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THE ECONOMICS OF AIR TRANSPORT IN EUROPE

PART ONE: AIR TRANSPORT AND GROWTH

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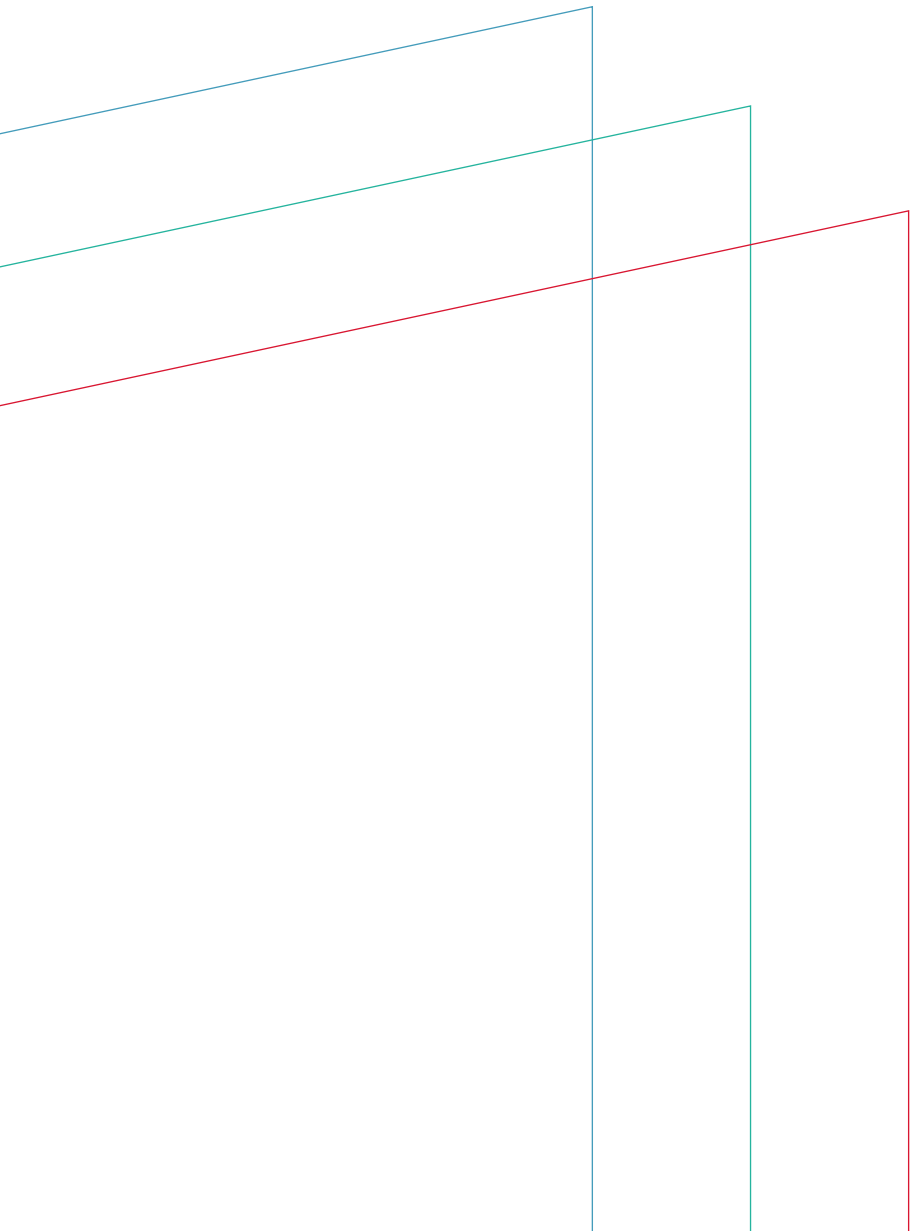

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EXECUTIVE SUMMARY

When addressing matters affecting air transport growth, such as airport expansion and aviation taxation, policymakers frequently frame decisions as a trade-off between economic gains and environmental losses. Within this paradigm, the claimed presence of an economic benefit is often either assumed or only lightly interrogated.

This study is the first of three reports taking a deeper look at the economic impacts of air transport growth in Europe, exploring respectively:

1. Does air transport growth have an impact on economic activity, and if so, is that impact positive, and where, when, and why does it occur?

2. Are the economic impacts of air transport usefully and fairly distributed between regions and social groups?

3. Are claimed economic impacts robust when considering climate and environmental damages and ecosystem tipping point risks, and are there lower-impact alternatives?

Through statistical analysis performed on 274 sub-regions of Europe, following the peer-reviewed methodology set out in Pot and Koster (2022), this report shows that the net impact of air transport growth on the wider economy varies greatly across Europe. While our analysis suggests the headline correlation between air transport and gross domestic product (GDP) growth presented in industry-funded research is generally robust at the pan-European level, the matter of causation has been under-evaluated, and the importance of variation in place and time understated.

Our analysis suggests that a causal relationship in which air connectivity growth drives GDP per capita growth can only be statistically supported in 37% (101) of European regions, many of which are located in Eastern Europe. In 53% (145) of European regions, we found a causal relationship in which income growth drives air transport demand (principally outbound tourism). These regions dominate much of northern and western Europe. There was a small amount of overlap between these two types of causality (12% of regions), leaving 22% of regions with no causality identified.

Looking across Europe, we found more regions where air transport demand appeared to be a response to increasing GDP per capita than we found where air connectivity appeared to drive growth. We additionally identified a subset (11%) of regions where the correlation between the two indicators was negative. We identified these findings without considering the GDP losses air transport creates through its impact on the climate.

Our findings have important implications for contemporary policy decisions. Policymakers cannot rely either on "assumed" growth benefits, or benefits calculated using relationships based on outdated or regionally non-specific analyses.

To highlight some key contextual issues that policymakers working on air transport strategy should be considering, we used a statistical clustering method to characterise Europe's regions by the type of relationship between air connectivity and the economy that they present. This led to the creation of four distinct clusters.

Through our clustering analysis, we highlight that a key factor for consideration, and a contributor to the decline in air transport's role as a driver of growth, is the decline in business-purposes air travel. Only nations dominated by our Cluster 1-type regions (see Map 1) have shown any business air passenger growth in the past 13 years. Elsewhere, we see signs of saturation in the business market. This is not to say that there is no air travel demand, but that it principally serves the leisure market.

The decline in air connectivity as a driver of growth is strongest in those regions where business air travel demand has declined, and where tourism spending is in a net deficit (ie a region sends more tourism than it receives) - mainly Clusters 3 and 4 in our typology. These regions are particularly common in Belgium, the Netherlands, the UK,

and Germany. Here, already high-income, high-connectivity places are delivering diminishing, and potentially even negative returns to air connectivity growth.

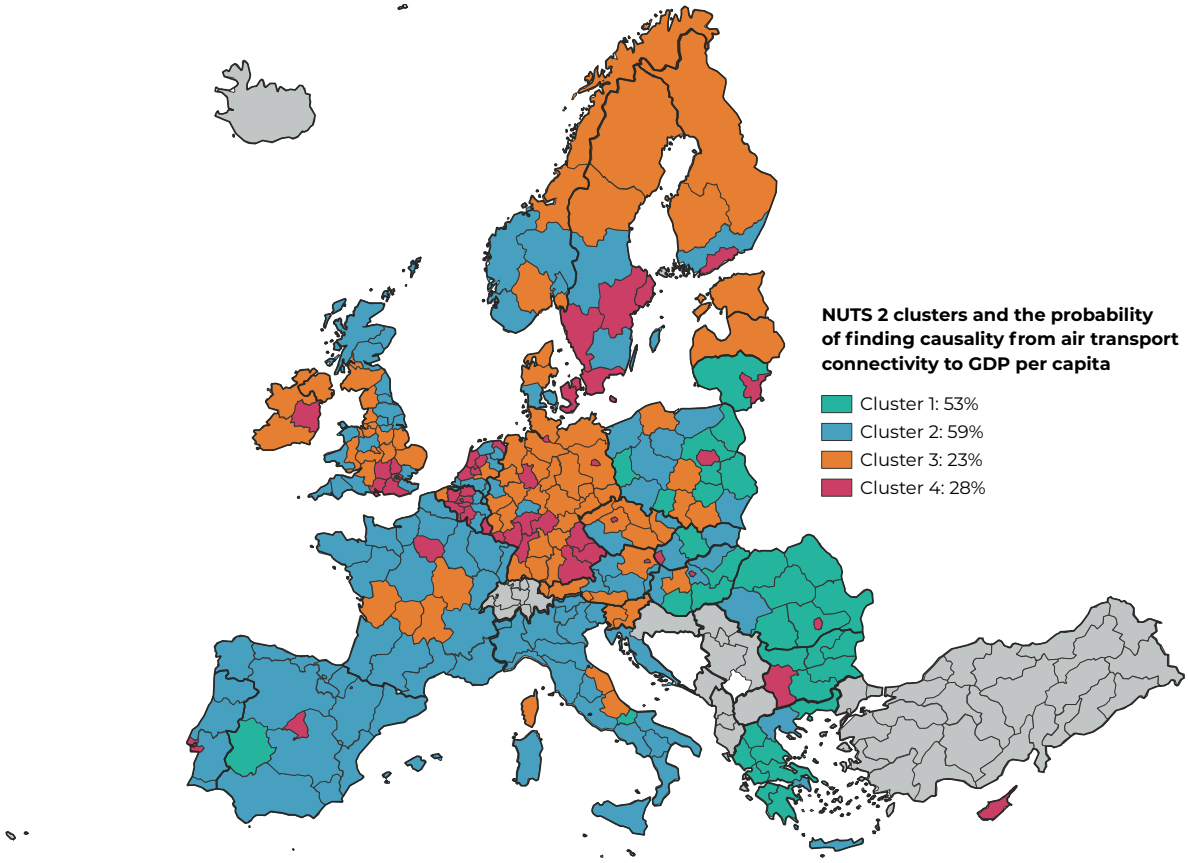
In tourism receiving areas, we also see stagnating business air travel, but air connectivity has a more nuanced relationship with economic growth. In this group - our Cluster 2 - which dominates in countries like Spain, Italy, and Portugal, tourism is a source of inbound spending flows. Most (59%) see a causal connection from air transport to growth, but the value created is moderated by several factors, such as the relative strength of land-transport routes and domestic tourism, which can act as lower-environmental-impact substitutes for air transport; the duration of visitor stay, which has been in decline in many receiving nations; and the quality of tourism infrastructure, which has been undermined by the rise of informal accommodation.

Our findings support the conclusion drawn by a report for the European Commission: that increased taxation of air transport would have a negligible impact on wider economic growth in most parts of Europe. This could potentially rise to a positive impact, were climate benefits included, and tax revenues raised invested well.

Given the significant regional variation in the impact of policies affecting air transport growth, policymakers should give careful consideration to broader tourism-related industrial strategy. Done well, this could contribute to reducing income, wealth, and environmental costs and inequities ingrained in European tourism and help address the concerns currently driving anti-tourism protests across the continent. These, and other issues, will be considered in the second report in this series.

MAP 1: THE NATURE OF THE RELATIONSHIP BETWEEN AIR TRANSPORT AND THE ECONOMY VARIES ACROSS EUROPE.

Regional clusters, and the probability of finding causality running from air connectivity to GDP per capita within each.



1. INTRODUCTION

This report takes a new look at the contemporary economics of air transport in Europe. The analysis looks not at the economics of running an airline or airport per se, but at the interaction between air transport and the wider economy. In particular, it considers the economic impact that air transport has on traditional indicators of gross domestic product (GDP), productivity, and employment growth, and its impact through the facilitation of international tourism. In 2025, as many countries face stagnant productivity, anti-tourism protests, and a climate crisis, what benefits and harms does air transport create? And in particular, is further growth in the public interest?

