DublinAirport

Dublin Airport Economic Impact Study

2023

Prepared for daa plc. Prepared by InterVISTAS Consulting

daa

DublinAirport

Economic Impact Study

Contents

2023 Executive Summary

Dublin Airport staged a strong recovery in 2022

from the impacts of the COVID-19 pandemic in the previous two years, with traffic reaching 28.1 million, 85% of peak 2019 levels (32.9 million). Prior to the pandemic, Dublin Airport had experienced a rapid growth in traffic, with passenger volumes growing by an average of 6.7% per annum between the opening of Terminal 2 in 2010 to 2019. With this traffic growth came greater connectivity to Europe, North America, Asia and Africa.

This report documents the economic impact of Dublin Airport based on 2022 traffic and activity levels. It also considers the airport's potential future economic contribution as air traffic continues to grow (subject to the necessary planning consents). Dublin Airport opened a new northern parallel runway in 2022 and, subject to planning, will deliver a significant Capital Investment Programme over the coming years. These will support traffic and connectivity growth and facilitate wider economic benefits to Ireland through increased tourism, trade and investment. The airport is subject to a 32 million annual passenger cap and this report also estimates the economic impact that will be forgone if this cap remains in place.

The key findings of the study are provided below.

Dublin Airport is a strategic national infrastructure asset, facilitating economic activity across the Irish economy. In 2022, it is estimated that a total of 116,100 jobs were generated or facilitated by the airport, along with €9.6 Billion in Gross Value Added (GVA, broadly equivalent to Gross Domestic Product).

DublinAirport

Number of Jobs

19,900
Direct
At airport and airport related businesses

11,700
Indirect
Supplyin and supporting businesses

13,300
Induced
Employees spending in the economy

71,200
Catalytic
Air service facilitating tourisim, trade, investment productivity

9,599 GVA (€Millions)

1,832 →
Direct
At airport and airport related businesses

1,020 →
Indirect
Supplyin and supporting businesses

1,024 →
Induced
Employees spending in the economy

5,723 →
Catalytic
Air service facilitating tourisim, trade, investment productivity

All financial figures are in 2022 prices. Numbers may not add up due to rounding.

Current Economic Impact of Dublin Airport

As a small, open, island-economy, Ireland is crucially dependent on its air links to facilitate its economy. Dublin Airport makes a substantial contribution to the national economy, as the country's primary global gateway, comprising the following:

- **Direct Economic Impact.** The employment, income and economic output associated with the operation and management of activities at the airport including firms on-site at the airport and airport-related businesses located elsewhere near the airport.
- **Indirect Economic Impact.** The employment, income and economic output generated by down-stream industries that supply and support the activities at the airport, such as booking flights, etc.
- **Induced Economic Impact**. The economic activity generated by the employees of firms directly or indirectly connected to the airport spending their income in the national economy.
- **Catalytic Impacts.** The way in which the airport facilitates the business of other sectors of the economy. As such, air transportation facilitates employment and economic development in the national economy by facilitating trade, tourism, investment and productivity growth.

The economic impact estimates for 2022 are summarised in Figure ES-1. Direct employment, supported by ongoing operations at Dublin Airport (e.g., daa, airlines, air traffic control, ground handlers, airport security, immigration, customs, airport retail, etc.) amounts to 19,900 jobs.

Adjusting for part-time and seasonal employment, this totals 17,800 Full-Time Equivalent jobs (FTEs). To put this into context, the number of direct jobs is similar to the combined employment of Intel, Google, Medtronic and Lidl in Ireland.[1] The total direct GVA generated by Dublin Airport is estimated to be over €1.8 billion.2 Analysis was also conducted on the regional location of these economic impacts, which found that 90% of the direct impact (17,900 jobs and €1.7 billion in GVA) was generated in Fingal, with the remaining 10% generated in the rest of Dublin and Ireland.

Adding in multiplier impacts (indirect and induced), the total employment supported by activities at Dublin Airport is estimated to be 44,900 jobs (or 39,900 FTEs), earning a total of €2.0 billion and generating €3.9 billion in GVA.

Air services at Dublin Airport allow a large number of tourists to visit Ireland, facilitate the transportation of high-value exports and enable employees of Irish and multi-national businesses to travel to clients, regional offices and global headquarters. Many of the businesses with regional headquarters in Ireland would not be located there without the

[1] Source: company websites: Intel: 4,900, Google: 5,000, Medtronic: 4,000, Lidl Ireland: 6,000.

[2] Gross Value Added (GVA) is the value of the operating surpluses of business linked to Dublin Airport, plus the income/wages of employees and consumption of fixed capital. Gross Domestic Product (GDP) is the sum of the GVA of all industries plus taxes less subsidies on production.

connectivity that Dublin Airport provides. The catalytic impacts of Dublin Airport are estimated to amount to 71,200 jobs (62,900 FTEs) and €5.7 billion in GVA.

