative analysis of the carbon leakage effects is outside the scope of this study, as the used AERO-MS model does not include passenger evasion or carbon leakage effects.

Fuel levies pose a serious carbon leakage risk in geographical scope Variant 2. This risk is minimal for ticket levies in the case of a total-journey implementation

Table 7 presents a qualitative assessment of carbon leakage risks associated with different aviation levies and geographical scopes of implementation. Under a global implementation, carbon leakage is not a concern, as all participating countries apply the levy uniformly. However, as the number of participating countries decreases, the risk of leakage increases. The highest risk occurs under geographical scope Variant 2, where leakage to nearby non-participating countries becomes more likely (e.g. from the EEA to the Middle East, or from Canada and Brazil to the US and Mexico). Fuel levies are particularly vulnerable to leakage through tankering. While the EEA has largely addressed this with the anti-tankering mandate in the RefuelEU Aviation regulation, countries without such measures face a significant risk of tankering if a fuel levy is introduced. Ticket levies, by contrast, are not subject to tankering risks. However, a first-stop implementation carries more leakage risk than a total-journey approach, as it allows evasion through stop-overs in non-participating countries.

Table 7 – Summary of the qualitative analysis of carbon leakage effects for the various aviation levies and geographical implementations

	Variant 1 – Global implementation 	**Variant 2 – GSTLF/EEA + 7 countries** 	**Variant 3 – GSLTF/EEA + top 20 aviation countries** 
Fuel levies	No carbon leakage	Risk (1, 2, 3, 4, 5, 6)	Low risk (1, 2, 3, 4, 5, 6)
Ticket levies *First-stop implementation*	No carbon leakage	Lower risk (1, 2, 3, 4, 5)	Low risk (1, 2, 3, 4, 5)
Ticket levies *Total-journey implementation*	No carbon leakage	Minimum risk (4, 5)	Minimum risk (4, 5)

For this analysis we distinguished six types of evasion:

1. Adding a stop-over outside the participating countries.
2. Switching a stop-over from a participating hub to a non-participating hub – indirect long-haul flight.
3. Switching a stop-over from a participating hub to a non-participating hub – intercontinental transfer.
4. Passengers choosing non-participating destinations.
5. Local evasion.
6. Tankering.

Each of these types of evasion are explained more elaborately in Text box 2. Not all of these evasion types are relevant for each aviation levy. We distinguish the evasion effects based on the characteristics of the aviation levy:

- **Fuel levies** (both for commercial and private jets): all 6 evasion effects are relevant.
- **Ticket levies** (modular air ticket levy and frequent flyer levy): the evasion effects depend on the implementation.

In the next paragraphs we will discuss the evasion options for both fuel levies and ticket levies.

Fuel levies

For fuel levies the amount of levy that should be paid depends on the fuel uplifted by aircraft departing from a participating country. This is the case for both the kerosene levy on commercial flights as the kerosene levy on private jets. Therefore, these levies have similar evasion options.

As fuel levies apply for fuel uplifted for a flight departing from a participating country, and not for the whole passenger journey, various types of evasion are possible by introducing (or replacing a stop-over in a participating country by) a stop-over in a non-participating country. This includes evasion Types 1, 2 and 3, more on this can be read in Text box 2. In these cases, the fuel levy only applies to the first leg of the flight, and not to the second leg. A transfer via a hub just outside the participating region becomes relatively attractive, as here the first leg is relatively short. This could specifically be a risk for geographical scope Variant 2, as this is the variant with the smallest geographical implementation. Studies show that the most important leakage risks for the EEA are the United Kingdom, Russia, Türkiye and Dubai (CE Delft, 2025), (SEO, 2022), (T&E, 2022). When the UK and Türkiye implement the aviation levy, as is assumed in Variant 2, the leakage risk is already greatly reduced. Also, at the time of writing, evasion to Russian airports is not possible due to the sanctions in relation to the Russia-Ukraine war. However, if in the future sanctions would be uplifted, this could again introduce a leakage risk to mostly Moscow airport. At this moment, for the EEA in Variant 2, the most relevant leakage risk is to the Middle East. The other participating countries in Variant 2 could also endure leakage risks. Passengers from Canada or Brazil could evade via United States or Mexican airports, passengers from participating African countries could evade via non-participating African hubs or passengers from Japan or the Republic of Korea could evade via Singapore, Thailand or other East-Asian hubs. These risks are greatly reduced in Variant 3, as here most of these hubs will also join the coalition.