1.1 AIR TRAVEL AND TOURISM HAVE AN EMISSIONS PROBLEM

Tourism was estimated to have contributed 9% of total global greenhouse gas (GHG) emissions in 2019, with the sector's footprint growing at twice the pace seen in the wider global economy at around 3.5% per year between 2009 and 2019.[1] Germany (4th), the UK (5th) and France (9th) are among the top ten global countries with the largest tourism footprints when ranking climate impact on the basis of a tourist's country of residence (as opposed to their country of destination being assigned responsibility). Air transport is the largest component of this footprint, but also the one showing the least progress. While Europe ramps up action to cut emissions to net zero by 2050 and sectors across the economy, particularly heat and electricity, deliver decarbonisation at pace, air transport lags behind. The sector has delivered increased emissions and lacks a viable within-sector route to net zero for the medium to long term.[2]

The European Union (EU) has set out an ambitious take-up target for alternative aviation fuels, which could see CO2 emissions cut to around 50% of their level in 2023 by 2050 (Figure 1), but the plan faces a major delivery risk. High uncertainty prevails as to whether the use of alternative fuels can be rolled out at the required pace, whether they will ultimately deliver the lifecycle emissions savings desired, and whether their production represents good use of highly sought-after energy resources. No clear solutions have been set out for the other 50% of the sector's CO2 emissions, which are expected to remain in 2050 (Figure 1), nor for the non-CO2 emissions, which scientists believe deliver the majority of air travel's climate damage.

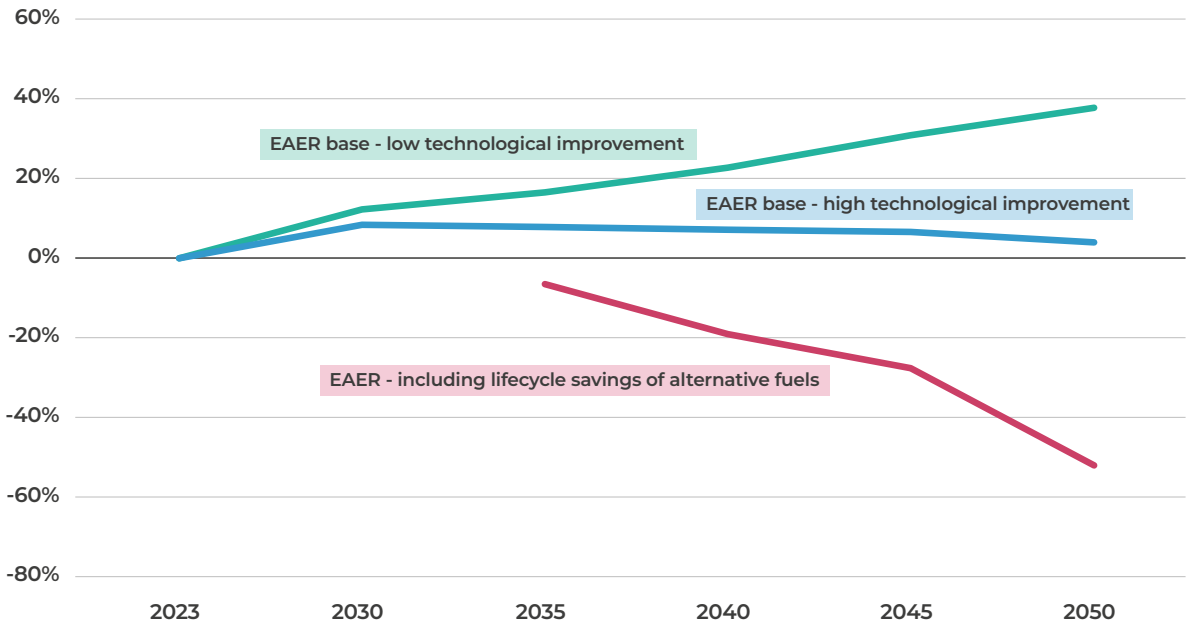
1.2 SIGNIFICANT GROWTH IS ON THE CARDS

Threatening Europe's net zero ambitions are industry plans for rapid growth over the coming years. Proposals for growth make achieving net zero harder and appear at odds with the precautionary principle established in European law in the Treaty on the Functioning of the European Union.[3] As a range of commentators have pointed out, the growth trajectories desired by major aviation industry players such as Airbus and Boeing seem incompatible with the decarbonisation plans set out by the EU and indeed the industry itself.[4] The tension between this desire for growth and the unresolved climate damage of the sector arises in three key policy debates: airport expansion, air transport taxation, and carbon emissions regulation/trading policy.

In Eurocontrol's central demand forecast, around nine European countries face capacity constraints in the period up to 2050.[5] By 2031, Eurocontrol expects air traffic movements in western Europe to reach 16% above its pre-pandemic peak. Aircraft manufacturers Boeing and Airbus foresee faster growth in revenue passenger kilometres (RPKs), at around 40% over the same period. This seems to imply faster growth overall, even after considering dimensions such as increasing passenger loads and load factors. At the pace desired by the industry, large airport capacity increases would likely be required, and the industry's decarbonisation trajectory would diverge further from a trajectory compatible with the Paris Climate Agreement and Europe's climate goals.

FIGURE 1: SIGNIFICANT GHG EMISSIONS FROM AIR TRAVEL ARE EXPECTED TO REMAIN IN 2050.

European Aviation Environment Report forecasts of future EU aviation emissions relative to a 2023 baseline.



Source: European Aviation Environment Report (EAER).

Whether the demand growth desired by aviation sector businesses ultimately materialises will depend on airport policy, but also future aviation tax policy and the scope of the EU emissions trading scheme and other carbon taxes. In both areas, key policy discussions are currently underway at the EU level. If policymakers decide to close the gap between the amount paid by the industry for its GHG emissions and the wider social cost of those emissions, prices could rise, and demand for air travel could fall.

1.3 GROWTH AND EXPANSION TRADE-OFFS

In recent years, European policymakers have, more often than not, given their backing to industry growth. As well as sustaining a generous tax environment for aviation, which sees the sector taxed less than many other goods and services, policymakers have often endorsed airport expansion. Frankfurt and Florence airports' major expansions are currently underway. Meanwhile, major expansions at multiple Spanish airports and multiple London airports have recently been approved. Invariably, the drivers cited by the policymakers behind these decisions are economic, and an implicit or explicit assumption is made that the economic gains outweigh the social and environmental costs and risks.

The decision by the French government to cancel the approved expansion of Paris Charles de Gaulle Airport in 2021, however, went against the grain. The decision highlighted that the balance of trade-offs between environmental and economic goals may be starting to shift. Similarly, at Schiphol Airport in the Netherlands, a conversation which was once about expansion has pivoted to sustainability and even shrinkage. Supporting this shift were several studies commissioned by government and industry in the Netherlands, which raised doubts about the strength of the economic arguments in favour of growth.[6]

In addition to these constraints on airport expansion, recent years have seen some European governments increase tax rates applied to air travel tickets. While still exempt from value added tax (VAT), air ticket taxes have recently been rolled out, or increased, in Belgium, Denmark, France, Germany, and the Netherlands. These moves often cite environmental impacts as at least a partial motivator, but also come against the backdrop

of significant real and perceived pressure on government finances. These developments suggest historic attitudes, which left air travel largely untouched by taxation, may be starting to shift.

The climate crisis is escalating, directly threatening community wellbeing and the air transport and tourism industry itself. Europe confronts this challenge alongside deep issues of stagnating living standards, rampant wealth inequality, and stalling productivity. The rapid growth of air transport was a major feature of the years leading up to this crunch point. That growth is forecast to continue, despite its clear direct and indirect interactions with these wider societal challenges. The assumptions which underpin past and current policy decisions, therefore, must be subjected to robust, regular, and detailed scrutiny.

This report, the first in a wider series, begins by taking the economic growth question on its own terms. We explore where, when, and why air transport does, and does not, drive growth in traditional indicators of economic success. In two subsequent reports, we will look at two further critical questions: the issue of to whom economic benefits and costs accrue, and what form those impacts take (eg income vs wealth); and the issue of whether, and how, climate and other environmental costs are dynamically integrated into economic impact assessments.

This report begins with a literature review, which establishes a tighter assessment framework for our subsequent analysis. We then present original economic impact modelling, supplemented by spatial analysis, to understand where and when interactions between air transport and the economy can occur. Finally, using new analysis of Eurostat datasets, we begin to explore why the regional and temporal variations we describe are occurring.

2. REVIEW: AIR TRAVEL AS AN ENABLER OF ECONOMIC GROWTH

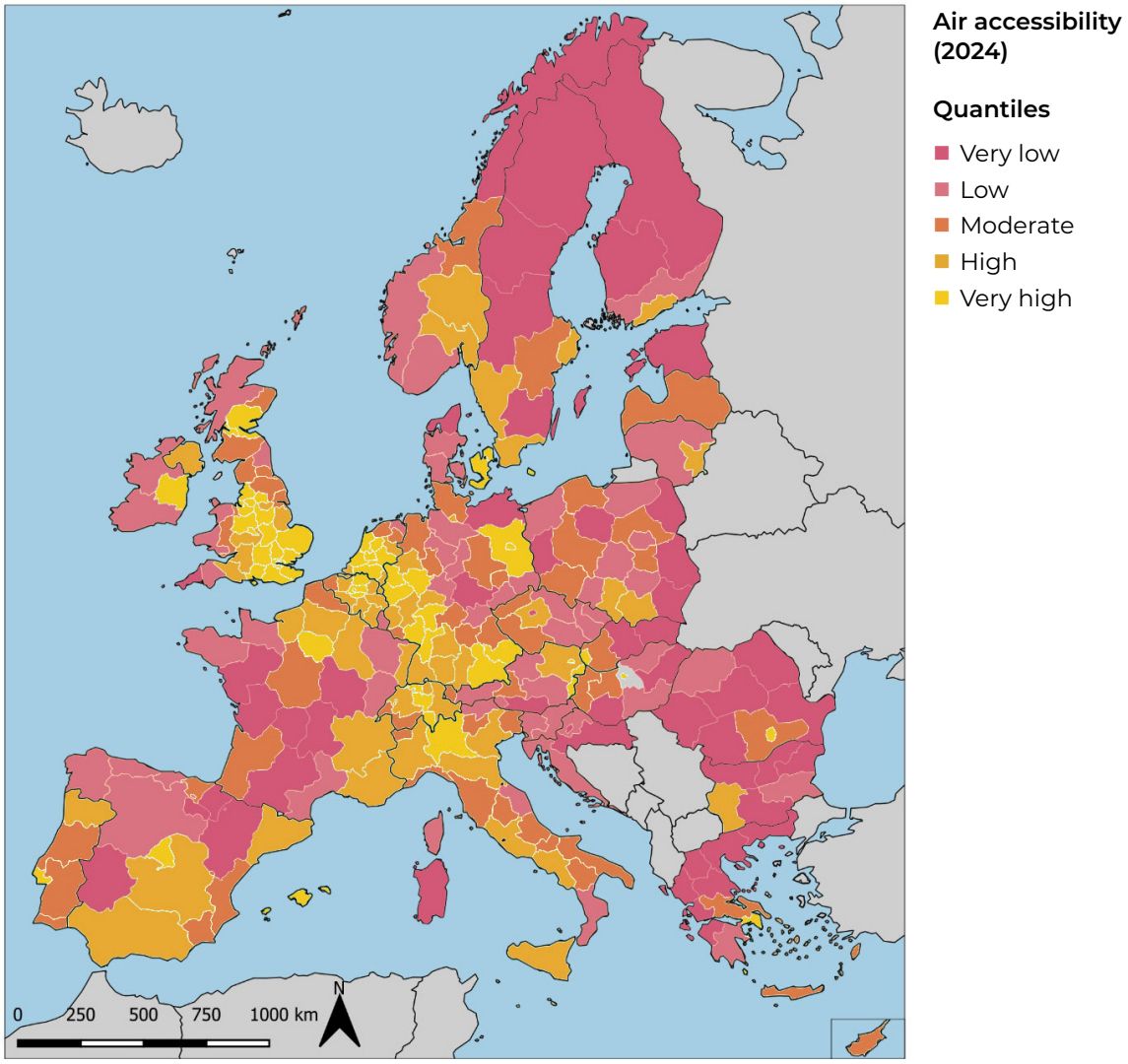
2.1 AIR TRANSPORT CAN BE AN ENABLER OF ECONOMIC GROWTH

Air transport and air connectivity growth can be measured in different ways. The simplest and most common measure of connectivity lies in passenger volumes, but more sophisticated measures include the number of destinations available from a place of origin and the average journey time to a destination. One such indicator is presented in Map 2, applying the definition of connectivity used by Pot and Koster (2022).[7] Very high levels of air connectivity have been achieved, particularly around western European capitals and their neighbouring regions, as well as in some tourism hotspots.

There is strong academic evidence that growth in a region's or country's air travel capacity can be a causal driver of economic growth. Zhang and Graham (2020) provide a useful review of studies presenting evidence spanning several decades, countries, and continents. Economic growth is

MAP 2: LEVELS OF AIR CONNECTIVITY VARY ACROSS EUROPEAN REGIONS.