Figure ES-1: Total Economic Impact Generated and Facilitated by Dublin Airport (2022)

Impact	Number of Jobs	Full-Time Equivalents (FTEs)	Wages (€ Millions)	GVA (€ Millions)	GVA as % of National GDP
Direct	19,900	17,800	€906	€1,832	0.4%
Indirect	11,700	10,300	€534	€1,020	0.2%
Induced	13,300	11,800	€516	€1,024	0.2%
Catalytic	71,200	62,900	€ 2,919	€ 5,723	1.3%
Total	**116,100**	**102,800**	**€ 4,876**	**€ 9,599**	**2.3%**

All financial figures are in 2022 prices. Numbers may not add up due to rounding.

The total economic impact of Dublin Airport includes activity directly related to the airport, the multiplier impacts that flow from it, and the other sectors of the economy facilitated by the airport. In total, this amounts to 116,100 jobs in Ireland, equivalent to 102,800 full-time jobs, earning a total of almost €4.9 billion. Furthermore, a total of €9.6 billion is generated in GVA, representing 2.3% of the national economy.[3] Approximately 27% of total employment and 29% of total GVA is located in Fingal, a further 21% of employment and 24% of GVA is located in the rest of Dublin, 22% of employment and 20% of GVA is located in the Rest of Leinster, and 31% of employment and 28% of GVA are located in the Rest of Ireland.

It should be noted that these figures are not attempting to credit Dublin Airport with creating nearly 2.3% of the national economy. The Irish economy is far more complex than that. It clearly takes a wide range of players acting together to generate economic growth – government, business, infrastructure providers, residents, etc. What the figures do show is that without Dublin Airport, and particularly without the extensive connectivity at the airport, the Irish economy would not be as large, affluent or diverse as it is today.

[3] Based on CSO estimates of 2021 GDP: https://www.cso.ie/. GVA figures were adjusted to 2021 prices for comparison with 2021 GDP

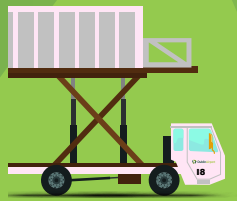
Future Economic Contribution of Dublin Airport

Initial air traffic forecasts produced by daa indicated that passenger volumes would recover to 2019 levels by around 2025, however, it should be noted that Dublin Airport is currently experiencing a strong growth in passenger numbers which is likely to result in an earlier than expected recovery to pre-pandemic levels.

Notwithstanding this, in the five years after 2025, traffic is forecast to grow at 3.7% per annum, reaching 39.6 million by 2030. Traffic is then projected to reach 46.6 million by 2040 and 55.0 million by 2055. The average growth between 2025 and 2055 is forecast to be 1.7% per annum (this assumes no constraints on growth either from physical or permitted airport capacity or government policy).[4]

As air services at Dublin Airport grow, the economic contribution of the airport is expected to grow as well. As more aircraft take-off and land, additional staff will be needed to crew, clean and maintain the aircraft, to service passengers and transport their luggage, and to process, load and unload air cargo (i.e., the direct impacts). Air carriers and other businesses at the airport will order additional goods and services from their suppliers (indirect impacts), and the increased employment will stimulate spending in the general economy (induced impacts). In addition, the new routes and greater frequencies at Dublin Airport will help facilitate increased tourism, trade, investment and attract business to Ireland (catalytic impacts). This traffic will be facilitated by the delivery of Dublin Airport's Capital Investment Programme (CIP). The CIP is a €2.9 billion programme to upgrade facilities and expand capacity, with a strong focus on providing a quality passenger experience.

Analysis was undertaken to estimate the future economic impact of Dublin Airport, based on the traffic forecasts produced by daa. The estimated future economic impact of Dublin Airport is provided in Figure 5-2. The total economic impact of Dublin Airport is projected to reach 151,000 jobs and €12.5 billion in GVA by 2030 and 191,600 jobs and €15.8 in GVA by 2055. While passenger traffic is forecast to grow by 106% by 2055, relative to 2022, the economic impact of Dublin Airport is projected to be only 65% higher due to assumed productivity and economies of scale effects.



[4] The figures quoted are taken from air traffic forecasts produced by daa in November 2022. These forecasts were based on the underlying demand for air travel and the expected supply of air services up to 2055. They represent an "unconstrained" view of passenger growth at the airport and take account of the recent decision to revise planning conditions which govern the operation of the airport's runway system as part of the Relevant Action planning application (FCC Ref: F20A/0668, ABP Ref PL06F.314485). This decision is currently the subject of an appeal to An Bord Pleanála, with a decision expected in Q4 2023.