Another leakage risk could be Type 4: passengers choosing non-participating destinations. Holiday travellers are not always strict in their destination choice. Cost differences between a destination just inside the participating region, where both for the departing and return flight levy has to be paid, or just outside of the participating region, where only the departing flight is levied, could lead to evasion.

Local evasion, Type 5, could occur when neighbouring countries do not implement the aviation levy. The size of this effect is probably small for all geographical implementation variants, since the levy is introduced mostly for blocks of adjacent countries (such as the EEA). This could pose a risk for separate countries implementing the levy, for example in Africa or South-America in Variant 2. However, since most of these countries are rather large in size it would require quite a detour (e.g. hours of driving) to get to a non-participating neighbouring countries airport, reducing the risk.

Tankering could pose a serious risk to the fuel levies. It would become quite beneficial to uplift excess fuel in non-participating countries such that they have to refuel as little as possible in participating countries, where the fuel levies would apply. For the EEA however, this risk is almost entirely mitigated by the anti-tankering mandate from the RefuelEU Aviation regulation. For other participating countries with no such regulations there is a serious risk of tankering by introducing a fuel levy. This risk is largest in Variant 2 and smaller in Variant 3.

Private jet fuel levy

Overall, private jets have similar evasion options as commercial flights, however they also present some unique leakage risks. Private jet operators have more flexibility in where they refuel compared to commercial airlines. Therefore the tankering risk, uplifting excess fuel in non-participating (bordering) countries, is higher. Next to this, private jets often operate from small regional or private airports, which may lack fuel flow measurement infrastructure compatible with tax administration and on-site customs or enforcement presence. These coverage gaps create opportunities for non-compliance or under-reporting, especially in fragmented fuel supply chains.

Private jets are frequently owned via shell companies, trusts, or leasing structures that obscure the operator's identity and nationality. This complicates tracking and determining the applicable tax jurisdiction, and enforcing compliance with fuel levy obligations. This opacity increases the risk of regulatory evasion, particularly when fuel is purchased under diplomatic or corporate exemptions.

To reduce leakage risks for private jets, the following strategies could be considered as potential mitigations techniques:

- Require fuel tracking and reporting systems at all airports, including small regional and private airfields. This should involve integrating Fixed Base Operators (FBOs) into national taxation and fuel monitoring frameworks, with strengthened enforcement through measures like digital fuel receipt submission and cross-referencing with flight tracking data (e.g., ADS-B).
- To address unavoidable carbon leakage, introduce complementary measures such as per-flight emissions charges or private jet ticket levies. These tools are less reliant on fuel uplift locations and can help ensure more comprehensive coverage of emissions from private aviation.

Ticket levies

For the ticket levies, both the modular air ticket levy and frequent flyer levy, the carbon leakage risk depends on the implementation: first-stop implementation or total-journey implementation.

First-stop implementation

Here, the ticket levy is implemented in a way where only the distance to the first stop from the departing country is relevant for the distance-dependent (part of the) levy. With this implementation, the relevant distance is similar in scope to the fuel levies, where also only the distance of the first flight applies. Therefore, this implementation also allows for evasion by introducing (or replacing a stop-over in a participating country by) a stop-over in a non-participating country, evasion Types 1, 2 and 3. Evasion Types 4 and 5 also apply, as only the outward journey is levied and evasion to adjacent countries could also be advantageous here. Tankering, evasion Type 6, does not apply for the ticket levies, as here the levy applies to the passenger and not the fuel uplifted.

Total-journey implementation

In a total journey-implementation the distance to the final destination (from the departing country) is relevant for the distance-dependent (part of the) levy. This implementation removes the carbon leakage risks from introducing (or replacing a stop-over in a participating country by) a stop-over in a non-participating country, evasion Types 1, 2 and 3. Also here, tankering (evasion Type 6) is not relevant. Therefore only evasion Types 4 and 5 remain.

Text box 2 – Types of evasion explained

Each type of evasion is explained by using an example

1. Adding a stop-over outside the participating countries

Amsterdam to Hong Kong: example for direct long-haul flights to non-participating destinations departing from a participating airport. As alternatives for these direct flights, passengers can choose a flight with a transfer at a hub just outside the participating region (such as Qatar or the United Arabic Emirates). A transfer via a hub just outside the participating region becomes relatively more attractive, as only the first (relatively short) outbound flight falls under the levy, while for the direct flight the whole flight is levied.