Relative levels of air connectivity in Europe in 2024 calculated using the method of Pot and Koster.



Source: Authors' calculations.

indicated, more often, through gross domestic product (GDP) growth, usually per capita, but also through indicators such as labour productivity and employment levels. Not all studies make a robust assessment of causality; many older ones simply highlight a correlation between air transport growth and economic growth. Nonetheless, the evidence presented by Zhang and Graham, alongside subsequent publications,[8, 9, 10] provides strong backing for the existence, in at least some contexts, of a positive causal relationship in which air transport/air connectivity growth can drive economic growth.

The published research, which makes up this evidence base, typically analyses panel datasets tracking air transport and economic indicators back as far as the 1970s (eg Çelik et al., 2025)[8] and often aggregates multiple regions and nations (eg AitBihiOuali et al., 2020) as well as different economic development contexts.[11] This tends to hide nuance, regional variation, and changes over time.

The European aviation industry has made heavy use of studies commissioned from consultancies to promote its argument that air transport growth is an essential driver of economic growth at European and national levels. A recent study by SEO Amsterdam, commissioned by ACI Europe (representing European airports), proposes that at the European level, a 10% increase in air connectivity drives (causally) a 0.5% increase in GDP.[12] There are a number of issues with the study, including that its headline finding is heavily influenced by the impact of connectivity growth in eastern Europe and inbound tourism hotspots, and therefore might not apply in parts of western Europe. There is also a question as to whether the study is actually presenting causal evidence of air connectivity as a driver of growth, or the reverse relationship in which growing incomes increase demand for air travel.

By contrast, when Ricardo looked at the impact of a reduction in air passengers resulting from increased aviation taxes at the European level, on behalf of the EU Commission, their analysis suggested that an 8%-9% reduction in flight numbers resulted in just a 0.05% reduction in GDP[13] – an order of magnitude lower than the level suggested by SEO Amsterdam (albeit using slightly different measures). These impacts were distributed very unevenly across European nations, with the impact lower in a majority of countries (such as Austria, Denmark, Czechia, Croatia, Slovakia, and Slovenia), and a minority of nations experiencing significantly larger declines (such as Latvia, Lithuania, and Bulgaria). The Ricardo study assumed revenues raised from the tax would not be recycled into the economy. Had they analysed the potential growth benefits of the use of revenues in new productive investment, the net economic impact of the tax could conceivably have been positive.

2.2 PRE-DETERMINANTS OF, AND LIMITS TO, GROWTH IMPACT

Some contemporary research has dug deeper into the characteristics of a particular region or airport that drives weaker or stronger causal connections from air connectivity to economic impact (noting that impact is usually, though not necessarily, positive). Some evidence suggests that the nature of the demand base is important in determining the level of benefit that might arise. This could include distinguishing between travel purposes (eg passengers travelling to visit friends and family, engage in leisure tourism, or for business purposes), and between passengers travelling to and from a region. While researchers frequently suggest that the presence of business passenger growth is more important to achieving wider economic benefits than leisure travel, such as Allroggen and Malina (2014)[14] and Lenaerts et al. (2021),[15] a paucity of data on passenger travel purpose at the airport level has held back research in this area.

The pre-existing level of transport connectivity (provided by air and other transport modes) and the industrial makeup of the local economy can also impact the relative returns to additional growth, as evidenced by Pot and Koster (2022).[16] The same authors highlight that investments in the enhancement of air travel capacity and connectivity are often, like most forms of public transport, subject to diminishing returns. Indeed, as economies become better developed and connected, they will trend towards saturation, and some researchers have already suggested that air transport may be reaching that point in some of the most developed countries.[17]

Decision-makers cannot assume that because one capacity expansion delivered a positive return, so will the next. For example, the first daily flight from one industrial centre to another may create significantly more benefit than the fifth or the tenth. While the point of saturation (where the relative economic benefit of growth peaks) might seem far away in many middle- and lower-income countries, recent shifts in key data series (discussed later in this report) should encourage decision-makers in higher-income countries to consider the possibility that various regions and nations are approaching that point. Only when the level of saturation is understood can negative environmental impacts be fully contextualised.

2.3 INDUCING DEMAND VERSUS TRAVEL NEED

The argument that air transport growth may have begun weakening as a driver of economic growth in high-income parts of Europe may seem counterintuitive, given the significant rates of passenger growth that have been seen in those places in recent years. Proponents of airport expansion often cite the existence of demand, or at least projected future demand, as part of their strategic case for growth. Caution is needed when interpreting evidence of demand, and a careful approach is needed to establish what that demand reflects. For instance, growth could relate to an unmet business demand to develop trade with a particular nation; alternatively, it could relate to a resident opting for a cheap international holiday from their local airport simply because it is easily accessible and it is cheap.

Induced demand is a concept now widely accepted in research in the road transport field. It is the idea that simply through the expansion of transport infrastructure capacity, you can encourage greater use. The existence of this demand, however, does not designate that there is a 'need' per se, nor that the fulfilment of the demand represents the best outcome for society.

A number of research papers have presented evidence of induced demand for air travel in countries such as the UK,[18] the USA,[19] and Switzerland.[20] These studies highlight that after controlling for a wide range of social and economic factors, proximity to a large airport creates demand for air travel. In other words, "build it and they will come". This is logical as the closer an individual lives to an airport, the lower their surface access transport costs are likely to be and therefore the lower their overall trip cost. Locals may also be subjected to larger volumes of advertising and other subconscious nudges to fly.

Leisure air travel is generally considered to be a highly price-elastic good – ie demand is very sensitive to price changes, particularly in the low-cost carrier market.[21,22] A study published by the Dutch government in 2025 highlighted the significant gulf in the "need to fly" reported by contemporary leisure travellers relative to business travellers.[23] When relative prices fall, an international air trip becomes more competitive against the other goods and services an individual might buy with the same money.

This analysis suggests that there are different types of air travel demand that, when fulfilled, can be more or less useful to wider economic objectives. But, to date, research has provided scant information on where this demand is located and whether it is in the societal interest for it to be fulfilled, for example, through air transport growth and airport expansion, or incentivised, for example, through lower taxes.

2.4 CONSIDERING EQUITY AND DISTRIBUTION OF IMPACT

To understand whether it is in the social interest for air transport capacity to be provided and for travel to be incentivised, we must understand the equity implications of doing so. Aggregate growth in traditional economic metrics like GDP, productivity, and employment does not necessarily mean positive social outcomes for all, or even for a majority. Studies which have shown a statistical link between air transport and, for example, GDP per capita present an average change across a region or population. Rarely do they articulate exactly who experiences that growth, where they are, and whether anyone loses out. Today, wealth inequality is back on the national and international agenda. Large protests have broken out in communities across Europe in opposition to mass tourism and the local and global impacts of air travel. These have been driven, at least in part, by real and perceived inequities in the air tourism system.

Quantitative academic evidence on the equity and distribution impacts of the air transport and tourism system is scant. Some research has looked at the spatial variation in impacts. Lenaerts et al. (2023), for example, evidence a positive employment effect of air transport growth experienced within 60km of an airport, but highlight that it is partially offset by job losses in regions further away.[24] A weakness is that their analysis averages across all EU regions over the period 2001-12.

Examining a similar time period and geographical area van de Vivjer et al. (2016) also identified this positive impact on average, but when it was broken down to a regional level, they could only identify a causal link in 43 out of 112 regions analysed (38%).[25] Their mapping hinted that it was easier to (causally) link air transport to employment increases in tourism-receiving regions than in higher-income parts of northern Europe, such as the UK, the Netherlands, and northern France.

Volkhausen looked at the impact of small airports on GDP across a similar geographical area over the period 1980-2016.[26] Their analysis also identifies an average positive impact from air transport growth across the region and period, but when this impact is broken down across European nations, significant variation is observed. A positive and statistically significant relationship could only be identified in Germany and Greece, while positive impacts, but not statistically significant, were identified in Italy and Spain. A negative, but not statistically significant, impact was identified in France, the UK, the Netherlands, Denmark, and Portugal. The distribution Volkhausen presents shows similarities with that mapped by van de Vivjer et al. (2016).

Very occasionally, and in very context-specific cases, studies have gone further in examining how air transport can impact indicators which have a more direct connection with the lived experience of local communities. Bilotkach (2015), for instance, considered impacts on wages, showing a small beneficial effect from air transport growth in the USA between 1993 and 2009.[27] Hong Tsui et al. (2019) considered the impact of air transport growth on house prices in New Zealand between 2008 and 2014, presenting evidence that air transport growth could increase house prices.[28] Such evidence suggests winners and losers, respectively home homeowners and renters. But in general, evidence on issues such as the distribution of benefits between high- and low-income groups, workers and owners, users and non-users of air transport is unavailable.

One might expect to find deeper distributional analysis in the impact assessments produced on behalf of the public in support of the evaluation of proposed developments, such as airport expansion. But despite these official economic impact assessments often going into great length and depth, most still fail to consider impact equity and distribution. The study recently commissioned, for example, by Aena, the Spanish airports manager, into the economic impact of Barcelona El Prat Airport and its proposed expansion, runs to over 200 pages, yet fails to mention the possibility that some sub-groups of the local population could experience negative economic outcomes from the airport and its proposed expansion.[29] Given that at least some segments of the local community have taken to the streets of Barcelona to protest the socioeconomic and cultural costs of mass tourism, there clearly are costs to these types of schemes. Reports which ignore these costs can give the impression of denying the lived experiences local people have of their economy.

Studies commissioned by the private sector are usually equally light on consideration of the distribution of air transport and tourism impacts. One study by SEO Amsterdam, commissioned by ACI Europe (representing European airports), purports to consider impacts in the domains of the UN sustainable development goals (SDGs). Goal 10: Reduced inequalities, which was in scope of their assessment, would imply consideration of issues of distribution and equity, but the study makes only a very simplistic (and inconclusive) assessment of impacts on gender equality. The social distribution of the GDP and tourism benefits that the study claims are created by air transport is not considered, nor is the possibility of any losers among those impacted by the so-called 'catalytic' tourism impact of air transport. This leaves economic issues like house and rent prices, wealth inequality, impacts on wages, local transport, and public spaces ignored.[30] Without access to a thorough analysis of these issues, decision makers are making judgments on important points of policy without fully understanding the consequences.

2.5 CAPTURING THE ECONOMIC DAMAGES OF AVIATION'S CLIMATE IMPACT

The rapidly rising social and economic losses resulting from climate breakdown are not integrated into the aforementioned GDP impact models. As the studies referred to are backwards looking, basing estimates of net economic impact on long-term historic time series, they do not contain the climate hazards now developing. Many of these hazards may well alter the economic value of air transport (in both positive and negative ways). Neither do these studies capture the economic costs that air transport creates through its own climate footprint, as the majority of these are yet to unfold, and models are not sufficiently sophisticated to attribute those that have already occurred to the GHG contribution of air travel. Studies do show, however, that failing to address the cost of carbon leads to it being imposed disproportionately on the lowest-income groups in society.[31]

Complicating the integration of the climate hazard into the economic impact calculations of air transport is the issue of non-linearity, or so-called tipping points. Failing to factor the hard limits the biosphere places on environmentally damaging activity into present decision-making may pave the way to rapid, sharp curtailments of economic activity (growth) in future. This may be enforced through the natural hazards – drought, extreme heat, floods, and storms – that are already reducing the stability and liveability of many tourism destinations in Europe and across the globe.[32]

Notwithstanding these issues, methods of capturing climate considerations in quantitative economic impact assessments do exist. While not dynamic and different in nature to traditional GDP-based assessments, contemporary methods of carbon costing can help weigh the environmental and welfare-based implications of aviation interventions. Indeed, Eurocontrol provide standardised carbon costs/prices for use in economic impact assessments and cost-benefit analyses, which are expected to help decision-makers on policies affecting air traffic movements make a "rational long-term investment decision".[33] Assessments making use of these tools and inputs are rarely conducted and/or made available to the public, particularly where high-profile aviation or airport policy decisions are involved.

2.6 REVIEW CONCLUSIONS

In years gone by, the generalised level of proof of economic benefit typically provided by recent academic and industry-funded studies may have been sufficient to inform air transport and tourism policy and government intervention in support of growth. In 2025, it is not. Environmental impacts have not been dynamically integrated, and ecological limits have not been appreciated. Too little consideration has been given to regional, temporal, and distributional differences in economic impacts, and critically, to the inequalities these imply. Potential second-order impacts on wider productivity have not been adequately scrutinised.

