Taxes in the Field of Aviation and their impact

Draft Final report

Executive summary

Aviation has a unique fiscal regime. On the one hand, in many countries it is subject to specific taxes and charges, such as a departure tax or a solidarity levy. On the other hand, aviation fuel is generally exempt from excise duty and many countries exempt tickets from VAT or apply a zero VAT rate in case of international aviation.

This study has made an inventory of taxes in the EU and selected non-EU countries. It has also estimated economic and environmental impacts of these taxes and of tax exemptions and provides an excel table to simulate certain effects of taxation on the economy.

In EU Member States, VAT or other taxes on domestic aviation are the most prevalent and exist in 17 Member States. Six Member States levy taxes on international aviation, invariably in the form of ticket taxes for passengers departing from airports in the Member State. Figure 1 shows the average aviation taxes per passenger in the EU, defined as the total receipts of aviation taxes divided by the total number of passengers. **Error! Reference source not found.** presents taxes levied on international passengers. These include only ticket taxes, as international aviation is exempt from VAT.

Figure 1 – Average aviation taxes per passenger in the EU. Weighted average for domestic and international passengers

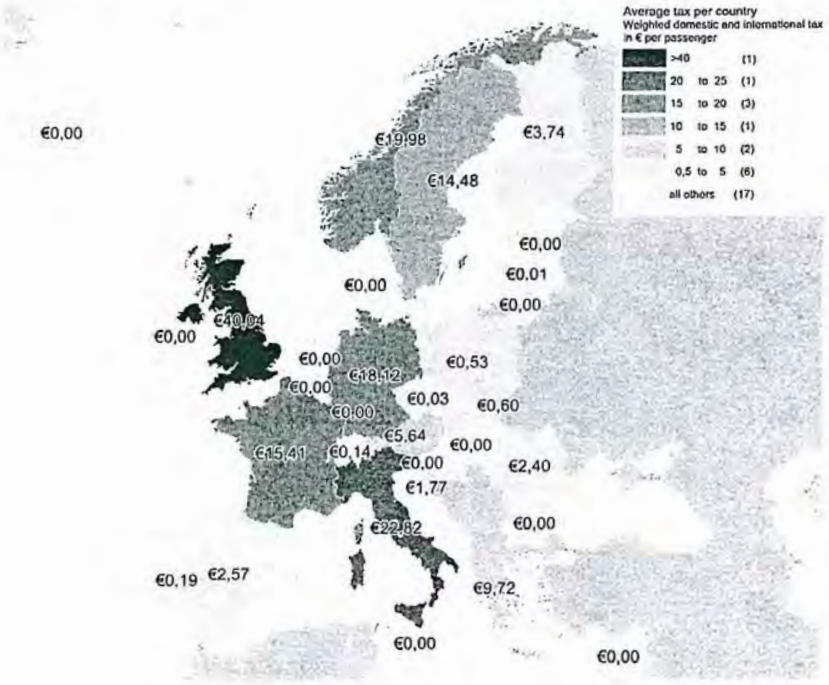

Figure 2 **Average aviation taxes per passenger in the EU, for international passengers**

Note: The value of tax exemptions has not been quantified.

Outside the EU, 13 mandate countries (i.e. countries for which the EU negotiates EU Air Service Agreements), as well as Australia, Canada, the United States, Hong Kong, Brazil and Japan all tax aviation activities. In most cases, the taxes are ticket or departure taxes, i.e. a fixed amount per passenger, sometimes depending on the destination or class of travel. Some countries levy VAT or sales taxes, i.e. a levy proportional to the value of the ticket. This is done, for example, in Japan, Mexico, the USA and Canada. Fuel on domestic flights is sometimes taxed, e.g. in the USA. In contrast, fuel used on international flights is generally exempt from fuel taxes, and international flights are generally not subject to VAT. Figure 3 shows how the taxes in non-EU countries compare to taxes in EU countries. The figure presents weighted average taxes for domestic and international flights (left hand side), as well as taxes for international flights only (right hand side). Australia and Oman have relatively high taxes, and tax levels in Mexico and Brazil are particularly high for international flights.

Figure 3 – Average aviation taxes per passenger in selected countries

Notes: Countries not mentioned in the figure do not apply aviation specific (indirect) taxes or apply a zero tax rate for certain taxes; the value of tax exemptions has not been quantified.

Taxes lower demand and have economic and environmental impacts. This study has developed a model to provide a global indication of some impacts, notably:

1. Passenger demand.
2. Change in the number of flights and connectivity.
3. Jobs (direct and indirect).
4. GDP.
5. Fiscal revenue from the aviation sector.
6. CO_2 emissions.
7. Noise.

There are two ways of modelling the economic impacts of taxes. One is to model the impacts of taxes in isolation, the other is to model the impacts in combination with simultaneous changes in government expenditures or other taxes which occur because the change in fiscal revenues. The literature on environmental tax reform, as well as a number of studies on aviation taxes, have generally adopted the latter approach, which takes into account that the fiscal revenue of a tax is ploughed back in the economy through higher government expenditures or lower taxes, and that a tax exemption has the opposite effect. This study has followed the same approach.

The modelling showed that for the aviation sector, tax exemptions result in higher passenger demand, a larger aviation sector (both in terms of jobs and value added) and more flights. For the wider economy, this means increased connectivity, which may have a positive effect, although there is no proof of a causal link. These impacts are counteracted by the fact that tax exemptions for one sector imply lower government spending or higher taxes for other sectors, which affects them negatively (both in terms of jobs and value added). Whether or not the total economic impacts are positive or negative on balance, depends on the structure of the economy. The environmental impacts of tax exemptions are negative, as they result in more noise and emissions. Imposing taxes have the opposite effect.

This study has analysed the impacts of taxes and tax exemptions for aviation in all EU Member States and for the EU-28 on average.

Currently, the average aviation tax in the EU across all Member States and destinations amounts to EUR 11 per flight. If all aviation taxes in the EU were abolished, the number of passengers would increase by 4%. This would result in an approximately equivalent increase in the number of flights, connections, jobs in the aviation sector and value added of the aviation sector. The CO_2 emissions of aviation would increase by 4% and the number of people affected by airport noise by 2%. Because of either lower government expenditures or higher taxes on other activities, most of the increase in jobs would be compensated by a decrease in employment in other sectors. The overall impact on GDP would be 0.2%.

Conversely, abolition of the exemption of energy taxation on aircraft fuel would, if it were not legally constrained, result in an increase of the average ticket price by 10% and a decrease in passenger demand of 11%. This has a negative impact on employment in the aviation sector (11% reduction), value added (11% reduction). The CO_2 emissions of the aviation sector would decrease by 11% and the number of people affected by airport noise by 8%. The higher fiscal revenues offset the negative effects on employment and value added in the aviation sector completely, as a result of which the impact on employment and GDP is negligible.

Some studies have partially reached different conclusions on the impacts of aviation taxes and tax exemptions on GDP and employment. In most cases, the differences are due to the fact that those studies have assessed the impacts of a combination of a tax and austerity, or of a tax exemption and fiscal stimulus. In other words, these studies do not assume that the tax revenues result in higher government or household expenditures which have economic impacts, but rather that they increase or reduce the budget deficit or surplus.

Other studies, which do not assess the impacts of a combination of a tax and austerity, reach similar conclusions, i.e. that the impacts of the introduction of an aviation tax on jobs and GDP are small when it is accompanied by a simultaneous change in government extenditure or in other taxes.

As a conclusion, the analysis showcase that any new aviation tax would have a significant negative effect on the aviation industry (lower direct and indirect employment) but its impact on the overall employment within a Member State, on fiscal revenue and GDP would be close-to-zero. In addition, with the changes in air movement the environmental load would change: in case of introduction of a new tax – as the traffic decreases – the CO_2 emmission and number of people affected by noise decrease, too. This way, any changes in tax regimes must be carefully analysed especially because the role of aviation a priority industry varies by Member States.

Aviation Taxes in Europe

Tool workings

Aviation tax
Taxation impacts demand for aviation and has economic impacts in the aviation sector and supplying sectors.

Taxation of aviation

Impact on government revenues
Changes in taxation on aviation impact government revenues. In absence of austerity of fiscal stimulus, these changes need to be offset by changes in other taxes.

Change in government revenues

Tax reform and off-setting effects
Changes in taxes on other sectors have economic impacts on other sectors.

Tax reform in other sectors

Example: effect of abolishing all EU ticket taxes

1. Aviation and other sectors

Aviation sector

Demand effects	Passengers: +27 million	Flights: +4%
Economic effects	Value added: +€ 2 billion	Indirect Employment: = negligible; Direct Employment: +14 thousand jobs
External effects	People affected by airport noise: +68 thousand	CO_2 emissions: +6 Mton

Other sectors

Indirect Employment (Thousand jobs): = negligible

Value added (Billion €): - € 2 billion

2. Total effect

Total effect on economy

GDP (Billion €): = negligible

Total Employment (Thousand jobs): = negligible

seo amsterdam economics

CE Delft

Committed to the Environment

1. Introduction

Aviation has a unique fiscal regime. On the one hand, in many countries it is subject to specific taxes and charges, such as a departure tax or a solidarity levy. On the other hand, aviation fuel is often exempt from excise duty and many countries exempt tickets from VAT or apply a zero VAT rate.

Taxes increase the cost of the good or service that is taxed and lower the demand. Lower demand for aviation may result in lower aviation activity, which in turn may result in lower connectivity and lower economic growth, but also in less congestion, lower negative environmental impacts and noise. In addition, aviation taxation has proven to result in substantial substitution effects of travel demand, both to other modes of transport and to foreign airports where no or lower taxes apply.

The extent to which taxes result in lower competitiveness is subject to a debate. International Air Transport Association (IATA) has published a methodology for its assessment (IATA, 2007). However, the approach may be improved to bring it more in line with commonly accepted methods for evaluating the economic impacts of changes in transport links (see e.g. CE Delft, 2013).

The European Commission has recognized the importance of aviation taxes in its Aviation Strategy for Europe (EC, 2015), where it writes: 'Current aviation taxes and levies applied by Member States over and above the normal profit tax may negatively impact connectivity and competitiveness'. In order to be able to assess the impacts, the Aviation Strategy announces that the Commission will 'publish an inventory of those taxes and levies and examine their impact'. This study is intended to form a basis for such a publication.

1.1 Aim of the study

This study aims to examine the tax regimes that collect revenue from air passengers and air cargo in Europe and other selected countries or regions.

More specifically, the objectives are to:

1. Examine the tax regimes that collect revenue from air passengers and air cargo in Europe and other selected countries or regions. It describes the existing taxes, measures the level of tax collected, and compares them.
2. Provide a calculation method (and the calculation itself) that estimates the positive and negative impact of taxation on air transport and the EU Member States.
3. Develop a user-friendly tool that could be used by public authorities and stakeholders to estimate the impacts of (new) aviation taxes.

1.2 Scope of the study

The scope of the study is limited to aviation taxes. Taxation of other modes of transport, goods and services is outside the scope.

For a fair comparison between countries, the study includes all taxes and charges that are related to the aviation industry and used for general public purposes. This means that the study includes all taxes that are specific to the aviation industry, as well as general taxes that affect the industry for which there is a special regime for aviation, such as VAT and luxury tax. Both passenger and cargo taxes are included.

The study assesses in detail how taxes are collected; what they are used for; whether any earmarking is applied and whether tax revenues collected on aviation are re-injected somehow into the aviation business.

Although airport charges are generally used for providing facilities and services for civil aviation, there may be cases in which airport charges are passed on to the treasury and used for general public purposes. For a fair comparison between countries we treat charges that are directly passed on to the treasury and are used for general public purposes as 'indirect taxes' and include them in the study.

Outside the scope of the study are taxes and charges that are:

- Not specific to the aviation industry and for which there is no special regime for aviation: corporate tax or labour tax, withholding tax on aircraft leases or interest payments, tax depreciations in respect of capital expenditure, customs duties and import tariffs.
- Not used for general public purposes: taxes/charges levied to defray the costs for specific aviation-related services such as infrastructure development, financing security costs, bird-strike prevention, environmental monitoring, financing fire services and safety as well as cargo inspection and handling costs. Noise and emission taxes/charges are levied to internalise external costs. Generally, these charges are levied by airports to finance measures taken to reduce noise pollution. Examples are isolation of houses, financing incentive schemes for airlines to use quieter aircraft, noise-reducing screening walls, changing flight procedures, avoiding flying around residential areas, etc.[1] This means that funds raised from security and noise charges or taxes are generally ring-fenced, and therefore they are not considered as taxes throughout this study.

The study identifies the aviation specific (indirect) taxes in the European Union Member States (EU28), countries in the European Economic Area (EEA), Switzerland, states with which the EU has an aviation agreement (US, Canada), similar aviation clusters (Japan, Australia, Brazil) as well as "mandate countries"[2]: Armenia, Bahrain, China, Kuwait, Mexico, Oman, Qatar, Saudi Arabia, Turkey, United Arab Emirates, Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

The study covers the aviation taxes which were effective at the time of writing this report. (June 2018).

The economic and environmental impacts are analysed for the 28 EU Member States.

The tax inventory in Chapter 2 includes taxes on air cargo and full freight flights. However, the modelling of the impacts excludes air cargo since this falls outside the scope of our study.

[1] See for example http://www.fraport.com/content/fraport/en/our-company/responsibility/aircraft-noise-infoservice/noise-abatement.html#id_tab__our-company_responsibility_aircraft-noise-infoservice_noise-abatement_active-noise-abatement__

[2] Mandate countries are (i) countries for which the EU has the mandate to negotiate an EU Air Service Agreement with (Armenia, ASEAN (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam), Azerbaijan, Brazil, Qatar, Tunesia, Turkey and UAE); and (ii) countries for which there are requests for further negotiations (Bahrain, China, Kuwait, Mexico, Oman and Saudia Arabia, as per the EU Aviation Strategy's external aviation policy (https://ec.europa.eu/transport/modes/air/aviation-strategy/external_policy_en#timeline-entry-3202).

1.3 Methodology of modelling aviation taxes

There are several ways to model aviation taxes, which are related to how the fiscal system is modelled.

A change in aviation taxes can either be a revenue-neutral tax reform, or change the total fiscal revenue.

In case of a revenue-neutral tax reform, a change in aviation taxes would be mirrored by a change in other taxes of the opposite sign. The impact on employment, welfare and GDP depends on how the revenues are recycled (Patuelli et al, 2001; Bovenberg et al, 1993) (Ballard et al, 1985). However, because this report does not model specific tax reform proposals, but aims to provide information on general tax reforms, the economic impacts are modelled as a net-zero demand impulse, where an increase (decrease) in aviation taxes results in a drop (jump) in demand for aviation services, with an offsetting rise (decrease) in demand in other sectors. The change in demand for the products and services of other sectors is based on the distribution of household consumption over these sectors.

In case of a change in fiscal revenue, the impact on GDP depends on how the change affects the economy. This can be either:

- A change in public spending; or
- A change in the government deficit or surplus.

In the former case, modelling the GDP impacts as a net-zero impulse makes sense because the change in public spending will change the output of economic sectors and thus value added (Ballard et al, 1985).

In the latter case, impact on GDP is harder to determine. A lowering of fiscal revenue would require the government to borrow more, thus driving up interest rates and lowering investment and borrowing. At the same time, the fiscal stimulus would result in higher demand. The balance of these two counteracting factors is hard to determine. (An increase in fiscal revenue would have the opposite effect).

However, when a change in taxation of the aviation sector results in a change of total fiscal revenues, the impacts of the change in taxes cannot be disentangled from the fiscal stimulus (in case taxes are lowered) or austerity (in case taxes are increased).

Studies on environmental tax reform generally assume that environmental taxes are recycled (e.g. Ekins 2007) (Conefry et al. 2008) (Williams et al., 2014).

In summary, except in the case where environmental taxes are part of a fiscal stimulus or an austerity package, the right way to model their impact on GDP is to assume that simultaneous with the change in aviation taxes, either other taxes are changed, or government expenditures change. This report follows that very path, which is often taken in the academic literature on tax reforms, and not uncommon to independent studies on aviation taxes.

1.4 Outline of the report

Chapter 2 contains an inventory of aviation taxes and a comparison of tax levels in the EU and in selected other countries.

Chapter 3 identifies the economic and environmental impacts and presents the methodology and data used to calculate them.

Chapter 4 presents the impacts of taxes and tax exemptions on Member States.

Chapter 0 presents the conclusions.

2. Inventory of Taxes

2.1. Introduction

This chapter presents an inventory of all taxes and tax exemptions that apply to aviation in the European Union Member States (EU28), countries in the European Economic Area (EEA), Switzerland, states with which the EU has an aviation agreement (US, Canada), similar aviation clusters (Japan, Australia, Brazil) as well as "mandate countries".

Section 2.2. describes the data sources used for identifying the various taxes. Thereafter, it introduces the various types of taxes applicable to the aviation industry. Section 2.4 provides a benchmark of the tax regimes in the various countries. The final section describes airline policies for reimbursement of taxes and charges in case of a no-show[3].

2.2. Data sources

Four data sources were used to identify the various aviation specific (indirect) taxes: IATA's Ticket Tax Box Service (TTBS) data, IATA's Airport Charges Intelligence Centre, information on taxes levied upon actual tickets as well as the "Taxes in Europe" database of the European Commission. Each of these sources is described in more detail below.

2.3.1. IATA Ticket Tax Box Service (TTBS)

IATA's TTBS[4] functions as an industry reference for taxes, fees and charges levied on passenger tickets. For the purpose of this study an excerpt of the database for EU28+EFTA[5] was provided by IATA. The data contains effective rates as of 10 October 2017, and also states foreseen changes or implementation of new taxes for 2018. Most profoundly this considers the implementation of Swedish Air Travel Tax in April 2018 and a 50% reduction of the Austrian Air Travel Tax as per 1 January 2018.

2.3.1. IATA Airport Charges Intelligence Centre

IATA's Airport Charges Intelligence Centre (ACIC) is an online tool including information on different types of charges, fees and taxes for airports worldwide. In this inventory of taxes, ACIC data was used to collect information on noise and emission charges, and other environmental taxes.

2.3.2. QPX Express API

To verify the data from the TTBS and to identify taxes for countries for which TTBS data was not available (being all countries outside EU28+EFTA), we use the QPX Express API.

The QPX Express API[6] is a web service which can be used to collect offered air fares on specific air routes. The service provides detailed information on charges and taxes levied

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[3] In this report, a no-show is defined as a passenger who does not take their flight for whatever reason. This is a different definition from the one dealing specifically with the passenger rights regulation (COM/2013/0130 final) where a passenger who does not take the first leg of the return ticket is, as a common practice, denied boarding for the second leg.

[4] http://www.iata.org/services/finance/Pages/ttbs.aspx

[5] European Free Trade Association including: Iceland, Liechtenstein, Norway and Switzerland.

[6] https://developers.google.com/qpx-express/

to passengers, including the names of the taxes and the country in which they are imposed. Data is provided for all taxes and charges which are stated on the passenger's ticket and levied on the based fare. For each country, fares are collected for one domestic, one short-haul[7], and one long-haul route. In total, this results in fares collected for 232 routes for which 1,559 resulting passenger fees and charges were identified.[8]

2.3.3. "Taxes in Europe" database

The "Taxes in Europe" database is an online tool provided by the European Commission covering the main taxes in force in the EU Member States.[9] For each tax, the database contains information on its legal basis, assessment base, main exemptions, rates, economic and statistical classification, as well as the generated revenue.

The database covers:

- all main taxes in revenue terms, such as personal and corporate income taxes, value added taxes, and EU harmonised excise duties;
- main social security contributions;
- other important taxes yielding at least 0.1% of GDP.

Customs duties and tariffs are not included, but these are out of scope in this study, as they are not considered as specific taxes for air transport.

This database was addressed for the following purposes:

1. Collecting information on relevant taxes other than ticket taxes.
2. Information on tax collection procedures and identification of the ultimate beneficiary.
3. Verification of the taxes identified from other data sources.

2.3.4. Use of the various data sources in the study

The TTBS data was used to identify all relevant aviation specific (indirect) taxes and their rates in the EU28 and the EFTA states. The data was cross-checked with the data from QPX Express API. The two sources provided identical information and are therefore considered highly reliable. The TTBS extract that we obtained did not include data on taxes for the non-EU and EFTA states. For these states we solely used the QPX Express API.
IATA's ACIC data was used to collect information on environmental taxes, most notably noise and emission charges.

The "Taxes in Europe" database was used to collect information on tax exemptions and specific legislation for the respective taxes.

Table 1 – Overview of data sources and the data that each covers

Data source	TTBS	Airport Charges Intelligence Centre (ACIC)	QPX Express	"Taxes in Europe"
Geographic	EU28 + EFTA	Worldwide	All relevant countries	EU28
Type of taxes and charges	Aviation related passenger-based taxes, shown explicitly on air tickets	All airport charges levied to airlines. Used to collect data on environmental taxes and charges.	Aviation related passenger-based taxes, fees and charges, shown explicitly on air tickets	Main taxes levied in each Member State
Measurement	Effective rates	Effective rates	Effective rates	Effective rates Exemptions Legislation
Source	IATA	IATA	Search engine	European Commission

2.3. Type of taxes

Aviation may be subject to different types of taxes. This section presents taxes on aviation as levied by the countries considered. The following types of taxes are distinguished:
1. Ticket taxes
2. Value added tax
3. Taxation on aircraft fuel
4. Environmental taxes
5. Taxes for air cargo

2.4.1. Ticket taxes

Ticket taxes are taxes imposed on all air passengers to the benefit of national (or regional) government's treasury. Examples are the UK Air Passenger Duty (APD) or the German Air Transport Tax.

Table 2 provides an overview of ticket taxes levied in Europe, as well as those levied in the selection of non-European countries.

Table 2 – Effective ticket taxes in the considered countries[10]

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[7] For the purpose of this study, a short-haul route was defined as a route with a stage length shorter than 3,500 km. Flights up to this stage length are typically operated by narrow-body aircraft. In terms of operations and costs, these differ from wide-body operations generally deployed on long-haul routes.

[8] For each of the 57 countries data on three different routes was collected (171 routes in total). In addition, we collected data for an inbound domestic, short-haul and long-haul flight for each country. This required 61 additional routes adding up to a total of 232 routes. In the output data, in total 1559 fees and charges were identified for these routes.

[9] The "Taxes in Europe" database is the European Commission's on-line information tool covering the main taxes in force in the EU Member States. The system contains information on around 650 taxes, as provided to the European Commission by the Ministries of Finance of the EU Member States. The data is not validated as such by the Commission.

https://ec.europa.eu/taxation_customs/taxes-europe-database-tedb_en

[10] See Annex C for a detailed definition of rates for Austria, Germany, France, Italy, Sweden and United Kingdom

Clusters	Country	Tax name	Effective rate (May 2018; per passenger unless indicated otherwise)	
EU+EFTA	Austria	Flugabgabe/Austria Air Transport Levy	€ 3.50	(short haul)
			€ 7.50	(medium haul)
			€ 17.50	(long haul)
	France	France Civil Aviation Tax	€ 4.48	(within EEA))
			€ 8.06	(all other)
			€ 1.33	per tonne of freight
		Air Passenger Solidarity Tax	€ 1.13	(within EEA + French overseas; economy class)
			€ 11.27	(within EEA + French overseas; business/first class)
			€ 4.51	(outside EEA; economy class)
			€ 45.07	(outside EEA; business/first class)
		Fiscal Tax (Corsica)	€ 4.57	(for all passengers to/from Corsica)
	Germany	Luftverkehrsteuer/German Air Transport Tax	€ 7.47	(short haul)
			€ 23.32	(medium haul)
			€ 41.99	(long haul)
	Italy*	Italy Embarkation Tax	€ 6.57	Domestic
			€ 12.69	(EU & EEA)
			€ 18.14	(Non-EEA)
		Italy City Council Tax	€ 7.07	
		Italy Luxury Tax	€ 10	(distance < 100km)
			€ 100	(distance < 1500km)
			€ 200	(distance> 1500km)
	Sweden	Air travel tax	€ 6.26 (SEK 60)	(domestic/EU)
			€ 26.06 (SEK 250)	(ICA < 6,000 km)
			€ 41.70 (SEK 400)	(all other)
	United Kingdom**	Air Passenger Duty	€ 14.42 (£ 13)	(lowest class < 2,000 miles)
			€ 28.85 (£ 26)	(all other classes < 2,000 miles)
			€ 86.54 (£ 78)	(aircraft > 20 tonnes for < 19 pax; < 2,000 miles)
			€ 86.54 (£ 78)	(lowest class > 2,000 miles)
			€ 173.10 (£ 156)	(all other classes > 2,000 miles)
			€ 499.24 (£ 450)	(aircraft > 20 tonnes for < 19 pax ; > 2,000 miles)
	Norway	Norway Air Passenger Tax	€ 8.77 (NOK 82)	
S – E -	USA	US International Departure Tax	€ 15.04	

Clusters	Country	Tax name	Effective rate (May 2018; per passenger unless indicated otherwise)	
			(USD 18)	
Mandate countries	Brazil	Embarkation fee	€ 3.44 - € 7.99 (BRL 8.01 – 19.62)	domestic (depending on airport category)
			€ 30.70 (USD 36)	international
	Hong Kong	Hong Kong Air Passenger Departure Tax	€ 12.85 (HKD 120)	
	Australia	Australia Passenger Movement Charge	€ 40.28 (AUD 60)	
	Bahrain	Bahrain Passenger Service Fee International	€ 15.71 (BHD 7)	
	China	China Airport Fee	€ 6.36 (CNY 60)	(domestic)
			€ 11.44 (CNY 90)	(international)
	Kuwait	Kuwait Airport Departure Tax	€ 6.27 (KWD 2)	
	Mexico	Mexico Airport Departure Tax	€ 16.25 (MXN 400)	(domestic)
			€ 37.53 (MXN 900)	(international)
	Oman	Oman Airport Tax	€ 4.36 (OMR 2)	(domestic)
			€ 21.76 (OMR 10)	(international)
	Qatar	Qatar Airport Fee International	€ 9.26 (QAR 35)	
	United Arab Emirates	United Arab Emirates Passenger Facilities Charge	€ 7.96 (AED 35)	
	Singapore	Singapore Aviation Levy	€ 3.79 (SGD 6.10)	
	Thailand	Thai international departure/arrival fee	€ 0.76 (THB 30)	

* Italy has different ticket tax rates for its airports. In order to model this we determined the weighted average tax for each of the groups of ticket taxes based on the 10 largest Italian airports in terms of passengers. The luxury tax for private aircraft was not included in our model since the IATA data did not specify the type of aircraft used to transport the passengers.

** For the UK the higher rates (e.g. for private jets) were not included in our model since the IATA data did not specify the type of aircraft used to transport the passengers.

Note: Applied exchange rates are listed in Annex F.

Source: IATA TTBS, QPX Express API.

For the countries with ticket taxes effective in January 2018, the table below outlines how these taxes are collected, and whether revenues are earmarked or re-invested in the aviation industry.

Table 3 Collection process and beneficiaries of ticket taxes

	How are taxes collected?	Beneficiary, earmarking or re-investment in aviation business

Austria[11] Aviation tax	–	The tax debtor is the aircraft owner performing the departure. The airport owner of the domestic airport from which the departure is undertaken bears liability for the tax. The tax debtor shall itself calculate the levy and shall submit a tax statement to the tax office (Finanzamt) no later than on the 15th day (due date) of the second calendar month following the calendar month in which the tax liability arose (statement period). The tax statement must be submitted electronically.	Beneficiary is the Austrian Minsitry of Finance. There is no specific earmarking of revenues. By documentation of the Austrian Parliament, the tax is defended as follows: *"Aviation plays a significant role in the emission of harmful substances. At the same time, fuels for aviation are exempted from consumption-based energy taxes due to European directives and international agreements. This leads to a tax preference for air traffic within the means of transport powered by fossil fuels. The levy is intended to influence the choice of means of transport in the area of private transport by reducing this imbalance in relation to the environmental impact of individual modes of transport. As the ticket price for a passenger flight continues to decline, there is no adequate awareness of the environmental costs of air traffic. The intended steering effect is necessary for passenger transport because the total number of departures of persons from Austrian airports increased by 9% between 2005 and 2009. By contrast, for example, the total weight of departures of freight transport has declined over the same period.* *If there is any additional tax burden on air traffic on the basis of EU law requirements, an evaluation of the Flight Abatement Act should be carried out in order to avoid any double taxation."*[12]
France[13] (Civil Aviation Tax)		As of 1 January 2006, a civil aviation tax is due by public air transport companies. The tax is eligible for all commercial flights. The airlines shall, by the last day of each month, submit a form provided by the Civil Aviation Administration, stating the number of passengers and the mass of cargo and mail embarked the previous month for flights made from France. Airlines which have declared less than € 12,000 in the previous years should make quarterly declarations instead of monthly declarations. These monthly or quarterly declarations shall be addressed to the accountants in the annex budget "Air Control and Operations". At the same time, the taxpayers pay the tax and the additional contribution (solidarity tax, see below), by bank transfer.	The revenues of the Civil Aviation Tax accrue to the "Air Control and Operations" budget and the general state budget. The shares of the revenues of the tax that are allocated to the respective budgets are determined by the Finance Act.
France[13] (Solidarity Tax)		In addition to the civil aviation tax (above), a solidarity tax is in place. The tax is collected in the same way as described above.	Revenues of this tax accrue the solidarity fund for development, as created by Article 22 of law no. 2005-1720 of December 30th, 2005.