2. Switching a stop-over from a participating hub to a non-participating hub – indirect long-haul flight

Nice via hub to Bangkok: competition for flights from participating countries to long-haul destinations outside the participating region, for routes without direct connections. The required transfer can either take place at a hub within or outside the participating region. The first outbound flight for the route with a transfer at a participating hub is a less attractive option compared to a transfer at a non-participating hub. The aviation levies lead to additional costs on both the first and second flight leg for transfers at the participating-hub, while for transfers at non-participating hubs this will be only be on the first flight leg.

3. Switching a stop-over from a participating hub to a non-participating hub – intercontinental transfer

Toronto via hub to Mumbai: intercontinental connection between two non-participating destinations, either direct or with a transfer at a (non-)participating-hub. In this case, a stopover at a participating-hub (such as Paris CDG, Frankfurt or London Heathrow) becomes relatively less attractive, as the second flight leg will be subject to the aviation levies. The other two travel options, direct and transfer at a non-participating hub (such as Qatar or Dubai), are not affected by the aviation levies.

4. Passengers choosing non-participating destinations

Destination at Mediterranean coast: this type of evasion differs from the above, as it involves a destination choice and not a route choice. The example represents a holiday destination choice of European citizens, either within or outside the participating region. Passengers flying to destination inside the participating region (such as Greece or Spain) have to pay aviation levies for both the departing and the return flight. Passengers flying to destinations outside the participating region (such as Marocco or Egypt) will only see an aviation levy for the departing flight, making these destinations relatively more attractive in terms of costs.

5. Local evasion

Local evasion occurs when neighbouring countries see different aviation levies. This type of evasion is mainly relevant for single countries: if for example the Netherlands introduces higher aviation levies, Dutch inhabitants could evade these levies by departing from an airport just over the border (e.g. Brussels, Dusseldorf). When neighbouring countries together as a block introduce aviation levies, this type of evasion would be minimal.

6. Tankering

Tankering occurs when airlines uplift excess fuel in one airport to cover the full or partial return leg for economic benefit. For the aviation levies, tankering would occur in non-participating countries such that they have to refuel as little as possible in participating countries, where the fuel levies would apply. This risk is almost entirely mitigated in the EU because of the anti-tankering mandate that obliges 90% of the fuel for a segment to be uplifted at the departure airport, as part of the EU's RefuelEU Aviation regulation. However, in other non-EU participating countries tankering could pose a serious risk for the fuel levies.

Based on assessments of carbon leakage for an aviation EU ETS scope expansion and the RefuelEU Aviation regulation: CE Delft (2025), T&E (2022).

Effects on tourism

Countries heavily dependent on tourism and reliant on air travel for international access are vulnerable for adverse economic effects due to aviation levies

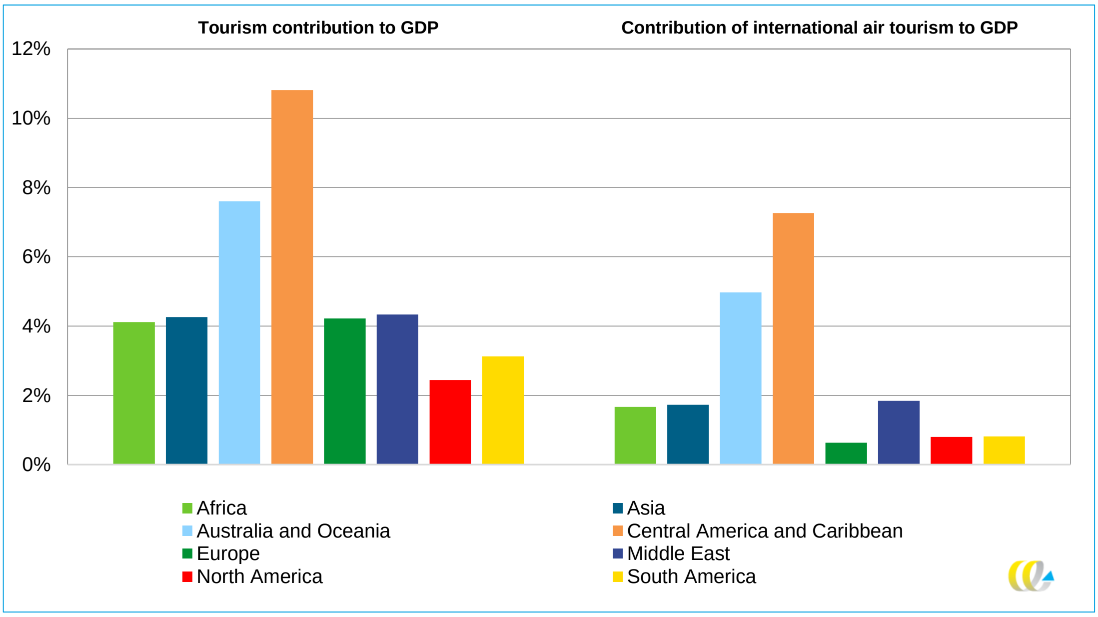
The effects of aviation levies on tourism are assessed using data from the UN Tourism Data Dashboard (UN Tourism, 2025). The left panel in Figure 7 shows the overall contribution of tourism to GDP, capturing arrivals by air, land, and sea (including cruise tourism), as well as domestic tourism. In contrast, the right panel focuses exclusively on the GDP contribution from international tourists arriving by air.[7]