2.7 ASSESSMENT FRAMEWORK

In the following study, we use a simple framework, or set of tests, which guides our analysis:

1. Does air transport growth have an impact on economic activity, and if it does, is that impact positive, and where, when, and why does it occur?

2. Are the economic impacts of air transport usefully and fairly distributed between regions and social groups?

3. Are claimed economic impacts robust when considering climate and environmental damages and ecosystem tipping point risks, and are there lower-impact alternatives?

This report focuses on Test One: Does air transport growth have an impact on economic activity, and if it does, is that impact positive, and where, when, and why does it occur?

3. ANALYSIS: WHERE AND WHEN MIGHT GROWTH ARISE?

3.1 OUR METHOD

Our analysis focused on investigating the net impact of air transport on the economy of a place, region, or nation. This is sometimes referred to as the "wider economic impact" or the "spillover effect". To some extent, however, this definition is misleading, as we are measuring all impacts (not just wider ones), including both those produced directly by the air transport sector itself (eg airport jobs), and impacts in sectors that either supply or use air transport. This approach separates us from the studies often produced by and for the industry, many of which focus more heavily on jobs in and around aeroplanes and airports. Such assessments provide only a partial view to decision-makers. Rarely, if ever, does a government build or sanction transport infrastructure for its own sake; usually, it serves a wider purpose, for example, roads are not built to create jobs in road maintenance, and buses are not provided to create jobs for bus drivers (this is not to say that those jobs do not have huge value to society).

Pot and Koster (2022) provided one of the most comprehensive breakdowns of the different contextual factors which influence the relationship between air connectivity and the economy. Recognising that air transport can both create growth and be a product of growth, their study in the *Journal of Transport Geography* analysed the strength of the causal relationship running from air accessibility to gross domestic product (GDP) per capita growth, and vice versa. Their statistical analysis measured these relationships in 273 regions of Europe in the EU's nomenclature of territorial units for statistics, second level (NUTS2), and looked at how differences in local socioeconomic factors influenced the probability of finding a causal connection.

In this project, we further developed Pot and Koster's model. We brought the input data up-to-date, giving an analysis period of 2000-23, and dove deeper into how causal connections between air transport and the economy vary across spaces and places.

Our analysis focused on the relationship between GDP per capita (adjusted for purchasing power parity) and the air accessibility of a region. We measured airport accessibility through a function of the distance to an airport from a region (up to a maximum of 200km) and the number of passengers handled by the airport, adjusted for the population size of the region. This gave us a measure of the connectivity per capita of a region. We recognise that our measure of connectivity is imperfect. Airport accessibility and passenger volumes are only two components of the connectivity offered by an airport. The number and quality of routes, as well as the frequency of flights on those routes, are important too. However, given data limitations, we deemed our measure of connectivity sufficient.

We performed regression analysis to identify the correlation between connectivity and GDP per capita and tested various regression models (estimators). All identified a statistically significant correlation, but with varying effect sizes. Our subsequent analysis focused on the results produced by the model termed the Mean Group (MG) estimator. We preferred this approach as it adjusted for the biases which can develop when creating pooled estimates from a heterogeneous group. It also involved making separate statistical estimations for every region in our European sample, thereby allowing deeper exploration of sub-groups within the sample.

Having identified a correlation between our two variables of interest, our next step was to investigate the presence and direction of causality between air accessibility and GDP per capita and its distribution across Europe. In other words, does higher GDP increase demand for air travel? Or does improved air connectivity increase GDP? For this task, we developed a Vector Error-Correction Model (VECM) to test for Granger causality. We subjected the outputs of this model to further regression analysis to test how different local contextual factors explained the presence of causality (focusing on causality in the direction from air connectivity to growth).

Finally, we applied a clustering process to the full dataset to characterise the air transport-economy relationship across European regions. Full methods are described in a separate methodology paper available to download alongside this report.

3.2 MODELLING AND RESULTS

The best estimate of the MG model is that a 10% increase in air connectivity is correlated with a 0.5% increase in GDP per capita, when averaging across Europe. This figure is comparable with those presented in the studies described in our literature review. Our figure represents an average derived from a heterogeneous group. Around 11% of the regions in our sample actually exhibited a negative correlation between air connectivity and GDP.

We then moved on to look at the presence of causality. Our analysis suggests, at the aggregate level, that a causal relationship running from increased (reduced) air connectivity to increased (reduced) GDP per capita could be statistically supported in 37% (101) of the 274 NUTS2 regions in our dataset. This is remarkably similar to the findings of van de Vivjer et al. (2016), who identified a causal connection with employment in 38% of their European regions. In 53% (145) of our regions, we identified a causal relationship running in the other direction, from GDP per capita increases (declines) to air connectivity rises (declines). In just 12% of regions, we identified causality running in both directions, leaving around 22% of regions where no causality was identified in either direction. Across Europe, we found more regions where air transport demand appeared to be a response to increasing GDP per capita than we found where air connectivity appeared to *drive* growth. Air transport is also a causal driver of GDP *loss* through its climate impact, but this is not captured in our model. This will be discussed further in a follow-up report.

Despite only 37% of regions displaying a causal relationship from connectivity to growth, there is sufficient support in the data for causality to present when considering the dataset in general (as well as sufficient support for the reverse relationship). This aligns with the findings of a recent study by SEO Amsterdam Economics for ACI Europe, which also suggests there is support for a causal relationship.[34] But given that this headline relationship is grounded in causality established in only a minority of European regions, a critical next step is to explore where and when it is present.

Our first step was to conduct a regression analysis that examined how different socioeconomic characteristics of a region impact (i) the strength of the correlation between air connectivity and GDP and (ii) the probability of identifying causality running from air connectivity to GDP (the primary direction of interest). We tested the impact of these variables on the elasticity between air connectivity and GDP over the periods 2000-2019 and 2000-2023. Although the two tests produced broadly similar results, the unusual pandemic-affected period from 2020 to 2022 did materially alter some effect sizes. Notably, a higher GDP was associated with a much bigger reduction in the elasticity. Given the exceptional nature of the pandemic period, we deemed it more robust to conduct the subsequent causality analysis on the 2000-2019 time series.

From the results shown in Table 1, we can see some key relationships. High population densities both increase the correlation and the likelihood of finding causality from air connectivity to GDP. Conversely, higher GDP per capita (ie levels of economic development) was associated with lower correlations and lower likelihood of finding causality from air connectivity to GDP. Both higher tourism nights and higher capacity for tourists (hotel beds) were associated with a higher likelihood of finding causality from air connectivity to GDP.

Higher rates of tertiary education and higher rates of employment in high-tech industries were also associated with a higher chance of finding causality from air connectivity to GDP, but without strong statistical significance. Having a denser rail network was associated with a lower chance of finding causality from air connectivity to GDP, but also with lower statistical significance. The nuance of some of these and our further findings are discussed in subsequent sections.

TABLE 1: REGRESSION RESULTS ASSESSING THE IMPACT OF DIFFERENT VARIABLES ON THE ELASTICITY BETWEEN AIR CONNECTIVITY AND GDP PER CAPITA (COLUMNS 1 AND 2); THE PROBABILITY OF FINDING CAUSALITY RUNNING FROM AIR CONNECTIVITY TO GDP PER CAPITA (COLUMN 3); AND THE PROBABILITY OF FINDING A NEGATIVE CORRELATION BETWEEN AIR CONNECTIVITY AND GDP PER CAPITA (COLUMN 4). ASTERISKS DENOTE STATISTICAL SIGNIFICANCE AT THE 10% (*), 5% (**) AND 1% (***) LEVELS.

	1	2	3	4	
Variable	**2000 - 2019**	**2000 - 2023**	**Probability of finding causality (2000-2019)**	**Probability of finding a negative correlation**	**Notes**
Population density (ln)	0.074*** (0.01)	0.095*** (0.00)	0.728** (0.32)	-0.864*** (0.325)	Higher population density *significantly increases* the correlation and the probability of finding causality running from connectivity to GDP.
Per capita GDP (ln)	-0.051*** (0.02)	-0.379*** (0.01)	-2.513*** (0.85)	0.430 (0.631)	Higher per capita GDP *significantly decreases* the correlation and the probability of finding causality running from connectivity to GDP.
Tertiary education share (%)	0.005*** (0.00)	0.002*** (0.00)	0.048 (0.04)	0.062 (0.034)	A more highly educated population very *slightly increases* the correlation and the probability of finding causality running from connectivity to GDP (the latter with low statistical confidence).
Employment share in high-tech (%)	0.002 (0.00)	0.011*** (0.00)	0.161 (0.16)	0.004 (0.108)	Having more high-tech employment *slightly increases* the correlation and the probability of finding causality running from connectivity to GDP, but with low statistical confidence.
Unemployment rate (%)	-0.013*** (0.00)	-0.006*** (0.00)	0.019 (0.04)	-0.071 (0.063)	Having higher unemployment *slightly decreases* the correlation and has a limited impact on the causality running from connectivity to GDP.
Nights spent at tourist accommodations (ln)	-0.019** (0.01)	-0.074*** (0.01)	0.530** (0.21)	0.992** (0.472)	Having more tourism nights *significantly decreases* the correlation but increases the likelihood of causality running from connectivity to GDP.
Hotel beds (ln)	0.01 (0.01)	0.047*** (0.01)	0.781* (0.44)	-1.247** (0.524)	Having more hotel beds *increases* the correlation and increases the likelihood of causality running from connectivity to GDP.
Rail infrastructure (km/km2)	0.090*** (0.01)	-0.073** (0.03)	-0.521 (0.48)	1.092** (0.534)	There is some inconsistency, but the longer time series seems to suggest that having better rail infrastructure *significantly decreases* both the elasticity and the probability of finding causality running from connectivity to GDP.
Island region (dummy)	0.127*** (0.03)	0.160*** (0.02)	-0.648 (1.22)	Omitted	Being an island region *significantly increases* the elasticity but *reduces* the likelihood of finding causality running from connectivity to GDP.
Constant	0.513*** (0.17)	4.340*** (0.55)	9.571 (5.96)	-7.068 (5.5160)	
N	3,550		168	160	
Adjusted R2	0.19	0.46	Pseudo-R^2: 0.11	Pseudo-R^2: 0.25	

4. DRIVERS OF DIVERGENCE IN THE AIR TRANSPORT-ECONOMY RELATIONSHIP

4.1 CHARACTERISING EUROPEAN REGIONS

The findings described in the previous chapter represent general indications established from a large and heterogeneous panel of regions. While the data quality and granularity of this assessment are insufficient to provide a robust estimate of the relationship between air connectivity and gross domestic product (GDP) in any one region alone, there is sufficient data granularity to analyse sub-groups of regions with shared characteristics. To provide deeper meaning to our findings for policymakers across Europe, we applied a hierarchical cluster analysis (Ward's linkage), which clusters regions based on a range of characteristics (variables) shown in Table 2. Based on a quantitative and qualitative assessment of the robustness of the potential number of clusters produced, we arrived at a four-cluster solution. Those clusters are described numerically in Table 2 and qualitatively in the text.

The clusters described are mapped out in Map 3. However, it is important to note that these are outputs of a statistical process, which (like all such analyses) is imperfect. The categorisation of single regions should not be over-interpreted, and readers are encouraged to take the findings as a stimulus for thought and further investigation rather than a final determination. In subsequent sections of this report, we dive deeper into the trends and characteristics of different nations and regions that might help explain the shape of the map we have produced.