11 https://www.bmf.gv.at/steuern/a-z/flugabgabegesetz/flugabgabe.html
12 https://www.parlament.gv.at/PAKT/VHG/XXIV/I/I_00981/fnameorig_201069.html
13 https://www.ecologique-solidaire.gouv.fr/taxes-aeronautiques

			The fund provides aid to developing countries, particularly in the field of health care.
Germany[14] Aviation tax	–	The tax debtor is the aviation enterprise which makes the departure. In addition, the representative in tax matters is also the tax debtor. The tax debtor must file the tax using the official form by the 10th day after the end of the calendar month in which the tax accrued or in which a tax exemption was utilised, in which the tax is computed by the filer of the return for the calendar month concerned (self-assessed tax return). The tax is due on the 20th day after the end of the calendar month in which it accrued.	Revenues accrue to the federal government. There is no specific mention of earmarking of revenues. The tax rates are linked to the involvement of air transport in the trading of greenhouse gas emission certificates (ETS), as noted in the Aviation Tax Act: *"The Federal Ministry of Finance shall be authorised, in agreement with the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, the Federal Ministry of Transport, Building and Urban Affairs and the Federal Ministry for Economic Affairs and Technology to reduce the tax rates pursuant to subsection 1 above by a certain percentage with effect from the beginning of a calendar year by statutory order without the consent of the Upper House of the German Federal Parliament (Bundesrat). The percentage reduction shall be calculated from the relation of the respective receipts of the previous year from the involvement of air transport in trading with greenhouse gas emission certificates to one billion euros. The receipts from the involvement of air transport in trading with greenhouse gas emission certificates shall be estimated on the basis of the receipts of the respective first six months of the previous year."*
Italy[15] Embarkation Tax and	-	Passenger boarding duty is a tax which is levied on the carrier, from any Italian airport, of chargeable passengers on chargeable aircraft in accordance with Law No. 324/76. It is payable by the operator of the aircraft, whilst the owner of the aircraft is kept jointly liable with the operator should the latter be in default.[16] Assessment, collection and payment of the taxes fall under the responsibility of the Ministry of Transport, in consultation with the Ministry of Finance.	Revenues accrue to the national treasury. Part of the revenues are reserved for payments to *"institutions and companies that manage airport complexes or terminals for goods or passengers, under Law No. 47/1974 and 117/1974"*. No further special earmarking of revenues is mentioned.
Italy - City Council Tax[17]		In addition to the embarkation tax (above), a city council tax is in place. The tax is collected in the same way as described above.	Law 350/2003 (Art. 11), in which the City Council Tax is introduced for the year 2004, mentions the following regarding allocation of revenues: *"The tax revenues are allocated to the State budget. For the subsequent reassignment for the part exceeding 30 million euro, a special fund is set up with the Ministry of the Interior and is reallocated into the aviation sector according to the following criteria:* *a) 20% of the total in favour of the*

14 http://www.zoll.de/EN/Businesses/Aviation-tax/aviation-tax_node.html
15 https://www.enac.gov.it/repository/contentmanagement/information/p185836070/eal_22.pdf
16 https://12baviation.com/tax/italy-2/ ; http://www.assaereo.it/documenti/LEGGE324-76.pdf ; http://www.edizioneuropee.it/LAW/HTML/89/zn95_26_074.html
17 http://www.mit.gov.it/mit/mop_all.php?p_id=01077 (Art. 11)

		municipalities of the airport or with neighbouring municipalities, according to the average of the following percentages: percentage of surface of the municipal territory incorporated in the airport enclosure on the total of the area; percentage of the total area of the municipality up to the maximum limit of 100 square kilometres; *b) in order to achieve effective measures to protect the safety of persons and structures, 80% of the total for financing measures aimed at preventing and combating crime and enhancing security in airport facilities and in the main railway stations."*
UK – Air Passenger Duty[18]	Air Passenger Duty (APD) is due by operators of aircraft used for the carriage of chargeable passengers from any UK airport. These operators must register for APD. Operators can use an online service to register with HM Revenue and Customs. Non-EU operators must appoint a fiscal representative in the UK. Payment of duty is required on a monthly or annual basis: by the 22nd day immediately following the accounting period to which the remittance relates for payments made by cash, cheque or postal order; and by the 29th day immediately following the accounting period to which the remittance relates for payments made by direct debit or credit transfer.	Revenues accrue to national treasury, as collected by HM Revenue and Customs. According to the UK Treasury, *"Air passenger duty is primarily a revenue raising duty which makes an important contribution to the public finances, whilst also giving rise to secondary environmental benefits"*. As such, revenues are not specifically earmarked or re-invested in the aviation industry.

2.4.2. Value Added Tax

According to ICAO (policy doc 8632[19]), the "normal practice with respect to the sale or use of international transport is to [apply a] zero [VAT] rate". IATA endorses ICAO's resolutions on taxation.[20] IATA argues that a zero VAT rate should be applied because international air transport generally takes place outside any tax jurisdiction. Moreover, applying an industry-wide zero VAT rate helps to foster a level playing field. As IATA puts it, equitable treatment for international aviation throughout the many jurisdictions into which it operates is essential. Domestic air transport is often subject to VAT.

Besides imposing VAT on (mainly domestic) air fares, states may also impose VAT on fuel, or on charges such as airport charges, air navigation charges or service fees.

Under the EC directive on the common system of Value Added Tax (2006/112/EC)[21], EU Member States may exempt passenger transport from VAT or apply a zero VAT rate. The following air transport related activities should be exempt from VAT (Article 148) – for commercial air traffic on international routes:

- the supply of goods for the fueling and provisioning of aircraft;
- the supply, modification, repair, maintenance, chartering and hiring of aircraft, and the supply, hiring, repair and maintenance of equipment incorporated or used therein;
- the supply of other services as mentioned in the point above, to meet the direct needs of the aircraft or of their cargoes.

Table 4 shows the effective VAT rates on domestic flights in Europe, as well as similar taxes in the considered non-European countries. European countries follow ICAO's guidelines by not charging VAT on international air transport. Most European countries do charge VAT on domestic flights. Some countries apply reduced rates (e.g. Sweden), whereas other countries apply general VAT rates up to 27%. Annex D provides a complete overview of VAT rates and VAT exemptions in the EU.

Outside the EU, Mexico charges a 4% transportation tax on international air travel, and Canada and USA charge sales or transportation tax for flights between USA and Canada and in the case of USA flights to Mexico.

Table 4 – VAT or similar taxes and rates in the considered countries levied on aviation

Cluster	Country	Tax name	Effective rate (domestic flights only, unless stated otherwise)
EU + EFTA	Austria	VAT	13%
	Belgium	VAT	6%
	Bulgaria	VAT	20%
	Croatia	VAT	25%
	Czech Republic	VAT	15% (on regular transport) / 21% (otherwise)
	Estonia	VAT	20%
	Finland	VAT	10%
	France	VAT	10%
	Germany	VAT	19%
	Greece	VAT	24%
	Hungary	VAT	27%
	Italy	VAT	10%
	Latvia	VAT	12%
	Lithuania	VAT	9% (Public passenger transportation services on established regular routes) / 21% (other)
	Luxembourg	VAT	3%
	Netherlands	VAT	21%
	Poland	VAT	8%
	Portugal	VAT	6%
	Romania	VAT	19%
	Slovakia	VAT	20%
	Slovenia	VAT	9.5%
	Spain	VAT	10%
	Sweden	VAT	6%
	Norway	VAT	10%
	Switzerland	VAT	8%

[18] https://www.gov.uk/government/publications/excise-notice-550-air-passenger-duty/excise-notice-550-air-passenger-duty

[19] https://www.icao.int/publications/Documents/8632_3ed_en.pdf

[20] https://www.iata.org/policy/Documents/value-added-tax.pdf

[21] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:347:0001:0118:en:PDF

Similar aviation clusters	Canada	Canadian Goods and Services Tax	5% (domestic/USA flights only)
	Canada	Canadian Harmonized Sales Tax	0-10% (depends on state)[22]
	Canada	Quebec sales tax	9.98%
	United States	US Transportation Tax	7.5% (domestic flights/CAN/MEX only)
Mandate countries	Australia	Australian Goods and Services Tax	10%
	Japan	Japan Consumption Tax	8%
	Mexico	Mexico Transportation Tax IVA Domestic	4-16%
	Mexico	Mexico Transportation Tax IVA International	4%
	Indonesia	VAT	10%
	Malaysia	Malaysia Goods and Services Tax	6%
	Thailand	VAT	7%
	Vietnam	VAT	10%

Note: Effective rate is 0% for the EU countries that are not listed in the table.
Source: IATA TTBS, vatlive.com (for non-EU countries), European Commission[23].

2.4.3. Taxation of aircraft fuel

Aircraft fuel, for commercial operations, is exempt from excise duty as per Energy Tax Directive 2003/96/EC (Article 14(1)(b)).[24] This article states that *"Member States shall exempt the following from taxation [...]: energy products supplied for use as fuel for the purpose of air navigation other than in private pleasure-flying."*

However, Member States may abolish this exemption for intra-Community and domestic flights, following Article 14(2) of the Energy Tax Directive: *"Member States may limit the scope of the exemptions [..] to international and intra-Community transport. In addition, where a Member State has entered into a bilateral agreement with another Member State, it may also waive the exemptions provided for in paragraph 1(b) and (c)."*

The minimum excise duty rate for kerosene, according to the Energy Tax Directive, is € 330/1,000 L. This value is used to quantify the magnitude of the jet fuel tax exemption. It should however be noted that according to Article 14(2) of the Directive, rates below the minimum may be applied when States decide to waive the exemptions. Currently, there are no EU Member States that waive the tax exemption on jet fuel on domestic flights.

The EU tax exemption of aircraft fuel is based on the international provisions of the 1944 ICAO Chicago Convention.[25] ICAO however does not explicitly prohibit the taxation of jet fuel. Article 24 states that *"Fuel [...] on board an aircraft of a contracting state, on arrival in the territory of another contracting State and retained on board on leaving the territory of the State shall be exempt from customs duty, inspection fees or similar national or local duties and charges."* This implies that the jet fuel tax exemption only applies to the taxation of fuel which is already on board, but not on the intake of fuel in another state.

However, ICAO policy document 8632 on taxation[26] elaborates further on the taxation of jet fuel in clause 1(c). The document states that *"it is the common practice of many States with respect to aircraft engaged in international transport generally to exempt all fuel and lubricants on board of arrival in each customs territory and, on a basis of reciprocity, to exempt from or refund taxes on fuel and lubricants taken on board at the final airport in that customs territory."* The intake of jet fuel is exempted from taxation in all Member States, which is in line with Article 14(1)(b) of EC Directive 2003/96.

The exemptions from taxation on jet fuel is often explicitly mentioned in bilateral air service agreements. For example the EU/US Air Transport Agreement (2007/339/EC)[27] states: *"There shall also be exempt, on the basis of reciprocity, from the taxes, levies, duties, fees and charges [..] with the exception of charges based on the cost of the service provided:[...] fuel, lubricants and consumable technical supplies introduced into or supplied in the territory of a Party for use in an aircraft of an airline of the other Party engaged in international air transportation[.]"*

In individual countries' position vis-à-vis ICAO policy document 8632, most countries considered in this study comply with ICAO resolutions that – based on reciprocity – intake of jet fuel is not taxed. Some countries included some reservations in this respect in their statement. In Europe, these were Germany, Norway, Sweden and Switzerland. In the case of Germany the following passage was included: *"The Government of Germany may decide[d] to introduce also in international commercial air transport a tax on the consumption of fuel and lubricants as well as a taxation on the sale and use of international passenger air transport. "Norway* includes the following passage: *"[...] Norway questions the reasons for the tax exemption concerning fuel in the Resolution. Tax policy in respect of environmental protection may be a reason for introducing taxes on fuel for the use by aircrafts in general. For domestic flights, a tax on fuel is applicable in Norway (effect from 1 January 1999). The revenue from this tax accrues direct to the Norwegian Exchequer."*
According to the position of Sweden: *"In light of the discussions in various fora about market based measures as tools in the limiting of the impact of international civil aviation on climate change, our opinion is that taxes levied on the uplift of lift or levied on air transport should not be ruled out as possible future measures."* A similar position is put forward by Switzerland: *"The Swiss Confederation generally supports and applies ICAO's policies on taxation in the field of air transport as set out in Doc 8632. Notwithstanding the Council's resolution, the Swiss Confederation is in favour of market-based measures aimed at reducing or limiting the environmental impact of aviation."*

Systematic data on excise duties on jet fuel is difficult to obtain. Keen and Strand (2006) provide an overview for some countries up until 2006.[28] Based on government and other web sources, information on jet fuel taxation in the considered non-European countries was obtained. Apart from the US – on which elaborated below – other countries such as Canada, Australia and Japan levy excise duties on jet fuel. Rates vary between €0.02 per litre in Australia to € 0.70 per litre in Hong Kong.

Table 5 – Excise duty on jet fuel

Country	Rate	Unit	€ per litre	Tax in	Source

[22] Provincial GST rates are listed in Annex D.

[23] https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/vat/how_vat_works/rates/vat_rates_en.pdf

[24] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003L0096:en:HTML

https://ec.europa.eu/taxation_customs/business/excise-duties-alcohol-tobacco-energy/excise-duties-energy/excise-duties-other-energy-tax-legislation_en

[25] https://www.icao.int/publications/pages/doc7300.aspx

[26] https://www.icao.int/publications/Documents/8632_3ed_en.pdf

[27] http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32007D0339&from=EN

[28] M. Keen and J. Strand (2006). Indirect taxes on international aviation. IMF Working Paper WP/06/124.

				%*	
Canada	0.03	CAD per litre	0.08	7%	https://www.canada.ca/en/revenue-agency/services/forms-publications/publications/currate/current-rates-excise-taxes.html
United States	0.044	USD per gallon	0.01	9%	https://taxmap.irs.gov/taxmap/pubs/p510-008.htm#TXMP440314d6
Hong Kong	6.51	HKD per litre	0.70	175%	https://www.customs.gov.hk/en/trade_facilitation/dutiable/types/
Australia	0.03556	AUD per litre	0.02	6%	https://www.ato.gov.au/business/excise-and-excise-equivalent-goods/fuel-excise/excise-rates-for-fuel/
Japan	18	JPY per litre	0.14	34%	https://www.env.go.jp/en/policy/tax/20170130_greening.pdf
Armenia	27	AMD per kg	0.05	12%	http://www.parliament.am/legislation.php?sel=show&ID=1472&lang=eng
Saudi Arabia			0.02	5% (domestic flights only)	http://gulfbusiness.com/saudi-apply-5-tax-fuel/
Laos	14%			14%	http://www.vdb-loi.com/wp-content/uploads/2017/04/Lao-Tax-Booklet-2016.pdf
Myanmar	5%			5%	http://download.pwc.com/mm/gobig/pdf/tax-updates_may2017.pdf
Philippines	4	PHP per litre	0.07	17%	https://business.mb.com.ph/2018/01/02/aviation-fuel-lubricants-hit-by-high-excise-taxes/
Thailand	4	THB per litre	0.10	25%	https://af.reuters.com/article/idAFL4N1FH1WE
Vietnam	3000	VND per litre	0.11	28%	http://vijagas.vn/en/environment-tax-increase-will-not-raise-gasoline-retail-price-in-vietnam-official.html

Note: For countries not included, no information was found after extensive desk research.
*: Tax in % is based on an average jet fuel price of €0.40 per litre (March 2018)

TAXATION OF AVIATION FUEL IN THE US

For commercial aviation, the federal tax rate in the US is US$0.044 per gallon (€ 0.010 per litre).[29]
For non-commercial aviation kerosene is generally taxed at $0.244 per gallon (€ 0.054 per litre). In addition, states or local authorities can levy additional taxes on aviation fuel. Figure 4 shows that these vary between $0 (Texas, Ohio and Delaware) and $0.328 (Illinois) per gallon (€ 0.072 per litre). As mentioned above, international air carriers may be exempted from these taxes as agreed in bilateral Air Service Agreements, as is the case in the EU-US agreement.

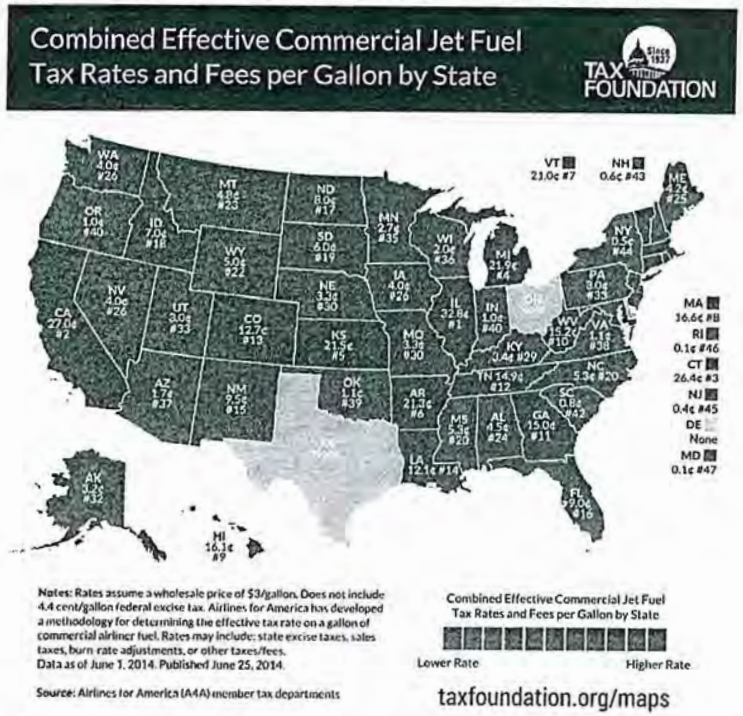
According to the Federal Aviation Authority (FAA), these state or local taxes accrue to airport revenues and should only be used for operating costs of the airport or other facilities related to air transportation, or for the support of state aviation programs.[30]

[29] https://taxmap.irs.gov/taxmap/pubs/p510-008.htm#TXMP440314d6

[30] https://www.faa.gov/airports/airport_compliance/aviation_fuel_tax/

The FAA is currently in the process of reviewing whether local or state authorities comply with the FAA's Policy Concerning the Use of Airport Revenues. This is not always the case. For example in Florida, 8% of the state aviation fuel tax revenue is allocated to a general revenue fund.[31]

Figure 4 – State taxes on jet fuel vary between $ 0.001 and $ 0.328 per gallon



Source: https://taxfoundation.org/combined-effective-commercial-jet-fuel-tax-rates-and-fees-state/

2.4.4. Environmental charges

Airlines may also be subject to environmental charges, most notably noise and emission charges. Appendix G presents these charges for the countries considered in this study.

These environmental charges are generally levied by airports, and revenues accrue to the airport. Earnings are often re-invested in the aviation sector, for example to fund noise abatement programs.[32] As revenues are not used for general public purposes, these do

[31] Florida's Transportation Tax Sources, a primer. FDOT, January 2017.

[32] See for example http://www.fraport.com/content/fraport/en/our-company/responsibility/aircraft-noise-infoservice/noise-abatement.html#id_tab__our-company_responsibility_aircraft-noise-infoservice_noise-abatement_active-noise-abatement__

not comply with the definition of taxes in this study, and will therefore not be included in our inventory or our model.

2.4.5. Taxes for air cargo

In some cases, civil aviation tax is levied on air freight as well. For the purpose of this study, this has been checked for all EU countries. Within the EU, only the French civil aviation tax is levied on air freight, with a rate of € 1.33 per ton of freight.[33]

Air cargo may be subject to various charges and fees. These include customs duties and import tariffs, safety and inspection costs and handling costs. These charges are however not seen as taxes, as these are levied to defray the costs of provided services.

In some countries (part of) the inspection costs are covered by public resources, leading to inspection cost differences across airports or countries.[34] Cost differences may also arise from varying levels in efficiency or cost-effectiveness of inspection authorities. EC Regulation 882/2004[35] does apply certain minimum rates to be charged throughout the EU for official controls of goods and live animals introduced in the community.[36]

Import and export customs duties also form a source of costs for air cargo users. As said, these are out of scope of this analysis as they are generally no specific charges for air transport.

2.4. Comparison of taxes

An extensive overview of taxes and charges is provided in Annex A while environmental taxes and charges are presented in Annex G. The table contains all passenger fees labelled as a "tax", and all other charges and fees that are considered passenger taxes based on the definition provided above.

2.5.1. Aviation taxes in Europe

Figure 5 shows the weighted average tax paid by passengers in Europe. The weighted average tax burden is calculated by combining the tax regimes per country with passenger booking data (PaxIS[37]). As taxes for domestic and international traffic generally strongly differ, the tax burden is also separately determined for domestic and international travel. Some taxes, most notably VAT, are levied as a percentage of the air fare. The average VAT burden is determined by multiplying the average fare from PaxIS by the effective tax rate. Moreover, in some cases taxes differ by airport. This is for instance the case in Italy. For these cases, we first determined the total tax revenue per airport using passenger data from OAG Traffic Analyser.[38] Next, the average tax burden is determined by dividing the total revenue by the total number of passengers. For taxes which vary by booking class – such as the UK APD – we used the booking class distinction as provided by IATA PaxIS (Discount Economy, Full Economy, Other classes, Business class, First class), where Discount Economy refers to the 'lowest class'.

The tax level ranges from zero in 10 countries to an average of over € 40 per departing passenger in the UK. Other countries with ticket taxes – being Norway, Sweden, Germany, France, Austria and Italy – also have high average tax levels. Countries for which the only tax is the VAT on domestic flights have relatively lower average tax levels. For those countries where the only tax is the VAT, larger countries with a higher share of domestic traffic (e.g. Greece, Finland, and Spain), show higher values than countries with a smaller domestic market (e.g. Slovakia, Czech Republic and Latvia).

Figure 5a – Average aviation taxes per passenger in the EU, weighted average for domestic and international passengers. Average per passenger taxes are highest in the United Kingdom

Figure 4b. Average aviation taxes per passenger in the EU, for international passengers

[33] https://www.ecologique-solidaire.gouv.fr/taxes-aeronautiques#e4

[34] BCI (2015). Hoogte van (lucht)havenaanloop- en doorvoerkosten (waaronder tarieven voor inspectie en toezicht) in Noordwest-Europese zee- en luchthavens. (Dutch report)

[35] REGULATION (EC) No 882/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules

https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:165:0001:0141:EN:PDF

[36] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:02004R0882-20140630

[37] See chapter 3 for a description of PaxIS

[38] The data provided by IATA contains only data at the country level.

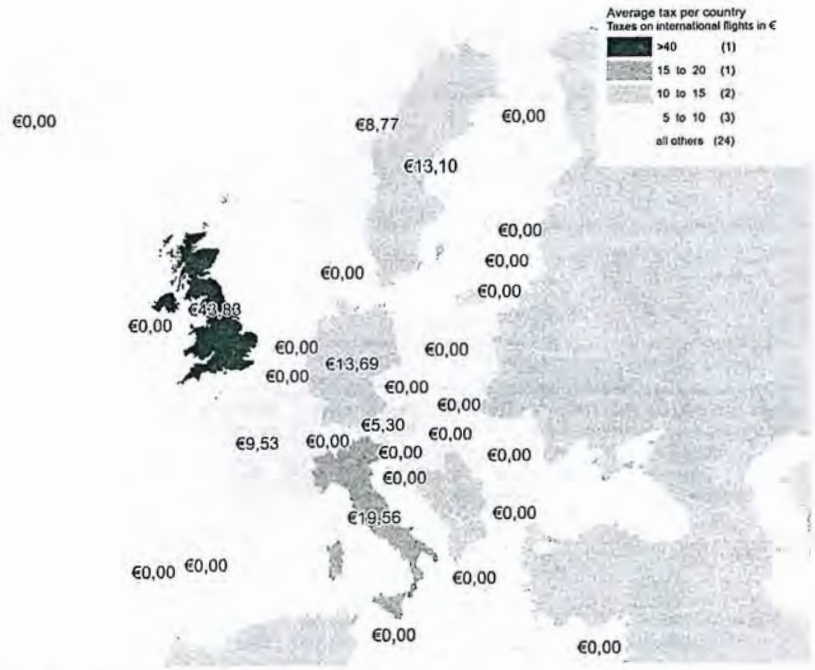
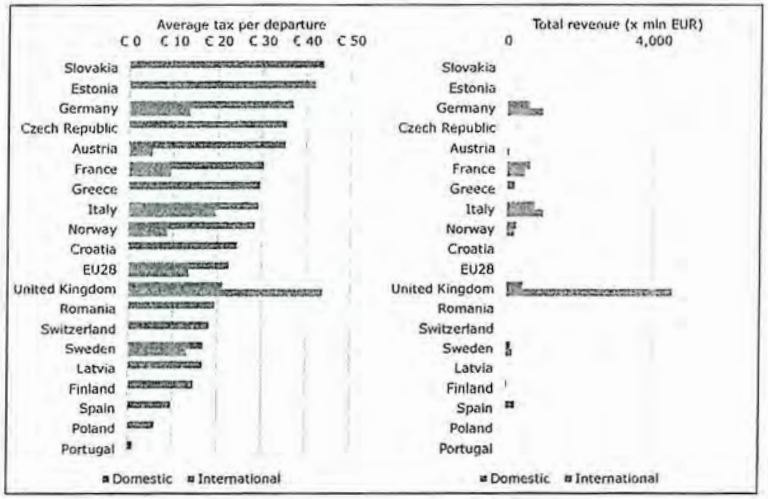


Figure 6 breaks down the average level of aviation taxes per departure between domestic and international flights. Slovakia levies the highest taxes for domestic flights. However, due to the low volume of domestic air travel in Slovakia, the country's average tax burden is close to zero and aviation tax revenues are negligible. Taxes for international flights are highest for the United Kingdom. Countries which charge high VAT rates report a high tax burden for domestic flights. Examples are Slovakia (20%) and Germany (19%). Countries with a ticket tax have the highest tax burden for international flights.

Figure 6 – International aviation taxes are highest in the UK; Slovakia levies the highest domestic taxes



Note: European countries not mentioned in the figure do not apply aviation specific (indirect) taxes or apply a zero tax rate for certain taxes. Revenues depict total estimated ticket tax and VAT revenues based on PaxIS data.

2.5.2. Aviation taxes outside Europe

Outside Europe the level of airport taxes varies. Of the countries considered, Australia has the highest taxes, mainly resulting from the AUD60 (around € 40) international departure tax. In the US and Canada sales taxes are levied over air fares and passenger charges, for flights within North America (and Mexico for the US). In the US a US$ 18 international departure tax is effective. Mexico and Brazil levy relatively high taxes on international passengers.

Figure 7 compares the average tax burden of European airports against the average tax burden on a non-European countries. In line with the calculations provided for Europe in the previous paragraph, the average tax burden is derived by estimating the average tax revenue per passenger, accounting for different tax regimes for domestic and international passengers. Passenger booking data from OAG Traffic Analyser was used to derive average fares and the number of domestic and international passengers per country.

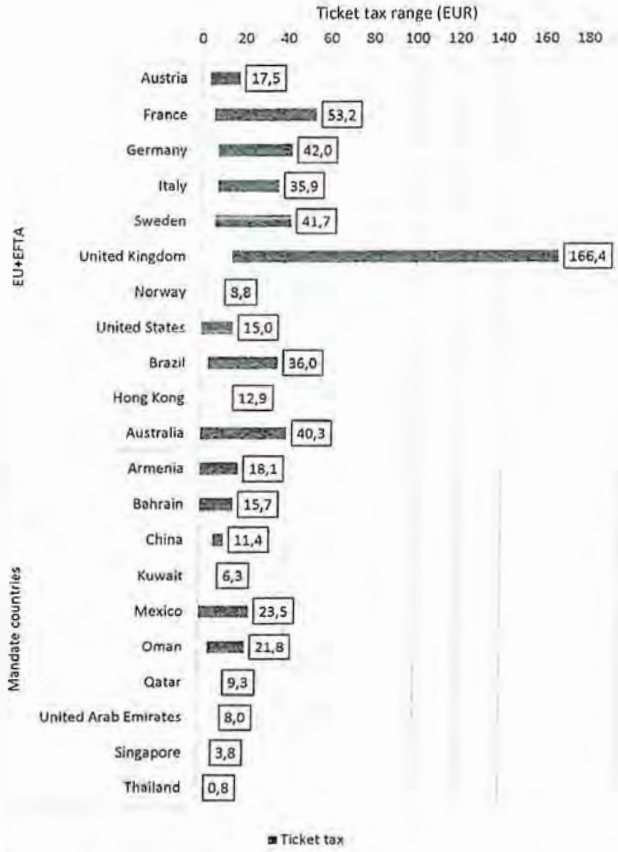
Figure 7 – Outside Europe, air travel taxes are highest in Australia

Note: Countries not mentioned in the figure do not apply aviation specific (indirect) taxes or apply a zero tax rate for certain taxes.

Various airports outside Europe levy some sort of passenger based taxes, apart from the regular passenger service charge to be paid for using airport services. For instance in the Gulf region, Oman, Bahrein, Kuwait, Qatar and UAE all have an effective airport tax or charge, varying between € 6.27-21.76 per international passenger. It is difficult to define whether these levies should be categorised as charges or taxes based on ICAO's definition. Various sources report that these taxes are used for airport infrastructure investment, and as such these should not be considered a tax.[39] The same holds for China's airport fee, which is officially labelled as "airport construction fee".[40]

Figure 8 presents the range of ticket taxes levied in the considered countries, excluding VAT. As identified before, UK levies the highest passenger based tax, particularly for intercontinental business class passengers. The range of ticket taxes – excluding VAT rates – in other European and non-European countries varies between € 0-50 per passenger.

Figure 8 – Ticket tax rates in European and non-European countries



Note: Bars indicate range of ticket taxes. Labels indicate maximum values for all ticket taxes.

Source: IATA TTBS, QPX Express API.

2.5. Policies in the case of no-shows

Airport charges and passenger taxes are levied on airlines based on the number of passengers and cargo carried. Therefore, in the event a passenger does not turn up for a flight, airlines are not billed for passenger charges and taxes. In general, airlines do not refund these charges, but only refund in case the passenger asks for it. In some cases, airlines charge an administrative fee for such refunds.

There is no standard European policy or law which requires airlines to automatically refund taxes (and passenger based charges) for unused tickets. To date, France is the only country having a legislation in force in this respect. In France, a law was introduced

[39] http://gulfbusiness.com/qatar-becomes-latest-gcc-state-to-levy-airport-tax-on-passengers/ ; https://www.theguardian.com/world/2016/mar/31/passengers-using-dubai-airport-to-pay-new-tax

[40] http://www.ebeijing.gov.cn/QA/all_questions/t1068430.htm

in November 2017 obliging airlines to reimburse taxes and charges of unused tickets[41]. This regards all taxes and charges that are related to the "effective boarding of the passenger", i.e. costs that are not due in case a ticket is not used. The law obliges airlines to reimburse these fees within 30 days. For reimbursements filed online, no invoicing costs may be levied. For reimbursement demanded through other means, the reimbursement costs may not be higher that 20% of the reimbursable amount.

Table 6 presents the reimbursement policies of some of the largest European airlines (together covering 37% of the seat capacity offered from European airports). All of these airlines do offer tax refunds on unused tickets, but terms and conditions are not always straightforward for passengers to find at airline's websites. Moreover, the forms that are supposed to be used for these tax refunds are generally the same as those to be used for cancellations and other refund requests, for which they do not appear to apply to no-shows.