Figure 7 indicates that countries in Central America & the Caribbean and Australia & Oceania are particularly dependent on air-based international tourism relative to other regions. It is important to note that the figure presents unweighted averages across the countries in each region included in our dataset. Within these regions, however, there are substantial disparities across economies.

A consistent pattern is that SIDS, which are highly dependent on both international tourism and international aviation, see a particularly high contribution of international air tourism to GDP. For mainland countries or larger islands within the same regions, the contribution tends to be much lower than the regional average. These intra-regional disparities are illustrated in Annex A.2.

[7] The right side of Figure 7 includes only the contribution to GDP from *international* tourists arriving by air. Domestic tourists arriving by air are excluded from this figure.

Figure 7 – Tourism contributions to GDP across geographical regions



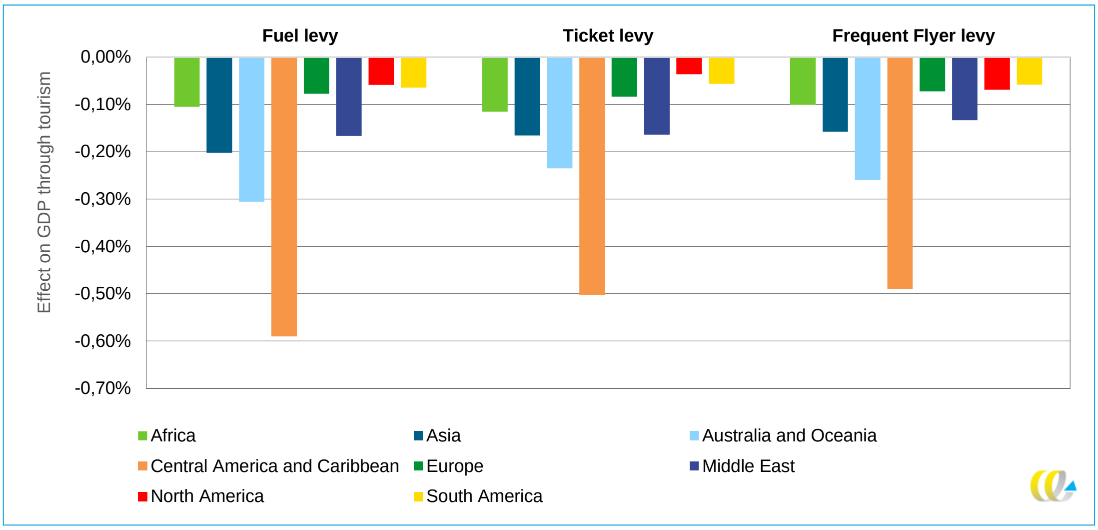
By combining data from the UN Tourism Database with output from the AERO-MS model, Figure 8 illustrates the GDP impact of the fuel levy, ticket levy, and frequent flyer levy, resulting from reductions in international air travel tourism. [89] The most pronounced GDP declines are observed in Central America and the Caribbean, highlighting the vulnerability of regions that are both highly dependent on tourism and reliant on air travel for international connectivity. SIDS are particularly sensitive to the economic side effects of aviation levies.

It should be noted in this context, however, that the declines in GDP as a result of aviation levies are much smaller compared to the estimated costs of climate change. For example, SIDS make up two-thirds of the countries that suffer the highest relative losses, between 1% and 9% of their GDP each year, from natural disasters and are acutely vulnerable to the impacts of climate change (OECD, 2024).

[8] In Figure 8, the impact of the jet fuel levy for private jets on GDP could not be analysed because this levy has not been analysed using the AERO-MS model. Therefore, we don't have detailed country-level output for the jet fuel levy on private jets.