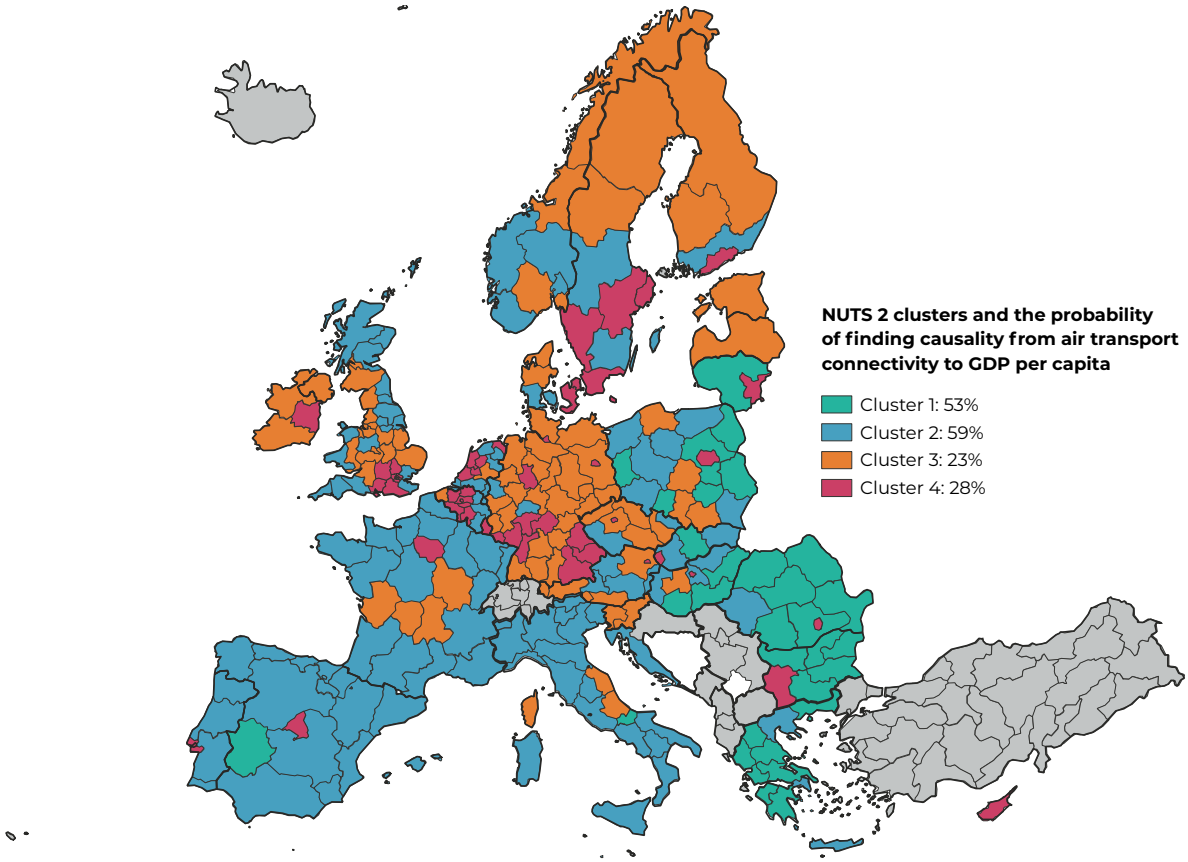
TABLE 2: KEY PARAMETERS OF EACH CLUSTER IN THE FOUR-CLUSTER SOLUTION.

	Cluster			
Variable	**1**	**2**	**3**	**4**
Regions	32	105	76	60
Causality from connectivity to GDP (%)	53%	59%	23%	28%
Causality from GDP to connectivity (%)	59%	34%	77%	20%
GDP (per capita, million PPS)	€24,665	€45,713	€49,175	€72,631
Population density (inhabitants per km2)	58	122	130	503
Tertiary education share (%)	23%	31%	32%	43%
Unemployment rate (%)	11%	9%	5%	6%
High-tech employment share (%)	2%	3%	4%	7%
Tourist nights (per capita)	3.3	10.8	7.3	5.6
Hotel beds (per capita)	0.04	0.11	0.08	0.05

To assist with subsequent analysis, which makes use of data mainly only available at the national level, we grouped the European countries in our analysis based on which of our four clusters is most prevalent among their regions. This is an imperfect process as there is regional variation inside most countries, but subsequent analysis will highlight why we believe it remains useful. As only two countries are present with Cluster 4 as the most prevalent cluster (Belgium and Sweden), and neither has complete travel data with Eurostat (our main source of statistics), Clusters 3 and 4 have been combined for this exercise. The two clusters share similar patterns in our key indicator of interest (ie evidence of a causal link running from air connectivity to GDP growth is weak).

MAP 3: THE NATURE OF THE RELATIONSHIP BETWEEN AIR TRANSPORT AND THE ECONOMY VARIES ACROSS EUROPE.

Regional clusters, and the probability of finding causality running from air connectivity to GDP per capita within each.



BOX 1: COUNTRIES GROUPED BASED ON WHICH REGIONAL CLUSTER TYPE IS MOST PREVALENT.

- **Cluster 1 most prevalent:** Lithuania,* Poland, Hungary, Romania, Bulgaria, Greece
- **Cluster 2 most prevalent:** Portugal, Spain, France, Norway,* Italy, Slovakia
- **Cluster 3 and Cluster 4 most prevalent:** Ireland, United Kingdom, Belgium, Netherlands,* Denmark, Sweden, Finland, Germany, Austria, Slovenia, Czechia, Estonia, Latvia

*Nations where there is a tie for the most prevalent cluster are allocated based on the dominant cluster when population weighting is applied

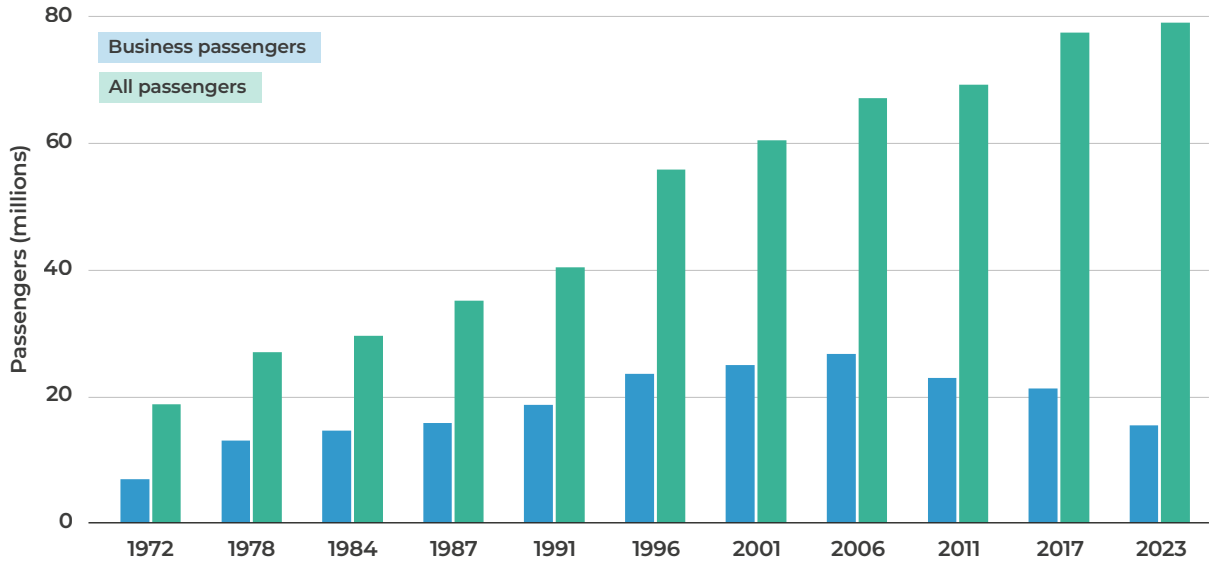
4.2 BUSINESS TRAVEL AS A DRIVER OF DIVERGENCE

Our first hypothesis, based on UK-specific analysis presented in Chapman (2023),[35] is that the lack of strong causal influence running from air connectivity to GDP in Clusters 3 and 4 relates primarily to changes in the demand for business air travel. We hypothesised that a weak, or lacking, connection is found where the marginal benefit to business from air travel compared with digital communication alternatives has declined; where already high levels of air travel connectivity have saturated business demand from sectors seeing increasing digitalisation of communication; and where tourism flows are in a net deficit (discussed later).

Business air travel could not be included as a specific variable in our statistical analysis because data is not routinely (and consistently) collected at the regional or airport level. However, in some

locations, we have useful data. The long-range time series in Figure 2 shows how passenger traffic has evolved over five decades at Heathrow Airport – not only the UK's largest airport but a key European hub. Somewhere around the time of the 2007/08 financial crisis, a trend which had sustained for four decades ceased and overall passenger growth no longer correlated with growth in travel for business purposes.

FIGURE 2: BUSINESS AIR PASSENGER NUMBERS HAVE BEEN IN DECLINE AT HEATHROW AIRPORT.
Terminating air passengers, and business air passengers, at Heathrow airport in time slices between 1972 and 2023.



Source: NEF analysis of UK Civil Aviation Authority Passenger Survey data.

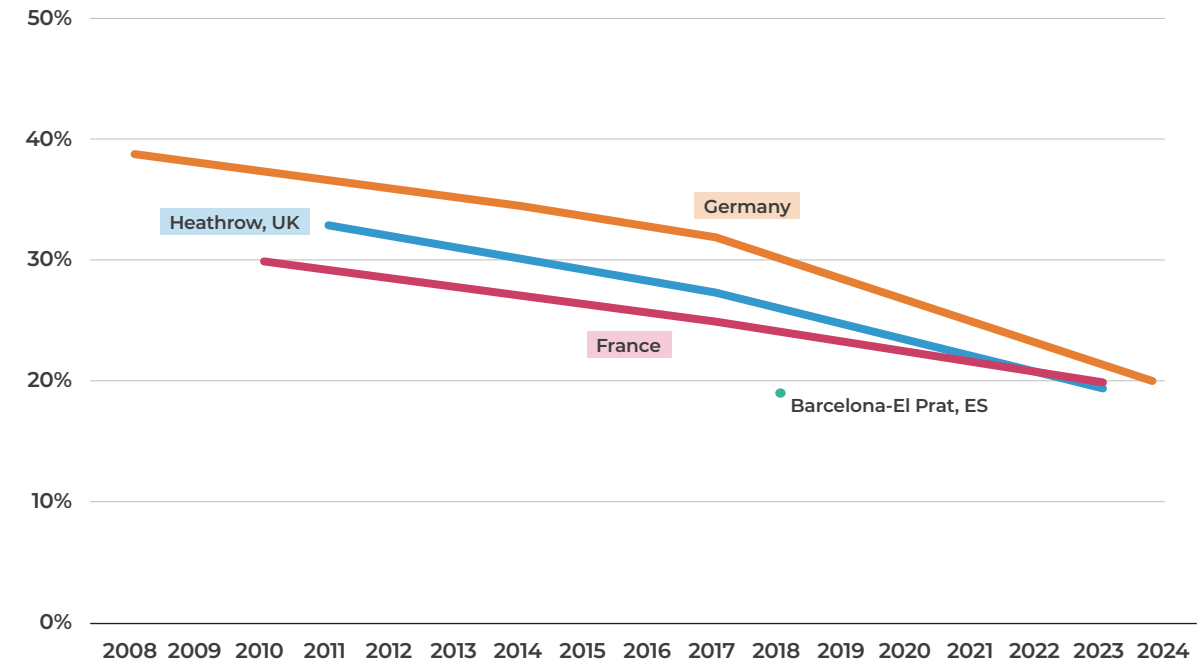
From a peak of around 50% of all passengers in the late 1970s and early 1980s, the market share of business passengers has steadily declined, such that they made up under 20% of passengers at Heathrow in 2023 (Figure 3). Few public datasets offer such long-running data, but more recent data from France and Germany, and at Barcelona Airport, point to a similar story of declining and/or low business shares (Figure 3).

Trends at the national level since 2012 can be measured in data captured by Eurostat. This data captures the trips made by air by European residents recorded in representative national surveys rather than monitoring data at airports or borders.

Echoing longer time-series data from the United Kingdom (see Chapman, 2023),[36] among countries dominated by Cluster 3 and 4 regions, we see business air trip numbers stagnant in the period up to the pandemic and resting at a lower level as pandemic restrictions withdrew. Countries dominated by Cluster 2 regions show a very similar trend, albeit losing slightly fewer business air passengers post-pandemic (Figure 4). Figure 4 presents changes in weighted total numbers, but trends are very similar when measuring unweighted cluster averages. Readers can view which countries fall under each cluster grouping in Box 1.

FIGURE 3: THE MARKET SHARE OF BUSINESS AIR PASSENGERS IS LOW OR DECLINING IN MULTIPLE COUNTRIES.