Table 6 – Airline terms and conditions in case of no-shows

Airline	Cost and time limit	How?	Terms and conditions/airline website
easyJet	Free; unlimited	By calling customer service	Article 6.4: *'If after having made a booking you do not fly with us, whether or not a refund or credit to the value of the fare is payable, you will be entitled to claim a refund of any applicable APD payable by you in accordance with Article 5.2, which as a consequence we have no obligation to pay to any government or other authority on behalf of which we collect passenger duty.'*
Wizz Air Hungary	No refund of passenger-based taxes and charges	-	Article 7.2.1: *'The Fare generally includes taxes, fees and charges imposed by governments, other authorities or by airport operators on Wizz Air [...]. Any taxes and charges imposed by an airport operator, even if they are based on the number of passengers, are not refundable.*
Norwegian	Free; unlimited	By filling in a web form	Article 5.3: *'The applicable taxes and charges imposed by government authorities or airport authorities must be paid by you. If taxes or charges are abolished or reduced so that they no longer apply to your journey on the day of departure, you may claim for reimbursement by contacting us directly.'* Article 12.5: *'If according to the Fare Rules your Booking is non-refundable, the Carrier Imposed Surcharges will also be non-refundable. You can however, apply for a refund of government taxes and charges for unused Bookings.'*
Ryanair	€ 20 or £ 17; 1 month	By filling in a web form	Article 4.2.1: *'If you do not travel, you may apply in writing within one month for a full refund of government taxes paid subject to the Government Tax Refund Administration Fee at the level set out in our Table of Fees. All other monies paid are non-refundable.'*
British Airways	GBP15-30; none	By filling in a web form	According to the Table of Fees, this fee amounts € 20 or £ 17 In its section on Government taxes and fees and carrier charges: *'Government and/or airport taxes are refundable, however some countries will apply a Value Added Tax, Sales Tax or equivalent, which will only be refunded on fully flexible tickets.'*
Lufthansa	€ 30; 6 months	Via the 'manage booking' web portal	According to the airline's FAQ: *'If you request a refund because you are voluntarily returning your ticket, you will receive a refund in accordance with the fare conditions. Taxes, fees and surcharges are, with the exception of the Ticket Service Charge, fully refundable, provided that no part of the ticket has been used.* *[...]* *Should a refund be possible, there may be a corresponding charge for this depending on the type of fare booked.'*
KLM	Costs vary per ticket (US$ 30 according to KLM US website; none	By filling in a web form	According to ticket refund conditions: *'In case you cancel your flight(s) for other reasons than those mentioned above and have a non-refundable ticket, you can request a refund of unused airport tax. Booking fee, reissue fee and payment surcharges will not be refunded. Carrier imposed international surcharges will not be refunded if your ticket conditions do not allow a refund.'*
Air France	Costs vary per ticket (free for tickets issued in France; US$ 30 according to AF US website); 12 months	By filling in a web form	According to General Conditions of Sale: *'Please note that if your ticket is not valid anymore and has not been used for transportation, you have a right to reimbursement of taxes as defined in our General Conditions of Carriage depending on your actual boarding.* *In order to be refunded of these amounts, you can submit your refund request directly online (free refund) in the section Review/modify your reservation.'* According to the General Conditions of Carriage: *'Should the Passenger not travel on a flight for which they have a confirmed Reservation, the Passenger will benefit from a refund of said taxes, airport charges and other fees, payment of which is connected to actual boarding of the Passenger in accordance with the applicable regulations.'*

[41] https://www.legifrance.gouv.fr/affichCodeArticle.do?cidTexte=LEGITEXT000006069565&idArticle=LEGIARTI000032221627&dateTexte=&categorieLien=cid

Estimate of total revenues associated with no-shows

As airlines are not required to actively refund taxes (and passenger-based charges), no-shows may be a source of revenue. Estimating the total revenues associated with these no-shows is rather challenging. This would require data on the number of no-shows as well as the share of no-show passengers that request a refund. Ideally, this should be at the route level to identify the exact amount of taxes paid by these passengers.

As these data consider rather business sensitive information, this information is not publicly available.

There are however rough estimates available for the revenues associated with non-refunded airport taxes and charges. Airhelp for instance estimates these at between GBP 300 million for the UK over a 6 year period and at € 3.5 billion in Europe in 2012 alone.[42] Others sources estimate these revenues at € 30,000 a day at Schiphol and € 55,000 at London Heathrow.[43] These calculations include both airport charges and taxes. Moreover, the source of no-show rates and estimation procedures from the above estimates are unclear.

In this paragraph we try to provide a more funded estimation, although it should be emphasised that this encapsulates a very rough estimate, based on available literature and expert assumptions, and not on actual airline data.

The first step is to estimate an average no-show rate across the EU. Airlines themselves use sophisticated models to forecast no-show rates, using historical booking patterns. These estimates are used as inputs to their revenue management models, in order to determine the optimal level of overbooking: the practice of intentionally selling more seats than available, anticipating on no-shows, in order to achieve higher load factors and increase revenues.

Many airlines have a policy to overbook their flights to prevent empty seats as a result of no-shows.[44] In the EU, passenger rights render airlines with high penalty costs for denied boarding, which acts as an incentive for airlines to be conservative in terms of overbooking. As a result, the number of passengers denied boarding due to overbooking is believed to be less than 1 in 10,000 in the EU.[45] In the US, according to BTS statistics, 700 in 10,000 passengers could not board due to overbooking, mainly consisting of passengers voluntarily accepting a compensation to take a later flight. Only 0.6 in 10,000 passengers were denied boarding involuntarily in the US in 2016.

Table 7 presents the rate of passengers not showing up for their flights according to various studies and surveys. Reportedly, the no-show rates vary between 0 and 25%, depending among others on market, airline and type of the route. Various sources report load factors from more than 10 years ago, however it remains unclear whether no-show rates have decreased or increased. The increase of online booking has made it easier for passengers to change or cancel bookings, which could have led to a decrease of no-show rates. On the other hand, the decrease of air fares and the rise of low-cost carrier travel could have increased no-show rates, as the costs of not showing up have decreased.

Table 7 – Information on the share of no-shows

No-show rate	Description	Source
2.5-5%	Estimated no-show rates using airline data of 2001/2002, for passengers for which an e-ticket was issued.	Garrow & Koppelman (2004)
0-10%	For a numerical analysis of a model on the impact of overbooking, the show-up rate is set as a random variable uniformly distributed between 0.9 and 1.	Guo et al. (2016)
6%	Global no-show rate of Air Canada, based on data for April 2009.	Dupuis et al. (2012)
15-25%	In the United States, domestic airline no-show rates average 15–25% of final predeparture bookings.	Barnhart et al. (2003)
10% in 2001; 4% in 2004	The analysis of passenger no-show rates at Continental Airlines shows that they have decreased dramatically from around 10% in 2001 to 4% in 2004 for Continental's domestic network.	Gorin et al. (2006)
5%	Used as a no-show parameter on a study on the viability of long-haul low-cost services: "[...] there is likely to be very few "no-show passengers". An average of 5% of passengers appears reasonable for unexpected changes (passengers missing their flight, exceptional flight cancellations, etc.)."	De Poret et al. (2015)
10%	Used as no-show parameter in a numerical study: "each passenger will independently become a no-show with probability p = 0.1".	Lan et al. (2015)
10%	Mean no-show rate for over 15,000 Air Canada flights between January and July 2002.	Lawrence et al. (2003)
5-12%	According to a survey by Gulf News. "The airlines, that responded to the survey, report that flights are overbooked from between 5-12%."	Gulf News (2002)
4% (3 mln over a total of 74.5 mln)	According to an EasyJet spokesperson: "Last year, nearly 3 million easyJet customers didn't show for their flights."	Independent (2017)

Based on the numbers in the table above, we assume the no-show rate to be around 5%, in line with the numbers mentioned in the most recent studies and surveys. This also corresponds to the no-show rate for EasyJet in 2016. According to a spokesperson from the airline around 3 million (out of 74.5 million) passengers did not show up for their flight, amounting to around 4%. For network carriers, the no-show rate is likely to be slightly higher, due to a higher share of business travel and a higher share of connecting passengers. To incorporate a margin for uncertainty, we apply a lower boundary on the no-show rate of 2.5% and an upper boundary of 7.5%.

In addition, information is required on the share of no-show passengers that do not apply for a refund. This strongly depends on the airline policy and on the passenger. As mentioned above such data is not publicly available. Therefore, assumptions are required. Passengers may be unaware of the fact that they are entitled to a refund on taxes (and passenger-based airport charges). In addition, we have seen above that some airlines are unclear on how to apply for these refunds, decreasing the likeliness that passengers apply for refunds. Moreover, the benefits of obtaining a refund may not outweigh the efforts required to apply for a refund. Based on these considerations, we assume that 25-75% of the no-show passengers do not apply for a refund. Although further research would be needed to narrow down this range, we are of the opinion that the higher value is probably closer to reality.

As a result, we find that the range of no-show passengers not applying for a refund is between 0.625% and 5.625% (2.5% * 25% = 0.625% to 7.5% * 75% = 5.625%) of the total number of air passengers in the EU will not claim back the taxes they have paid to airlines. Multiplying this by the total amount of taxes[46] paid by domestic and international

[42] https://www.airhelp.com/en/blog/flight-taxes-and-fees-airhelp-teams-up-with-flight-tax-refund-service-airtaxbackcom-17/

[43] http://www.re-fund.com/how-to-get-an-airport-tax-refund-unused-ticket/

[44] In this respect, budget carrier Ryanair claims to be the only exception in Europe, not overbooking their flights (https://corporate.ryanair.com/about-us/passenger-charter/).

[45] https://www.ft.com/content/e4cb5744-1e9d-11e7-a454-ab04428977f9

[46] Excluding VAT, as VAT cannot be claimed back by passengers.

air passengers in the EU in 2016, as identified from the analysis earlier in this chapter, yields the total amount of additional revenue generated by airlines through non-refunded taxes (see Figure 5 "International aviation taxes are highest in the UK; Slovakia levies the highest domestic taxes" for tax revenues of each Member State). Using the parameters defined above, we estimate these revenues to lie in the range of € 50-€ 475 million per year in the EU (again, we are of the opinion that in reality, the higher values are more probable).

3. Modelling the Impacts of Aviation Taxes

3.1. Introduction

One of the aims of this study is to develop a simple, easily calculable and generally applicable methodology that stakeholders could use in the future in assessing the effects of the introduction, change or abolition of aviation taxes or aviation-specific tax exemptions. The model is described in this chapter will be programmed in a tool for the quantification of impacts.

The model is a partial equilibrium model to analyse the impacts: because the tax or tax exemption affects the price of flying, the first impact is on the demand for aviation. The extent to which the demand is changed is given by the price elasticity of demand. The change in demand results in a change of supply, i.e. the number of flights changes and as a result the connectivity changes. This also has an impact on noise and emissions. The change in demand causes a change in output of the aviation sector which has an impact on direct and indirect jobs and value added. This impact is calculated by an input-output analysis. The change in fiscal revenue also has an impact on the output of other sectors, which has an impact on jobs and value added. Together, these impacts cause a change in GDP.

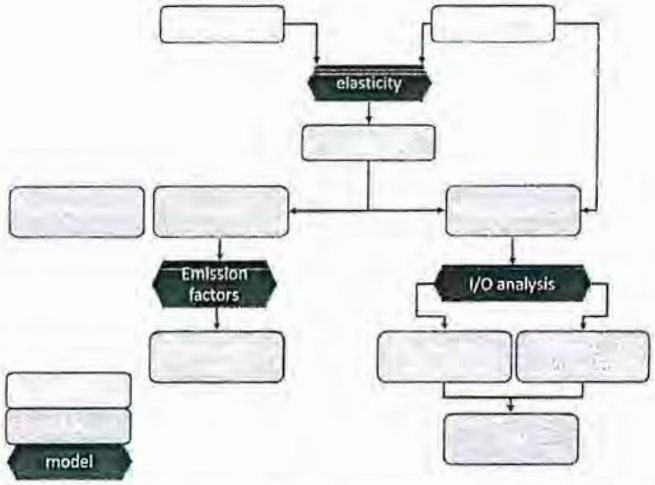
Hence, the following impacts are modelled:

1. Passenger demand.
2. Change in the number of flights and connectivity.
3. Jobs (direct and indirect).
4. GDP.
5. Fiscal revenue from the aviation sector.
6. CO_2 emissions.
7. Noise.

Outputs are provided in relative terms and, where possible, in absolute terms.

Figure 9 provides a graphical representation of the relations between the tax and the impacts.

Figure 9 – Model to estimate impacts



Whilst this partial model does not take into account the second- and third-order effects in the economy brought about by changes in prices and disposable incomes, it has the great benefit of being transparent in the sense that the results can be easily traced back to the design of the tax.

Note that the impact of taxes and tax exemptions on air cargo have not been modelled because the data sources used do not contain information on air freight rates nor on price elasticities of demand for air freight. As reported in Chapter 2, most aviation taxes exempt air cargo, and most tax exemptions apply equally to cargo and passengers.

The remainder of this chapter is devoted to the presentation and justification of the model and its input values.

3.1.1. How the model can be applied

The model is well suited to provide a first estimate of the most important impacts of the introduction or abolishment of an aviation tax or the abolishment of a tax exemption.

The model favours transparency over mathematical detail. The results are traceable to the inputs, but in most cases, feedback loops that are present in the economy are not incorporated in the model. The model uses average airport charges per Member State, average ticket prices per category of consumers, and average estimates of environmental impacts.

If an accurate estimate of, say, the impact of a ticket tax on noise exposure around a certain airport is required, additional analysis should be undertaken.

3.1.2. Treatment of fiscal revenues in the model

One important choice that was made in the model is the view of the state in generating fiscal revenue.

The change in aviation taxes can either be a revenue-neutral tax reform, or change the total fiscal revenue.

In case of a revenue-neutral tax reform, modelling the GDP impacts as a net-zero impulse is logical. After all, taxes are shifted between different tax bases, but the total fiscal revenue does not change. In reality, the GDP and welfare impacts may depend on how the revenues are recycled (Patuelli et al, 2001; Bovenberg et al, 1993) (Ballard et al, 1985) , but this is beyond the scope of the report.

In case of a change in fiscal revenue, the impact on GDP depends on how the change affects the economy. This can be either:

- A change in public spending; or
- A change in the government deficit or surplus.

In the former case, modelling the GDP impacts as a net-zero impulse makes sense because the change in public spending will change the output of economic sectors and thus value added (Ballard et al, 1985).

In the latter case, impact on GDP is harder to determine. A lowering of fiscal revenue would require the government to borrow more, thus driving up interest rates and lowering investment and borrowing. At the same time, the fiscal stimulus would result in higher demand. The balance of these two counteracting factors is hard to determine. (An increase in fiscal revenue would have the opposite effect).

However, when a change in taxation of the aviation sector results in a change of total fiscal revenues, the impacts of the change in taxes cannot be disentangled from the fiscal stimulus (in case taxes are lowered) or austerity (in case taxes are increased).

Studies on environmental tax reform generally assume that environmental taxes are recycled (e.g. Ekins 2007) (Conefry et al. 2008) (Williams et al., 2014). In studies specific to aviation taxes, some focus only on the impacts on the aviation sector (Fukui et al 2017), others (mostly those commissioned by the aviation sector) have changes in taxation coincide with fiscal stimulus or austerity, yet others assume that taxes are rebated or fiscal revenue leads to higher government spending (Forsyth et al., 2014), while still others point to the welfare loss associated with leaving a sector untaxed (Keen et al., 2013).

The studies that assume that taxes are rebated or lead to higher government revenues, generally conclude that the impacts of aviation taxes on employment an the environment are limited. In Sweden (Loman et al., 2016), the study found that employment would shift between sectors, but that the overall level of employment would hardly be affected. The economic impacts were assessed to be 'limited'. An ex-post evaluation in Austria (IHS 2014) found it unlikely that there had been negative impacts of the Austrian tax. A study in the Netherlands (CE Delft, 2018) found that the overall impacts on GDP and employment on the whole economy would be positive. An exception is Scotland, where a study into halving the Air Passenger Tax indicated that the additional Gross Value added would be higher than the tax revenue foregone (Scottish Government, 2017). However, this study did not assume that the foregone fiscal revenues would somehow be compensated by higher other taxes or result in lower government spending.

In summary, except in the case where environmental taxes are part of a fiscal stimulus or an austerity package, the right way to model their impact on GDP is to assume that simultaneous with the change in aviation taxes, either other taxes are changed, or government expenditures change. This report follows that path, which is the one often taken in the academic literature on tax reforms, and not uncommon to independent studies on aviation taxes.

Therefore, the model regards the state as an entity that generates fiscal revenue which is entirely spent domestically. The model assumes that States balance their budgets, at least in the long term, or have constant deficits or surplusses. This means that the

introduction of an aviation tax either prevents the increase of another tax, results in a decrease of other taxes or results in higher public expenditures (and conversely, the abolition of an aviation tax would result in lower public expenditures or higher taxes on other activities).[47]

This assumption is consistent with a view of the state as a revenue-neutral entity: it raises the taxes it needs to raise in order to provide the public expenditures that the electorate requires, while at the same time ensuring that the budget deficit or surplus does not exceed the level that the electorate requires.

Note that the assumption does not necessarily assume that states have a balanced budget every year, neither that they balance their budget over the business cycle.

The impacts of this assumption are discussed in more detail in Sections 3.5 and 4.11. In Section 3.5, the impacts of the decrease in aviation taxes and the impacts of the increase in other taxes or government expenditures are shown separately. Section 4.11 compares the results of our study with the findings of a study which assumed that the abolition of a tax would coincide with a fiscal stimulus.

3.1.2. Outline of the chapter

Section 3.2 describes which data are used in the model.
Section 3.3 presents the way in which passengers are grouped.
Section 3.4 describes how the different types of taxes are modelled.
Section 3.5 presents the mathematical modelling of the different impacts.

3.2. Data inputs

In this section we will describe the chosen base year, the steps taken to determine the final ticket price, as well as the steps needed to model the effect of the excise duty and VAT on tickets. While the data are provided for all 28 EU Member States, this section provides examples for Germany, since that country levies ticket taxes and VAT (only on domestic flights) and this way it provides a good example of how we have processed the data.

3.2.1. Base year

We report effects relative to values in the base year 2015.

The base year should not be interpreted in the sense that the values we report for indicators in that year are the exact values for 2015. Rather, the values should be interpreted as approximations for values in years around 2015. This interpretation of the base year as indication for the time period, rather than an exact representation of it, reflects the uncertainty around the values we report. The uncertainty arises from unavoidable assumptions and approximations we have to make, such as that input/output coefficients, employment intensities and aviation demand elasticities are stable over time and that all fares are paid in the country of origin of the flight (a simplification with regards to transfer flights).

[47] An alternative view could be that aviation taxes impact the budget surplus or deficit, which in turn impacts the interest rates in the economy. In this view, the introduction (abolition) of taxes would reduce (increase) the deficit, resulting in lower (higher) interest rates, which encourage (crowd out) investments in the economy, resulting in higher (lower) growth of other industries. This would, however, be harder to model in a simplified linear model.

These necessary assumptions and approximations imply we cannot report values with a precision that would justify further assumptions to report values for an exact base year. Instead, depending on the indicator, we report values for the most recent year depending on data availability after 2015. Our interpretation of the base year 2015 is that the reported values are good approximations of real values for years around 2015.

3.2.2. Passenger volumes

Passenger volumes were acquired from IATA for the period August 2016–July 2017, which was the most recent 12-month period at the start of data modelling. The use of IATA data was part of the Terms of reference of the project. The benefit of this datasource is that is provides a consistent set of passenger volume and air fare data.

In order to compare the IATA passenger volume data with other data, a comparison with Eurostat was made. Eurostat provides data on the number of passengers per Member State based on data per airport for 2016[48].

The Eurostat data did not exactly match the PaxIS data. There are a number of reasons for this:

- PaxIS data were obtained for the last 12 consecutive months before the start of the data modelling: August 2016–July 2017, while Eurostat data are reported per year or per month, but recent months are not yet available at time of writing.
- Eurostat data are based on departing and arriving passengers per airport, including transfer passengers, while PaxIS data are based on tickets sold through the IATA's BSP (Billing and Settlement Plan) system. The passenger numbers in PaxIS are adjusted for tickets sold by other airlines.

subsequently, PAXIS data were scaled to the Eurostat level as explained in the textbox hereafter.

Passenger volume adjustment:

1. The IATA data consists of departing passengers while Eurostat's airport data consists of the aggregated number of departing, arriving and transfer passengers. We firstly subtracted the number of transfer passengers from this data. The number of transfer passengers is known for most Member States, however for some it is not known at all (e.g. Bulgaria and Greece), or only for previous years (e.g. the UK up to 2013). We supplemented the transfer data with other sources as much as possible. For Greece we used the number of transfer passengers from Athens International Airport as a proxy for the number of transfer passengers in Greece (https://www.avialliance.com/avia_en/data/pdf/AIA_Annual_Report_2016.pdf) and for Luxembourg this was estimated at 0.4% of the total number of passengers (http://www.dlr.de/fw/Portaldata/42/Resources/dokumente/paper/Maertens_Grimme_Transfer_Rate_estimation.pdf). For the UK we used the percentage of transfer passengers in 2013 based on Eurostat and assumed that this percentage also applies over 2016. For the other Member States (inter alia Bulgaria) no data was found hence we took the weighted average of transfer passengers from the Member States with available data (11%) and applied this to each Member State with lacking data.
2. The number of passengers (excluding transfer passengers) was then halved to approximate the number of departing passengers by assuming that the number of departing and arriving passengers is the same once we subtracted the number of transfer passengers.

[48] The Eurostat source we used was "Airport traffic data by reporting airport and airlines (avia_tf_apal)". We decided to use this data source instead of the "Air passenger transport by reporting country (avia_paoc)" source as it is not clear how the number of transfer passengers relates to the latter data source. It is namely important to deduct the number of transfer passengers in order to produce a similar measurement with respect to the IATA data.

In the following table a comparison is made between the IATA and Eurostat data for departing passengers in Germany. Eurostat data has been adjusted based on the steps highlighted in the textbox above.

Table 8 – Comparison of data sources for departing passengers in Germany

Data source	Number of departing passengers	Year
IATA	87,331,309	August 2016-July 2017
Eurostat	99,323,097	2016

For Germany the IATA data is underestimated by around 14% relative to the Eurostat data. We will scale the IATA passenger data up with this factor (1.14) for Germany, and will likewise do so for the other Member States.

3.2.3. Ticket prices

The PaxIS data originates from IATA's BSP system, which covers 180 countries and 400 airlines, although it is not exhaustive. Not all airlines use BSP, and amongst those which do not, low-cost carriers dominate. IATA makes estimates for passenger volumes of airlines not using BSP but not for the average ticket price data. This means that IATA's average ticket price data is an overestimation of the true average ticket price for intra-EU and domestic flights, since low-cost carriers predominantly fly on routes within the EU. For intercontinental flights this poses less of a problem.

Despite the data gaps, IATA's PaxIS database is the most comprehensive data on ticket prices available. QPX Express API (Section 2.3.2.) provided price data for single tickets but not averages. Statistics on e.g. tourism expenditures do not provide detailed disaggregation on destinations and flight class. By excluding some low-cost airlines, which predominantly fly on intra-EU routes, the largest deviation is likely to occur in the category of economy class passengers on intra-EU routes. In order to estimate the possible deviation in the data, we have compared the average fares for these passengers from the PaxIS database with the average fares of some of the largest low-cost carriers in Europe: Ryanair, easyJet and Wizz Air[49] (other major low-cost carriers do not publish average fares).

In the following table the average ticket price for German passengers departing for European or domestic destinations is given (based on IATA data) and compared with the average fares of some of the largest low-cost carriers in Europe. The low-cost average fares all included airport charges for single tickets, but excluded taxes such as VAT or ticket taxes. Therefore in order to make a like-for-like comparison with the IATA data, which initially excluded all charges and taxes for single tickets, the airport charges were included for the IATA data.

From the following table it is clear that for our Economy class passenger group (see Section 3.3) the weighted average single ticket price for European and domestic destinations for Germany is significantly higher than those for the low-cost carriers: the latter range from around € 45 to 65 per ticket, while the IATA data points to an average ticket price of € 101.

[49] https://centreforaviation.com/insights/analysis/europes-top-20-airline-groups-by-passengers-2017-lufthansa-wrests-top-spot-from-ryanair-394211

Table 9 – Comparison of IATA PaxIS data on ticket prices for European economy flights with large low-cost carrier average fares

Airline	Average fare (€)	Number of departing passengers (million)	Year	Source
Single ticket fare IATA Germany economy class	101		August 2016 to July 2017	IATA PaxIS data
Ryanair	46	106	2016	Annual Report[50]
easyJet[51]	65	73	2016	Annual Report[52]
Wizzair[53]	45	20	2016	Annual Report[54]
Average LCC fare	**53**		2016	

Using the IATA data will therefore lead to an overestimation of the average ticket prices for *European* and *domestic flights*. We consequently adjusted the IATA ticket price for each Member State by using the share of low-cost carriers in passenger departures for each Member State (based on EUROCONTROL data[55]) with the weighted average ticket price of these three airlines (which is € 53). In 2016 approximately 30% of all European flights were flown by low-cost carriers[56], however this varies strongly between Member States, with Germany having a share of around 33% of low-cost carriers in 2016 while Spain had around 55%. Assuming that the three airlines are representative for the average ticket price of low-cost carriers in Europe we are able to adjust the average ticket price per Member State for domestic and European flights using the following formula for Member State *i*:

$$Adjusted\ price_i = (Share\ LCC_i * \#\ Pax\ IATA_i * Average\ price\ LCC) + ((1 - Share\ LCC_i) * \#\ Pax\ IATA_i * Average\ price\ IATA\ economy\ domestic\ and\ European_i)$$

BARE AVERAGE TICKET PRICE

The average ticket prices are for departing passengers, however they do not include aviation taxes currently levied in the MS of departure, airport charges levied by the airport of departure, domestic VAT levied on domestic flights, nor the EU ETS certificates which airlines need to acquire for intra-EU flights. The IATA ticket prices, which we call

[50] https://investor.ryanair.com/wp-content/uploads/2016/07/Ryanair-Annual-Report-FY16.pdf

[51] easyJet does not publish the average fare in their annual report but rather the revenues per seat (£ 58.46), hence this acts as a proxy for the average fare.

[52] http://corporate.easyjet.com/~/media/Files/E/Easyjet/pdf/investors/result-center-investor/annual-report-2016.pdf

[53] Wizzair also does not publish the average fare in their annual report but rather the average passenger ticket revenue, which also acts as a proxy for the average fare.

[54] https://cdn.static.wizzair.com/static/downloads/ipo/Wizz_Air_Holdings_Plc_Annual_report_and_accounts_2016.pdf

[55] In EUROCONTROL's STATFOR dashboard (http://www.eurocontrol.int/statfor) data on the number of flight departures per Member State is gathered amongst others for low-cost carriers, traditional scheduled and all-cargo flights. Based on the data for 2016 we could determine the percentage of flight departures which were flown by low-cost carriers.

[56] http://www.eurocontrol.int/news/rapid-rise-low-cost-carriers

the *bare* average ticket price, are similar to *air fare* as defined by the Commission in Article 2(18) of the Regulation 1008/2008[57].

The consumer price however comprises the bare ticket price, airport charges and taxes where applicable. In order to complement the bare ticket price data with the taxes and charges levied in each MS we acquired IATA's Aviation Charges Intelligence Centre (ACIC) database. This database covers the largest airports in each MS. Since the passenger volume and ticket data are given on a country-destination basis, we do not know from which airport passengers departed from in each MS. Eurostat has data on where passengers depart from in each MS which we used to pinpoint the airports of departure. The relevant airport charges used in our model per MS are described in the following textbox.

Airport Charges per MS:

- For countries where there is one main airport (such as Austria, Czech Republic, Denmark, etc.), or where there is hardly any difference in rates with other major airports (such as Bulgaria), we used the rates of the largest airport.
- For countries where there are several large airports with different rates, a weighted average of the airport charges for the largest airports was determined.
- Discounts for children/students were not included, while different tariffs between Summer and Winter (e.g. Ireland) were averaged.

The ticket taxes and airport charges are often differentiated into different groups according to the distance. Insofar as the differentiation coincides with our segmentation of passengers (domestic, intra-European and intercontinental, economy and premium class, see Section 3.3), we used the existing differentiation. Where the boundaries were different, we calculated weighted average ticket tax and airport charge per country destination and added this to the bare ticket price. Finally, we included the VAT rate levied on domestic flights where this is applied.

We did not include the costs of purchasing EU ETS certificates for intra-EU flights in the ticket price since we do not know what is the distribution of these costs over Member States. Moreover, the costs are negligible. According to IATA[58] these costs were € 40 million in 2013 for all intra-EU flights. This is three orders of magnitude smaller than the revenues of airlines of intra-European flights originating in Germany alone, which were € 16.5 billion according to the PaxIS figures.

FROM SINGLE TICKETS TO RETURN TICKETS

The PaxIS database contains information on airline revenues for unidirectional flights. In reality, most passengers book return tickets. In order to adequately model some taxes, prices of return flights are needed. We therefore make the simplifying assumption that all departing passengers are return passengers, and that the average ticket prices should be doubled. This is a necessary simplification since we do not know if passengers departing from for instance Germany to the US are German nationals going on holiday to the US, US citizens returning from a holiday in Germany, or German nationals immigrating to the US.

[57] "Air fares' means the prices expressed in euro or in local currency to be paid to air carriers or their agents or other ticket sellers for the carriage of passengers on air services and any conditions under which those prices apply, including remuneration and conditions offered to agency and other auxiliary services" (https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32008R1008&from=EN)

[58] https://www.iata.org/publications/economics/Documents/EUETS-cost-briefing-march-2013.pdf

Since airport charges are levied in all countries, we assume that return flights will also include an airport charge for the return-leg of the flight. However since our airport charges data only covers the EU+EFTA countries we assume that the airport charges of the return leg are equal to the airport charges of the outbound flight departing from the largest airport in the MS. Consequently, we doubled the airport charges per country-destination for each MS. For flights that include a transfer, passengers also pay airport charges at the transfer airport. However, since the PaxIS data do not contain information on whether flights are direct or not, we do not include airport charges for transfer passengers in the ticket prices. This results in an underestimation of the average ticket price, especially on intercontinental flights where transfers are more likely to occur than on domestic or intra-European flights.

Having combined the doubled *bare* average ticket price with the taxes and charges per MS as well as the VAT levied on domestic flights, we were able to aggregate the data to calculate the final average ticket price per MS.

The following table provides an example of the aggregation needed to reach the final average ticket price for Germany for all return passengers. Note that the current ticket tax, the doubled airport charges and the VAT levied on domestic flights are the weighted averages for all German return passengers. In other words, the total VAT revenue levied on domestic tickets divided by the total number of passengers, both domestic and international, amounts to € 6 per passenger.

Table 10 – Ticket price components for Germany

Ticket price components	
Weighted average ticket price (doubled)	€ 259
Weighted average of airport charges (doubled)	€ 44
Weighted average of current ticket tax	€ 13
Weighted average of VAT (only levied on domestic flights)	€ 6
Final average ticket price	**€ 325**

3.2.4. Employment data

Employment data were obtained from Eurostat's National Accounts. The most recent year for which data on sector level is available is 2015.

3.2.5. GDP data

GDP data were obtained from Eurostat's National Accounts. The most recent year for which data on sector level is available is 2015.

3.3. Passenger groups

The average ticket price and volume data per MS is further split into 5 classes of passengers by IATA: first, business, full economy, discount economy and other (which is predominantly a shuttle service with no reservation). We aggregated this data into two groups: a first and business class group, and an economy group consisting of full and discount economy, as well as the shuttle service group (group other). A fare adjustment is made for the economy passengers on intra-EU flights, to account for passengers flying with low-cost airlines (see Section 3.2.3.).

In order to model the demand effects as accurately as possible we used elasticities which differentiated between business and economy class; and secondly which differentiated between domestic flights, European flights and intercontinental flights (see section 3.5.1. for these elasticities). This differentiation is presented in the following table.

Table 11 – Passenger groups

Geographic zone	Domestic		Europe		Intercontinental	
Passenger group	First/business class	Economy class & other classes	First/business class	Economy class & other classes	First/business class	Economy class & other classes

The model determines the change in passenger demand on the level of the type of passenger, of which there are 6 groups, as shown in the table above. After having calculated the demand effects per passenger group, these can be summed to give the total demand effect (see Section 3.3).

3.4. Modelling taxes

The model comprises three types of taxes: ticket taxes, value added taxes and excise duties on fuel. Each is modelled in a different way, as discussed in this section.

In the base case, we assume that international flights are exempt from VAT and excise duties (see Chapter 2).

3.4.1. Ticket taxes

The base case assumes that the ticket taxes are in place that were identified in Chapter 2.