[9] For the fuel levy, effects are shown for the variant *middle levy rate, all international flights*. For the ticket levy, effects are shown for the variant *all international flights*.

Figure 8 – Effects of aviation levies on GDP through international air travel tourism



As mentioned in the introduction, the levy rates applied in this study do not consider a phase-in approach. The adverse economic effects of the aviation levies on tourist-dependent economies could be lowered by considering a phase-in approach, gradually increasing the levy rate over time.

6 Legal feasibility

Fuel levies face several legal constraints that can be overcome

The legal feasibility of introducing a global aviation fuel levy is subject to several existing legal constraints. The Chicago Convention prohibits the taxation of fuel already on board upon arrival, but allows for taxation of fuel uplifted before departure, meaning there is no overarching international legal ban on fuel levies (ICAO, 1944).

More relevant are Air Service Agreements (ASAs) between countries, that often explicitly mention taxation exemptions of jet fuel. For example, article 11 of the EU-US Open Skies Agreement contains such a provision. However, legal analysis by CE Delft (2018b) concludes that it can be argued that the Open Skies Agreement allows for each side to unilaterally impose fuel taxation, as the exemption is only on the basis of reciprocity and can be withdrawn at any time (not tested in court).

Within the EU, the Energy Taxation Directive (ETD) currently mandates a tax exemption for jet fuel used in commercial aviation (EC, 2021). The proposed revision of the ETD includes a provision to lift this exemption, but it has not yet been adopted (unanimity necessary among EU Member States). Similar legislative fuel levy exemptions may exist in other countries or regions as well, although this has not been examined in the context of this study.

In conclusion, current legal frameworks, particularly ASAs and national or regional legislation, present legal barriers to the implementation of fuel levies. These barriers are not impossible to overcome. With sufficient political will, targeted revisions of treaties and adapted regulatory frameworks can establish the legal basis needed to introduce a global aviation fuel levy. Nevertheless, these legal barriers make a near-term implementation of a fuel levy more difficult.

Ticket levies face few legal hurdles, but differentiating levy rates across market segments could reduce legal robustness

We examine the legal feasibility of implementing ticket levies based on CE Delft (2018a). The study examined legal challenges in five European countries and concluded that such levies are generally lawful under international and EU law, provided certain design conditions are met.

Ticket levies do not violate Article 15 of the Chicago Convention, which prohibits charges solely for entry, transit, or exit from a state's territory, as long as the levies are **not discriminatory** and are not **directly linked to these rights**. Moreover, such levies are distinct from fuel levies and thus are not subject to fuel-related legal tax exemptions under international agreements. This is a big advantage of ticket levies over fuel levies.

Differentiation by distance is legally feasible, provided it does not distort competition within internal markets such as the EU. This means that while multiple distance bands can be applied, the same levy rate should apply to all flights within the internal market (e.g. the EU) to avoid breaching competition rules or granting unlawful State aid. For example, the Irish ticket levy was successfully challenged because it applied lower rates to certain short-haul intra-EU flights, leading to selective advantages for some carriers. Conversely, distance-based differentiation that uniformly applies to all non-EU destinations, or treats all intra-EU flights equally, has been upheld in other jurisdictions.

In conclusion, a ticket levy faces fewer legal obstacles than a fuel levy, as existing tax exemptions for aviation fuel do not apply to ticket levies. This makes the implementation of a ticket levy more feasible within a coalition of the willing. However, care should be taken when introducing differentiation within the levy: if a ticket levy leads to distortions in competition within internal markets, its legal basis may be challenged.

A frequent flyer levy is legally feasible, but requires careful design to comply with regulations in the areas of data protection and fare transparency

The implementation of a frequent flyer levy is legally feasible, but it requires careful design to comply with existing regulations, particularly in the areas of data protection, fare transparency, and taxation law. We assess the legal feasibility of a frequent flyer levy using Chapman et al. (2024) that studied the feasibility of a frequent flyer levy in a European context.

To apply a differentiated levy based on an individual's flight frequency, a database must be in place to track the number of flights per traveller. Within the EU, this raises concerns under the General Data Protection Regulation (GDPR). However, Chapman et al. (2024) concludes that tracking flight data can be lawful if the principles of proportionality and public interest are respected. A proposed solution is to assign a Unique Passenger ID, enabling flight tracking while limiting data exposure, provided that clear legal bases and safeguards are established.