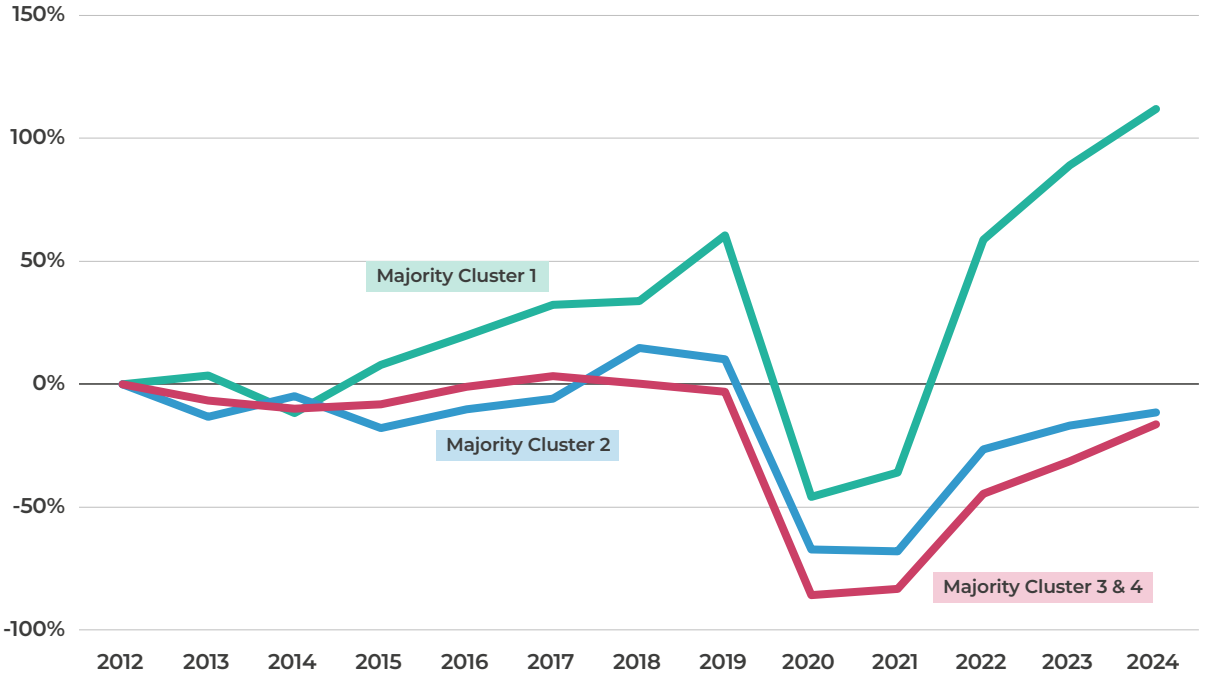
The market share of business air passengers in two countries and at two airports.



Source: NEF analysis of the UK Civil Aviation Authority passenger survey, the German Flughafenverband (ADV) passenger survey, the French Ministére Chargé des Transports passenger survey, and the Spanish airports authority Aeropuertos Españoles y Navegación Aérea (AENA).

FIGURE 4: ONLY CLUSTER 1 COUNTRIES HAVE SHOWN ANY RISE IN BUSINESS AIR PASSENGER NUMBERS SINCE 2012.

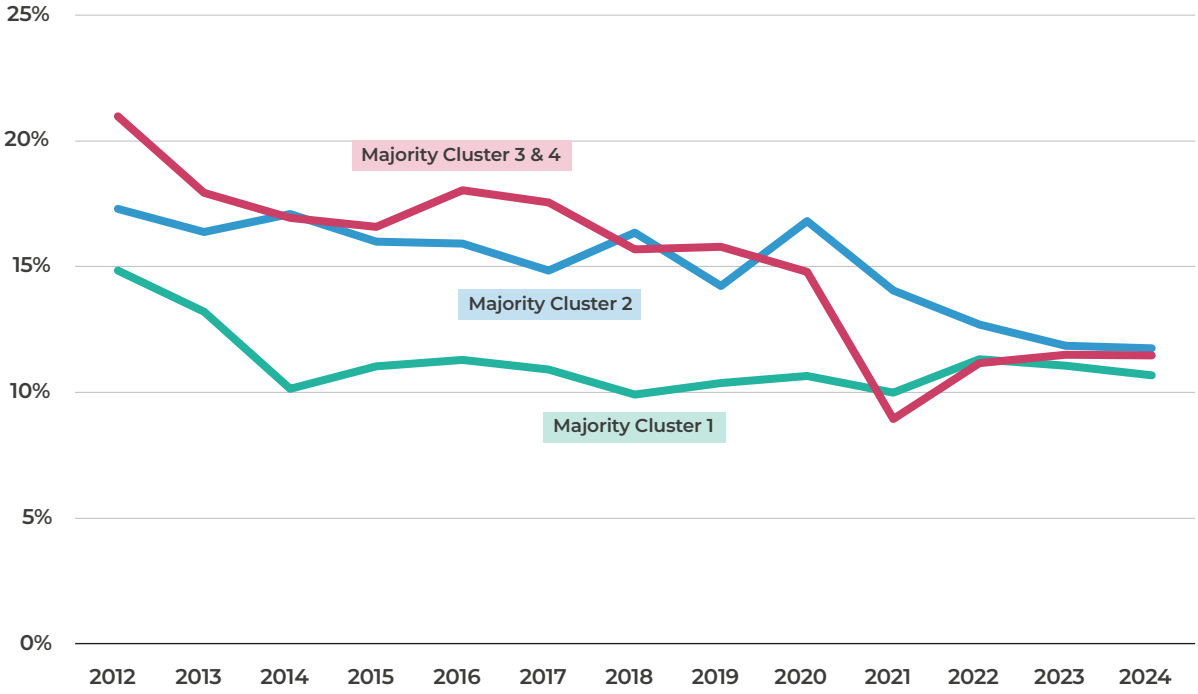
Change (relative to 2012) in the number of trips made by air for business purposes in each cluster grouping; lines represent aggregate weighted trip numbers.



Source: NEF analysis of Eurostat. Cluster 2 adjusted to remove the exceptional impact of the 2024 Olympic Games in France.

FIGURE 5: THE MARKET SHARE OF BUSINESS AIR TRAVEL HAS BEEN DECLINING AND CONVERGING ACROSS COUNTRIES.

Business air trip market share among all air trips in each cluster grouping; lines represent aggregate weighted trip numbers.



Source: NEF analysis of Eurostat. Cluster 2 adjusted to remove the exceptional impact of the 2024 Olympic Games in France.

In stark contrast with Cluster 2, 3, and 4 countries, countries in Cluster 1 (Air-led Growth Potential) show much clearer growth in business air travel numbers, both pre- and post-pandemic. When measuring with a weighted average, business air trips increased around 90% between 2012 and 2023.

Another way to look at recent business trends is through the lens of market share. Again, our analysis focuses on the trips made by European residents. Figure 5 shows how the business air travel market share has developed through the period 2012-23. Once again, we see that the business share in Clusters 2, 3, and 4 has declined over the period. Interestingly, while Cluster 1 has maintained a stable market share through most of the period, there was a decline in 2012 and 2013 (led by a jump in leisure trip numbers). There has been little growth since, and the latest market share figures show levels comparable with other clusters. Indeed, there is some evidence of the business market share converging across Europe.

Two decades of academic and consultant-led research has established that the wider economic benefits driven by (passenger) air transport growth are facilitated primarily by the transportation of passengers travelling for business purposes.[37] European transport policymakers have yet to reconcile with what the approach of the saturation point, ie where additional air travel capacity no longer facilitates business growth, means for wider decision-making. We have presented strong evidence that not only has this point been reached in much of Europe, but that it has indeed led to the diminishing of air transport growth as a causal driver of GDP per capita growth. This is not to say that there are not situations in which new business air connections might create new value. But in light of the much higher willingness to pay of business passengers, these connections do not depend on the creation of new capacity within already high-capacity air networks.

4.3 TOURISM AS A DRIVER OF DIVERGENCE

While our higher-tourism Cluster 2 presents a similar business travel trend to Clusters 3 and 4, our statistical analysis highlighted a stronger causal connection running from air connectivity to GDP growth. Our second hypothesis, based on UK-specific analysis presented in Chapman (2023),[38] is that one factor explaining this difference relates to the nature of tourism flows in these regions. A weak, or lacking, connection is found where air travel is a net drain rather than a net source of spending flows, and vice versa.

Clusters 1 and 2 are distinguished from Clusters 3 and 4 by their balance of cross-border travel spending flows (ie balance of travel services payments). While, in aggregate, Clusters 1 and 2 see net travel spending surpluses of 1.2% and 1.5% of GDP, respectively, Clusters 3 and 4 report an aggregate deficit of 1.1% of GDP (Table 3). There are a few exceptions. Norway, which had an even split of regions in Cluster 2 and Cluster 3, presents a travel spending deficit more aligned with countries in Clusters 3 and 4. On the other hand, Austria, which had a majority of regions in Clusters 3 and 4, presents data more akin to Cluster 2, with a 1.8% GDP travel spending surplus.

The data in Table 3 shows that while travel spending can be a source of incoming cash for some economies, for others it is a net loss. Our statistical analysis suggests, perhaps unsurprisingly, that in regions with a travel spending deficit, we are less likely to find that air connectivity growth is a causal driver of GDP growth.

Spain, Portugal, and Greece operate the largest travel account surpluses in our dataset. Germany, Belgium, Norway, and the UK operate the largest deficits. In Germany and Norway, this deficit is more than offset by the nation's significantly wider current account surplus. In Belgium and the UK, the deficit makes an important contribution to the national current account deficit.

Those nations which appear in Clusters 3 and 4 and have travel spending surpluses (Austria, Czechia, Estonia, and Slovenia) present interesting cases. This finding is likely at least partly explained by the nature of tourism in these countries. Specifically, the question of how much tourism in these nations relies on air transport.

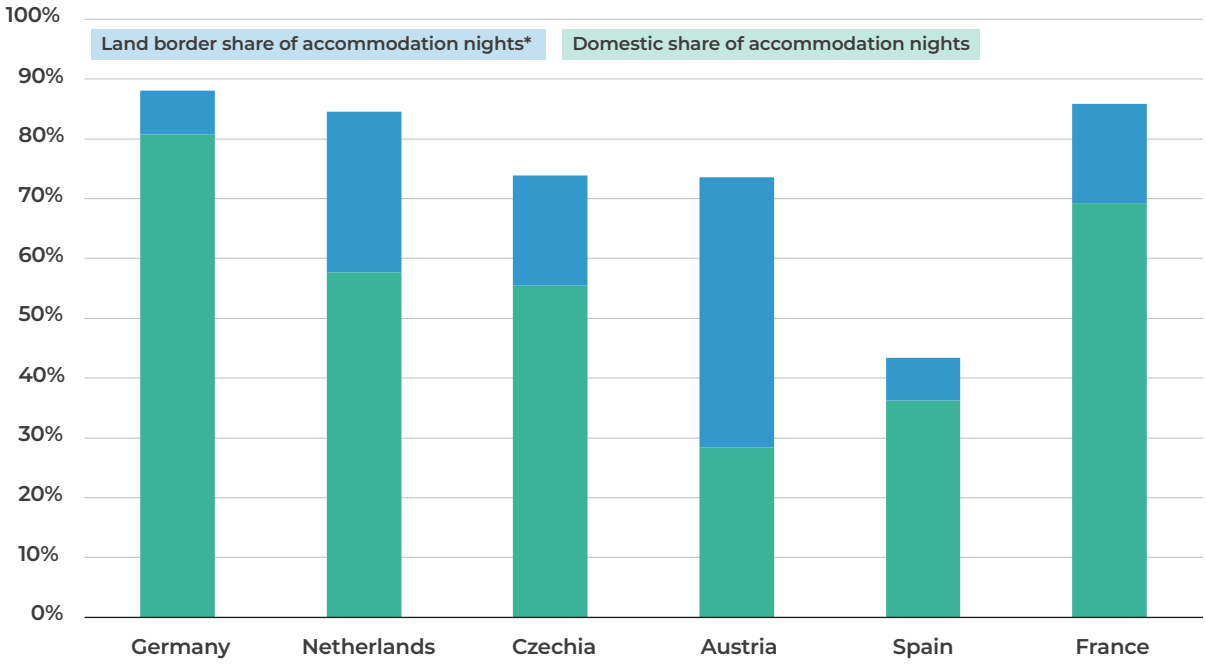
TABLE 3: EUROPEAN NATIONS AND THEIR NET TRAVEL SERVICES BALANCE OF PAYMENTS IN 2024, IN EUROS AND AS A PROPORTION OF GDP. AGGREGATE CLUSTER BALANCES ARE ALSO SHOWN.