With regards to the ticket taxes we assume that they are only levied in the country of departure. This is the common practice with such taxes in both EU countries and other countries included in this study, as shown in Chapter 2. In contrast to VAT (as modelled in this study), they also apply to inbound passengers which pay the ticket tax on their return leg.

3.4.2. VAT

In this study, VAT is modelled as an ad-valorem tax on the purchase of a ticket. The model contains the standard and reduced VAT rates of the Member States, as well as a zero rate. For example, for Germany these are: standard (19%), reduced (7%) and zero (0%). If the user of the model selects a non-zero VAT rate on domestic and/or international flights, VAT is levied over the final average ticket price including the current ticket taxes and airport charges. The final average ticket price also includes the VAT on domestic aviation tickets for countries which levy this. In effect we assume that airlines would pass on the VAT to passengers for 100%.

When the exemption on VAT is abolished, we assume that VAT is charged on the entire value of the ticket in the country where the ticket is sold. So if Germany were to introduce VAT, it would be levied on e.g. a ticket to Spain that was sold in Germany, but not on a ticket from Spain to Germany that was sold in Spain.

It should be noted that such a tax is not in line with the VAT Directive (2006/112/EC) which specifies that VAT can only be levied 'where the transport takes place, proportionate to the distances covered' (Article 48). This means that a VAT on a ticket from Member State A to neighbouring Member State B could under the present directive only be levied for a share of the ticket price proportional to the share of the distance flown in Member State A. A change in these rules would require a unanimous decision by the Council, which means a compromise that is rather challenging to reach among Member States and therefore any changes to VAT legislation is not realistic to forecome in short time

Because the impact of a change in the VAT rate on ticket prices is calculated on the basis of the price of tickets sold in a country, the impacts on the number of passengers is overestimated when relatively many international transfer passengers use the airports in a country as a hub. This results on an overestimation of the impacts on the aviation sector, GDP and the number of flights, emissions and noise.

3.4.3. Excise duty

As was discussed in Section 2.4.3., aircraft fuel is currently exempt from excise duties. The model can estimate the impacts of a removal of the exemption. It contains a standard rate of € 330 per 1,000 litres[59] (which is the minimum rate in the Energy Taxation Directive 2003/96/EC for kerosene used in other sectors than aviation).

Eurostat provides data available on kerosene sold per Member State from 2016 for international and domestic aviation. We however do not know the share of fuel consumed per passenger group. In order to estimate this, we firstly used the PaxIS revenue data to estimate the share of revenues per passenger group. The share of revenues acts as a proxy for the share in kerosene consumed per Member State since the further one flies, the higher the fuel costs, and hence the higher the revenue has to be of the flight relative to a shorter flight, all else equal. We can then estimate the fuel consumed per passenger group. If an excise duty is levied of € 330 per 1,000 litres, this will lead to a relative ticket price increase.

When the exemption in excise duty is abolished, all the fuel sold to aviation in a Member State is subject to the excise duty. This affects both departing and arriving passengers, but only for one leg of their journey, viz. the leg that departs from the state which levies the excise duty. In principle, it also affects transfer passengers but since the PaxIS database does not contain information on the routing of passengers, we have not been able to model this impact.

Because the impact of a change in the excise duty on ticket prices is calculated on the basis of the price of tickets sold in a country, while the fuel is used to carry OD[60] passengers as well as transfer passengers and freight, the impact of an excise duty on ticket prices is overestimated when

- relatively much fuel is used by full freighters; or
- relatively many international transfer passengers use the airports in a country as a hub.

In those cases, changes of jobs in the aviation sector, GDP, flights, emissions and noise are overestimated.

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[59] https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/excise_duties/energy_products/rates/excise_duties-part_ii_energy_products_en.pdf

[60] Origin and Destination traffic: passengers arriving or departing from that airport, as opposed to making a connection there

3.5. Impacts

The impacts of taxes on the following parameters are modelled:

1. Passenger demand;
2. The number of flights and connectivity;
3. Jobs (direct and indirect);
4. GDP;
5. Fiscal revenue from the aviation sector;
6. CO_2 emissions;
7. Noise.

3.5.1. Passenger demand

The effect of a change in aviation tax on the passenger demand will depend on the level of the tax relative to the ticket price, how much of the tax is passed on in the ticket price and how price sensitive passengers are to an increase/decrease in prices.

After determining the ticket price per MS for each of the groups of passengers we can determine the effect of a tax change on the number of return passengers. Three types of tax regimes can be changed:

- a ticket tax levied/abolished in the MS;
- abolishing/introducing the VAT-exemption on aviation tickets;
- abolishing the exemption of excise duty on aviation fuel.

Note that these three types of tax can be chosen simultaneously in the model. In practice however the regimes are mostly levied separately: in the UK for instance the introduction of the Air Passenger Duty was partly a result of the exemption of VAT and fuel excise duties in the aviation sector (Seely, 2012[61]).

The cost pass-through rates depend on the market and the type of competition in the market. There is disagreement in the literature. For example, Koopmans and Lieshout (2005) argue on the basis of theoretical considerations and the assumption that aviation markets are Cournot-type oligopolies that the pass-through rate for airline-specific cost increases is less than 50%, whereas the pass-through rate for industry-wide cost increases is more than 50%. Vivid Economics (2007) argue that, depending on the elasticity of demand, and also assuming that aviation markets are Cournot-type oligopolies, pass through rates of more than 100% are possible. CE Delft (2007) argues that aviation markets show characteristics of Bertrand-type oligopolies (the profit margins do not suggest large oligopoly rents) and that therefore, the cost pass-through will be 100%. The model offers a choice between a 50 and 100% pass through rate.

With respect to the price elasticity of demand[62] we used Intervistas (2007) where a number of elasticities are provided. For the three main groups of passengers (Domestic, Europe and Intercontinental) we used the following national level elasticities for economy class passengers:

[61] http://researchbriefings.files.parliament.uk/documents/SN00413/SN00413.pdf

[62] A price elasticity of demand is the percentage change in the quantity demanded resulting from a 1% change in the price for a good or service. It reveals how price sensitive the demand is for a good or service.

1. For Domestic flights we used the intra-Europe short-haul elasticity of -1.23.
2. For the European flights we used the intra-Europe long-haul elasticity of -1.12.
3. For the intercontinental flights we used the national elasticity of -0.8.

Short-haul flights generally have a higher elasticity in absolute terms (i.e.lower) compared to
long-haul flights since the likelihood of inter-modal substitution is greatest in case of a fare increase as the car or train can act as a substitute. For long-haul flights there are no alternative modes of transport, hence passengers are relatively less price sensitive.

In order to correctly model the change in demand for first/business class passengers we modified the elasticities by using the business class dummy elasticity of Brons et al. (2001). The business class elasticity of 0.552 is presented in relation to that of the economy class elasticity: i.e. business class elasticities are 0.552 higher than economy class elasticities, all else equal, and are therefore less price sensitive. We assume that this relation has not changed over the years and that the relation is the same for first class passengers. We could then determine the business class elasticity in relation to the economy class elasticity for the main passenger groups. These elasticities are given for the different passenger groups in the following table.

Table 12 – Passenger groups and elasticities

Geographic zone	Domestic		Europe		Intercontinental	
Passenger group	First/business class	Economy class & other classes	First/business class	Economy class & other classes	First/business class	Economy class & other classes
Elasticity	-0.68	-1.23	-0.57	-1.12	-0.25	-0.8

After having determined the demand effect for each of these passenger groups, the demand effects were summed to give the total change in demand for the MS.

It should be noted that our model does not include a modal shift when a tax increase depresses demand since this is beyond the scope of our study.

3.5.2. Change in number of flights and connectivity

A change in aviation taxes will result in a change in passenger demand. This will lead to a change in the number of flights for a specific route since airlines may cancel some flights if the passenger load factor of the flight becomes below expected profit rates. A change in the number of flights will also impact the connectivity of passengers, since this will impact the number of direct flights[63]. As connectivity and the number of flights are very similar we will treat them as one impact.

In the model we assume that a 1% change in the passenger demand will lead to the same percentage change in the number of flights. At a city-pair basis, modelling the

[63] Connectivity is defined as the number of direct flights offered.

impact of changes on demand would require knowing the current passenger load factors, the importance of certain flights to airline networks and the route-specific price elasticity of demand. This information is not known. Moreover, our model does not have a city-pair as a unit of analysis, but rather demand for aviation to a country. At this aggregate level, it is justified to assume that the change in the number of flights will be proportional to the change in passengers.

The model assumes that the number of flights will change proportionally for all designations. This means that the number of direct connections will change in proportion to the number of flights.

3.5.3. Jobs

A change in aviation taxes will change demand for aviation and, as a result, the employment in the aviation sector. When demand for aviation is changed, the output of sectors that supply to the aviation sector (e.g. the fuel sector, catering, et cetera) also changes.

Because of the revenues from aviation taxes are used for certain ends (e.g. to lower other taxes or prevent increases in other taxes, or to increase government expenditures) changes in aviation taxes also have employment effects in the wider economy.

Hence, the total employment effects of changes in aviation taxes are the sum of:

1. The change in the number of direct jobs in the aviation sector based on Eurostat's Passenger air transport services sector[64].
2. The change in the number of indirect jobs from the major suppliers of the aviation sector.
3. The change in the number of indirect jobs from all sectors except aviation and its major suppliers.

In a simplified model, we do not intend to take into account the following effects on employment:

- employment effects of tourism (sometimes also called 'catalytic effects'), i.e. when as a result of the price increases, people do not spend money abroad on a vacation but rather domestically; and
- forward employment effects (sometimes also called 'induced employment') as this would lead to double-counting.

This study uses an input-output analysis to calculate the effect of a change in demand for aviation on the demand for products in other sectors, with corresponding effects on revenue and jobs.

INPUT-OUTPUT ANALYSIS WITH A 0-NET DEMAND IMPULSE

We model the effect of a rise in aviation taxes as a drop in demand for aviation services, with an offsetting rise in demand in other sectors. The rise in demand for the products and services of other sectors is based on the distribution of household consumption over these sectors.[65]

0-net demand impulse

An important assumption in the analysis of the number of jobs and GDP is that governments aim to balance their budgets. Hence, when a tax is introduced or increased, the additional fiscal revenue is offset by a lowering of other taxes (or increasing government expenditures) by the same amount.

The model does not make an assumption about which taxes are lowered in case an aviation tax is introduced, or which taxes are increased in case an aviation tax is increased. Rather, it assumes that the change in output of the aviation sector is offset by an increase in output of all other sectors combined by the same amount (but a different sign). In other words, if the output of the aviation sector is increased by EUR 100 million because a tax is abolished, other taxes have to be increased so that the output of all other sectors in the economy is reduced by EUR 100 million.

INPUT-OUTPUT ANALYSIS TO CALCULATE THE EFFECT OF CHANGES IN AVIATION TAXES ON REVENUE

The input-output analysis uses Eurostat's input-output tables. The tables provide the euro-values of products and services in 65 sectors. For these sectors, they report the values of (intermediate) products and services that are used in the production of products and services of other sectors as well as to meet final demand. Dividing the euro-values of intermediate products and services by total demand in the corresponding sector gives a coefficient for the value of intermediary production that is needed in an upstream sector to meet € 1 final demand for products in a downstream sector. With these coefficients, we calculated the effect of a tax-induced change in demand for airport services on revenue in all the other sectors[66].

If available, product-by-product tables are used[67]. For the remaining countries[68], industry-by-industry tables were used. We have taken data for the year 2015, as this is the year with the most complete Eurostat data.

FROM OUTPUT TO JOBS

To calculate the amount of jobs, we multiplied the calculated effect of the aviation tax on sectoral revenue[69] with the labour intensity of the respective sector. Labour intensity is calculated by dividing the sectoral revenue by the number of people employed in the sector. Data to calculate labour intensity were taken from Eurostat National Accounts, for the year 2015. Gaps in the labour intensity data for a number of combinations of countries and sectors, were filled based on the average labour intensity for the sector adjusted for the labour intensity of the country.

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[64] http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=CPA_2_1&StrLanguageCode=EN&IntPcKey=33554372&StrLayoutCode=HIERARCHIC

[65] This approach differs from the method in Steer, Davies and Gleave (2015), where a non-0 net-demand impulse is used. This explains to a large extent why the effects found in our study are smaller than those in Steer Davies and Gleave (2015).

[66] We have taken values for the long term, calculated using the Leontief inverse of the matrix with I/O-coefficients. However, we noticed that already 3 years after the change in airport taxes, the outcome is stable for most indicators.

[67] These were available for the countries Belgium, Bulgaria, Czech Republic, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Austria, Poland, Portugal, Slovenia, Slovakia, Sweden and the United Kingdom.

[68] These are: Denmark, Malta, Netherlands, Romania and Finland.

[69] 'Output' and 'revenue' are used interchangably in this report.

We measure the effect on direct jobs as the change in jobs in the aviation sector, using the procedure above. With respect to the effect on indirect jobs this is measured as the difference between the economy-wide change in jobs and the change in direct jobs. Next, we single out changes in jobs in the upstream sectors that supply most intermediate goods and services to the aviation sector (warehousing and support services for transportation, rental and leasing services, travel agencies, tour operator and other reservation services and related services, repair and installation services of machinery and equipment, coke and refined petroleum products). Finally we calculate the total effect on jobs as the economy-wide change in jobs.

3.5.4. GDP

The impact of changes in aviation demand on GDP can be calculated in two different ways.

The first is to calculate the changes in value added related to the changes in employment. This has the advantage that the calculations are transparent and consistent with the changes in sectoral employment. The disadvantage, however, is that the effects on employment are temporary and that changes in productivity as a result of changes in aviation demand are not captured this way.

The second way is to assess the impact of air links on productivity. Aviation enables the exchange of ideas and people, as well as regional specialisation and can have a positive impact on productivity. Key studies which have investigated this (Brueckner[70], 2003; Green[71], 2007; Bilotkach[72], 2015; SEO[73], 2015; Campante and Yanagizawa-Drott[74], 2016); all found that there were positive effects of airports on regional economic development. The mentioned authors (except Campante and Yanagizawa-Drott, 2016 and SEO, 2015) however all question whether the effects of airports on employment and GDP are causal in their studies. In addition, Bogai et al. (2011)[75] point out that many studies on the relation between aviation and regional economic development are inconclusive on the question whether regions with airports grow at the expense of regions without airports, or that aviation increases growth overall. Campante and Yanagizawa-Drott (2016) on the other hand do find a causal relationship between more air link connections and local economic development, and SEO (2015) found a causal link (amongst others) between passenger numbers and GDP per capita in the following year.

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70 According to Brueckner (2003) the effect of airline traffic on urban employment is positive with respect to the creation of service-related jobs, with a 10% increase in passenger enplanements in a metro area leading to a 1% increase in services-related employment.

71 Green (2007) found that hub cities saw employment grow between 8.4% and 13.2% faster than in non-hub cities.

72 Bilotkach (2015) uses panel data over 17 years to quantify the effects of, amongst others, connectivity, the number of flights and the number of passengers at US airports on employment, the average wage and the number of business establishments. For connectivity, which was defined as the number destinations of non-stop flights, a 10% increase would result in a 0.13% increase in employment, a 0.1% increase in the number of business establishments and a 0.2% increase in the average weekly wage.

73 SEO (2015) found that larger airports which experience a 10% increase in passenger numbers lead to a 1.7% increase in GDP per capita in the next year.

74 Campante and Yanagizawa-Drott (2016) found that long-distance air links between cities result in higher local economic activity (measured in terms of night light). Air links between cities were also found to increase business links and capital flows, probably due to the possibilities for face-to-face contact over long distances.

75 https://link.springer.com/article/10.1007%2Fs10037-011-0049-7?LI=true

Apart from the issue with causality, the main obstacle to this approach is that most studies either focus on the US or on small regional airports. Reliable studies on aviation-related productivity changes in EU Member States are lacking. Undertaking such a study is beyond the scope of this project.

METHOD TO ESTIMATE GDP EFFECT

Because of the lack of relevant study results and the issue with causality, we propose to estimate the impact on GDP following the first method, i.e. the changes in value added in the aviation sector and other related sectors. After all, by definition the GDP is the sum of the gross value added by all sectors plus taxes minus subsidies on products. Because the model assumes that the change in aviation taxes will be offset by an equivalent change in other taxes, the overall level of taxes minus subsidies is constant and the impact on GDP can be calculated as the sum of changes in value added across all sectors of the economy.

We calculated the effect on GDP starting from revenue, by multiplying revenue with a value-added fraction (percentage of revenue created by adding value). This fraction can be calculated from Eurostat's input-output tables, by dividing value added by revenue. The change in value added is used to calculate the change in GDP. The effect on the value added within the aviation sector is calculated in a similar fashion, using sector specific values for the data on revenue and value-added.

In the following table we disassociate the effect of the ticket tax change on GDP in case VAT on international tickets was levied in Germany (the relative effect is the same for jobs): on the one hand the VAT increase leads to a decrease in value added in the aviation sector (column 3), while on the other hand our assumption of a budget neutral tax increase means demand in other sectors increases for all goods/services (column 4), leading to an increase in demand for the aviation sector. These effects are quantified for GDP in the following sectors: aviation, major aviation suppliers, all other sectors, and the total economy. The GDP effect for Germany is positive in this case as the demand increase of non-aviation related sectors outweighs the lower demand in the aviation-related sectors (based on the input-output tables explained above.

Table 13 – Disassociated effects of introducing VAT on international tickets in Germany

	Introducing VAT on international tickets		
	Total effect (Δ € mln)	**Part caused by change in aviation demand (€ mln)**	**Part caused by change in demand in other sectors (€ mln)**
Value Added aviation sector	-873	-874	1
Value added in sectors that are major suppliers aviation sector	-521	-638	117
Value added all sectors except aviation and its major suppliers	2,147	-6,185	8,332
GDP*	837	-8,549	9,386

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

3.5.5. Fiscal revenue from the aviation sector

Taxes raise fiscal revenue. As explained in Section 3.1.2., the model assumes that increases in taxation in one sector will be either offset by decreases in taxation in other

sectors, in which case the net fiscal revenue is zero, or in changes in government expenditures. Still, the fiscal revenue of a change in taxation would be a relevant result of the model.

In our model the fiscal revenues of the aviation sector are simply calculated by multiplying the number of passengers per passenger group (see Table 11) with the average tax per passenger group. Hereafter the fiscal revenues per group are summed to give the total fiscal revenues per Member State arising from the aviation sector. Similarly the demand change resulting from the change in the average tax per passenger group will allow us to determine the change in the total fiscal revenue per Member State.

3.5.6. CO_2 emissions from the aviation sector

Direct emissions from aviation account for about 3% of the EU's total greenhouse gas emissions and while they have been stable in recent years, they are projected to increase further (CE Delft, 2016)[76]. The CO_2 emissions resulting from international and domestic aviation bunkers per Member State are based on EEA CO_2 emissions statistics for 2015 (EEA, 2017)[77].

A part of the aviation caused CO_2 emissions is caused by cargo flights. The share of cargo flights of all flights in 2015 per Member State was collected from Eurocontrol data[78], which acts as a proxy for the share of CO_2 emissions per Member State caused by cargo flights. The share of CO_2 emissions caused by cargo flights was subtracted from the CO_2 emissions from the aviation sector in each Member State leaving the CO_2 emissions resulting from passenger transport. According to EEA (2017)[79] the percentage of cargo flights in Europe was 3.5% of the total number of flights in 2015, however this share varies between 12% for Belgium and Luxembourg, to 1% for Portugal and Croatia.

We assume that a 1% change in passenger demand will result in a 1% change in CO_2 emissions.

3.5.7. Noise

An aviation tax has an impact on demand for aviation services, which has an impact on the number of flights that, in turn, affects the noise around airports.

The relation between the number of flights and noise exposure is complex because of the fact that different aircraft types produce different amounts of noise, because of the logarithmic scale of noise and because the number of exposed people within certain noise bands may not be uniform. Hence, in order to calculate the change in noise exposure, ideally noise modelling would need to be performed.
When modelling small changes in the number of flights, e.g. of a few percent at most, the noise exposure can be assumed to be linearly related to the number of flights, taking into account that noise is measured in dB, which is a logarithmic scale:

[76] http://www.cedelft.eu/publicatie/a_comparison_between_corsia_and_the_eu_ets_for_aviation/1924

[77] http://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer

[78] In EUROCONTROL's STATFOR dashboard (http://www.eurocontrol.int/statfor) data on the number of flight departures per Member State is gathered amongst others for low-cost carriers, traditional scheduled and all-cargo flights. Based on the data for 2015 we could determine the percentage of flight departures which were flown by all-cargo flights.

[79] https://ec.europa.eu/transport/sites/transport/files/european-aviation-environmental-report-2016-72dpi.pdf

$L_{den,new} = L_{den,old} + 10 * \log(N_{new}/N_{old})$, with N the number of flights.

Moreover, if one assumes that the distribution of people within noise bands is uniform, one can model the change in the number of people exposed to noise as follows:

For each noise band (e.g. 60-64 dB Lden), the number of people exposed is assumed to change linearly with the change of the noise level. If the number of flights and hence noise increases, people move to the next band (in this case, 65-69 dB Lden), if it decreases, people move to lower bands.

The data of the number of people exposed to aviation noise within different Lden and Lnight bands is available from the European Environmental Agency.[80] The output of this module is the number of people exposed to aviation noise.

[80] https://www.eea.europa.eu/data-and-maps/data/data-on-noise-exposure-2

4. Impacts of Aviation Taxes on EU Member States and the EU-28

In this section the effect of the change in the taxation regime will be presented for each of the impacts. The user of the model is able to vary the ticket tax, introduce a VAT on tickets or introduce a fuel excise duty on kerosene. To gauge the impacts, we change one taxation regime at a time, while not varying the other regimes and assume a 100% cost-pass through (while this can be varied in the Excel tool however). We utilise the following scenarios:

1. Abolition or introduction of ticket tax. If a Member State already levies a ticket tax this scenario will determine the impacts when abolishing the ticket tax, while the current VAT and excise duty schemes are held constant. The majority of Member States do not levy a ticket tax, hence for these Member States this scenario will determine the impacts by introducing a ticket tax based on the German Air Transport Tax, while the current VAT and excise duty schemes are held constant. The weighted average ticket tax over all Member States, which in our model is the EU-28's average ticket tax, will be abolished in this scenario. The abolition of the ticket tax increases passenger demand, while an introduction of a ticket tax decreases it.
2. Introduction of VAT on international and/or domestic tickets. Some MS already levy VAT on domestic tickets. For these Member States the same VAT rate which applies to domestic flights will be levied on international flights. For the Member States which do not levy VAT on domestic flights the same VAT rate which is levied on other modes of international transport (bus or train) will be levied (see Annex D). The UK and Ireland do not levy any VAT on transport, so we used Germany's VAT rate of 19% on domestic flights as a proxy. This is a purely arbitrary choice since we could have used another VAT rate which is applied in each country. The 19% VAT rate is also the VAT rate applied for determining the EU-wide impact of levying VAT on all tickets. As a result ticket prices are increased, leading to a fall in passenger demand.
3. Introduction of fuel excise duty. The minimum energy tax amounts to € 330/kilolitre for kerosene, although the Energy Taxation Directive exempts aviation fuel.[81] In this scenario, this rate is nevertheless applied to aviation fuels for all flights, while the current ticket tax and VAT levied on tickets are held constant. In effect ticket prices are increased, leading to a fall in passenger demand.

It should be noted that some data inputs for a number of Member States are missing: Eurostat does not have recent input/output tables for Poland, Luxembourg or Malta, while the table for Croatia does not report the jobs or value added in the aviation sector. As a result, we could not determine the effects on jobs and value added of aviation taxes for these countries. There are also no data for the number of people exposed to noise pollution for Croatia, Cyprus, Estonia, Greece, Latvia, Malta and Slovenia.

[81] Note that the Energy Taxation Directive permits EU Member States to impose a tax on aviation fuel used in domestic flights without limitation as well as on intra-EEA flights between Member States on the condition that the affected States have entered into a bilateral agreement to do so.

Lastly, the jobs data of the aviation sector, its major supplies and all other sectors do not always add up to the total jobs in the tables due to rounding off.

4.1. Austria

CURRENT TAX REGIME

The ticket tax used in Austria is called the Air Transport Levy (Flugabgabe), and applies to departing passengers on board aircraft with a weight of more than 2,000 kg. Three destination bands have been defined, each with its own tax rate. See Table 14.

Exempted from the ticket tax are transfer passengers continuing to another destination within 24 hours, and children below the age of two.

Table 14 – Ticket tax rates in Austria

Destination band	Description	Tax rate
Short haul	To domestic destinations, European countries, Russia, and most North-African countries	€ 3.50
Medium haul	To the Middle East, other African countries, India and the United Arab Emirates	€ 7.50
Long haul	To other destinations	€ 17.50

A VAT of 13% is levied in Austria on domestic flights. There is no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 15 – Impacts per taxation scenario and change relative to the current situation for Austria

	Current situation	Abolition of ticket tax		Introducing VAT on all tickets (13%)		Introducing fuel excise duty	
Impacts Aviation sector	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Passenger demand (million)	12.3	12.5	2%	10.7	-13%	11.3	-8%
Average ticket price (€)	336	331	-2%	380	13%	360	8%
Number of flights and connectivity			2%		-13%		-8%
Employment (1000 FTE)	8	8	2%	7	-14%	7	-9%
Value added (€ billion)	0.8	0.8	2%	0.7	-14%	0.7	-9%
CO_2 emissions (Mton)	2.1	2.2	2%	1.9	-13%	2.0	-8%
People affected by noise (1000)	30.7	31.1	1%	27.3	-11%	28.7	-7%
Aviation-related fiscal revenue (€ billion)	0.1	0.0	-93%	0.5	667%	0.3	383%
Impacts on major suppliers							
Employment	100	100	0%	100	0%	100	0%

	Current situation	Abolition of ticket tax		Introducing VAT on all tickets (13%)		Introducing fuel excise duty	
(1000 FTE)							
Value added (€ billion)	14	14	0%	14	0%	14	0%
Impacts on all other sectors							
Employment (1000 FTE)	3,600	3,600	0%	3,600	0%	3,600	0%
Value added (€ billion)	293	293	0%	293	0%	293	0%
Total economic impacts							
Employment (1000 FTE)	3,700	3,700	0%	3,700	0%	3,700	0%
GDP (€ billion)	344	344	-0%	345	0%	345	0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, the current ticket tax is abolished. This causes the average ticket price to decrease by 2%. As a result, both the number of passengers and the number of flights increase by 2%. In turn, the increase in passenger demand leads to an increase in both the number of direct jobs and in the value added of the aviation sector, which both rise by the same 2%. However, this is compensated by an almost equal decrease in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the ticket tax abolition is € 5 million (generated by the current VAT), compared to € 70 million in the current situation. With regard to climate and environmental impacts, the CO_2 emissions also increase by 2%, and the number of people affected by noise by 1%.

In the second scenario, the VAT rate of 13% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 13% compared to the current situation. This results in a reduction of the number of direct jobs and the value added by the aviation sector of 14%, although the overall effect on jobs and GDP is negligible. The extension of the VAT to all flights results in a total fiscal revenue of € 607 million. The reduction in CO_2 emissions is 13%, and the number of people affected by noise drops by 11%. Comparing these results with the first scenario, we can see that the relative effects of the VAT introduction are a factor seven larger than the (oppositely directed) effects of the ticket tax abolition.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 8% compared to the current situation. The number of flights and passengers decline by 8%, as do the CO_2 emissions. The fiscal revenue amounts to € 337 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 9% for both. The reduction in the number of people affected by noise of 7% is in line with the reduction of the number of flights. Thus, the impacts of this particular excise duty are found to be smaller than extending the VAT on air passenger tickets to all destinations, but still much higher than the (oppositely directed) impacts of the ticket tax abolition.

4.2. Belgium

CURRENT TAX REGIME

Belgium levies no aviation taxes: neither a passenger ticket tax, nor a VAT on air tickets, nor an excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 16 – Impacts per taxation scenario and change relative to the current situation for Belgium

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (6%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	13.0	12.4	-4%	12.2	-6%	10.8	-17%
Average ticket price (€)	274	286	4%	291	6%	316	16%
Number of flights and connectivity			-4%		-6%		-17%
Employment (1000 FTE)	6	5	-4%	5	-6%	5	-17%
Value added (€ billion)	0.5	0.5	-4%	0.5	-6%	0.4	-17%
CO_2 emissions (Mton)	3.7	3.5	-4%	3.4	-6%	3.0	-17%
People affected by noise (1000)	67.5	65.5	-3%	64.7	-4%	59.3	-12%
Aviation-related fiscal revenue (€ billion)	0	0.1	>>100%	0.2	>>100%	0.5	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	100	100	0%	100	0%	100	0%
Value added (€ billion)	18	18	0%	18	0%	18	0%
Impacts on all other sectors							
Employment (1000 FTE)	3,700	3,700	0%	3,700	0%	3,700	0%
Value added (€ billion)	349	349	0%	349	0%	349	0%
Total economic impacts							
Employment (1000 FTE)	3,800	3,800	0%	3,800	0%	3,800	0%
GDP (€ billion)	410	410	-0%	410	-0%	410	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 4% increase. As a result, both the number of passengers and the number of flights decrease by 4%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 4%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is zero. The fiscal revenue resulting from the introduced ticket tax is 142 million euro. With regard to climate and environmental impacts, the CO_2 emissions also decrease by 4%, and the number of people affected by noise by 3%.

The VAT rate that is applied to the second scenario is based on the standard VAT rate on international transport tickets in Belgium, which is 6%. If this VAT rate were introduced on tickets for all destinations, the demand for flights by passengers and the resulting number of flights would decrease more than in the ticket tax scenario: by 6% (compared to 4%). This is caused by the higher average ticket price increase that the VAT brings about. This results in a larger reduction of the number of direct jobs and the value added by the aviation sector of 6%, although the overall effect on jobs and GDP is negligible. The introduction of the VAT creates a fiscal revenue of € 202 million. The reduction in CO_2 emissions is larger than in the current situation (6%), and the number of people affected by noise drops by 4%.

The strongest effects can be observed for the introduction of a fuel excise duty of 330 €/kilolitre, which causes the average ticket price to increase by 16% compared to the current situation. The number of flights and passengers decline by 17% compared to the current situation as do the CO_2 emissions. The fiscal revenue amounts to € 450 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 17% for both. The reduction in the number of people affected by noise of 12% is in line with the reduction of the number of flights.