The Principle of Air Fares Transparency (Regulation 1008/2008) requires that the total price, including all levies, must be shown to customers upfront. Since the frequent flyer levy would vary per individual, ticket sellers would need to identify the passenger before displaying prices. A viable solution is to require passengers to enter their ID or 'Traveller Number' early in the booking process. This allows the frequent flyer levy to be calculated and shown in compliance with the fare transparency rule. Outside the EU, many countries do not have strict regulations like Regulation 1008/2008.

In conclusion, a frequent flyer levy is legally feasible, but its implementation depends on overcoming significant administrative challenges related to data collection and protection, and fare transparency. While workable solutions exist, putting them into practice, especially on a global scale, will likely be difficult in the near term.

A fuel levy for private jets faces few legal challenges

A fuel levy on private jets appears to face relatively few legal challenges compared to fuel levies on commercial aviation. Unlike commercial jet fuel, which is mandatorily exempt from taxation under the current ETD, fuel used by private and non-commercial aviation is not subject to a mandatory exemption. Moreover, private jets are in some cases not covered by the ASAs that protect commercial airlines from a fuel levy, reducing the risk of legal conflict or challenges under bilateral treaties.

Policy consideration: Interaction with CORSIA

Although primarily a political rather than a legal matter, alignment or interaction with CORSIA could be considered to enhance the political feasibility of an aviation levy.

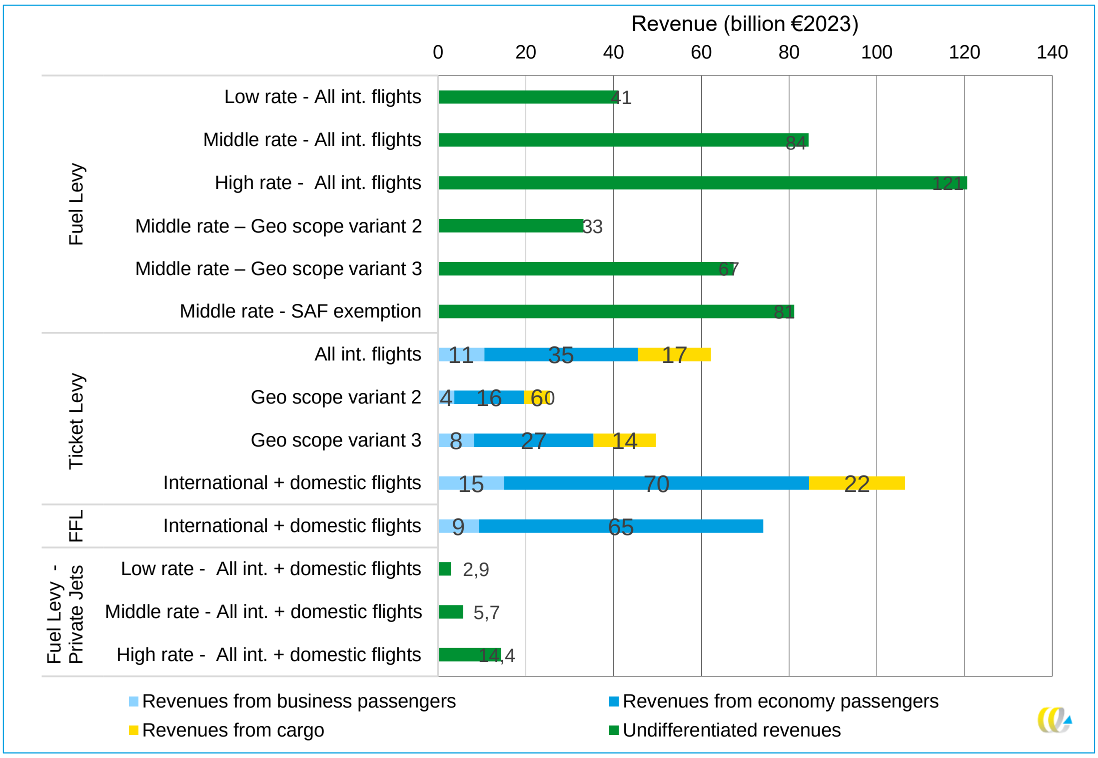
CORSIA is a global market-based measure established within ICAO to address the growth in emissions from international aviation. Within CORSIA, countries offset any growth in CO_2 emissions above 85% of 2019 levels (IATA, 2023). In the current phase, participation is voluntary. Starting in 2027, CORSIA will become mandatory for most countries, with exceptions for certain LDC’s and SIDS.