Cluster grouping	Country	Net travel services balance of payments (millions)	...as a share of GDP
1	Bulgaria	€2,116	2.0%
1	Greece	€18,788	7.9%
1	Lithuania	-€32	0.0%
1	Hungary	€3,823	1.9%
1	Poland	€2,371	0.3%
1	Romania	-€4,399	-1.2%
Majority Cluster 1		**€22,666**	**1.2%**
2	Spain	€68,425	4.3%
2	France	€15,883	0.5%
2	Italy	€21,207	1.0%
2	Portugal	€20,917	7.3%
2	Slovakia	-€827	-0.6%
2	Norway	-€9,629	-2.2%
Majority Cluster 2		**€115,976**	**1.5%**
3 & 4	Austria	€8,606	1.8%
3	Slovenia	€795	1.2%
3 & 4	Czechia	€298	0.1%
3	Estonia	€121	0.3%
3 & 4	Belgium	-€16,266	-2.6%
3 & 4	Denmark	-€920	-0.2%
3 & 4	Germany	-€74,060	-1.7%
3 & 4	Ireland	-€5,572	-1.0%
3	Latvia	-€69	-0.2%
3 & 4	Netherlands	-€5,721	-0.5%
3 & 4	Finland	-€1,861	-0.7%
3 & 4	Sweden	-€3,037	-0.5%
3 & 4	United Kingdom	-€47,679	-1.5%
Majority Cluster 3 & 4		**-€145,365**	**-1.2%**

Source: NEF analysis of Eurostat.

FIGURE 6: COUNTRIES VARY IN THEIR RELATIVE RELIANCE ON DOMESTIC TOURISTS, AND TOURISTS FROM LAND-BORDER NATIONS.

Share of accommodation nights occupied by domestic residents, and by residents of nations with a land border with the relevant nation in 2024. Selected nations only.



Source: NEF analysis of Eurostat *includes direct rail through the Channel Tunnel.

Austria receives very significant foreign travel spending income for a country of its size. Just 28% of accommodation nights spent in Austria are made by domestic residents compared with around 81% in Germany. Austria, however, receives an unusually large share of its incoming visitor nights (45% in 2024) from countries with which it shares a land border. Czechia and Slovenia also receive above-average shares of visitors from land-border nations, at 18% and 20% in 2024, respectively. Many travellers can therefore arrive by road and rail, leading to much lower air transport dependence. This contrasts with tourism receiving countries in Cluster 2, such as Spain, which receives very large amounts of incoming tourism (at 64% of nights) but a very low share from land-border nations (7% in 2024) (Figure 6).

France is an unusual case. Despite being widely recognised as a tourist destination and operating a significant travel spending surplus worth almost €16bn in 2024, accommodation in France is actually mostly occupied by domestic tourists (69% of nights). The country also receives a reasonably large share (17%) of its tourists from land-border nations (Figure 6). These features do not prevent many regions of France from being represented among our Cluster 2, but do highlight that strong tourism industries do not necessarily depend on air travel.

Eurostat data allows analysis of trends in the land-border share of inbound tourism back to 2014. In the large majority of cases, the share of visitor-nights from land-border and domestic sources has remained relatively stable. Two notable shifts were identified, the first in Ireland, where the domestic and land-border share declined dramatically from 70% in 2014 to 51% in 2024 despite a relatively limited change in the overall number of accommodation nights of just +5.5%. This points to a decline in visitors from the United Kingdom and a rise from nations further afield. The second was in Czechia, where the domestic and land-border share rose from 65% to 74% at the same time as an overall increase in accommodation nights of 52%.

From where does tourism value derive?

Our analysis highlighted that regions that are recipients of international tourism show a higher probability of finding statistical support for a causal relationship running from air connectivity to economic growth. Causality was only statistically

evidenced, however, in 59% of regions in Cluster 2. As we have shown, in many Cluster 2 regions, a significant proportion of tourism activity does not rely on air travel and can be created through alternative means. To explore precisely what provides tourism value, and why, we included some additional parameters in our statistical modelling that are considered here.

Mode of travel
The first parameter we considered was the role of the local rail infrastructure. As rail travel can also bring tourists into a region, we wanted to understand whether there was evidence that it could act as a substitute for air travel. Our initial analysis supported this hypothesis. We found that the presence of a more developed rail network in a region reduced the likelihood of finding causality running from air transport to GDP growth, but with low statistical confidence.

An interesting dynamic is presented in terms of the impact of rail transport infrastructure on the strength of the correlation between air transport connectivity and economic growth (Table 1). In the pre-pandemic period, rail infrastructure presented as a complement to the correlation, potentially linked to the role that rail infrastructure plays in transporting passengers to airports. However, when the pandemic period was introduced, rail infrastructure presented as a substitute for air transport. This could relate to the role rail infrastructure played in facilitating tourism while air travel was restricted by pandemic-related public health policies.

In a second test of this relationship (Table 1), we looked at the factors explaining the presence of a negative correlation between air transport and GDP, ie where more air transport was actually correlated with worse economic performance, a context found in 11% of our regions. Our analysis suggested that having better rail infrastructure made it much more likely that a region would present with this negative relationship, and this time, we found high statistical confidence. Further research is required into these issues, as this could suggest that if a region already has a good rail network, there is a chance that adding more air capacity could do more harm than good.

In summary, high-quality and strategic transport connectivity that fits with the local context is important. Air connectivity can be one component of such a package, but its importance can vary between contexts. This is underscored by the fact that we found a much stronger correlation between air transport and the economy in island regions (Table 1).

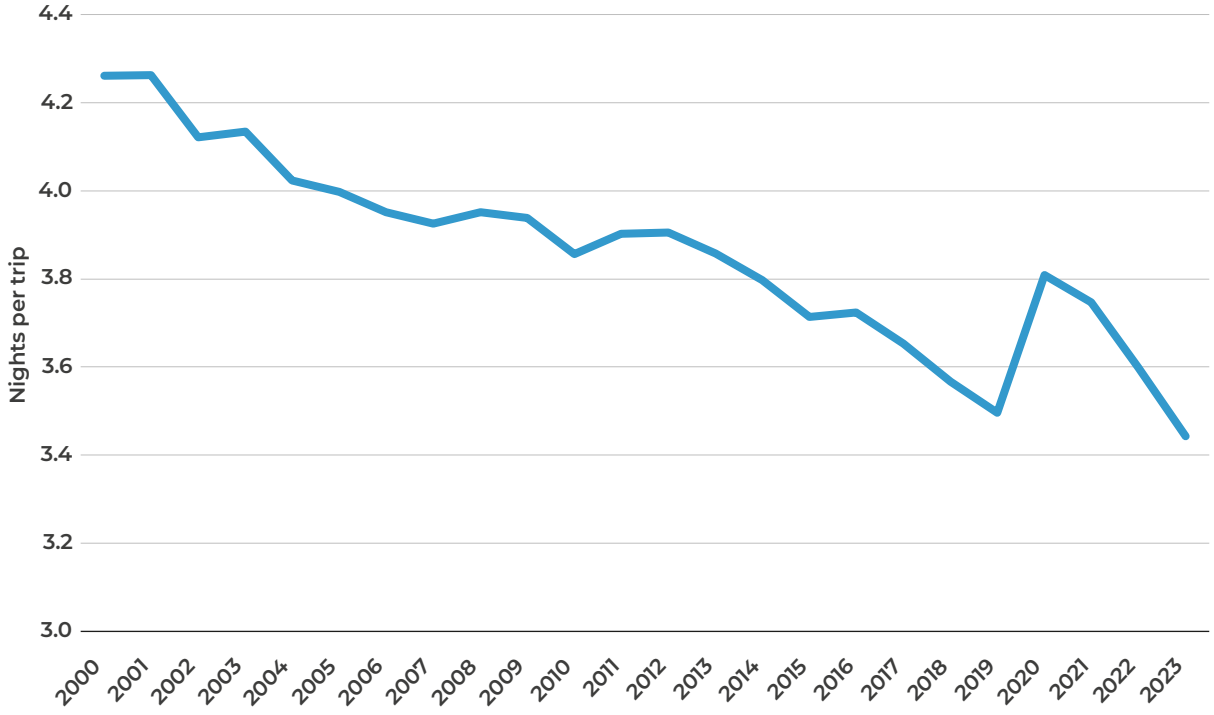
Duration of stay, volume of spend, and infrastructure quality
Our second area of analysis looked at the influence tourism itself had on the air connectivity-economy relationship when it was split into two components: one, the number of tourist nights, representing the number of nights visitors spend; the other, the number of hotel beds, representing the size of the formal industry those visitors are supporting. Although related, these two parameters have an important distinction. Revenue in the local tourism sector might be generated by having more tourist arrivals or by having tourists spend more nights. Additionally, revenue might be generated in a formal tourism economy/infrastructure or in an informal sector, with different knock-on impacts on the economy.

Our statistical analysis found that, all other things held equal, increases in nights spent by tourists *reduced* the correlation between air connectivity and the economy (but increased the probability of finding a causal relationship). The suggestion is, if tourist nights can be increased with no net increase in air transport (eg through longer stays, land transport, or domestic tourism), then the importance of air transport to the economy declines.

Our statistical analysis also found that, all other things held equal, increasing the size of the local tourism infrastructure (as indicated via hotel beds) increased the value created by air transport, ie the size of the correlation *and* the likelihood of finding causality increased. In other words, more value is created when more formal tourism infrastructure is available. This raises the suggestion that higher use of informal tourist accommodation, such as Airbnb, may reduce the value facilitated by air transport.

FIGURE 7: THE AVERAGE DURATION OF TOURIST STAYS IN FORMAL ACCOMMODATION HAS BEEN DECLINING.

Average number of of foreign tourists staying at formal tourist accommodation visiting major tourism receiving countries (Spain, France, Italy, Austria, Portugal).



Source: NEF analysis of Eurostat.

Tourism value creation in Europe

In light of this statistical analysis, we here consider what recent trends and policy directions mean for tourism value creation in contemporary Europe.

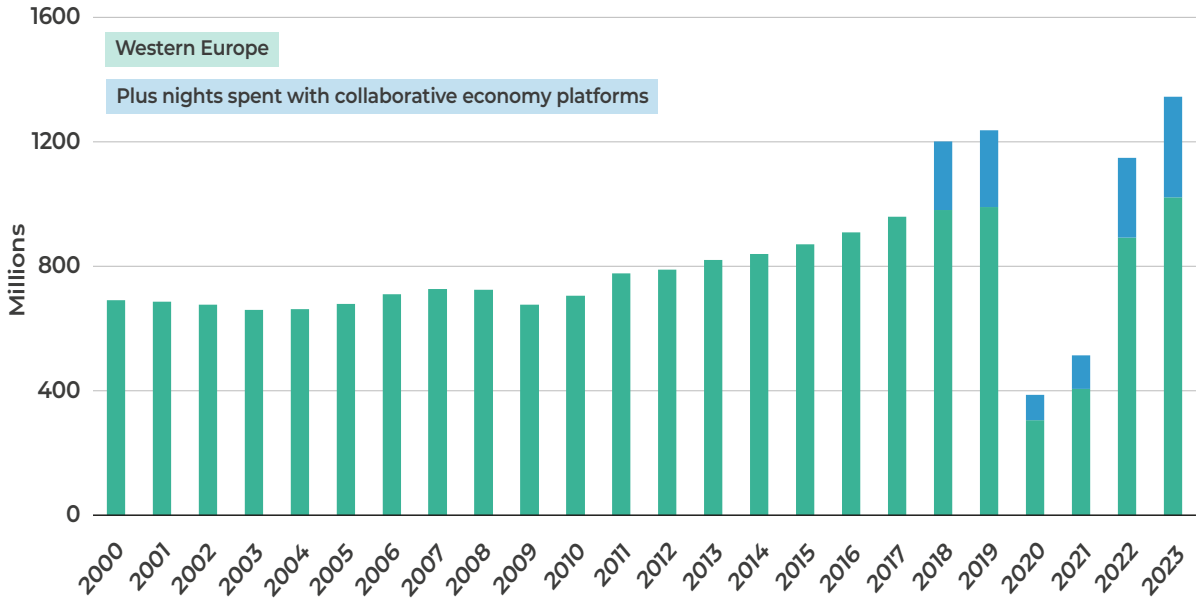
Among visitors to traditional/formal forms of tourist accommodation, who account for the large majority of nights spent, the average number of nights spent per trip has been falling rapidly. In 2023, trips to the major European tourist-receiving nations were their shortest on record at just over 3.4 nights per trip (Figure 7).