4.3. Bulgaria

CURRENT TAX REGIME

Bulgaria levies no aviation taxes: neither a passenger ticket tax, nor a VAT on air tickets, nor an excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 17 – Impacts per taxation scenario and change relative to the current situation for Bulgaria

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (20%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	4.3	4.1	-5%	3.3	-21%	3.8	-11%
Average ticket price (€)	211	220	4%	253	20%	231	10%
Number of flights			-5%		-21%		-11%
Employment (1000 FTE)	2	2	-5%	2	-22%	2	-11%
Value added (€ billion)	0.1	0.1	-5%	0.1	-22%	0.1	-11%
CO_2 emissions (Mton)	0.6	0.5	-5%	0.4	-21%	0.5	-11%
People affected by noise (1000)	105.6	103.4	-2%	94.7	-10%	100.5	-5%
Aviation-related fiscal revenue (€ billion)	0	0.04	>>100%	0.1	>>100%	0.1	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	100	100	0%	100	0%	100	0%
Value added (€ billion)	1	1	0%	1	0%	1	0%
Impacts on all other sectors							
Employment (1000 FTE)	2,500	2,500	0%	2,500	0%	2,500	0%
Value added (€ billion)	38	38	0%	38	0%	38	0%
Total economic impacts							
Employment (1000 FTE)	2,500	2,500	0%	2,500	0%	2,500	0%
GDP (€ billion)	45	45	-0%	45	-0%	45	-0%

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 4% increase. As a result, both the number of passengers and the number of flights decrease by 5%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 5%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is € 38 million. With regard to climate and environmental impacts, the CO_2 emissions also decrease by 5%, and the number of people affected by noise by 2%.

The VAT rate that is applied to the second scenario is based on the standard VAT rate on international transport tickets in Bulgaria, which is 20%. If this VAT rate were introduced on tickets for all destinations, the demand for flights by passengers and the resulting number of flights would decrease much more than in the ticket tax scenario: by 21% (compared to 5%). This is caused by the higher average ticket price increase that the VAT brings about. This results in a larger reduction of the number of direct jobs and the value added by the aviation sector of 22%, although the overall effect on jobs and GDP is negligible. The introduction of the VAT creates a fiscal revenue of 144 million euro. The reduction in CO_2 emissions is 21%, and the number of people affected by noise drops by 10%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 10% compared to the current situation. The number of flights and passengers decline by 11%, as do the CO_2 emissions. The fiscal revenue amounts to 78 million euro. The relative reduction of the number of direct jobs and the value added by the aviation sector is 11% for both. The reduction in the number of people affected by noise of 5% is in line with the reduction of the number of flights. Thus, the impacts of this particular excise duty are found to be twice as small as for the introduction of a VAT of 20% on all air passenger tickets, but twice as high as for the introduction of the ticket tax.

4.4. Croatia

CURRENT TAX REGIME

Croatia does not impose a ticket tax on air passengers. The country levies a VAT of 25% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 18 – Impacts per taxation scenario and change relative to the current situation for Croatia

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (25%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Passenger demand (million)	3.9	3.7	-4%	2.9	-25%	3.7	-6%
Average ticket price (€)	263	273	4%	326	23%	276	5%
Number of flights			-4%		-25%		-6%
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
Value added (€ billion)	Not available	Not available	-	Not available	-	Not available	-
CO_2 emissions (Mton)	0.4	0.4	-4%	0.3	-25%	0.4	-6%
People affected by noise (1000)	Not available	Not available	-	Not available	-	Not available	-
Aviation-related fiscal revenue (€ billion)	0	0.05	>>100%	0.2	>>100%	0.06	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
Value added (€ billion)	Not available	Not available	-	Not available	-	Not available	-
Impacts on all other sectors							
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
Value added (€ billion)	Not available	Not available	-	Not available	-	Not available	-

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

It must be noted that Croatia has not reported the number of jobs or value added in the aviation sector. Therefore, the corresponding impacts could not be estimated.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 4% increase. As a result, both the number of passengers and the number of flights decrease by 4%. The fiscal revenue resulting from the introduced ticket tax is € 46 million (€ 38 million more than in the current situation). With regard to climate and environmental impacts, the CO_2 emissions also decrease by 4% (data on noise exposure are lacking).

In the second scenario, the VAT rate of 25% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 25% compared to the current situation. This decrease is a factor six higher than for the ticket tax, which is caused by the much higher average ticket price increase that the VAT brings about. The extension of the VAT to all flights results in a total fiscal revenue of 186 million euro. The reduction in CO_2 emissions is 25%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 5% compared to the current situation. The number of flights and passengers decline by 6%, as do the CO_2 emissions. The fiscal revenue amounts to € 56 million. Thus, the impacts of this particular excise duty are found to be much smaller than extending the VAT on air passenger tickets to all destinations, and slightly higher than the introduction of the ticket tax.

4.5. Cyprus

CURRENT TAX REGIME

Cyprus levies no aviation taxes: neither a passenger ticket tax, nor a VAT on air tickets, nor an excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 19 – Impacts per taxation scenario and change relative to the current situation for Cyprus

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (9%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	4.5	4.3	-4%	4.1	-9%	4.0	-10%
Average ticket price (€)	252	262	4%	275	9%	276	10%
Number of flights and connectivity			-4%		-9%		-10%
Employment (1000 FTE)	0.08	0.08	-4%	0.07	-9%	0.07	-11%
Value added (€ billion)	0.002	0.002	-4%	0.002	-9%	0.002	-11%
CO_2 emissions (Mton)	0.7	0.7	-4%	0.7	-9%	0.7	-10%
People affected by noise (1000)	Not available	Not available	-	Not available	-	Not available	-
Aviation-related fiscal revenue (€ billion)	0	0.041	>>100%	0.093	>>100%	0.09	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	12	12	0%	12	0%	12	0%
Value added (€ billion)	1	1	0%	1	0%	1	0%
Impacts on all other sectors							

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (9%)		Introducing fuel excise duty	
Employment (1000 FTE)	312	311	0%	311	0%	311	0%
Value added (€ billion)	15	15	0%	15	0%	15	0%
Total economic impacts							
Employment (1000 FTE)	324	324	0%	323	0%	323	0%
GDP (€ billion)	18	18	-0%	18	-0%	18	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 4% increase. As a result, both the number of passengers and the number of flights decrease by 4%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 4%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is € 41 million. With regard to climate and environmental impacts, the CO_2 emissions also decrease by 4% (data on noise exposure are lacking).

The VAT rate that is applied to the second scenario is based on the standard VAT rate on international transport tickets in Cyprus, which is 9%. If this VAT rate were introduced on tickets for all destinations, the demand for flights by passengers and the resulting number of flights would decrease more than in the ticket tax scenario: by 9% (compared to 4%). This is caused by the higher average ticket price increase that the VAT brings about. This results in a larger reduction of the number of direct jobs and the value added by the aviation sector of 9%, although the overall effect on jobs and GDP is negligible. The introduction of the VAT results in a total fiscal revenue of € 93 million. The reduction in CO_2 emissions is 9%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 10% compared to the current situation. The number of flights and passengers decline by 10%, as do the CO_2 emissions. The fiscal revenue amounts to € 93 million, exactly the same as for the VAT scenario. The relative reduction of the number of direct jobs and the value added by the aviation sector is 11% for both. Thus, the impacts of this particular excise duty are found to be very similar to those of the VAT on air passenger tickets.

4.6. Czech Republic

CURRENT TAX REGIME

The Czech Republic does not impose a ticket tax on air passengers. The country levies a VAT of 15% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 20 – Impacts per taxation scenario and change relative to the current situation for Cyprus

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (15%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	6.8	6.4	-5%	5.7	-15%	6.2	-8%
Average ticket price (€)	266	280	5%	306	15%	286	8%
Number of flights and connectivity			-5%		-15%		-8%
Employment (1000 FTE)	2	2	-5%	2	-16%	2	-8%
Value added (€ billion)	0.1	0.1	-5%	0.1	-16%	0.1	-8%
CO_2 emissions (Mton)	0.9	0.8	-5%	0.7	-15%	0.8	-8%
People affected by noise (1000)	11.3	10.9	-3%	10.1	-10%	10.7	-5%
Aviation-related fiscal revenue (€ billion)	0.0	0.1	>>100%	0.2	>>100%	0.1	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	100	100	0%	100	0%	100	0%
Value added (€ billion)	6	6	0%	6	0%	6	0%
Impacts on all other sectors							
Employment (1000 FTE)	4,300	4,300	0%	4,300	0%	4,300	0%
Value added (€ billion)	146	146	0%	146	0%	146	0%
Total economic impacts							
Employment (1000 FTE)	4,400	4,400	0%	4,400	0%	4,400	0%
GDP (€ billion)	168	168	-0%	168	-0%	168	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 5% increase. As a result, both the number of passengers and the number of flights decrease by 5%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in

the value added of the aviation sector, which both fall by the same 5%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is € 85 million. With regard to climate and environmental impacts, the CO_2 emissions also decrease by 5%, and the number of people affected by noise by 3%.

In the second scenario, the VAT rate of 15% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 15% compared to the current situation. This decrease is a factor three higher than for the ticket tax, which is caused by the higher average ticket price increase that the VAT brings about. It also leads to a larger reduction of the number of direct jobs and the value added by the aviation sector of 16%, although the overall effect on jobs and GDP is negligible. The extension of the VAT to all flights results in a total fiscal revenue of € 234 million. The reduction in CO_2 emissions is 15%, and the number of people affected by noise drops by 10%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 8% compared to the current situation. The number of flights and passengers decline by 8%, as do the CO_2 emissions. The fiscal revenue amounts to € 123 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 8% for both. The reduction in the number of people affected by noise of 5% is in line with the reduction of the number of flights. Thus, the impacts of this particular excise duty are found to be twice as small as for extending the VAT on air passenger tickets to all destinations, but a bit higher than for the introduction of the ticket tax.

4.7. Denmark

CURRENT TAX REGIME

Denmark levies no aviation taxes: neither a passenger ticket tax, nor a VAT on air tickets, nor an excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 21 – Impacts per taxation scenario and change relative to the current situation for Denmark

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (25%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	14.1	13.6	-4%	10.4	-26%	12.8	-9%
Average ticket price (€)	312	324	4%	390	25%	338	9%
Number of flights and connectivity			-4%		-26%		-9%
Employment (1000 FTE)	5	5	-4%	4	-26%	5	-9%
Value added (€ billion)	0.7	0.7	-4%	0.5	-26%	0.6	-9%
CO_2 emissions (Mton)	2.7	2.6	-4%	2.0	-26%	2.4	-9%
People affected by noise (1000)	3.9	3.8	-2%	3.2	-18%	3.7	-6%
Aviation-related fiscal revenue (€ billion)	0	0.2	>>100%	0.8	>>100%	0.3	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	100	100	0%	100	-1%	100	0%
Value added (€ billion)	6	6	0%	6	-1%	6	0%
Impacts on all other sectors							
Employment (1000 FTE)	2,600	2,600	0%	2,600	0%	2,600	0%
Value added (€ billion)	229	229	0%	229	0%	229	0%
Total economic impacts							
Employment (1000 FTE)	2,700	2,700	0%	2,700	0%	2,700	0%
GDP (€ billion)	272	272	0%	272	0%	272	0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 4% increase. As a result, both the number of passengers and the number of flights decrease by 4%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 4%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is € 171 million. With regard to climate and environmental impacts, the CO_2 emissions also decrease by 4%, and the number of people affected by noise by 2%.

The VAT rate that is applied to the second scenario is based on the standard VAT rate on international transport tickets in Denmark, which is 25%. If this VAT rate were introduced on tickets for all destinations, the demand for flights by passengers and the resulting number of flights would decrease much more than in the ticket tax scenario: by 26% (compared to 4%). This is caused by the higher average ticket price increase that the VAT brings about. This results in a larger reduction of the number of direct jobs and the value added by the aviation sector of 26%, although the overall effect on jobs and GDP is negligible. The introduction of the VAT results in a total fiscal revenue of € 842 million. The reduction in CO_2 emissions is 26%, and the number of people affected by noise drops by 18%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 9% compared to the current situation. The number of flights and passengers decline by 9%, as do the CO_2 emissions. The fiscal revenue amounts to € 335 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 9% for both. The reduction in the number of people affected by noise of 6% is in line with the reduction of the number of flights. Thus, the impacts of this particular excise duty are found to be three times smaller than for the VAT on air passenger tickets, but still two times higher than for the ticket tax scenario.

4.8. Estonia

CURRENT TAX REGIME

Estonia does not impose a ticket tax on air passengers. The country levies a VAT of 20% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 22 – Impacts per taxation scenario and change relative to the current situation for Estonia

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (20%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	1.1	1.0	-5%	0.9	-21%	1.1	-4%
Average ticket price (€)	222	232	4%	266	20%	229	3%
Number of flights and connectivity			-5%		-21%		-4%
Employment (1000 FTE)	0.29	0.27	-5%	0.22	-22%	0.27	-4%
Value added (€ billion)	0.021	0.020	-5%	0.017	-22%	0.021	-4%
CO_2 emissions (Mton)	0.1	0.1	-5%	0.1	-21%	0.1	-4%
People affected by noise (1000)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Aviation-related fiscal revenue (€ billion)	0.0	0.01	>>100%	0.04	>>100%	0.01	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	19	19	0%	19	-1%	19	0%
Value added (€ billion)	1	1	0%	1	-1%	1	0%
Impacts on all other sectors							
Employment (1000 FTE)	546	546	0%	546	0%	546	0%
Value added (€ billion)	17	17	0%	17	0%	17	0%
Total economic impacts							
Employment (1000 FTE)	565	565	0%	564	0%	565	0%
GDP (€ billion)	20	20	-0%	20	-0%	20	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 4% increase. As a result, both the number of passengers and the number of flights decrease by 5%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 5%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is € 10 million. With regard to climate and environmental impacts, the CO_2 emissions also decrease by 5% (data on noise exposure are lacking).

In the second scenario, the VAT rate of 20% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 22% compared to the current situation. This decrease is a factor four higher than for the ticket tax, which is caused by the higher average ticket price increase that the VAT brings about. It also leads to a larger reduction of the number of direct jobs and the value added by the aviation sector of 22%, although the overall effect on jobs and GDP is negligible. The extension of the VAT to all flights results in a total fiscal revenue of € 39 million. The reduction in CO_2 emissions is 21%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 3% compared to the current situation. The number of flights and passengers decline by 4%, as do the CO_2 emissions. The fiscal revenue amounts to € 8 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 4% for both. Thus, the impacts of this particular excise duty are found to be similar to those of the introduction of the ticket tax, but much smaller than for extending the VAT on air passenger tickets to all destinations.

4.9. Finland

CURRENT TAX REGIME

Finland does not impose a ticket tax on air passengers. The country levies a VAT of 10% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 23 – Impacts per taxation scenario and change relative to the current situation for Estonia

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (10%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	9.1	8.7	-4%	8.4	-8%	8.0	-12%
Average ticket price (€)	281	292	4%	304	7%	310	11%
Number of flights and connectivity			-4%		-8%		-12%
Employment (1000 FTE)	4	4	-4%	4	-8%	4	-12%
Value added (€ billion)	0.6	0.6	-4%	0.5	-8%	0.5	-12%
CO_2 emissions (Mton)	2.1	2.0	-4%	1.9	-8%	1.8	-12%
People affected by	14.7	14.2	-3%	13.8	-6%	13.3	-10%

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (10%)		Introducing fuel excise duty	
noise (1000)							
Aviation-related fiscal revenue (€ billion)	0.0	0.1	255%	0.2	513%	0.3	606%
Impacts on major suppliers							
Employment (1000 FTE)	100	100	0%	100	0%	100	-1%
Value added (€ billion)	5	5	0%	5	0%	5	0%
Impacts on all other sectors							
Employment (1000 FTE)	2,100	2,100	0%	2,100	0%	2,100	0%
Value added (€ billion)	175	175	0%	175	0%	175	0%
Total economic impacts							
Employment (1000 FTE)	2,200	2,200	0%	2,200	0%	2,200	0%
GDP (€ billion)	210	210	0%	210	0%	210	0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 4% increase. As a result, both the number of passengers and the number of flights decrease by 4%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 4%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is € 134 million (compared to € 38 million in the current situation). With regard to climate and environmental impacts, the CO_2 emissions also decrease by 4%, and the number of people affected by noise by 3%.

In the second scenario, the VAT rate of 10% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 8% compared to the current situation. This decrease is a factor two higher than for the ticket tax, which is caused by the higher average ticket price increase that the VAT brings about. It also leads to a larger reduction of the number of direct jobs and the value added by the aviation sector of 8%, although the overall effect on jobs and GDP is negligible. The extension of the VAT to all flights results in a total fiscal revenue of € 231 million. The reduction in CO_2 emissions is 8%, and the number of people affected by noise drops by 6%.

The strongest effects can be observed for the introduction of a fuel excise duty of 330 €/kilolitre, which causes the average ticket price to increase by 11% compared to the current situation. The number of flights and passengers decline by 12%, as do the CO_2 emissions. The fiscal revenue amounts to 267 million euro. The relative reduction of the number of direct jobs and the value added by the aviation sector is 12% for both. The reduction in the number of people affected by noise of 10% is in line with the reduction of the number of flights.

4.10. France

CURRENT TAX REGIME

France charges two types of ticket tax to each individual air passenger. The French Civil Aviation Tax includes two destination bands, and an additional fee per tonne of freight. The French Solidarity Tax distinguishes between destinations and classes of travel. This tax is levied for the purpose of development aid worldwide. Furthermore, air passengers to/from Corsica pay a Fiscal Tax, however this was not included in our model since we do not know from which French passengers departed from in France. See Table 24. Children below the age of two are exempted from the ticket tax.

Table 24 – Ticket tax rates in France

Ticket tax type	Tax rate description	Tax rate
Civil Aviation Tax	To EU & EEA countries, Switzerland and French overseas	€ 4.48
	To all other destinations	€ 8.06
	Per tonne of freight (all destinations)	€ 1.33
Air Passenger Solidarity Tax	To EU & EEA countries, Switzerland and French overseas, in economy class	€ 1.13
	To EU & EEA countries, Switzerland and French overseas, in business/first class	€11.27
	To other countries, in economy class	€ 4.51
	To other countries, in business/first class	€ 45.07
Fiscal Tax - Corsica	Applied to all passengers embarking and disembarking in Corsica	€ 4.57

France levies a VAT of 10% on domestic flights. This VAT is also charged on the Civil Aviation Tax and the Air Passenger Solidarity Tax. There is no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 25 – Impacts per taxation scenario and change relative to the current situation for France

	Current situation	Abolition of ticket tax		Introducing VAT on all tickets (10%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	81.5	83.9	3%	75.9	-7%	74.1	-9%
Average ticket price (€)	381	372	-3%	411	7%	412	9%
Number of flights and connectivity			3%		-7%		-9%
Employment (1000 FTE)	63	65	3%	58	-7%	57	-10%
Value added (€ billion)	8.7	9.0	3%	8.1	-7%	7.9	-10%
CO_2 emissions (Mton)	21.1	21.7	3%	19.6	-7%	19.2	-9%
People affected by noise (1000)	20.6	21.1	2%	19.4	-6%	19.1	-7%
Aviation-related fiscal revenue (€ billion)	1.3	0.6	-55%	3.6	164%	3.5	160%
Impacts on major suppliers							

	Current situation	Abolition of ticket tax		Introducing VAT on all tickets (10%)		Introducing fuel excise duty	
Employment (1000 FTE)	700	700	0%	700	0%	700	0%
Value added (€ billion)	92	92	0%	92	0%	92	0%
Impacts on all other sectors							
Employment (1000 FTE)	23,800	23,800	0%	23,800	0%	23,800	0%
Value added (€ billion)	1,863	1,863	0%	1,863	0%	1,863	0%
Total economic impacts							
Employment (1000 FTE)	24,600	24,600	0%	24,600	0%	24,600	0%
GDP (€ billion)	2,194	2,194	0%	2,194	-0%	2,194	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, the current ticket taxes are abolished. This causes the average ticket price to decrease by 3%. As a result, both the number of passengers and the number of flights increase by 3%. In turn, the increase in passenger demand leads to an increase in both the number of direct jobs and in the value added of the aviation sector, which both rise by the same 3%. However, this is compensated by an almost equal decrease in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the ticket tax abolition is € 605 million (generated with the current VAT on air tickets), which is much lower than the € 1,347 million in the current situation. With regard to climate and environmental impacts, the CO_2 emissions also increase by 3%, and the number of people affected by noise by 2%.

In the second scenario, the VAT rate of 10% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 7% compared to the current situation. This results in a reduction of the number of direct jobs and the value added by the aviation sector of 7%, although the overall effect on jobs and GDP is negligible. The fiscal revenue increases to € 3,555 million, due to the extension of the VAT to all flights. The reduction in CO_2 emissions is 7%, and the number of people affected by noise drops by 6%. Comparing these results with the first scenario, we can see that the (oppositely directed) effects of the VAT introduction are a factor two to three higher than the effects of the ticket tax abolition.

The strongest effects can be observed for the introduction of a fuel excise duty of 330 €/kilolitre, which causes the average ticket price to increase by 9% compared to the current situation. The number of flights and passengers decline by 9%, as do the CO_2 emissions. The fiscal revenue amounts to € 3,506 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 10% for both. The reduction in the number of people affected by noise of 7% is in line with the reduction of the number of flights.

4.11. Germany

CURRENT TAX REGIME

Germany currently levies a ticket tax on departing passengers: the German Air Transport Tax (Luftverkehrsteuer). The tax rate is differentiated according to the distance of the destination, as summarised below. The amount levied per passenger depends on the distance of the biggest commercial airport in the country of destination from Germany's largest airport, Frankfurt am Main. These countries are divided into three destination bands[82]:

- Annex 1 countries include the EU and EFTA Member States, domestic flights, EU candidate countries and Turkey, Russia, Morocco, Tunisia and Algeria, which are taxed at € 7.47 per passenger.
- Annex 2 countries are those not listed in Annex 1 and with a distance of not more than 6,000 kilometres, which includes countries in North and Central Africa, Middle East and Central Asia, which are taxed at € 23.32 per passenger.
- The rest of the countries not in Annex 1 or 2 are charged at € 41.99 per passenger.

Table 26 – Ticket tax groups in Germany

Tax groups	Example country	Tax rate
Annex 1	Belgium, Russia	€7.47
Annex 2	Qatar, Ghana	€23.32
Rest	US, South Africa	€41.99

See also Table 26. The full list of countries in destination bands Annex 1 and 2 is given in Annex C.

Some types of passengers are exempted from the ticket tax, such as children below the age of two. Furthermore, transfer passengers with a transfer under twelve hours for Annex 1 countries and with a transfer under 24 hours for Annex 2 countries do not need to pay a ticket tax. Passengers in flights serving military, state authority or medical purposes are also exempted.

With respect to VAT, Germany levies a 19% rate on domestic flights. There is currently no fuel excise duty levied in Germany.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 27 – Impacts per taxation scenario and change relative to the current situation for Germany

	Current situation	Abolition of ticket tax		Introducing VAT on all tickets (19%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	99.3	103.5	4%	83.7	-16%	87.1	-12%
Average ticket price (€)	327	314	-4%	382	15%	363	12%
Number of flights and connectivity			4%		-16%		-12%
Employment (1000 FTE)	65	68	4%	55	-16%	57	-12%
Value added (€ billion)	5.5	5.7	4%	4.6	-16%	4.8	-12%

[82] http://www.fccaviation.com/regulation/germany/aviation-tax

	Current situation	Abolition of ticket tax		Introducing VAT on all tickets (19%)		Introducing fuel excise duty	
CO_2 emissions (Mton)	25.0	26.0	4%	21.0	-16%	21.9	-12%
People affected by noise (1000)	792.2	813.1	3%	706.4	-11%	726.3	-8%
Aviation-related fiscal revenue (€ billion)	1.9	0.6	-66%	6.2	232%	4.8	153%
Impacts on major suppliers							
Employment (1000 FTE)	1,100	1,100	0%	1,100	-1%	1,100	0%
Value added (€ billion)	121	121	0%	121	0%	121	0%
Impacts on all other sectors							
Employment (1000 FTE)	37,600	37,600	0%	37,600	0%	37,600	0%
Value added (€ billion)	2,614	2,613	0%	2,616	0%	2,615	0%
Total economic impacts							
Employment (1000 FTE)	38,700	38,700	0%	38,700	0%	38,700	0%
GDP (€ billion)	3,044	3,043	-0%	3,044	0%	3,044	0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, the current ticket tax is abolished. This causes the average ticket price to decrease by 4%. As a result, both the number of passengers and the number of flights increase by 4%. In turn, the increase in passenger demand leads to an increase in both the number of direct jobs and in the value added of the aviation sector, which both rise by the same 4%. However, this is compensated by an almost equal decrease in jobs in other sectors of the economy, so the net effect on employment is close to zero. Without a ticket tax, the aviation related fiscal revenues drop from € 1.9 billion to € 0.6 billion as the only source of fiscal revenues is the VAT levied on domestic tickets. With regard to climate and environmental impacts, the CO_2 emissions also increase by 4%, and the number of people affected by noise by 3%.

In the second scenario, the VAT rate of 19% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 16% compared to the current situation. This results in a reduction of the number of direct jobs and the value added by the aviation sector of 16%, although the overall effect on jobs and GDP is negligible. The fiscal revenue increases to € 6,247 million, due to the extension of the VAT to all flights. The reduction in CO_2 emissions is 16%, and the number of people affected by noise drops by 11%. Comparing these results with the first scenario, we can see that the (oppositely directed) effects of the VAT introduction are a factor four larger than the effects of the ticket tax abolition.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 12% compared to the current situation. The number of flights and passengers decline by 12%, as do the CO_2 emissions. The fiscal revenue amounts to € 4,765 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 12% for both. The reduction in the number of people affected by noise of 8% is in line with the reduction of the number of flights. Thus, the impacts of this particular excise duty are found to be smaller than for extending the VAT on air passenger tickets to all destinations, but still substantially higher than the (oppositely directed) impacts of the ticket tax abolition.

Differences with other impact studies

Some other studies on the impacts of aviation taxes reach very different conclusions than this one. For example, PwC (2017)[83] suggests that the GDP in the Germany would increase by 0.11% and the employment by almost 0.03% when aviation taxes were abolished. Although the report does not provide a detailed explanation of the modelling approach, it appears that the model assumes that the reduction in fiscal revenue that results from the abolition of the aviation tax would not be offset by higher taxes in the rest of the economy. In other words, the PwC study seems to assume that the total fiscal revenue would be lowered. It also seems that the study does not assume that the consumption by public authorities would also be lowered. If this interpretation is correct, it seems that PwC assumes that Germany would introduce a fiscal stimulus. This means that part of the benefits of the PwC study are the result of a fiscal stimulus, rather than the result of the abolition of the aviation tax.

In contrast, this report assumes that an abolition of the aviation tax would be offset completely by an increase in other taxes. I.e. there would not be a fiscal stimulus. In that respect, this report provides a more accurate picture of the impacts resulting from mere changes in aviation taxation, because the results are not convoluted with the effects of a fiscal stimulus.

4.12. Greece

CURRENT TAX REGIME

Greece does not impose a ticket tax on air passengers. The country levies a VAT of 24% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 28 – Impacts per taxation scenario and change relative to the current situation for Greece

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (24%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	24.3	23.1	-5%	20.1	-17%	22.5	-7%
Average ticket price (€)	250	260	4%	296	16%	267	7%
Number of flights and connectivity			-5%		-17%		-7%
Employment (1000 FTE)	6	6	-5%	5	-17%	6	-7%
Value added (€ billion)	0.6	0.5	-5%	0.5	-17%	0.5	-7%
CO_2 emissions (Mton)	3.2	3.1	-5%	2.7	-17%	3.0	-7%
People affected by noise (1000)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

[83] https://a4e.eu/wp-content/uploads/2017/10/The-economic-impact-of-air-taxes-in-Europe-Germany-004.pdf

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (24%)		Introducing fuel excise duty	
Aviation-related fiscal revenue (€ billion)	0.3	0.5	77%	1.1	310%	0.6	127%
Impacts on major suppliers							
Employment (1000 FTE)	100	100	0%	100	0%	100	0%
Value added (€ billion)	4	4	0%	4	0%	4	0%
Impacts on all other sectors							
Employment (1000 FTE)	2,600	2,600	0%	2,600	0%	2,600	0%
Value added (€ billion)	151	151	0%	151	0%	151	0%
Total economic impacts							
Employment (1000 FTE)	2,700	2,700	0%	2,700	0%	2,700	0%
GDP (€ billion)	176	176	-0%	176	-0%	176	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 4% increase. As a result, both the number of passengers and the number of flights decrease by 5%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 5%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is 490 million euro, compared to € 277 million in the current situation. With regard to climate and environmental impacts, the CO_2 emissions also decrease by 5% (noise exposure data are lacking).

In the second scenario, the VAT rate of 24% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 17% compared to the current situation. This decrease is a factor three to four higher than for the ticket tax, which is caused by the higher average ticket price increase that the VAT brings about. It also leads to a larger reduction of the number of direct jobs and the value added by the aviation sector of 17%, although the overall effect on jobs and GDP is negligible. The extension of the VAT to all flights results in a total fiscal revenue of € 1,135 million. The reduction in CO_2 emissions is 17%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 7% compared to the current situation. The number of flights and passengers decline by 7%, as do the CO_2 emissions. The fiscal revenue amounts to € 629 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 7% for both. Thus, the impacts of this particular excise duty are found to be smaller than for extending the VAT on air passenger tickets to all destinations, but a bit higher than for the introduction of the ticket tax.

4.13. Hungary

CURRENT TAX REGIME

Hungary does not impose a ticket tax on air passengers. The country levies a VAT of 27% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 29 – Impacts per taxation scenario and change relative to the current situation for Hungary

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (27%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	5.9	5.6	-5%	4.2	-28%	5.5	-5%
Average ticket price (€)	258	270	4%	328	27%	270	5%
Number of flights and connectivity			-5%		-28%		-5%
Employment (1000 FTE)	1	1	-5%	1	-29%	1	-5%
Value added (€ billion)	0.5	0.5	-5%	0.4	-29%	0.5	-5%
CO_2 emissions (Mton)	0.5	0.5	-5%	0.4	-28%	0.5	-5%
People affected by noise (1000)	50.9	49.1	-4%	37.6	-26%	48.7	-4%
Aviation-related fiscal revenue (€ billion)	0	0.1	>>100%	0.3	>>100%	0.1	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	100	100	0%	100	0%	100	0%
Value added (€ billion)	4	4	0%	4	0%	4	0%
Impacts on all other sectors							
Employment (1000 FTE)	3,800	3,800	0%	3,800	0%	3,800	0%
Value added (€ billion)	89	89	0%	89	0%	89	0%
Total economic impacts							
Employment (1000 FTE)	3,900	3,900	0%	3,900	0%	3,900	0%
GDP (€ billion)	111	111	-0%	111	-0%	111	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 4% increase. As a result, both the number of passengers and the number of flights decrease by 5%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 5%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is € 64 million. With regard to climate and environmental impacts, the CO_2 emissions also decrease by 5%, and the number of people affected by noise by 4%.

In the second scenario, the VAT rate of 27% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 28% compared to the current situation. This decrease is a factor five to six higher than for the ticket tax, which is caused by the higher average ticket price increase that the VAT brings about. It also leads to a larger reduction of the number of direct jobs and the value added by the aviation sector of 29%, although the overall effect on jobs and GDP is negligible. The extension of the VAT to all flights results in a total fiscal revenue of € 305 million. The reduction in CO_2 emissions is 28%, and the number of people affected by noise drops by 26%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 5% compared to the current situation. The number of flights and passengers decline by 5%, as do the CO_2 emissions. The fiscal revenue amounts to € 68 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 5% for both. The reduction in the number of people affected by noise of 4% is in line with the reduction of the number of flights. Thus, the impacts of this particular excise duty are found to be equal to those of the introduction of the ticket tax, but much smaller than for extending the VAT on air passenger tickets to all destinations.