To complement CORSIA, the aviation levy proposed in this study could be applied to emissions that fall outside the scope of CORSIA. This would mean that CO_2 emissions up to 85% of 2019 levels, those excluded from offsetting obligations under CORSIA, could be subject to the levy. By aligning the scope of the levy with the emissions gap left by CORSIA, such a measure can enhance environmental effectiveness while respecting existing international agreements. We should note that this is a policy consideration, but it has not been included in the modelling for this study.

A Extended results

A.1 Revenues

Figure 9 – Revenues (billion € 2023) differentiated by economy class passengers, business class passengers and cargo



A.2 Effects tourism on GDP

Figure 10 – (Air) tourism contribution to GDP by country income-level

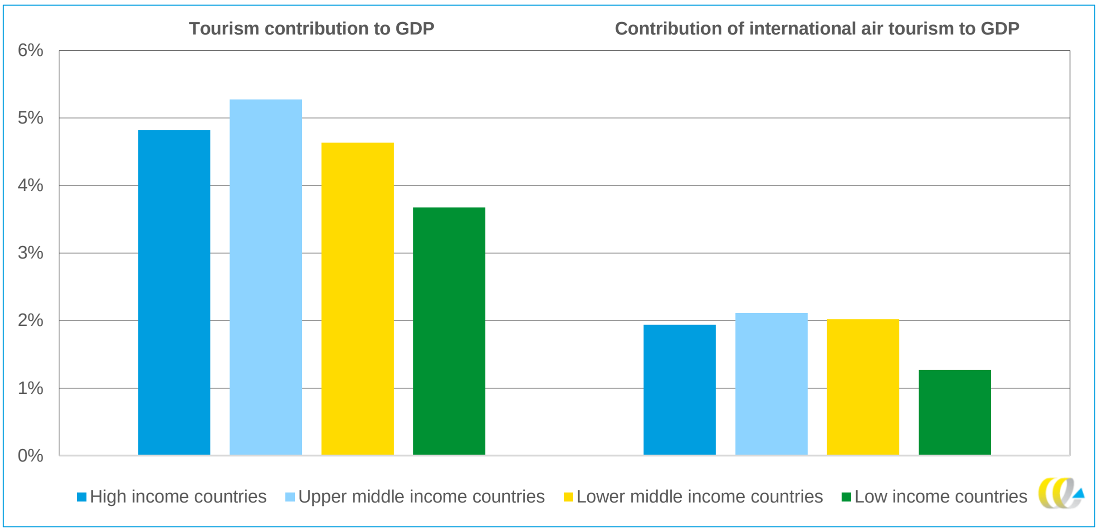


Figure 11 – Effects aviation levies on GDP through tourism, by country income-level