The evolution of collaborative economy accommodation somewhat clouds this picture. Eurostat's experimental data tracking nights spent at accommodation through these platforms, going back to 2018 (Figure 8), suggests that by 2023, around 25% of nights were being spent in accommodation secured through these platforms. It is possible that among this group of tourists, the average duration of stay is longer, and, therefore, the overall decline in Figure 7 is too pessimistic. However, as collaborative economy platforms only gained a foothold in the European market in the early 2010s, the preceding decline should be robust. Given that transport, and particularly air travel, is the largest contributor to tourism's environmental footprint, a reduction in the duration of stay points to a greater environmental cost per tourist trip.

We can also explore the issue of trip duration through the lens of travel expenditure. If visitors are taking shorter trips, we would expect the share of their travel budget being spent on transport to increase when viewed on a spend-per-night basis. Our analysis of Eurostat data appears to confirm this. At least prior to the pandemic, spend per night on transport costs was rising, after adjusting for inflation, among visitors to five major tourism destinations (Figure 9). The largest proportionate rise was seen in Spain, where between 2012 and 2019, transport spend per night increased by over 40%. This seems logical as Spain also sees the highest share of short trips, with around 63% of trips by European residents lasting just 1-3 nights. This compares with around 43% in Italy and 13% in Greece.

FIGURE 8: TOURIST NIGHTS HAVE RISEN RAPIDLY IN WESTERN EUROPE SINCE 2010.

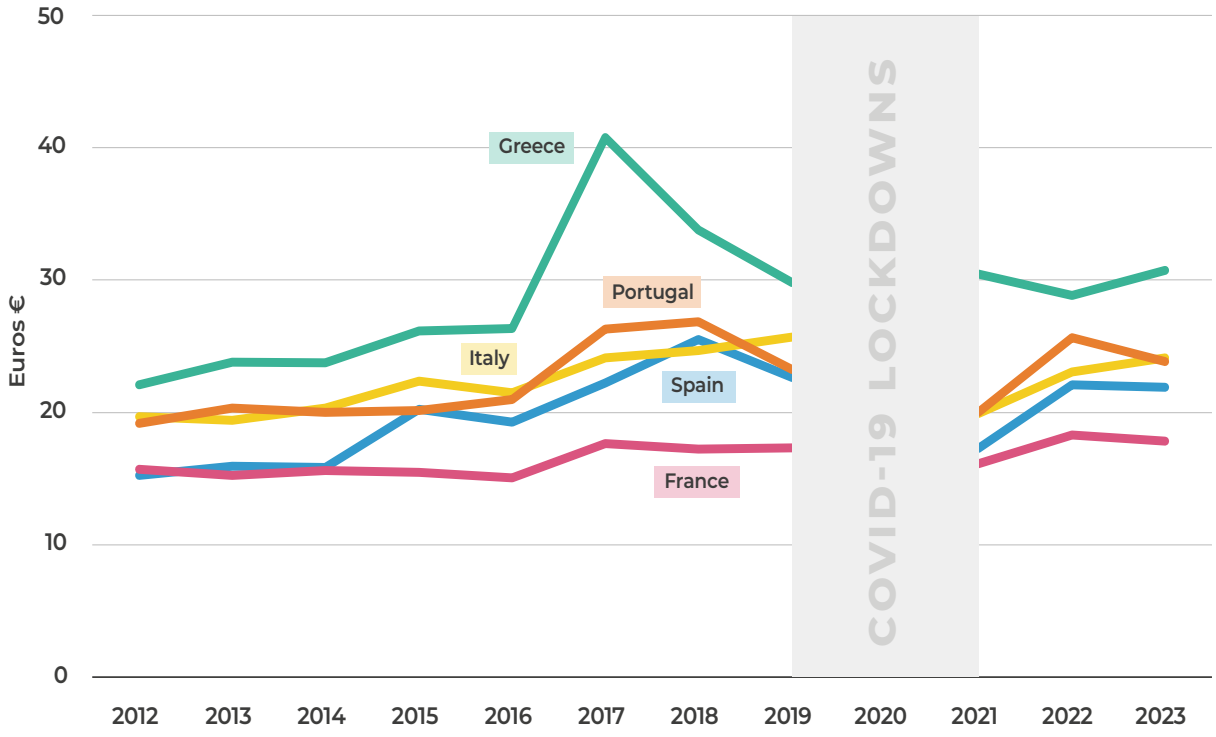
Nights spent in tourist accommodation by foreign residents in western European countries since 2000, with additional nights in collaborative economy platform accommodation from 2018 (experimental statistics).



Source: NEF analysis of Eurostat. Western Europe includes Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands, Portugal.

FIGURE 9: ON A PER-NIGHT BASIS, TOURIST SPENDING ON TRANSPORT HAS RISEN RAPIDLY IN MAJOR TOURISM ECONOMIES.

Spend on trip transport costs by European residents engaging in leisure travel to selected European countries presented on a per-night basis and adjusted for headline inflation.



Source: NEF analysis of Eurostat.

There are a number of caveats to this analysis. In Figure 9, we have adjusted using headline inflation, but air fares experienced their own rate of inflation. Our analysis suggests this is not the driver of the trends shown, as airfare inflation sat at a level only marginally above headline inflation. Another consideration is that trips could be becoming more transport-cost heavy because tourists are coming from farther afield in Europe. For example, more tourists travelling to Spain from eastern Europe, on longer and hence more expensive routes, would drive up the travel spending share. Again, our analysis suggests this is not a major driver, with the majority of the visitor growth deriving from western European sources. It seems likely that the rise of frequent flying on shorter-duration trips has increased the share of trip expenditure going to transport costs, thereby reducing the share accruing to recipient communities.

In summary, we find that the GDP improvements secured from tourism facilitated by air travel can also be facilitated via rail travel. We also found that the amount of value created is influenced by the quality of the local tourism infrastructure and the amount of value left by visitors, not just the volume of arrivals. Additionally, we found that the trend towards shorter holidays is increasing the transport costs share of tourist trip expenditure in Europe, and is reducing the value of each additional trip. This raises important questions about how tourism value is being created and distributed in Europe, how much is retained by local communities, and critically, how much value is being retained relative to the environmental cost of the activity.

4.4 A TYPOLOGY OF THE AIR TRANSPORT-ECONOMY RELATIONSHIP

Following this review of some of the key trends and features that distinguish the air transport-economy relationship within and between our clusters of nations, we here provide a qualitative description of how each cluster might be characterised. This should be understood as a data-informed qualitative interpretation of a statistical clustering process.

Cluster 1 regions: Business demand and less advanced connectivity
Comprising 32 regions (just 12% of the panel), this grouping presents a more traditional relationship between air transport and the economy. The cluster is primarily found in eastern Europe, and the air transport-economy relationship bears similarities with that described by researchers in western Europe in the 1990s and early 2000s. The regions are not typically major tourist destinations, and have lower population density, meaning the correlation between air connectivity and GDP is slightly below average. However, their lower level of development and pre-existing connectivity, and evidence of growing business travel demand, leave room for connectivity-led improvement. We document a moderate probability (53% of regions) that a causal relationship running from air connectivity to GDP can be statistically supported. We also document a moderate probability that causality from GDP growth to connectivity can be supported (59% of regions), suggesting there is growing outbound air travel demand.

Cluster 2 regions: Tourism-dependent and other lower-income regions
Comprising 105 regions, this is the largest cluster (38% of the panel). While their GDP levels are slightly lower than average, they nonetheless show a similar stagnation of business air travel demand as seen in nations in Clusters 3 and 4. Most of these regions have larger-than-average tourism economies and operate net tourism spending surpluses. Some other lower-income regions of high-income countries have also been captured in this cluster. In these regions, there is a moderate chance (59%) of finding causality running from air connectivity to GDP. A range of factors influence the relationship between air transport and economic growth. Some regions show lower air travel dependence as they source tourists through land routes and domestic tourism. Some regions, with higher air travel dependence, have seen value creation decline due to declining lengths of stay and the rise of informal accommodation. In these regions, there is a lower chance (34%) of finding causality in the reverse direction, suggesting limited levels of demand for outbound travel.

Cluster 3 regions: Middle-income regions with low business demand and high outbound demand

Comprising 76 regions, this is the second largest grouping (28%). Cluster 3 regions are most commonly found in Germany, the UK, Czechia, and Scandinavia. In these regions, we find the lowest support for a causal relationship running from air connectivity to GDP, in just 23% of regions. Regions with a negative correlation between air transport and economic growth are also most likely to be found in this grouping. Air connectivity is either already well developed and/or the core business sectors are less dependent on air travel. There is evidence of business air travel demand saturation, or even decline. Inbound tourism is low and more likely to be domestic and not air-travel-reliant. These regions are defined by a very high chance of finding causality running from GDP growth to air connectivity. That is to say, growing incomes are fuelling demand for outbound leisure travel. As a result, these regions are more often associated with tourism spending deficits, and it is conceivable that air transport actually creates negative economic outcomes.

Cluster 4 regions: High-income, high-connectivity regions showing signs of saturation

Comprising 60 regions (22%), this grouping includes most of the northern, western, and southern European capitals, and most of the best-connected regions on the continent. This includes southern and western Germany, the southeast of the UK, and much of Belgium, the Netherlands, and Sweden. With already highly developed economies and high GDPs, these regions appear to be approaching a point where additional air connectivity no longer adds significant value. There is evidence of business air travel demand saturation. The chance of finding statistical support for a causal relationship between air connectivity and the economy is low, both from connectivity to GDP (28%) and from GDP to connectivity (20%). While a correlation between air connectivity and GDP can still be evidenced, this appears to be an artefact created by the location of major airports close to these regions, which are sourcing demand from other regions, particularly those in Cluster 3.

CONCLUSIONS AND RECOMMENDATIONS

We have evidenced how the relationship between air transport and the wider economy has varied across Europe in recent years. Contrary to widely held presumptions, we find evidence that air transport is a driver of economic growth in only around one-third of areas. If air transport's impact on the climate were factored into our economic model, this figure would likely fall. In the majority of regions, air transport demand growth has been a response to income growth, not a driver. The decline of business air travel demand appears to be a key factor in explaining why areas, particularly those that send rather than receive tourists, no longer experience economic gains driven by air transport connectivity growth (regions have reached, or are approaching, saturation).

We identify two types of regions where a causal relationship from air transport connectivity to growth can prevail. The first group of regions, primarily found in eastern Europe, is characterised by places with lower incomes and lower pre-existing connectivity. In these areas, business air travel demand growth remains robust, and trends evidenced in western Europe in the 1990s and early 2000s may still hold.

The other group of regions we observe are concentrated on Europe's tourism receiving areas. In these areas, a complex relationship between air transport, tourism, and the wider economy prevails. Air transport growth can be a facilitator of gross domestic product (GDP) growth, but our analysis suggests that this growth is moderated by a number of factors. These include the strength of domestic tourism and land-based connectivity, which can act as a substitute for air travel. The relationship is also influenced by issues such as the duration of stay of visitors, where we see declining per-trip value creation resulting from declining lengths of stay; and by the strength of local tourism infrastructure, where we see evidence that informal accommodation types may be reducing the net value created locally. As travellers shorten their trips, we see rising per-trip environmental costs and increased accumulation of income within the air transport sector rather than in recipient communities.

We recommend that European policymakers and analysts working on issues related to air transport and tourism policy:

- Implement a critical review of the economic assumptions and underpinning modelling that have thus far been guiding decisions on policies impacting air transport and tourism (eg airport expansion and air transport taxation), ensuring that up-to-date, and regionally specific, input data and models are used.

- Review whether the continued under-taxation of air transport, relative to other sectors and the level of environmental damage it creates, is justified in the contemporary context of declining business air travel and diminishing economic returns.

- Consider how tourism industrial strategy can increase value retention while cutting environmental costs, such as by incentivising lower-volume, higher-quality, international tourism and more domestic tourism, extending lengths of stay, incentivising in situ spending over air transport spending, and ensuring spending takes place in areas served by appropriate tourism infrastructure.

- Set up the necessary infrastructure to ensure wider and more consistent reporting of travel purposes, and greater availability of key economic and travel data at NUTS2,[a] rather than national levels.

In subsequent reports, we will explore the equity and distribution of the income flows facilitated by air transport, and characterise how economic changes are experienced in local communities. We will also look at the economic dimensions of the climate crisis, and the extent to which it is adequately considered in economic models and decision-making on air transport.

a The EU's nomenclature of territorial units for statistics, second level.

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