4.14. Ireland

CURRENT TAX REGIME

Ireland levies no aviation taxes: neither a passenger ticket tax, nor a VAT on air tickets, nor an excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 30 – Impacts per taxation scenario and change relative to the current situation for Ireland

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (19%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	15.8	15.0	-5%	12.6	-20%	14.4	-8%
Average ticket price (€)	280	292	5%	333	19%	301	8%
Number of flights and connectivity			-5%		-20%		-8%
Employment (1000 FTE)	8	8	-5%	6	-21%	8	-9%
Value added (€ billion)	2.2	2.1	-5%	1.7	-21%	2.0	-9%
CO_2 emissions (Mton)	2.5	2.3	-5%	2.0	-20%	2.3	-8%
People affected by noise (1000)	21.4	20.4	-4%	17.4	-19%	19.8	-7%
Aviation-related fiscal revenue (€ billion)	0	0.2	>>100%	0.7	>>100%	0.3	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	26	26	0%	26	-1%	26	0%
Value added (€ billion)	13	13	0%	13	0%	13	0%
Impacts on all other sectors							
Employment (1000 FTE)	1,600	1,600	0%	1,600	0%	1,600	0%
Value added (€ billion)	228	228	0%	228	0%	228	0%
Total economic impacts							
Employment (1000 FTE)	1,700	1,700	0%	1,700	0%	1,700	0%
GDP (€ billion)	262	262	-0%	262	-0%	262	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 5% increase. As a result, both the number of passengers and the number of flights decrease by 5%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 5%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is € 183 million. With regard to climate and environmental impacts, the CO_2 emissions also decrease by 5%, and the number of people affected by noise by 4%.

The VAT rate that is applied to the second scenario is based on the standard VAT rate on international transport tickets in Ireland, which is 19%. If this VAT rate were introduced on tickets for all destinations, the demand for flights by passengers and the resulting number of flights would decrease much more than in the ticket tax scenario: by 20% (compared to 5%). This is caused by the higher average ticket price increase that the VAT brings about. This results in a larger reduction of the number of direct jobs and the value added by the aviation sector of 21%, although the overall effect on jobs and GDP is negligible. The introduction of the VAT results in a total fiscal revenue of € 708 million. The reduction in CO_2 emissions is 20%, and the number of people affected by noise drops by 19%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 8% compared to the current situation. The number of flights and passengers decline by 8%, as do the CO_2 emissions. The fiscal revenue amounts to € 299 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 9% for both. The reduction in the number of people affected by noise of 7% is in line with the reduction of the number of flights. Thus, the impacts of this particular excise duty are found to be smaller than for the VAT on air passenger tickets, but higher than for the ticket tax scenario.

4.15. Italy

CURRENT TAX REGIME

Italy charges two types of ticket tax to air passengers. The Italy Embarkation Tax distinguishes between three destination bands. The Italy City Council Tax consists of a single tariff for all passengers. A luxury tax is levied on private aircraft, but was not included in the model since we do not know which type of planes transported Italian passengers. See Table 31.

Table 31 – Ticket tax rates in Italy

Ticket tax type	Tax rate description	Tax rate
Italy Embarkation Tax	To domestic destinations	€ 6.57
	To EU & EEA countries	€ 12.69
	To other countries	€ 18.14
Italy City Council Tax		€ 7.07

Italy levies a VAT of 10% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 32 – Impacts per taxation scenario and change relative to the current situation for Italy

	Current situation	Abolition of ticket tax		Introducing VAT on all tickets (10%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	79.6	88.7	11%	74.2	-7%	73.0	-8%
Average ticket price (€)	255	235	-10%	275	7%	274	8%
Number of flights and connectivity			11%		-7%		-8%
Employment (1000 FTE)	20	22	11%	19	-7%	18	-8%
Value added (€ billion)	0.7	0.7	11%	0.6	-7%	0.6	-8%
CO_2 emissions (Mton)	11.4	12.7	11%	10.6	-7%	10.4	-8%
People affected by noise (1000)	217.6	232.1	7%	207.8	-4%	205.6	-5%
Aviation-related fiscal revenue (€ billion)	1.9	0.4	-79%	3.3	69%	3.2	63%
Impacts on major suppliers							
Employment (1000 FTE)	600	600	0%	600	0%	600	0%
Value added (€ billion)	47	47	0%	47	0%	47	0%
Impacts on all other sectors							
Employment (1000 FTE)	17,700	17,700	0%	17,700	0%	17,700	0%
Value added (€ billion)	1,437	1,437	0%	1,437	0%	1,437	0%
Total economic impacts							
Employment (1000 FTE)	18,300	18,300	0%	18,300	0%	18,300	0%
GDP (€ billion)	1,653	1,653	0%	1,653	-0%	1,653	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, the current ticket tax is abolished. This causes the average ticket price to decrease by 10%. As a result, both the number of passengers and the number of flights increase by 11%. In turn, the increase in passenger demand leads to an increase in both the number of direct jobs and in the value added of the aviation sector, which both rise by the same 11%. However, this is compensated by an almost equal decrease in jobs in other sectors of the economy, so the net effect on employment is close to zero. Without a ticket tax, the aviation related fiscal revenues drop from € 1.9 billion to € 0.4 billion as the only source of fiscal revenues is the VAT levied on domestic tickets.With regard to climate and environmental impacts, the CO_2 emissions also increase by 11%, and the number of people affected by noise by 7%.

In the second scenario, the VAT rate of 10% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 7% compared to the current situation. This results in a reduction of the number of direct jobs and the value added by the aviation sector of 7%, although the overall effect on jobs and GDP is negligible. The fiscal revenue increases to € 3,265 million, due to the extension of the VAT to all flights. The reduction in CO_2 emissions is 7%, and the number of people affected by noise drops by 4%. Comparing these results with the first scenario, we can see that the (oppositely directed) effects of the VAT introduction are a bit smaller than the effects of the ticket tax abolition.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 8% compared to the current situation. The number of flights and passengers decline by 8%, as do the CO_2 emissions. The fiscal revenue amounts to € 3,152 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 8% for both. The reduction in the number of people affected by noise of 5% is

in line with the reduction of the number of flights. Thus, the impacts of this particular excise duty are found to be similar to those of extending the VAT on air passenger tickets to all destinations.

4.16. Latvia

CURRENT TAX REGIME

Latvia does not impose a ticket tax on air passengers. The country levies a VAT of 12% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 33 – Impacts per taxation scenario and change relative to the current situation for Latvia

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (12%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	2.0	1.9	-6%	1.7	-13%	1.7	-14%
Average ticket price (€)	188	198	5%	211	12%	212	13%
Number of flights and connectivity			-6%		-13%		-14%
Employment (1000 FTE)	1	1	-6%	1	-13%	1	-14%
Value added (€ billion)	**0.043**	0.040	-6%	0.037	-13%	0.037	-14%
CO_2 emissions (Mton)	0.3	0.3	-6%	0.3	-13%	0.3	-14%
People affected by noise (1000)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Aviation-related fiscal revenue (€ billion)	**0**	0.02	>>100%	0.04	>>100%	0.04	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	**35**	35	0%	0	0%	0	0%
Value added (€ billion)	1	1	0%	1	0%	1	0%
Impacts on all other sectors							
Employment (1000 FTE)	700	700	0%	700	0%	700	0%
Value added (€ billion)	20	20	0%	20	0%	20	0%
Total economic impacts							
Employment (1000 FTE)	800	800	0%	800	0%	800	0%
GDP (€ billion)	24	24	0%	24	0%	24	0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 5% increase. As a result, both the number of passengers and the number of flights decrease by 6%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 6%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is 18 million euro. With regard to climate and environmental impacts, the CO_2 emissions also decrease by 6% (noise exposure data are lacking).

In the second scenario, the VAT rate of 12% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 13% compared to the current situation. This decrease is a factor two higher than for the ticket tax, which is caused by the higher average ticket price increase that the VAT brings about. It also leads to a larger reduction of the number of direct jobs and the value added by the aviation sector of 13%, although the overall effect on jobs and GDP is negligible. The extension of the VAT to all flights results in a total fiscal revenue of € 40 million. The reduction in CO_2 emissions is 13%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 13% compared to the current situation. The number of flights and passengers decline by 14%, as do the CO_2 emissions. The fiscal revenue amounts to € 40 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 14% for both. Thus, the impacts of this particular excise duty are similar to those of extending the VAT on air passenger tickets to all destinations, and higher than for the introduction of the ticket tax.

4.17. Lithuania

CURRENT TAX REGIME

Lithuania does not impose a ticket tax on air passengers. The country levies a VAT of 9% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 34 – Impacts per taxation scenario and change relative to the current situation for Lithuania

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (9%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	2.4	2.3	-6%	2.2	-10%	2.1	-10%
Average ticket price (€)	163	172	5%	178	9%	178	9%
Number of flights and connectivity			-6%		-10%		-10%
Employment (1000 FTE)	0.46	0.43	-6%	0.41	-10%	0.41	-11%
Value added (€ billion)	**0.032**	0.030	-6%	0.029	-10%	0.029	-11%
CO_2 emissions (Mton)	0.2	0.2	-6%	0.2	-10%	0.2	-10%
People affected by noise (1000)	32.7	30.7	-6%	30.2	-8%	30.2	-8%

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (9%)		Introducing fuel excise duty	
Aviation-related fiscal revenue (€ billion)	0.0	0.020	>>100%	0.032	>>100%	0.032	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	33	32	0%	32	0%	32	0%
Value added (€ billion)	2	2	0%	2	0%	2	0%
Impacts on all other sectors							
Employment (1000 FTE)	1,100	1,100	0%	1,100	0%	1,100	0%
Value added (€ billion)	32	32	0%	32	0%	32	0%
Total economic impacts							
Employment (1000 FTE)	1,200	1,200	0%	1,200	0%	1,200	0%
GDP (€ billion)	37	37	-0%	37	-0%	37	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 5% increase. As a result, both the number of passengers and the number of flights decrease by 6%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 6%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is € 20 million. With regard to climate and environmental impacts, both the CO_2 emissions and the number of people affected by noise decrease by 6%.

In the second scenario, the VAT rate of 9% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 10% compared to the current situation. This decrease is higher than for the ticket tax, which is caused by the higher average ticket price increase that the VAT brings about. It also leads to a larger reduction of the number of direct jobs and the value added by the aviation sector of 10%, although the overall effect on jobs and GDP is negligible. The extension of the VAT to all flights results in a total fiscal revenue of € 32 million. The reduction in CO_2 emissions is 10%, and the number of people affected by noise drops by 8%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 9% compared to the current situation. The number of flights and passengers decline by 10%, as do the CO_2 emissions. The fiscal revenue amounts to € 32 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 11% for both. The reduction in the number of people affected by noise of 8% is in line with the reduction of the number of flights. Thus, the impacts of this particular excise duty are found to be similar to those of extending the VAT on air passenger tickets to all destinations, and higher than for the introduction of the ticket tax.

4.18. Luxembourg

CURRENT TAX REGIME

Luxembourg does not impose a ticket tax on air passengers. The country levies a VAT of 3% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 35 – Impacts per taxation scenario and change relative to the current situation for Luxembourg

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (3%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	1.5	1.4	-4%	1.4	-3%	*	*
Average ticket price (€)	317	327	3%	326	3%	*	*
Number of flights and connectivity			-4%		-3%		*
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
Value added (€ billion)	Not available	Not available	-	Not available	-	Not available	-
CO_2 emissions (Mton)	1.2	1.2	-4%	1.2	-3%	*	*
People affected by noise (1000)	52.9	52.1	-1%	52.2	-1%	*	*
Aviation-related fiscal revenue (€ billion)	0.0	0.01	-	0.01	-	*	*
Impacts on major suppliers							
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
Value added (€ billion)	Not available	Not available	-	Not available	-	Not available	-
Impacts on all other sectors							
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
Value added (€ billion)	Not available	Not available	-	Not available	-	Not available	-
Total economic impacts							
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
GDP (€ billion)	Not available	Not available	Not available	Not available	Not available	Not available	Not available

*: The calculation of the impact of an excise duty on ticket prices yields unreliable results, which may be the result of the relatively high share of full freight flights from Luxemburg airports.

**: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

It must be noted that input-output data were not available for the aviation sector in Luxembourg. Therefore, the effects on jobs and economic value added could not be estimated.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 3% increase. As a result, both the number of passengers and the number of flights decrease by 4%. The fiscal revenue resulting from the introduced ticket tax is € 14 million. With regard to climate and environmental impacts, the CO_2 emissions also decrease by 4%, and the number of people affected by noise by 1%.

In the second scenario, the VAT rate of 3% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 3% compared to the current situation. This decrease is similar to the one in the ticket tax scenario, which is caused by the similar ticket price increase. The fiscal revenue is € 14 million. The reduction in CO_2 emissions is 3%, and the number of people affected by noise drops by 1%.

The impacts of the introduction of a fuel excise duty of 330 €/kilolitre are found to be more than ten times higher than for both the VAT scenario and the ticket tax scenario. The fuel excise duty causes the average ticket price to increase by 45% compared to the current situation. The number of flights and passengers decline by 48%, as do the CO_2 emissions. The fiscal revenue amounts to € 98 million. The reduction in the number of people affected by noise of 27% is much lower than the reduction of the number of flights.

4.19. Malta

CURRENT TAX REGIME

Malta levies no aviation taxes: neither a passenger ticket tax, nor a VAT on air tickets, nor an excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 36 – Impacts per taxation scenario and change relative to the current situation for Malta

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (18%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	2.6	2.4	-5%	2.1	-20%	2.3	-10%
Average ticket price (€)	224	233	4%	264	18%	243	9%
Number of flights and connectivity			-5%		-20%		-10%
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
Value added (€ billion)	Not available	Not available	-	Not available	-	Not available	-
CO_2 emissions (Mton)	0.3	0.3	-5%	0.3	-20%	0.3	-10%
People affected by noise (1000)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Aviation-related fiscal revenue (€ billion)	0	0.02	>>100%	0.08	>>100%	0.04	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
Value added (€ billion)	Not available	Not available	-	Not available	-	Not available	-
Impacts on all other sectors							
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
Value added (€ billion)	Not available	Not available	-	Not available	-	Not available	-
Total economic impacts							
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
GDP (€ billion)	10	10	-0%	10	-0%	10	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

It must be noted that input-output data were not available for the aviation sector in Malta. Therefore, the effects on jobs and economic value added could not be estimated.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 4% increase. As a result, both the number of passengers and the number of flights decrease by 5%. The fiscal revenue resulting from the introduced ticket tax is € 21 million. With regard to climate and environmental impacts, the CO_2 emissions also decrease by 5% (data of noise exposure are not available).

The VAT rate that is applied to the second scenario is based on the standard VAT rate on international transport tickets in Malta, which is 18%. If this VAT rate were introduced on tickets for all destinations, the demand for flights by passengers and the resulting number of flights would decrease four times more than in the ticket tax scenario: by 20% (compared to 5%). This is caused by the higher average ticket price increase that the VAT brings about. The reduction in CO_2 emissions is 20%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 9% compared to the current situation. The number of flights and passengers decline by 10%, as do the CO_2 emissions. The fiscal revenue amounts to € 43 million. Thus, the impacts of this particular excise duty are found to be twice as small as for the VAT on air passenger tickets, but still twice as high as for the ticket tax scenario.

4.20. The Netherlands

CURRENT TAX REGIME

The Netherlands does not levy a ticket tax. There is a VAT on air tickets of 21% for domestic flights, but no excise duty.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 37 – Impacts per taxation scenario and change relative to the current situation for Netherlands

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (21%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	23.1	22.2	-4%	18.2	-21%	18.7	-19%
Average ticket price (€)	371	386	4%	449	21%	435	19%
Number of flights and connectivity			-4%		-21%		-19%
Employment (1000 FTE)	25	24	-4%	20	-22%	20	-20%
Value added (€ billion)	3.4	3.2	-4%	2.6	-22%	2.7	-20%
CO_2 emissions (Mton)	11.1	10.6	-4%	8.7	-21%	9.0	-19%
People affected by noise (1000)	55.4	53.7	-3%	45.8	-17%	46.9	-15%
Aviation-related fiscal revenue (€ billion)	0.0	0.3	>>100%	1.5	>>100%	1.2	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	200	200	0%	200	-1%	200	-1%
Value added (€ billion)	27	27	0%	26	-1%	26	0%
Impacts on all other sectors							
Employment (1000 FTE)	7,100	7,100	0%	7,100	0%	7,100	0%
Value added (€ billion)	585	585	0%	587	0%	586	0%
Total economic impacts							
Employment (1000 FTE)	7,300	7,300	0%	7,300	0%	7,300	0%
GDP (€ billion)	683	684	0%	684	0%	684	0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is relatively close to the corresponding € 7.47 tax rate, which comes down to a 4% increase. As a result, both the number of passengers and the number of flights decrease by 4%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 4%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is € 324 million. With regard to climate and environmental impacts, the CO_2 emissions also decrease by 4%, and the number of people affected by noise by 3%.

In the second scenario, the VAT rate of 21% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 21% compared to the current situation. This decrease is more than five times higher than for the ticket tax, which is caused by the higher average ticket price increase that the VAT brings about. It also leads to a larger reduction of the number of direct jobs and the value added by the aviation sector of 22%, although the overall effect on jobs and GDP is negligible. The extension of the VAT to all flights results in a total fiscal revenue of € 1,500 million. The reduction in CO_2 emissions is 21%, and the number of people affected by noise drops by 17%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 19% compared to the current situation. The number of flights and passengers decline by 19%, as do the CO_2 emissions. The fiscal revenue amounts to € 1,192 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 20% for both. The reduction in the number of people affected by noise of 15% is in line with the reduction of the number of flights. Thus, the impacts of this particular excise duty are found to be slightly smaller than for extending the VAT on air passenger tickets to all destinations, but still much higher than for the introduction of the ticket tax.

4.21. Poland

CURRENT TAX REGIME

Poland does not impose a ticket tax on air passengers. The country levies a VAT of 8% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 38 – Impacts per taxation scenario and change relative to the current situation for Poland

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (8%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	15.1	14.2	-6%	13.9	-8%	13.5	-10%
Average ticket price (€)	195	205	5%	210	7%	212	9%
Number of flights and connectivity			-6%		-8%		-10%
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
Value added (€ billion)	Not available	Not available	-	Not available	-	Not available	-
CO_2 emissions (Mton)	1.9	1.8	-6%	1.8	-8%	1.7	-10%
People affected by noise (1000)	68.7	65.4	-5%	64.3	-6%	63.1	-8%
Aviation-related fiscal revenue (€ billion)	0.0	0.2	>>100%	0.2	>>100%	0.2	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
Value added	Not available	Not	-	Not	-	Not	-

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (8%)		Introducing fuel excise duty	
(€ billion)		available		available		available	
Impacts on all other sectors							
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
Value added (€ billion)	Not available	Not available	-	Not available	-	Not available	-
Total economic impacts							
Employment (1000 FTE)	Not available	Not available	-	Not available	-	Not available	-
GDP (€ billion)	430	430	-0%	430	-0%	430	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

First of all, it must be noted that input-output data were not available for the aviation sector in Poland. Therefore, the effects on jobs and economic value added could not be estimated.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 5% increase. As a result, both the number of passengers and the number of flights decrease by 6%. The fiscal revenue resulting from the introduced ticket tax is € 151 million, compared to € 9 million in the current situation (generated by the current VAT on domestic flights). With regard to climate and environmental impacts, the CO_2 emissions also decrease by 6%, and the number of people affected by noise by 5%.

In the second scenario, the VAT rate of 8% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 8% compared to the current situation. This decrease is a bit higher than for the ticket tax, which is caused by the higher average ticket price increase that the VAT brings about. The extension of the VAT to all flights results in a total fiscal revenue of € 217 million. The reduction in CO_2 emissions is 8%, and the number of people affected by noise drops by 6%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 9% compared to the current situation. The number of flights and passengers decline by 10%, as do the CO_2 emissions. The fiscal revenue amounts to € 246 million. The reduction in the number of people affected by noise of 8% is in line with the reduction of the number of flights. Thus, the impacts of this particular excise duty are found to be (less than two times) higher than for both the VAT scenario and the ticket tax scenario.

4.22. Portugal

CURRENT TAX REGIME

Portugal does not impose a ticket tax on air passengers. The country levies a VAT of 6% on domestic flights, except when flying to/from the Madeira Islands and the Azores Islands, or between the islands. There is no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 39 – Impacts per taxation scenario and change relative to the current situation for Portugal

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (6%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	20.2	19.2	-5%	19.1	-5%	18.0	-11%
Average ticket price (€)	257	267	4%	270	5%	281	10%
Number of flights and connectivity			-5%		-5%		-11%
Employment (1000 FTE)	11	11	-5%	11	-5%	10	-11%
Value added (€ billion)	0.9	0.9	-5%	0.9	-5%	0.8	-11%
CO_2 emissions (Mton)	3.5	3.3	-5%	3.3	-5%	3.1	-11%
People affected by noise (1000)	49.1	47.8	-3%	47.6	-3%	45.9	-6%
Aviation-related fiscal revenue (€ billion)	0.0	0.2	>>100%	0.3	>>100%	0.5	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	100	100	0%	100	0%	100	-1%
Value added (€ billion)	5	5	0%	5	0%	5	-1%
Impacts on all other sectors							
Employment (1000 FTE)	3,800	3,800	0%	3,800	0%	3,800	0%
Value added (€ billion)	151	151	0%	151	0%	151	0%
Total economic impacts							
Employment (1000 FTE)	3,900	3,900	0%	3,900	0%	3,900	0%
GDP (€ billion)	180	180	-0%	180	-0%	180	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 4% increase. As a result, both the number of passengers and the number of flights decrease by 5%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 5%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is € 239 million, compared to € 32 million in the current situation (generated by the current VAT). With regard to climate and environmental impacts, the CO_2 emissions also decrease by 5%, and the number of people affected by noise by 3%.

In the second scenario, the VAT rate of 6% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 5% compared to the current situation. This decrease is very similar to the one in the ticket tax scenario. It also leads to a similar

reduction of the number of direct jobs and the value added by the aviation sector of 5%, but the overall effect on jobs and GDP is negligible. The VAT extension results in a higher fiscal revenue (€ 293 million) than the ticket tax, indicating that the tax per passenger is higher in the VAT scenario. The reduction in CO_2 emissions is 5%, and the number of people affected by noise drops by 3%.

The strongest effects can be observed for the introduction of a fuel excise duty of 330 €/kilolitre, which causes the average ticket price to increase by 10% compared to the current situation. The number of flights and passengers decline by 11%, as do the CO_2 emissions. The fiscal revenue amounts to 463 million euro. The relative reduction of the number of direct jobs and the value added by the aviation sector is 11% for both. The reduction in the number of people affected by noise of 6% is in line with the reduction of the number of flights.

4.23. Romania

CURRENT TAX REGIME

Romania does not impose a ticket tax on air passengers. The country levies a VAT of 19% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 40 – Impacts per taxation scenario and change relative to the current situation for Romania

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (19%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	8.2	7.7	-6%	6.7	-18%	7.4	-9%
Average ticket price (€)	176	185	5%	206	17%	190	9%
Number of flights and connectivity			-6%		-18%		-9%
Employment (1000 FTE)	8	7	-6%	6	-18%	7	-9%
Value added (€ billion)	0.2	0.2	-6%	0.1	-18%	0.2	-9%
CO_2 emissions (Mton)	1.4	1.4	-6%	1.2	-18%	1.3	-9%
People affected by noise (1000)	11.2	10.8	-3%	10.0	-10%	10.6	-5%
Aviation-related fiscal revenue (€ billion)	0.0	0.1	316%	0.2	882%	0.1	470%
Impacts on major suppliers							
Employment (1000 FTE)	100	100	0%	100	0%	100	0%
Value added (€ billion)	6	6	0%	6	0%	6	0%
Impacts on all other sectors							
Employment (1000 FTE)	6,000	6,000	0%	6,000	0%	6,000	0%
Value added (€ billion)	134	134	0%	134	0%	134	0%
Total economic impacts							
Employment (1000 FTE)	6,200	6,200	0%	6,200	0%	6,200	0%
GDP (€ billion)	160	160	0%	160	0%	160	0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 5% increase. As a result, both the number of passengers and the number of flights decrease by 6%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 6%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is 94 million euro, compared to € 23 million in the current situation (generated by the current VAT). With regard to climate and environmental impacts, the CO_2 emissions also decrease by 6%, and the number of people affected by noise by 3%.

In the second scenario, the VAT rate of 19% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 18% compared to the current situation. This decrease is a factor three higher than for the ticket tax, which is caused by the higher average ticket price increase that the VAT brings about. It also leads to a larger reduction of the number of direct jobs and the value added by the aviation sector of 18%, although the overall effect on jobs and GDP is negligible. The extension of the VAT to all flights results in a total fiscal revenue of € 222 million. The reduction in CO_2 emissions is 18%, and the number of people affected by noise drops by 10%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 9% compared to the current situation. The number of flights and passengers decline by 9%, as do the CO_2 emissions. The fiscal revenue amounts to € 129 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 9% for both. The reduction in the number of people affected by noise of 5% is in line with the reduction of the number of flights. Thus, the impacts of this particular excise duty are found to be twice as small as for extending the VAT on air passenger tickets to all destinations, but larger than for the introduction of the ticket tax.

4.24. Slovakia

CURRENT TAX REGIME

Slovakia does not impose a ticket tax on air passengers. The country levies a VAT of 20% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 41 – Impacts per taxation scenario and change relative to the current situation for Slovakia

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (20%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	1.0	1.0	-5%	0.8	-21%	0.9	-12%
Average ticket price (€)	174	183	5%	208	20%	193	11%
Number of flights and connectivity			-5%		-21%		-12%
Employment (1000 FTE)	0.60	0.57	-6%	0.47	-22%	0.53	-12%
Value added (€ billion)	0.034	0.032	-6%	0.026	-22%	0.030	-12%
CO_2 emissions (Mton)	0.1	0.1	-5%	0.1	-21%	0.1	-12%
People affected by noise (1000)	1.5	1.4	-5%	1.2	-20%	1.4	-10%
Aviation-related fiscal revenue (€ billion)	0.0	0.01	>>100%	0.03	>>100%	0.02	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	100	100	0%	100	0%	100	0%
Value added (€ billion)	4	4	0%	4	0%	4	0%
Impacts on all other sectors							
Employment (1000 FTE)	1,885	1,885	0%	1,885	0%	1,885	0%
Value added (€ billion)	68	68	0%	68	0%	68	0%
Total economic impacts							
Employment (1000 FTE)	1,943	1,943	0%	1,943	0%	1,943	0%
GDP (€ billion)	79	79	-0%	79	-0%	79	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding€ 7.47 tax rate, which comes down to a 5% increase. As a result, both the number of passengers and the number of flights decrease by 5%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by 6%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is € 9 million euro, compared to € 1 million in the current situation (generated by the current VAT). With regard to climate and environmental impacts, both the CO_2 emissions and the number of people affected by noise decrease by 5%.

In the second scenario, the VAT rate of 20% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 21% compared to the current situation. This decrease is a factor four higher than for the ticket tax, which is caused by the higher average ticket price increase that the VAT brings about. It also leads to a larger reduction of the number of direct jobs and the value added by the aviation sector of 22%, although the overall effect on jobs and GDP is negligible. The extension of the VAT to all flights results in a total fiscal revenue of € 28 million. The reduction in CO_2 emissions is 21%, and the number of people affected by noise drops by 20%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 11% compared to the current situation. The number of flights and passengers decline by 12%, as do the CO_2 emissions. The fiscal revenue amounts to € 17 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 12% for both. The reduction in the number of people affected by noise of 10% is in line with the reduction of the number of flights. Thus, the impacts of this particular excise duty are found to be smaller than for extending the VAT on air passenger tickets to all destinations, but larger than for the introduction of the ticket tax.

4.25. Slovenia

CURRENT TAX REGIME

Slovenia does not impose a ticket tax on air passengers. The country levies a VAT of 9.5% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 42 – Impacts per taxation scenario and change relative to the current situation for Slovenia

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (10%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	0.6	0.6	-3%	0.6	-10%	0.6	-5%
Average ticket price (€)	322	332	3%	353	9%	335	4%
Number of flights and connectivity			-3%		-10%		-5%
Employment (1000 FTE)	0.55	0.53	-3%	0.49	-10%	0.52	-5%
Value added (€ billion)	0.025	0.024	-3%	0.023	-10%	0.024	-5%
CO_2 emissions (Mton)	0.1	0.1	-3%	0.1	-10%	0.1	-5%
People affected by noise (1000)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Aviation-related fiscal revenue (€ billion)	0	0.01	>>100%	0.03	>>100%	0.02	>>100%
Impacts on major suppliers							
Employment (1000 FTE)	19	19	0%	18	0%	19	0%
Value added (€ billion)	1	1	0%	1	0%	1	0%

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (10%)		Introducing fuel excise duty	
Impacts on all other sectors							
Employment (1000 FTE)	700	700	0%	700	0%	700	0%
Value added (€ billion)	32	32	0%	32	0%	32	0%
Total economic impacts							
Employment (1000 FTE)	800	800	0%	800	0%	800	0%
GDP (€ billion)	39	39	-0%	39	-0%	39	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 3% increase. As a result, both the number of passengers and the number of flights decrease by 3%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by the same 3%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is € 6 million. With regard to climate and environmental impacts, the CO_2 emissions also decrease by 3% (noise exposure data are not available).

In the second scenario, the VAT rate of 9.5% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 10% compared to the current situation. This decrease is a factor three higher than for the ticket tax, which is caused by the higher average ticket price increase that the VAT brings about. It also leads to a larger reduction of the number of direct jobs and the value added by the aviation sector of 10%, although the overall effect on jobs and GDP is negligible. The extension of the VAT to all flights results in a total fiscal revenue of € 17 million. The reduction in CO_2 emissions is 10%.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 4% compared to the current situation. The number of flights and passengers decline by 5%, as do the CO_2 emissions. The fiscal revenue amounts to 8 million euro. The relative reduction of the number of direct jobs and the value added by the aviation sector is 5% for both. Thus, the impacts of this particular excise duty are found to be twice as small as for extending the VAT on air passenger tickets to all destinations, but higher than for the introduction of the ticket tax.