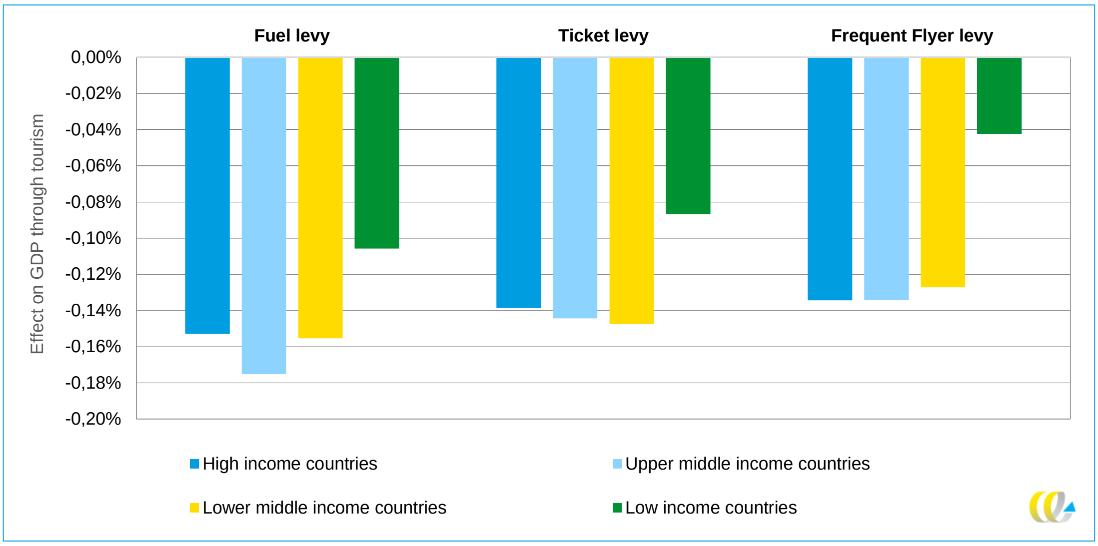


Figure 12 – Distribution of tourism contribution to GDP

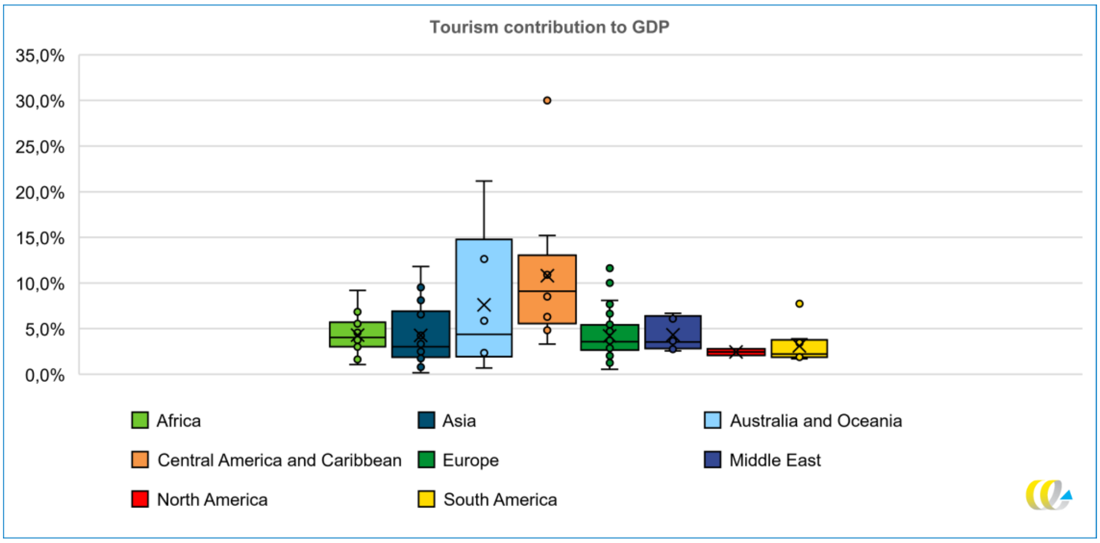
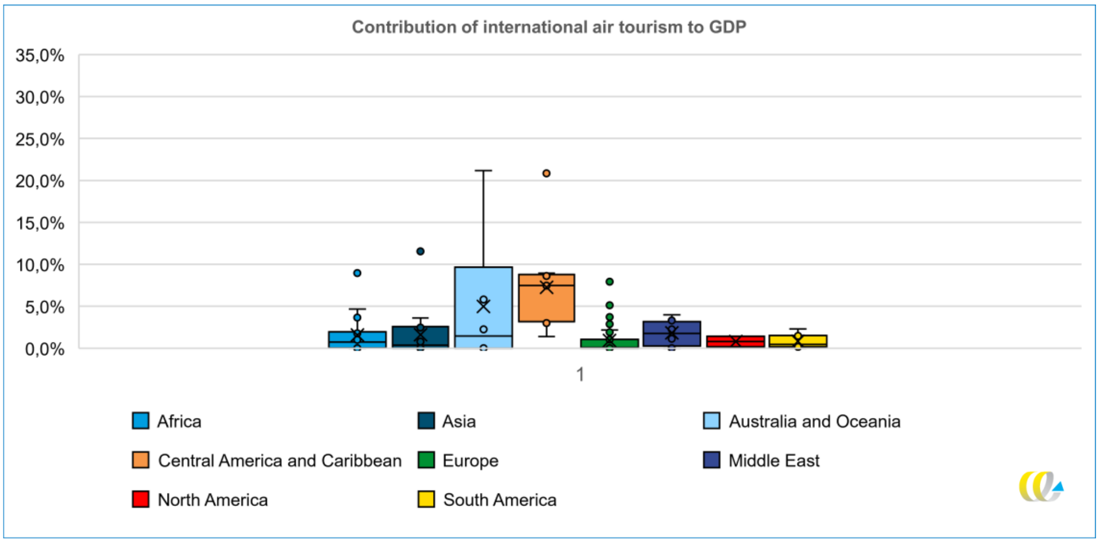


Figure 13 – Distribution of the contribution of international air tourism to GDP



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