4.26. Spain

CURRENT TAX REGIME

Spain does not impose a ticket tax on air passengers. The country levies a VAT of 10% on domestic flights, except to/from the Canary Islands, Ceuta and Melilla. There is no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 43 – Impacts per taxation scenario and change relative to the current situation for Spain

	Current situation	Introduction of ticket tax		Introducing VAT on all tickets (10%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	102.2	97.0	-5%	94.4	-8%	90.9	-11%
Average ticket price (€)	230	240	5%	248	7%	252	10%
Number of flights and connectivity			-5%		-8%		-11%
Employment (1000 FTE)	32	30	-6%	29	-8%	28	-12%
Value added (€ billion)	2.9	2.8	-6%	2.7	-8%	2.6	-12%
CO_2 emissions (Mton)	16.8	16.0	-5%	15.6	-8%	15.0	-11%
People affected by noise (1000)	130.4	125.2	-4%	122.6	-6%	118.9	-9%
Aviation-related fiscal revenue (€ billion)	0.4	1.4	237%	2.1	426%	2.4	487%
Impacts on major suppliers							
Employment (1000 FTE)	400	400	0%	400	0%	400	0%
Value added (€ billion)	34	34	0%	34	0%	34	0%
Impacts on all other sectors							
Employment (1000 FTE)	15,600	15,600	0%	15,600	0%	15,600	0%
Value added (€ billion)	943	943	0%	943	0%	943	0%
Total economic impacts							
Employment (1000 FTE)	16,000	16,000	0%	16,000	0%	16,000	0%
GDP (€ billion)	1,080	1,080	-0%	1,080	-0%	1,080	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, a ticket tax is introduced with the same structure and level as the German Air Transport Tax. Because most passengers fly to destinations within Europe in economy class and other classes, the average ticket price rises by a value that is close to the corresponding € 7.47 tax rate, which comes down to a 5% increase. As a result, both the number of passengers and the number of flights decrease by 5%. In turn, the decrease in passenger demand leads to a drop in both the number of direct jobs and in the value added of the aviation sector, which both fall by 6%. However, this is compensated by an almost equal increase in jobs in other sectors of the economy, so the net effect on employment is close to zero. The fiscal revenue resulting from the introduced ticket tax is € 1,366 million, compared to € 406 million in the current situation (generated by the current VAT). With regard to climate and environmental impacts, the CO_2 emissions also decrease by 5%, and the number of people affected by noise by 4%.

In the second scenario, the VAT rate of 10% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 8% compared to the current situation. This decrease is higher than for the ticket tax, which is caused by the higher average ticket price increase that the VAT brings about. It also leads to a larger reduction of the number

of direct jobs and the value added by the aviation sector of 8%, although the overall effect on jobs and GDP is negligible. The extension of the VAT to all flights results in a total fiscal revenue of € 2,131 million. The reduction in CO_2 emissions is 8%, and the number of people affected by noise drops by 6%.

The strongest effects can be observed for the introduction of a fuel excise duty of 330 €/kilolitre, which causes the average ticket price to increase by 10% compared to the current situation. The number of flights and passengers decline by 11%, as do the CO_2 emissions. The fiscal revenue amounts to € 2,382 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 12% for both. The reduction in the number of people affected by noise of 9% is in line with the reduction of the number of flights.

4.27. Sweden

CURRENT TAX REGIME

Sweden charges a ticket tax to all departing air passengers. There are three tax rates that apply to different destination bands. See Table 44.
The tax has entried into force on April 1st, 2018. The government aims to reduce the number of flights per year by 450,000-600,000 per year with this tax, which should lead to an emissions reduction of about 2%, and thereby contribute to meeting the Sustainable Development Goals by 2030[84].

Table 44 – Ticket tax rates in Sweden

Ticket tax type	Tax rate description	Tax rate
Air Ticket Tax	To domestic and European destinations	€ 6.26 (SEK 60)
	To destinations outside Europe, but below 6,000 km from origin	€ 26.06 (SEK 250)
	All other destinations	€ 41.70 (SEK 400)

Sweden levies a VAT of 6% on domestic flights, but no excise duty on kerosene.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 45 – Impacts per taxation scenario and change relative to the current situation for Sweden

	Current situation	Abolition of ticket tax		Introducing VAT on all tickets (6%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	20.9	21.8	4%	20.1	-4%	19.2	-8%
Average ticket price (€)	245	235	-4%	256	4%	263	8%
Number of flights and connectivity			4%		-4%		-8%
Employment (1000 FTE)	6	6	4%	6	-4%	5	-8%
Value added (€ billion)	0.7	0.7	4%	0.7	-4%	0.6	-8%
CO_2 emissions (Mton)	2.5	2.7	4%	2.4	-4%	2.3	-8%
People affected by noise (1000)	28.5	29.4	3%	27.6	-3%	26.4	-7%
Aviation-related fiscal revenue (€ billion)	0.3	0.1	-71%	0.5	69%	0.6	111%
Impacts on major suppliers							
Employment (1000 FTE)	100	100	0%	100	0%	100	0%
Value added (€ billion)	14	14	0%	14	0%	14	0%
Impacts on all other sectors							
Employment (1000 FTE)	4,500	4,500	0%	4,500	0%	4,500	0%
Value added (€ billion)	383	383	0%	383	0%	383	0%
Total economic impacts							
Employment (1000 FTE)	4,600	4,600	0%	4,600	0%	4,600	0%
GDP (€ billion)	449	449	0%	449	-0%	449	-0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, the current ticket tax is abolished. This causes the average ticket price to decrease by 4%. As a result, both the number of passengers and the number of flights increase by 4%. In turn, the increase in passenger demand leads to an increase in both the number of direct jobs and in the value added of the aviation sector, which both rise by the same 4%. However, this is compensated by an almost equal decrease in jobs in other sectors of the economy, so the net effect on employment is close to zero.
The fiscal revenue resulting from the ticket tax abolition is € 83 million (generated by the current VAT on air tickets), which is much lower than than the € 289 million in the current situation. With regard to climate and environmental impacts, the CO_2 emissions also increase by 4%, and the number of people affected by noise by 3%.

In the second scenario, the VAT rate of 6% that is currently levied to domestic flights applies to tickets for all destinations. As a result, the demand for flights by passengers and the number of flights decrease by 4% compared to the current situation. This results in a reduction of the number of direct jobs and the value added by the aviation sector of 4%, although the overall effect on jobs and GDP is negligible. The fiscal revenue increases to € 489 million, due to the extension of the VAT to all flights. The reduction in CO_2 emissions is 4%, and the number of people affected by noise drops by 3%.
Comparing these results with the first scenario, we can see that the effects of the VAT introduction are similar in size as the effects of the ticket tax abolition, but in the opposite direction.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 8% compared to the current situation. The number of flights and passengers decline by 8%, as do the CO_2 emissions. The fiscal revenue amounts to € 610 million. The relative reduction of the number of direct jobs and the value added by the aviation sector is 8% for both. The reduction in the number of people affected by noise of 7% is in line with the reduction of the number of flights. Thus, the impacts of this particular

[84] https://nordic.businessinsider.com/sweden-is-making-flying-more-expensive-with-a-contested-airline-tax--and-some-airlines-are-already-cancelling-routes--/

excise duty are found to be higher than for both the VAT scenario and the (oppositely directed) ticket tax abolition scenario.

4.28. United Kingdom

CURRENT TAX REGIME

The ticket tax in the UK is called the UK Air Passenger Duty, and is charged to all passengers departing from UK airports on board aircraft with a maximum takeoff weight (MTOW) of more than 20 tonnes. The tax applies to both domestic and international flights. The tax value depends on the aircraft (MTOW, seat pitch, and number of seats) and the distance of the capital city of the destination country or territory from London. There are six tax rates in total, see Table 46.

Table 46 – UK ticket tax rates

Tax rate	Description	Value
Band A – Reduced rate	< 2,000 miles, lowest class, seat pitch < 40 inches	€ 14.42
Band A – Standard rate	< 2,000 miles, all other classes, seat pitch > 40 inches	€ 28.85
Band A – Higher rate	< 2,000 miles, aircraft > 20 tonnes for < 19 passengers	€ 86.54
Band B – Reduced rate	> 2,000 miles, lowest class, seat pitch < 40 inches	€ 83.21
Band B – Standard rate	> 2,000 miles, all other classes, seat pitch > 40 inches	€ 166.41
Band B – Higher rate	> 2,000 miles, aircraft > 20 tonnes for < 19 passengers	€ 499.24

There are two destination bands. In band A the distance from London to the capital of the destination country or territory is between 0 to 2,000 miles (3,218.7 kilometres); in band B the distance is higher than 2,000 miles. There are three rates of duty for each destination band. The 'reduced rate' applies to the lowest class of travel available in the plane for seat pitches below 40 inches (1.016 metres). The 'standard rate' applies to all other classes of travel, or to seats with a pitch above 40 inches. The 'higher rate' applies to airplanes that weigh 20 tonnes or more and carry fewer than 19 passengers[85].

Transfer passengers and passengers travelling from the Channel Islands and the Scottish Highlands and Islands region are exempted from the UK ticket tax. Passengers departing from Northern Ireland do not pay the ticket tax in case of direct long-haul flights, i.e., flights to a destination outside band A. Furthermore, passengers in emergency and public service flights do not pay this tax.

There is neither a VAT on air tickets in the UK nor an excise duty.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 47 – Impacts per taxation scenario and change relative to the current situation for the UK

	Current situation	Abolition of ticket tax		Introducing VAT on all tickets (19%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	116.4	126.5	9%	93.3	-20%	102.8	-12%
Average ticket price (€)	393	362	-8%	468	19%	432	11%
Number of flights and connectivity			9%		-20%		-12%
Employment (1000 FTE)	75	82	9%	60	-20%	66	-12%
Value added (€ billion)	12.8	13.9	9%	10.3	-20%	11.3	-12%
CO_2 emissions (Mton)	34.0	36.9	9%	27.2	-20%	30.0	-12%
People affected by noise (1000)	1,084.7	1,143.8	5%	926.7	-15%	996.0	-8%
Aviation-related fiscal revenue (€ billion)	3.7	0.0	-100%	10.5	186%	7.3	97%
Impacts on major suppliers							
Employment (1000 FTE)	700	700	0%	700	0%	700	0%
Value added (€ billion)	75	75	0%	75	0%	75	0%
Impacts on all other sectors							
Employment (1000 FTE)	25,900	25,800	0%	25,900	0%	25,900	0%
Value added (€ billion)	2,233	2,232	0%	2,236	0%	2,235	0%
Total economic impacts							
Employment (1000 FTE)	26,600	26,600	0%	26,600	0%	26,600	0%
GDP (€ billion)	2,602	2,602	-0%	2,602	0%	2,602	0%

*: The sum of value added gives the gross value added, which is equal to GDP plus taxes minus subsidies.

In the first scenario, the current ticket tax is abolished. This causes the average ticket price to decrease by 8%. As a result, both the number of passengers and the number of flights increase by 9%. In turn, the increase in passenger demand leads to an increase in both the number of direct jobs and in the value added of the aviation sector, which both rise by the same 9%. However, this is compensated by an almost equal decrease in jobs in other sectors of the economy, so the net effect on employment is close to zero.
The fiscal revenue resulting from the ticket tax abolition drops to zero, as the UK does not levy a VAT on flight tickets. This is a large reduction compared to the € 3.7 billion that is raised in the current situation. With regard to climate and environmental impacts, the CO_2 emissions also increase by 9%, and the number of people affected by noise by 5%.

[85] https://www.gov.uk/guidance/rates-and-allowances-for-air-passenger-duty

The VAT rate that is applied to the second scenario is based on the standard VAT rate on international transport tickets in the UK, which is 19%. If this VAT rate were introduced on tickets for all destinations, the demand for flights by passengers and the resulting number of flights would decrease by 20% compared to the current situation. This results in a reduction of the number of direct jobs and the value added by the aviation sector of 20%, although the overall effect on jobs and GDP is negligible. The introduction of the VAT creates an additional fiscal revenue of € 6.8 billion (creating a total fiscal revenue of 10.5 billion euro), which is more than the current ticket tax generates. The reduction in CO_2 emissions is 20%, and the number of people affected by noise drops by 15%. Comparing these results with the first scenario, we can see that the effects of the VAT introduction are more than twice as large as the effects of the ticket tax abolition, but in the opposite direction.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 11% compared to the current situation. The number of flights and passengers decline by 12%, as do the CO_2 emissions. The fiscal revenue amounts to 7.3 billion euro. The relative reduction of the number of direct jobs and the value added by the aviation sector is 12% for both. The reduction in the number of people affected by noise of 8% is in line with the reduction of the number of flights. Thus, the impacts of this particular excise duty are found to be smaller than for the VAT on flight tickets, and higher than for the (oppositely directed) abolition of the ticket tax.

4.29. EU-28

CURRENT TAX REGIME

There is no EU-wide taxation regime, hence we determined the impacts on the EU-28 by aggregating the taxation and other data from each MS. In effect the model treats the EU-28 as if it was a single country.

The weighted average ticket tax for the EU-28 is around €11 per ticket, while the average VAT is around €4 per ticket. Neither excise duty nor VAT are levied EU-wide.

IMPACTS

The scenarios and the effect they have on the modelled impacts are presented in the following table.

Table 48 – Impacts per taxation scenario and change relative to the current situation for the EU-28

	Current situation	Abolition of ticket tax		Introducing VAT on all tickets (19%)		Introducing fuel excise duty	
Impacts	*Value*	*Value*	*Change*	*Value*	*Change*	*Value*	*Change*
Aviation sector							
Passenger demand (million)	691.5	718.5	4%	570.4	-18%	616.0	-11%
Average ticket price (€)	304	293	-4%	358	17%	333	10%
Number of flights and connectivity			4%		-18%		-11%
Employment (1000 FTE)	362	376	4%	296	-18%	321	-11%
Value added (€ billion)	43.4	45.1	4%	35.6	-18%	38.5	-11%
CO_2 emissions (Mton)	149.5	155.3	4%	123.3	-18%	133.1	-11%
People affected by noise (1000)	2,851.5	2,919.8	2%	2,495.9	-12%	2,637.1	-8%
Aviation-related fiscal revenue (€ billion)	10.0	2.6	-74%	39.9	297%	26.9	168%
Impacts on major suppliers							
Employment (1000 FTE)	5,100	5,100	0%	5,100	0%	5,100	0%
Value added (€ billion)	527	527	0%	525	0%	526	0%
Impacts on all other sectors							
Employment (1000 FTE)	188,300	188,300	0%	188,500	0%	188,400	0%
Value added (€ billion)	12,672	12,670	0%	12,680	0%	12,677	0%
Total economic impacts							
Employment (1000 FTE)	193,800	193,800	0%	193,900	0%	193,900	0%
GDP (€ billion)	14,798	14,798	0%	14,797	-0%	14,797	-0%

In the first scenario, the average EU ticket tax is abolished, or in other words the current ticket taxes levied in some MS are abolished. This causes the average ticket price to decrease by 4% resulting in the number of passengers and flights increasing by 4%. The effect is relatively small owing to the fact that a minority of MS currently levy ticket taxes. In turn, the increase in passenger demand leads to an increase in both the number of direct jobs and in the value added of the aviation sector, which both rise by 4%. However, this is compensated by an almost equal decrease in jobs in other sectors of the economy, so the net effect on total employment is close to zero. The fiscal revenue resulting from the ticket tax abolition drops by 74%, from €10 billion EU-wide to €2.6 billion, with the remainder resulting from domestic VAT levied in some Member States. With regards to climate and environmental impacts, the CO_2 emissions increase by 4% to 155.3 Mton CO_2, and the number of people affected by noise increases by 2%.

The VAT rate that is applied to the second scenario is based on Germany's VAT rate of 19% for domestic flights. If this VAT rate were introduced on tickets for all destinations, the demand for flights by passengers and the resulting number of flights would decrease by 18% compared to the current situation. This results in a reduction of the number of direct jobs and the value added by the aviation sector of 18%, although the overall effect on jobs and GDP is negligible. The introduction of the VAT increases the aviation-related fiscal revenue EU-wide from 10 billion euro to 40 billion euro. The reduction in CO_2 emissions is 18%, and the number of people affected by noise drops by 12%. Comparing these results with the first scenario, we can see that the effects of the VAT introduction are more than three times as large as the effects of the ticket tax abolition, but in the opposite direction.

The introduction of a fuel excise duty of 330 €/kilolitre causes the average ticket price to increase by 10% compared to the current situation. The number of flights and passengers decline by 11%, as do the CO_2 emissions, while the number of people affected by noise declines by 8%. The aviation-related fiscal revenue increases from 10 billion euro to 27 billion euro, while on the other hand there is a relative reduction of 11% in the number of direct jobs and the value added by the aviation sector. Thus, the impacts of this particular excise duty are found to be smaller than for the VAT on flight tickets, and higher than for the (oppositely directed) abolition of the ticket tax.

5. Conclusions

Although many countries exempt aviation from all taxes, a number of countries levy taxes on some aviation activities. In EU Member states, VAT or other taxes on domestic aviation are the most prevalent and exist in 17 Member States. Six Member States levy taxes on international aviation, invariably in the form of ticket taxes for passengers departing from airports in the Member State.

Outside the EU, 13 mandate countries, as well as Australia, Canada, the United States, Hong Kong, Brazil and Japan all tax aviation activities. In most cases, the taxes are ticket or departure taxes, i.e. a fixed amount per passenger, sometimes depending on the destination or class of travel. Some countries levy VAT or sales taxes, i.e. a levy proportional to the value of the ticket. This is done, for example, in Japan, Mexico, the USA and Canada.

Fuel on domestic flights is sometimes taxes, e.g. in the USA. In contrast, fuel used on international flights is generally exempt from fuel taxes due to international convention.

Taxes lower demand and have economic and environmental impacts. This study has developed a model to assess certain impacts of the introduction or abolition of a ticket tax, VAT, or a fuel excise duty on EU Member States. Due to data constraints, it could model the impacts for 245 Member States.

A fuel excise duty is chosen as an example to illustrate the results because it could have the same rate in all countries, viz. the minimum rate for kerosene from the Energy Taxation Directive (which exempts kerosene used in international aviation).

The calculated impacts on ticket prices range from 3-19%, although in most Member States it is close to 10%. The reasons for the differences are partly due to the different level of ticket prices in EU Member States, but also point to constraints of the model: when a country has a high share of international transfer passengers or freight flights, the impacts are overestimated.

As a result of the impact on ticket prices, the demand for aviation is reduced. The impact depends on the price elasticity of demand which, amongst others, depends on the share of intercontinental and intra-European flights. In most countries, a 10% increase in ticket prices results in a 9–11% lower demand. This corresponds to a similar reduction in the number of flights.

In general, introduction of a tax that increases the ticket prices by 10% has no net impacts on jobs. The negative impacts on employment in the aviation sector and suppliers are offset by positive impacts in other sectors caused by increased fiscal revenue, which either results in higher government spending, or results in lower taxes and increases demand of households or businesses.

The impact on GDP are composed of a reduction in value added in aviation sector and supplying sectors, and an increase of value added in other sectors because the tax raises fiscal revenue that either results in increased government expenditure or lower taxes and increased spending by households and companies. The balance depends on structure of the economy and varies per Member State. The introduction of an excise duty on fuel has an impact of less than 0.1% for most Member States, although some outliers have a contraction of GDP by 0.6% or an increase of 0.7%.

Because lower demand reduces the number of flights, emissions and noise are reduced as well. In this case by 9–11% in most Member States.

A Overview of taxes

	Country	Name of Tax	Year of intro-ductio n	Tax rate	Exemptions	Notes
EU	Austria	Flugabgabe / Austria Air Transport Levy	2011	€7 (short haul) €15 (medium haul / selection of destinations) €35 (other long haul)	Transfer / transit pax continuing to another destination within 24 hours	Rates will be reduced by 50% effective 1 January 2018
		VAT		10%	International flights	
	Belgium	No aviation tax				
	Bulgaria	No aviation tax				
	Croatia	VAT		25%	International flights	
		Croatia Civil Aviation Authority CCAA Tax	2010	€ 1.37		Not considered as tax (levied by civil aviation authority)
	Cyprus	No aviation tax				
	Czech Republic	VAT		15% (domestic flights only)		
		Embarkation tax		€ 19.26 (domestic) € 22.42 (other)		Not considered as tax: levied by airport authority to fund aviation-related services or infrastructure
	Denmark	No aviation tax				
	Estonia	VAT		20%	International flights (Includes domestic/intl connections)	
	Finland	VAT		10%	International flights (Includes domestic/intl connections)	
	France	VAT		10%	(domestic flights only)	
		France Civil Aviation Tax		€ 4.48 (domestic/EU) € 8.06 (all other) € 1.33 per ton of freight	Transfer pax	
		Air Passenger Solidarity Tax	2006	€ 1.13 (within EEA[55]; economy class) € 11.27 (within EEA; business/first class) € 4.51 (outside EEA; economy class) € 45.07 (outside EEA; business/first class)	Transfer pax	
		Airport Tax	2013	€ 10.85 (domestic) € 12.75 (international)	40% reduction for transfer/transit pax	Not considered as tax: its purpose is to finance fire services, bird strike prevention, safety and environmental monitoring
		Fiscal Tax (Corsica)		€ 4.57 (for all passengers to/from Corsica)		
	Germany	VAT		19%	International flights	
		Luftverkehrsteuer / German Air Transport Tax	2012	€ 7.47 (short haul) € 23.32 (medium haul/selection of destinations) € 41.99 (other long haul)	Transfer passengers with transfer < 12h for annex 1 countries or <24h for annex 2 countries	
	Greece	VAT		10%	International flights	
	Hungary	Hungary Airport Departure Tax		€ 25.30		Not considered as tax: revenues are used to fund aviation-related services
	Ireland	No aviation tax				
	Italy	VAT		10%	International flights	
		Italy Embarkation Tax		Rates for FCO € 17.77 (EU) € 28.41 (Long haul)		
		Italy City Council Tax		€ 6.50 (all other airports) € 7.50 (Rome Airports)		
	Latvia	VAT		12% (domestic flights only)		
	Lithuania	Lithuania Airport Tax		€ 6.37		Not considered as tax: revenues are used to fund aviation-related services
	Luxembourg	No aviation tax				

[55] See Annex B for a definition of countries.

	Country	Name of Tax	Year of intro-ductio n	Tax rate	Exemptions	Notes
	Malta	VAT		18%	International flights	
	Netherlands	No aviation tax				
	Poland	VAT		8%	International flights	
		Poland airport tax		PLN48.60 (domestic) PLN65 (international) PLN70 (intercontinental)		Not considered as tax: revenues are used to fund aviation-related services
	Portugal	VAT		6%	International flights Flights to/from Madeira and Azores	
		Security tax		€ 3.47 (domestic/short haul) € 6.94 (intercontinental)		Not considered as tax, revenues are used to finance security services
	Romania	VAT		20%	International flights	
		Airport Departure Tax		€ 5.07 (domestic) € 10.40 (international)		Not considered as tax: revenues are used to fund aviation-related services
	Slovakia	VAT		20%	International flights	
		Slovakia Embarkation Tax		€ 6.64 (domestic) € 16.27 (international)		Not considered as tax: revenues are used to fund aviation-related services
	Slovenia	No aviation tax				
	Spain	VAT		10%	International flights Flights to/from Canary Islands, Ceuta and Melilla	
		Security tax		€ 3.63		Not considered as tax, revenues are used to finance security services
	Sweden	VAT		6%	International flights	
			2018 (April)	SEK60 (domestic/EU) SEK250 (ICA < 6,000 km) SEK400 (all other)		Aviation tax will be installed as of 1 April 2018
	United Kingdom	Air Passenger Duty	2007	GBP13 (lowest class < 2,000 miles) GBP26 (all other classes < 2,000 miles) GBP78 (aircraft > 20 tonnes for < 19 pax; < 2,000 miles) GBP75 (lowest class > 2,000 miles) GBP150 (all other classes > 2,000 miles) GBP450 (aircraft > 20 tonnes for < 19 pax ; < 2,000 miles)	Transfer pax Passengers travelling from Channel Islands	
EEA	Iceland	No aviation tax				
	Norway	VAT		10%	International flights	
		Norway Air Passenger Tax	2016	NOK82 (€8.77)	Transfer passengers Children under 2 Airline employees travelling on business	
CH	Switzerland	VAT		8%	International flights	
Similar aviation clusters	Canada	Canadian Goods and Services Tax		5%	Flights other than domestic / USA	
		Canadian Harmonized Sales Tax		0-10%		Rates differ by state
		Quebec sales tax		9.98%		
	United States	US Transportation Tax		7.5%	International flights Flights to Canada and Mexico	
		US International Departure Tax		USD 18 ; € 15.04		
	Brazil	Embarkation fee (domestic)		BRL 18.62/€ 7.99 (CAT1) BRL 15.42/€ 6.62 (CAT2) BRL 11.58/€ 4.97 (CAT3) BRL 8.01/€ 3.44 (CAT4)		Differs per airport (4 categories)
		Embarkation fee (international)		USD 36/€ 30.70		
	Hong Kong	Hong Kong Air Passenger Departure Tax		€12.85 HKD120	Children under 12 Transfer passengers	
	Australia	Australian Goods and Services Tax		10%	International flights	
		Australia Passenger Movement Charge		AUD 60/€ 40.28		
	Japan	Japan Consumption Tax		8%	International flights	

	Country	Name of Tax	Year of Introduction	Tax rate	Exemptions	Notes
Mandate countries	Armenia	State Tax (international)		AMD 10,000/€ 18.05		
	Bahrain	Bahrain Passenger Service Fee International		€ 15.71 BHD 7		Stated tax purpose remains unclear. It appears that the tax is levied to defray cost for passenger services, and is as such not considered a tax
	China	China Airport Fee (domestic)		CNY 60/€ 6.36		Chinese airport fee has as stated purpose "airport development fee"[87], and is used for infrastructure development. Not considered as a tax
		China Airport Fee (international)		CNY 90/€ 11.44		Idem as above
	Kuwait	Kuwait Airport Departure Tax		KWD 3/€ 6.27		Stated tax purpose remains unclear. It appears that the tax is levied to defray cost for passenger services, and is as such not considered a tax
	Mexico	Mexico Airport Departure Tax Tua Domestic		€ 16.25		Not considered as tax: revenues are used to fund aviation-related services
		Mexico Airport Departure Tax Tua International		€ 37.53		Not considered as tax: revenues are used to fund aviation-related services
		Mexico Transportation Tax IVA Domestic		4-16%	International flights	Differs per airport
		Mexico Tourism Tax Derecho No Inmigrante		€ 23.45		
		Mexico Transportation Tax IVA International		4%		
ASEAN	Oman	Oman Airport Tax Domestic		€ 4.36		Stated tax purpose remains unclear. It appears that the tax is levied to defray cost for passenger services, and is as such not considered a tax
		Oman Airport Tax International		€ 21.76		Idem as above
	Qatar	Qatar Airport Fee International		€ 9.26		Idem as above
	Saudi Arabia	No aviation tax				
	Turkey	No aviation tax				
	United Arab Emirates	United Arab Emirates Passenger Facilities Charge		€7.96 AED 35		Stated tax purpose remains unclear. It appears that the tax is levied to defray cost for passenger services, and is as such not considered a tax
	Brunei	No aviation tax				
	Cambodia	No aviation tax				
	Indonesia	VAT		10%	International flights	
	Laos	No aviation tax				
	Malaysia	Malaysia Goods and Services Tax		6%	International flights	
	Myanmar	No aviation tax				
	Philippines	No aviation tax				
	Singapore	Singapore Aviation Levy		€ 3.79 SGD 6.10		
	Thailand	VAT		7%	International flights	
		Thai international departure/arrival fee		€ 0.76		Paid twice (upon departure and arrival)
	Vietnam	VAT		10%		

[87] http://www.ebeijing.gov.cn/QA/all_questions/t1068430.htm

B VAT Rules used in scenarios

Country	Effective rate (domestic flights only, unless stated otherwise)	VAT on other passenger transport
Austria	13%	
Belgium	0%	6%
Bulgaria	0%	20%
Croatia	25%	
Cyprus	0%	9%
Czech Republic	15%	
Denmark	0%	25%
Estonia	20%	
Finland	10%	
France	10%	
Germany	19%	
Greece	24%	
Hungary	27%	
Ireland	0%	0%*
Italy	10%	
Latvia	12%	
Lithuania	9%	
Luxembourg	3%	
Malta	0%	18%
Netherlands	21%	
Poland	8%	
Portugal	6%	
Romania	19%	
Slovakia	20%	
Slovenia	9,5%	
Spain	10%	
Sweden	6%	
United Kingdom	0%	0%*

* In case no VAT is levied on other modes of international passenger transport the German VAT rate on domestic flights is used.

C Regional breakdown for tax rates

C.1 Austria Air Transport Levy

Short range	Medium range
Armenia	Afghanistan
Albania	Azerbaijan
Algeria	Bahrain
Andorra	Benin
Austria	Burkina Faso
Belarus	Burundi
Belgium	Cameroon
Bosnia and Herzegovina	Cape Verde
Bulgaria	Central African Republic
Croatia	Chad
Czech Republic	Cote D'Ivoire
Cyprus	Djibouti
Denmark	Eritrea
Germany	Equatorial Guinea
Egypt	Ethiopia
Estonia	Gabon
Finland	Gambia
France	Ghana
Georgia	Guinea
Gibraltar	Guinea Bissau
Greece	India
Guernsey	Iraq
Hungary	Iran
Ireland	Iceland
Italy	Kazakhstan
Isle of Man	Kenya
Israel	Kyrgyzstan
Jersey	Democratic Republic of the Congo
Jordan	Congo
Latvia	Kuwait
Liechtenstein	Liberia
Lithuania	Mali
Luxembourg	Morocco
Lebanon	Mauritania
Libya	Niger
Malta	Nigeria
Macedonia	Oman
Moldova	Pakistan
Montenegro	Qatar
Monaco	Rwanda
Netherlands	Sao Tome and Principe
Norway	Saudi Arabia
Poland	Senegal
Portugal	Sierra Leone
Romania	Somalia
Russian Federation	Sudan
San Marino	Tajikistan
Slovenia	Togo
Sweden	Turkmenistan

Short range	Medium range
Switzerland	Uganda
Serbia	Uzbekistan
Slovakia	United Arab Emirates
Spain	Yemen
Syria	
Tunisia	
Turkey	
Ukraine	
United Kingdom	

C.2 French Air Passenger Solidarity Tax/Civil Aviation Tax

Countries where reduced rates apply	
Austria	Lithuania
Belgium	Luxembourg
Bulgaria	Malta
Croatia	Martinique
Cyprus	Mayotte
Czech Republic	Netherlands
Denmark	New Caledonia
Estonia	Norway
Finland	Poland
France	Portugal
French Guiana	Reunion
French Polynesia	Romania
Germany	Saint Pierre and Miquelon
Greece	Slovakia
Guadeloupe	Slovenia
Hungary	Spain
Iceland	Sweden
Ireland	Switzerland
Italy	United Kingdom
Latvia	

C.2 German Air Transport Tax

Short range (Annex 1 Countries)	Medium range (Annex 2 Countries)
Albania	Afghanistan
Algeria	Armenia
Andorra	Azerbaijan
Austria	Bahrain
Belgium	Benin
Belarus	Burkina Faso
Bosnia and Herzegovina	Cameroon
Bulgaria	Cape Verde
Denmark	Central African Republic
Germany	Chad
Estonia	Djibouti
Finland	Egypt
France	Equatorial Guinea
Macedonia	Eritrea
Gibraltar	Ethiopia
Greece	Gabon
Ireland	Gambia

Short range (Annex 1 Countries)	Medium range (Annex 2 Countries)
Iceland	Georgia
Italy	Ghana
Croatia	Guinea Bissau
Cyprus	Iran
Czech Republic	Iraq
Latvia	Israel
Libya	Ivory Coast (Cote d'Ivoire)
Liechtenstein	Jordan
Lithuania	Kazakhstan
Luxembourg	Kuwait
Malta	Kyrgyzstan
Moldova	Lebanon
Morocco	Liberia
Monaco	Mali
Montenegro	Mauritania
Netherlands	Niger
Norway	Nigeria
Poland	Oman
Portugal	Pakistan
Romania	Palestinian Territories
Russian Federation	Qatar
San Marino	Sao Tome and Principe
Sweden	Saudi Arabia
Switzerland	Senegal
Serbia	Sierra Leone
Slovakia	Sudan
Slovenia	Syria
Spain	Tajikistan
Turkey	Togo
Tunisia	Turkmenistan
Ukraine	Uganda
Hungary	United Arab Emirates
United Kingdom	Yemen

C.4 Italy Embarkation Tax

IATA code	Airport name	Domestic	EU countries	Other countries
AHO	Alghero	3.81	3.81	7.91
ALL	Albenga	3.43	3.43	7.62
AOI	Ancona	4.86	4.86	8.26
AOT	Aosta Valley	3.72	3.74	8.26
BDS	Brindisi	3.69	3.69	6.68
BGY	Milan Bergamo/orio al Serio Apt	5.58	5.58	10.18
BLQ	Bologna Guglielmo Marconi	8.06	8.06	9.91
BRI	Bari	4.8	4.8	3.81
BZO	Bolzano/Bozen	5.27	5.27	8.67
CAG	Cagliari	5.26	5.26	7.36
CIA	Rome Ciampino Apt	5.97	5.97	6.15
CRV	Crotone	3.29	3.29	7.29
CTA	Catania	6.52	6.52	8.98
CUF	Cuneo	4.09	4.09	8.37
EBA	Elba Island	3.72	3.72	8.26
FCO	Rome Fiumicino Apt	7.77	17.77	28.41
FLR	Florence Peretola Apt	9.99	9.99	12.08
FNU	Fenosu	2.95	2.95	6.55
FOG	Foggia	3.2	3.2	7.1

IATA code	Airport name	Domestic	EU countries	Other countries
FRL	Forli	6.18	6.18	7.65
GOA	Genoa	1.02	11.02	17.96
GRS	Grosseto	7.02	7.02	8.5
LCV	Lucca	2.15	2.15	4.77
LIN	Milan Linate Apt	4.75	14.75	17.7
LMP	Lampedusa	3.72	3.72	8.25
MXP	Milan Malpensa Apt	4.75	14.75	17.7
NAP	Naples Capodichino Apt	4.29	8.58	12.77
OLB	Olbia	7.74	7.74	11.61
PEG	Perugia	4.19	4.19	8.37
PMF	Milan Parma Apt	4.15	4.15	8.28
PMO	Palermo	4.84	9.69	12.89
PNL	Pantelleria	1.86	3.72	8.25
PSA	Pisa	7.35	7.35	8.42
PSR	Pescara	3.79	3.79	8.07
QSR	Salerno Costa d'Amalfi	3.34	3.34	7.41
REG	Reggio Di Calabria	3.24	7.19	3.24
RMI	Rimini	8.38	8.38	8.64
SAY	Siena	3.84	3.84	7.04
SUF	Lamezia Terme	6.15	6.15	11.43
TAR	Taranto	3.83	3.83	8.5
TPS	Trapani	3.48	3.48	7.73
TRN	Turin Caselle Airport	1.08	11.08	16.62
TRS	Trieste	8.47	8.47	14.85
TSF	Venice Treviso/Sant'Angelo Apt	8.5	8.5	8.54
VBS	Verona Brescia/Montichiari Airport	3.96	3.96	7.62
VCE	Venice Marco Polo Apt	9.81	9.81	11.77
VIC	Vicenza	5.36	5.36	7.13
VRN	Verona Villafranca Airport	4.09	8.18	10.39
CIY	Comiso	4.94	6.38	9.67

C.5 Sweden Air travel tax

Destinations outside EU, <6,000 km from Sweden (Stockholm)		
Afghanistan	India	Pakistan
Albania	Iran	Qatar
Algeria	Iraq	Russian Federation
Andorra	Isle of Man	Saint Pierre and Miquelon
Armenia	Israel	San Marino
Azerbaijan	Jersey	Saudi Arabia
Bahrain	Jordan	Senegal
Belarus	Kazakhstan	Serbia
Bosnia and Herzegovina	Kuwait	South Sudan
Burkina Faso	Kyrgyzstan	Sudan
Cape Verde	Lebanon	Switzerland
Chad	Libya	Syria
Djibouti	Liechtenstein	Tajikistan
Egypt	Macedonia	Tunisia
Eritrea	Mali	Turkey
Ethiopia	Mauritania	Turkmenistan
Faroe Islands	Moldova	Ukraine
Gambia	Monaco	United Arab Emirates
Gaza Strip	Mongolia	United Kingdom
Georgia	Montenegro	Uzbekistan
Gibraltar	Morocco	West Bank
Greenland	Niger	Western Sahara
Guernsey	Nigeria	Yemen
Guinea Bissau	Norway	
Iceland	Oman	

C.6 United Kingdom Air passenger duty

Destinations < 2,000 miles from UK (London)	
Albania	Liechtenstein
Algeria	Lithuania
Andorra	Luxembourg
Austria	Macedonia
Belarus	Malta
Belgium	Moldova
Bosnia and Herzegovina	Monaco
Bulgaria	Montenegro
Croatia	Morocco
Czech Republic	Netherlands
Denmark	Norway
Estonia	Poland
Faroe Islands	Portugal
Finland	Romania
France	Russian Federation
Germany	San Marino
Gibraltar	Serbia
Greece	Slovakia
Guernsey	Slovenia
Hungary	Spain
Iceland	Sweden
Ireland	Switzerland
Isle of Man	Tunisia
Italy	Turkey
Jersey	Ukraine
Latvia	United Kingdom
Libya	Western Sahara

D VAT rates in the European Union

Country	Rate	Standard/ reduced	Goods to which rates apply
Austria	20%	Standard	All other taxable goods and services.
	13%	Reduced	Domestic flights; entrance to sporting events; firewood; some agricultural supplies; wine production; cut flowers and plants for decorative use.
	10%	Reduced	Foodstuffs; take-away food; water supplies; pharmaceutical products; domestic transport (ex flights); international and intra-community road and rail transport; newspapers and periodicals; printed books (ex e-books); pay and cable TV; TV licence; social services; domestic refuse collection; treatment of waste water; restaurants (ex all beverages); hotel accommodation; admission to cultural events and amusement parks; cut flowers and plants for food production; some agricultural supplies.
	0%	Zero	Intra-community and international transport (excluding road and rail).
Belgium	21%	Standard	All other taxable goods and services.
	12%	Reduced	Some foodstuffs; certain agricultural supplies; some social housing; some construction work on new buildings; restaurants (all beverages excluded); certain energy products e.g. coal, lignite, coke; some pesticides and fertilizers; certain tyres and inner tubes for agricultural use.
	6%	Reduced	Some foodstuffs (including takeaway food); soft drinks; water supplies; some pharmaceutical products; some medical equipment for disabled persons; domestic transport of passengers; some books (excluding e-books); newspapers and periodicals (with certain exceptions); entrance to cultural events and amusement parks; some social housing; certain repair and renovation of private dwellings; some agricultural supplies; hotel accomodation; addmission to sporting events; use of sports facilities; intra-community and international road, rail and inland waterways transport; some motor vehicles; some social services; certain undertaker and cremation services; minor repairs (including bicycles, shoes and leather goods, clothing and household linen); firewood; cut flowers and plants for decorative use and food production.
	0%	Zero	Daily and weekly newspapers; certain recycled materials and by-products; intra-community and international transport (excluding road, rail and inland waterways).
Bulgaria	20%	Standard	All other taxable goods and services.
	9%	Reduced	Hotel accommodation and camping.
	0%	Zero	Intra-community and international transport.
Croatia	25%	Standard	All other taxable goods and services.
	13%	Reduced	Some foodstuffs; water supplies (excluding bottled water); newspapers (other than daily published newspapers with less than 50% advertising content); periodicals (magazines other than science periodicals with less than 50% advertising content); tickets for concerts; hotel accomodation; restaurants; certain bars, cafes and nightclubs; some alcoholic beverages.
	5%	Reduced	Some foodstuffs (including bread, milk and infant formula); pharmaceutical products (only approved medicines prescribed by a doctor); some medical equipment; books (excluding e-books); daily newspapers (with less than 50% advertising content); science periodicals; admission to cinema.
	0%	Zero	Intra-community and international transport (excluding road and rail).
Cyprus	19%	Standard	All other taxable goods and services.
	9%	Reduced	Some road passenger transport; domestic passenger transport by sea; hotel accomodation; restaurants.
	5%	Reduced	Basic foodstuffs; water supplies; pharmaceutical products; medical equipment for disabled persons; childrens car seats; certain road passenger transport; books (excluding e-books); newspapers and periodicals; admission to cultural events and amusement parks; writers and composers; renovation and repair of private dwellings; some agricultural supplies; admission to sports events; domestic waste collection; hairdressing; some undertaker and cremation services.
Czech Republic	21%	Standard	All other taxable goods and services.
	15%	Reduced	Foodstuffs (excluding essential child nutrition); some soft drinks; take away food; water supplies; medical equipment for disabled persons; children's car seats; some domestic passenger transport; some books (excluding e-books); admission to cultural events, shows and amusement parks; writers and composers; social housing; renovation and repair of private dwellings; cleaning of private households; some agricultural supplies; hotel accomodation; admission to sporting events; use of sporting facilities; social services; supplies to undertaker and cremation services; medical and dental care; domestic care services; firewood; some pharmaceuticals; some domestic waste collection and street cleaning.
	10%	Reduced	Foodstuffs classed as essential child nutrition; newspapers and periodicals; pharmaceutical products; some books.
	0%	Zero	Intra-community and international transport
Denmark	25%	Standard	All taxable goods and services.
	0%	Zero	Newspapers and journals (published more than once a month); intra-community and international transport.
Estonia	20%	Standard	All other taxable goods and services.
	9%	Reduced	Pharmaceutical products; medical equipment for disabled persons; books (excluding e-books); newspapers and periodicals; hotel accommodation.
	0%	Zero	Some passenger transport; intra-community and international transport.
Finland	24%	Standard	All other taxable goods and services.
	14%	Reduced	Foodstuffs; some agricultural supplies; restaurants; some soft drinks; take away food; cut flowers and plants for food production.
	10%	Reduced	Pharmaceutical products; passenger transport; books (excluding e-books); newspapers and periodicals (sold on subscription); admission to cultural events and amusement parks; TV licence; writers and composers; hotel accommodation; admission to sports events; use of sports facilities; domestic transport.
	0%	Zero	Printing services for publications of non-profitmaking organisations; intra-community and international transport; some taxation of gold ingots, bars and coins.
France	20%	Standard	All other taxable goods and services.

Country	Rate	Standard/ reduced	Goods to which rates apply
	10%	Reduced	Some foodstuffs; some pharmaceutical products; domestic passenger transport; intra-community and international road (some exceptions) and inland waterways transport; admission to amusement park (with cultural aspect); pay/cable TV; some renovation and repairs of private dwellings; some cleaning in private households; some agricultural supplies; hotel accomodation; restaurants (excluding alcoholic beverages); some domestic waste collection; certain domestic care services; firewood; take away food; bars, cafes and nightclubs; cut flowers and plants for decorative use.
	5.50%	Reduced	Some foodstuffs; water supplies, medical equipment for disabled persons; books (excluding those with pornographic or violent content); e-books; admission to certain cultural events; writers and composers; some social housing; admission to sports events; some domestic care services; cut flowers and plants for food production.
	2.10%	Reduced	Some pharmaceutical products; some newspapers and periodicals; TV licence.
	0%	Zero	Intra-community and international transport (excluding road and inland waterways).
Germany	19%	Standard	All other taxable goods and services.
	7%	Reduced	Some foodstuffs; water supplies; medical equipment for disabled persons; some domestic passenger transport; intra-community and international passenger transport for certain road, rail and inland waterway transportation; books (excluding e-books); newspapers and periodicals; admission to cultural events; writers and composers; some agricultural supplies (fertilizers); hotel accomodation; certain admission to sports events; social services; medical and dental care; firewood; some timber for industrial use; take away food; cut flowers and plants for decorative use and food production; taxation of some gold coins and jewellery.
	0%	Zero	Intra-community and international transport (excluding road and rail and some inland waterways transport).
Greece	24%	Standard	All other taxable goods and services.
	13%	Reduced	Basic foodstuffs; water supplies; some pharmaceutical products; some medical equipment for disabled persons; some agricultural supplies; domestic care services; hotel accommodation.
	6%	Reduced	Some pharmaceutical products; some books (excluding e-books); some newspapers and periodicals; certain theatre admissions.
	0%	Zero	Intra-community and international air and sea transport.
Hungary	27%	Standard	All other taxable goods and services.
	18%	Reduced	Certain foodstuffs; admission to certain open air concerts; hotel accommodation; restaurant services.
	5%	Reduced	Certain foodstuffs; pharmaceutical products (intended for human use); some medical equipment for disabled persons; books (excluding e-books); newspapers and periodicals; some social housing; district heating; some supplies for new building.
	0%	Zero	Intra-community and international transport.
Ireland	23%	Standard	All other taxable goods and services.
	13.50 %	Reduced	Certain foodstuffs; children's car seats; social housing; renovation and repair of private dwellings; cleaning in private households; some agricultural supplies; medical and dental care; collection of domestic waste; treatment of waste water; minor repairs of bicycles, shoes and leather goods and household linen; energy for heating and light (including natural gas, electricity, district heating, firewood and heating oil); moveable property used in the construction and maintenance of immovable property; construction work on new buildings; supply of immovable property; some social housing; routine cleaning of immovable property; services relating to the care of the human body; certain tourist services; photography services; services supplied by jockeys; works of art and antiques; short term hire of certain passenger vehicles; driving schools; services supplied by veterinary surgeons; cut flowers and plants for decorative use.
	9%	Reduced	Certain foodstuffs; take away food; some bars and cafes; newspapers and periodicals; admission to cultural events and amusement parks; hotel accommodation; restaurants (excluding all beverages); use of sports facilities; hairdressing.
	4.80%	Reduced	Livestock intended for use in the preparation of foodstuffs; some agricultural supplies.
	0%	Zero	Some books (excluding newspapers and periodicals); some foodstuffs; wax candles (undecorated); certain animal feed; certain fertilizers; some food supplies for food production; some medicines for human consumption; some medicines for veterinary use (excluding pets); certain feminine hygiene products; some medical equipment; clothing and footwear for children; intra-community and international transport; cut flowers and plants for food production.
Italy	22%	Standard	All other taxable goods and services.
	10%	Reduced	Some foodstuffs; water supplies; some pharmaceutical products; domestic passenger transport; admission to cultural events; some social housing; renovation and repair of private dwellings; some supplies and construction work for new buildings; some agricultural supplies; hotel accomodation; restaurants; admission to certain sports events; energy products (excluding district heating); firewood; collection of domestic waste; some waste water treatment; alcoholic beverages in bars and cafes; take away food; cut flowers and plants for decorative use and food production.
	5%	Reduced	Social and health services provided by social cooperatives and their consortia.
	4%	Reduced	Some food products; certain medical equipment for disabled persons; certain books; newspapers and some periodicals; some e-books; online journals newspapers; TV licence; some social housing; some agricultural supplies; certain social services; some motor vehicles; some supplies for new buildings; some construction work on new buildings.
	0%	Zero	Supplies of land which cannot be used for building; intra-community and international transport.
Latvia	21%	Standard	All other taxable goods and services.
	12%	Reduced	Food products for infants; pharmaceutical products; medical products for disabled persons; domestic passenger transport; books (excluding e-books); newspaper and periodicals; hotel accommodation; district heating
	0%	Zero	Intra-community and international transport
Lithuania	21%	Standard	All other taxable goods and services.
	9%	Reduced	Some domestic passenger transport; books (excluding e-books); newspapers and periodicals; hotel accommodation; district heating.

Country	Rate	Standard/ reduced	Goods to which rates apply
	5%	Reduced	Pharmaceutical products; medical equipment for disabled persons.
	0%	Zero	Intra-community and international transport.
Luxembourg	17%	Standard	All other taxable goods and services.
	14%	Reduced	Certain wines; solid mineral fuels, mineral oils and wood intended for use as fuel with the exception of wood for heating; washing and cleaning products; printed advertising matter; heat, cooling and steam with the exception of district heating; safe custody and administration of securities; administration of credit and credit guarantees by a person or organisation other than that granting the credit.
	8%	Reduced	Cleaning in private households; minor repairs of bicycles, shoes and leather goods, clothing and household linen; hairdressing; district heating; natural gas; electricity; firewood; LPG; cut flowers and plants for decorative use.
	3%	Reduced	Foodstuffs; soft drinks; children's clothing and footwear; water supplies; certain pharmaceutical products; certain medical equipment for disabled persons; domestic passenger transport; books; newspapers and periodicals; admission to cultural events and amusement parks; some pay TV/cable TV; agricultural supplies (excluding pesticides); hotel accomodation; restaurants (excluding alcoholic beverages); take away food; bars, cafes and nightclubs, cut flowers and plants for food production; supplies for new building; some construction work on new buildings; admission to sports events; use of sports facilities; undertaker and cremation services; collection of domestic waste; some telephone services;
	0%	Zero	Intra-community and international transport.
Malta	18%	Standard	All other taxable goods and services.
	7%	Reduced	Hotel accommodation; use of sporting facilities.
	5%	Reduced	Medical equipment for disabled persons; books (except for e-books); newspapers and periodicals; cultural events; minor repairs of shoes and leather goods, bicycles, clothing, and household linens; domestic care services; supply of electricity.
	0%	Zero	Some supplies of food for human consumption (excluding some processed and pre-cooked foods); prescribed medicines; gold ingots and bars; seeds for food production; live animals for human consumption; intra-community and international transport.
Netherlands	21%	Standard	All other taxable goods and services.
	6%	Reduced	Foodstuffs; some soft drinks; water supplies; certain pharmaceutical products; certain medical equipment for disabled persons; domestic passenger transport (excluding air travel); intra-community and international road, rail and inland waterway passenger transport; books; newspapers and periodicals; admission to cultural events and amusement parks; writers and composers; certain renovation and repair of private dwellings; certain cleaning of private households; agricultural supplies; hotel accomodation; restaurants (excluding alcoholic beverages); take away food; bars, cafes and night clubs; admission to sports events; use of sports facilities; minor repairs of bicycles; shoes and leather goods; clothing and household linen; hairdressing; cut flowers and plants for decorative use (some exclusions) and food production.
	0%	Zero	Taxation of gold coins; intra-community and international passenger transport by air and sea.
Poland	23%	Standard	All other taxable goods and services.
	5%	Reduced	Some foodstuffs; fruit juices; certain books and periodicals (excluding e-books); some agricultural supplies.
	8%	Reduced	Certain foodstuffs; water supplies; pharmaceutical products; medical equipment for disabled persons; children's car seats; domestic passenger transport; intra-community and international passenger transport by inland waterway and road; some newspapers and periodicals; admission to cultural events and amusement parks; some pay TV/cable TV; writers and composers; social housing; certain renovation and repair of private dwellings; certain agricultural supplies; hotel accomodation; restaurants (excluding alcoholic and certain other beverages); admission to sports events; use of sports facilities; undertaker and cremation services; collection of domestic waste; minor repairs of bicycles, shoes and leather goods, clothing and household linen; hairdressing; firewood; some take away food; some bars and cafes; cut plants and flowers for decorative use and food production (some at 5%); some building supplies; some construction work on new buildings.
	0%	Zero	Intra-community and international passenger transport (excluding inland waterway and road transport).
Portugal	23%	Standard	All other taxable goods and services.
	13%	Reduced	Some foodstuffs; admission to certain cultural events; restaurant & cafe food; some agricultural supplies; wine; mineral water; diesel for agriculture.
	6%	Reduced	Some foodstuffs; water supplies; certain pharmaceutical products; medical equipment for disabled persons; childrens car seats; domestic passenger transport; restaurant services; some books (excluding e-books); certain newspapers and periodicals; TV licence; social housing; renovation and repair of private dwellings; certain agricultural supplies; hotel accommodation; some social services; some medical and dental care; collection of domestic waste, minor repairs of bicycles; domestic care services; fruit juices; firewood; cut flowers and plants for decorative use and food production.
	0%	Zero	Intra-community and international passenger transport.
Romania	19%	Standard	All other taxable goods and services. Standard VAT rate decreased from 20% to 19% on 1 Jan 2017
	9%	Reduced	Foodstuffs; pharmaceutical products; medical equipment for disabled persons; books; newspapers and periodicals; hotel accommodation; water supplies; restaurants and catering services; some beer; soft drinks.
	5%	Reduced	Social housing; books (excluding e-books); newspapers and periodicals; admission to cultural events; admission to sporting events.
	0%	Zero	Intra-community and international passenger transport.
Slovakia	20%	Standard	All other taxable goods and services.
	10%	Reduced	Some foodstuffs; pharmaceutical products; medical equipment for disabled persons; books (excluding e-books).
	0%	Zero	Intra-community and international passenger transport.
Slovenia	22%	Standard	All other taxable goods and services.
	9.50%	Reduced	Foodstuffs; water supplies; pharmaceutical products; medical

Country	Rate	Standard/ reduced	Goods to which rates apply
			equipment for disabled persons; domestic passenger transport; books (excluding e-books); newspapers and periodicals; cultural events and themeparks; writers and composers; social housing; renovation and repairs of private dwellings; cleaning of private dwellings; agricultural supplies; restaurants (preparation of meals only); hotel accomodation; admission to sports events; use of sports facilities; undertaker and cremation services; domestic waste collection; minor repairs of bicycles, clothes and household linen, shoes and leather goods; domestic care services; hairdressing; soft drinks; intra-community and international road passenger transport; some take away food; cut flowers and plants for decorative use and food production; certain supplies for new buildings; certain construction work for new buildings.
	0%	Zero	Intra-community and international transport (excluding road transport).
Spain	21%	Standard	All other taxable goods and services.
	10%	Reduced	Some foodstuffs; water supplies; certain pharmaceutical products; some medical equipment for disabled persons; domestic passenger transport; intra-community and international transport by road, rail and inland waterways; some social housing; renovation and repair of private dwellings; agricultural supplies; hotel accommodation, camping and spa services, restaurants and, in general, the provision of meals and beverages to be consumed immediately, even if they are made after the recipient's order; some social services; domestic waste collection; some soft drinks; bars, cafes, night clubs and alcoholic beverages sold therein; cut flowers and plants for food production; some supplies for new buildings; some construction work on new buildings; entrance to cultural buildings and events, including: libraries, archives, and documentation centers, museums, art galleries, theaters, circuses, bullfights, concerts, and to the other live cultural shows; eye glasses, supply of frames, graduated contact lenses and the products necessary for their use, care and maintenance.
	4%	Reduced	Some foodstuffs; some pharmaceutical products; some medical equipment for the disabled; some books (excluding e-books); certain newspapers and periodicals; some social housing; some social services.
	0%	Zero	Taxation of some gold coins, ingots and bars; intra-community and international transport by air and sea.
Sweden	25%	Standard	All other taxable goods and services.
	12%	Reduced	Some foodstuffs; hotel accommodation; restaurants.
	6%	Reduced	Domestic passenger transport; books (excluding e-books); newspapers and periodicals; admission to cultural events; writers and composers; admission to sports events; use of sports facilities.
	0%	Zero	Medicines supplied on prescription or sold to hospitals; printing and other services related to the production of magazines for non-profit making organisations; intra-community and international passenger transport.
United Kingdom	20%	Standard	All other taxable goods and services.
	5%	Reduced	Children's car seats; social housing; natural gas supplies; electricity supplies; energy-saving domestic installations and goods; LPG and heating oil; some renovation and repairs of

Country	Rate	Standard/ reduced	Goods to which rates apply
			immovable property
	0%	Zero	Social housing; printed books (excluding e-books); journals and other printed materials; renovations to private housing; collections of domestic refuse; household water supplies; basic foodstuffs (excluding highly processed or pre-cooked food); some take away food; cut flowers and plants for food production; prescribed pharmaceutical products; certain medical supplies; domestic passenger transport; children's clothing and footwear; live animals destined for human consumption; seed supplies; construction of residential buildings; some supplies for the construction of new buildings; sewerage services; motor cycle and bicycle helmets; intra-community and international passenger transport; some gold ingots, bars and coins.

Source: https://www.vatlive.com/vat-rates/european-vat-rates/

E Sales taxes outside the EU

E.1 Canadian GST/HST

A nation-wide GST of 5% is levied. Some countries levy an additional HST varying between 0% and 10%.

Province	Rates On or after October 1, 2016
Alberta	5%
British Columbia	5%
Manitoba	5%
New Brunswick	15%
Newfoundland and Labrador	15%
Northwest Territories	5%
Nova Scotia	15%
Nunavut	5%
Ontario	13%
Quebec	5%
Prince Edward Island	15%
Saskatchewan	5%
Yukon	5%

F Exchange rates used

Country	Currency	Exchange rate
Bulgaria	BGN	0.5115
Croatia	HRK	0.1370
Czech Republic	CZK	0.0384
Denmark	DKK	0.1343
Hungary	HUF	0.0032
Poland	PLN	0.2160
Romania	RON	0.2174
Sweden	SEK	0.1003
United Kingdom	GBP	1.1096
Norway	NOK	0.1070
United States	USD	0.8356
Brazil	BRL	0.2680
Hong Kong	HKD	0.1071
Australia	AUD	0.6713
Armenia	AMD	0.0018
Bahrain	BHD	2.2443
China	CHN	0.1271
Kuwait	KWD	2.0900
Mexico	MXN	0.0471
Oman	OMR	2.1760
Qatar	QAR	0.2646
United Arab Emirates	AED	0.2274
Singapore	SGD	0.6213
Thailand	THB	0.0253

Note: Effective exchange rates as of September 2017

G Noise and Emission charges

Noise and emission charges are usually charged by airports and are generally airport-specific. The table below summarises the noise and emission charges for the largest airports in the countries considered. In some cases – most notably Australia – surcharges are only levied at certain (smaller) airports.

Noise charges are levied at an aircraft basis, either per movement, MTOW (maximum takeoff weight) or noise value unit (e.g. Vienna). In many cases, the charge differs between aircraft categories, where airports generally define their own categorisation. Most airports distinguish between night and daytime operations for noise charges, where night charges are often substantially higher. In Zurich for example, charges for category 4 aircraft (e.g. Boeing 737-700 or Airbus A319) are 10 Swiss francs (€ 8.72) per landing during daytime hours, but increase to CHF 1,500 (€ 1,308) for landings between midnight and 6.00 AM. Moreover, airports tend to distinguish noise charges per aircraft category, based on their noise emission levels. As such, these charges are imposed to incentivise the use of quieter aircraft and at times that is less inconvenient for the neighbouring area (as well as respect the night curfews).

Table 1 : Noise and emission charges

Country	Airport	Noise		Emission
		Unit rate	description	Unit rate per kg NOx
Austria	VIE	EUR 2.00	Charges per noise value unit[88] ()	-
Bulgaria	SOF	Category 1 EUR 0.19 Category 2 EUR 0.23 Category 3 EUR 0.3 Category 4 EUR 0.46 Category 5 EUR 0.68	daytime charges per ton MTOW, higher charges during night hours (x2)	-
Czech Republic	PRG	Category 5 CZK 122.9 / EUR 4.71 Category 4 CZK 61.9 / EUR 2.37 Category 3 CZK 29.9 / EUR 1.15 Category 2 CZK 12.9 / EUR 0.49 Category 1 CZK 5.9 / EUR 0.23	charges per ton MTOW	-
Denmark	CPH	-		16.72 DKK / EUR 2.25
France	CDG	EUR 23.5 x 1.3 (Group 1) EUR 23.5 x 1.2 (Group 2 (EPNdB below 5 db)) EUR 2.5 x 1.15 (Group 3 (EPNdB between 5 and 8 dB), Chapters 3-5) EUR 23.5 (Group 4 (EPNdB between 8 and 13 dB)) EUR 23.5 x 0.85 (Group 5a (EPNdB above 13 dB)) EUR 23.5 x 0.7 (Group 5b (Chapters 6/8/10/11))	daytime charges per ton MTOW, higher charges during night hours (x150%)	
Germany	FRA	Category 1 EUR 83.79 Category 2 EUR 102.39 Category 3 EUR 124.14 Category 4 EUR 134.57 Category 5 EUR 201.03 Category 6 EUR 388.6 Category 7 EUR 423.91 Category 8 EUR 584.92 Category 9 EUR 636.69 Category 10 EUR 746.58 Category 11 EUR 804.33 Category 12 EUR 1,351.5 Category 13 EUR 1,685.45 Category 14 EUR 2,813.0 Category 15 EUR 22,742.0	daytime charges per movement, higher charges during night hours (x3)	3.08 EUR
Hungary	BUD	EUR 7.58	Unit rate per movement	
Netherlands	AMS	Noise Category MCC3 EUR Basic landing compensation increased by 60% Noise Category A EUR Basic landing compensation increased by 40% Noise Category B EUR Basic landing compensation Noise Category C EUR Basic landing compensation reduced by 20%	Daytime charges, higher charges during night hours (x150% (take-off) or x127% (landing))	
Poland	WAW	Category 1 0 PLN (only night charges) Category 2 0 PLN (only night charges) Category 3 0 PLN (only night charges) Category 4 PLN 6.5 / EUR 1.52 Category 5 PLN 9.0 / EUR 2.11	Night time charges are around 10 times higher for category 4 and 5. Charges per ton MTOW	
Spain	MAD	Noise Category 1 70% surcharge of the landing charge Noise Category 2 20% surcharge of the landing charge Noise Category 3 Noise Category 4	daytime charges, night charges are higher (x2)	
Sweden	ARN	-		50 SEK / 5.24 EUR
United Kingdom	LHR	Chapter 3: 700% of ch14 base landing charges Chapter 4 high: 200% of ch14 base landing changes Chapter 4 base: 180% of ch14 base landing charges Chapter 14 high: 140% of ch 14 base landing charges Chapter 14 base: 100% Chapter 14 low: 60% of ch 14 base landing charges	Night 2.5 times higher	15.96 GBP / 17.84 EUR
Switzerland	ZRH	Noise Class 1 CHF 2,000.0 /EUR 1743.68 Noise Class 2 CHF 400.0 / EUR 348.74 Noise Class 3 CHF 40.0 / EUR 34.87 Noise Class 4 CHF 10.0 / EUR 8.72 Noise Class 5 CHR 0	daytime charges, night charges are higher (up to 250x higher for departures between 0:00 and 6:00)	
Australia	BNE (none at other airports)	For the use of the runway and taxiway system and aprons by Marginally Compliant Aircraft, a noise surcharge will apply in the amount of 50 %.		

[88] See also : https://www.viennaairport.com/jart/prj3/va/uploads/data-uploads/Charges%20Regulations%202018.pdf

Japan	Noise Rating Index A JPY 1,550.0 / EUR 11.75 Noise Rating Index B JPY 1,650.0 / EUR 12.51 Noise Rating Index C JPY 1,750.0 / EUR 13.27 Noise Rating Index D JPY 1,850.0 / EUR 14.02 Noise Rating Index E JPY 1,950.0 / EUR 14.78 Noise Rating Index F JPY 2,000.0 / EUR 15.16	Minimum rate JPY 50,000, unit rate per MTOW

Note: Countries that are not included in the table do not impose any noise or emission charges
Source: IATA Airport Charges Intelligence Centre; individual airport charges manuals