Figure ES-2: Projected Economic Impact of Dublin Airport (Unconstrained Traffic Forecast)

Impact	Number of Jobs	Full-Time Equivalents (FTEs)	Wages (€ Millions)	GVA (€ Millions)
Current 2022 Impact (26.9 million passengers)				
Direct	19,900	17,800	€ 906	€ 1,832
Indirect	11,700	10,300	€ 534	€ 1,020
Induced	13,300	11,800	€ 516	€ 1,024
Catalytic	71,200	62,900	€ 2,919	€ 5,723
Total	**116,100**	**102,800**	**€ 4,876**	**€ 9,599**
2030 Impact (39.6 million passengers)				
Direct	24,700	22,100	€ 1,127	€ 2,277
Indirect	14,500	12,900	€ 664	€ 1,267
Induced	16,600	14,700	€ 641	€ 1,273
Catalytic	95,200	84,200	€ 3,904	€ 7,654
Total	**151,000**	**133,900**	**€ 6,336**	**€ 12,471**
2040 Impact (46.6 million passengers)				
Direct	27,600	24,600	€ 1,256	€ 2,539
Indirect	16,200	14,300	€ 741	€ 1,413
Induced	18,500	16,400	€ 715	€ 1,420
Catalytic	107,700	95,100	€ 4,413	€ 8,652
Total	**170,000**	**150,400**	**€ 7,125**	**€ 14,025**
2050 Impact (52.3 million passengers)				
Direct	29,800	26,600	€ 1,358	€ 2,745
Indirect	17,500	15,500	€ 801	€ 1,528
Induced	20,000	17,700	€ 773	€ 1,534
Catalytic	117,500	103,800	€ 4,816	€ 9,443
Total	**184,800**	**163,600**	**€ 7,748**	**€ 15,250**
2055 Impact (55.0 million passengers)				
Direct	30,800	27,500	€ 1,404	€ 2,838
Indirect	18,100	16,000	€ 828	€ 1,580
Induced	20,700	18,300	€ 799	€ 1,587
Catalytic	122,000	107,800	€ 5,000	€ 9,803
Total	**191,600**	**169,600**	**€ 8,031**	**€ 15,807**

All financial figures are in 2022 prices. Numbers may not add up due to rounding.

Glossary of Terms and Abbreviations

Capex	Capital expenditure.
Catalytic Impacts	Catalytic Impacts, also known as Wider Economic Benefits, captures the way in which specific economic activities facilitates further economic or business impacts in other sectors of the economy. Air transport creates catalytic impacts primarily through increased connectivity and improves national economic performance through the following mechanisms: tourism, trade in goods and services, investment, and increased productivity.
CIP	Capital Investment Programme.
Connecting traffic	Passenger traffic that transfers between flights at Dublin Airport (transfer passengers) or stays on the aircraft when it makes stop at Dublin Airport (transit passengers).
COVID-19	COVID-19 is a disease caused by a new strain of coronavirus which first identified in December 2019, and which spread globally as a pandemic during 2020. In an attempt to control the spread of the outbreak, many governments enacted measures to restrict air travel or quarantine inter national travellers, which resulted in a massive decline in air travel globally and in Ireland.
CSO	Central Statistics Office, Ireland.
daa	State owned corporation responsible for the operation and management of Dublin and Cork airports.
Direct impacts	Direct Impacts arise immediately from the conduct of those entities performing the activity in question. For an airport, the “direct impacts” would include the activities of airlines, the airport itself, forwarders, ground handling agents, and other firms whose principal business involves commercial aviation.
E/D Passengers	Enplaned/deplaned passengers. A measure of passenger volume that counts each passenger who enplanes or deplanes an aircraft.
Economic Impact	Economic impact is a measure of the employment, spending and economic activity associated with a business, a sector of the economy, a specific project (such as the construction of a new facility), or a change in government policy or regulation.
FDI	Foreign Direct Investment. Investment from one country into another (normally by companies rather than governments) that involves establishing operations or acquiring tangible assets, including stakes in other businesses.
FTE	A full-time equivalent (FTE) year of employment is equivalent to the number of hours that an individual would work on a full-time basis for one year (also known as a person year). FTEs are useful because part-time and seasonal workers do not account for one full-time job.

GDP	Gross Domestic Product, a measure of the total output of an economy.
GVA	Gross Value Added (GVA) – the value of the operating surpluses of business linked to Dublin Airport, plus the income/wages of employees and consumption of fixed capital. GVA is broadly equivalent to Gross Domestic Product (GDP), whereby the value-added of each industry sums to the total GDP of an economy.
I-O Model	Input-Output (I-O) model. A representation of the flows of economic activity within a region or country. An I-O model captures what each business or sector must purchase from every other sector in order to produce a dollar's worth of goods or services.
Indirect impacts	Indirect Impacts involve the supply chain of the businesses or entities conducting the primary activity (i.e., those included in the direct impact). The airlines at an airport purchase fuel which has been refined at a plant and transported to the airport by pipe or truck. Catering companies at the airport buy food from wholesalers. The items purchased can be used for many purposes besides commercial aviation and would usually occur off site. The materials support the primary aviation activity, although they could be used for many purposes.
Induced impacts	Induced impacts capture the economic activity generated by the employees of firms directly or indirectly connected to the airport spending their income in the national economy. For example, an airline employee might spend his/her income on groceries, restaurants, childcare, dental services, home renovations and other items which, in turn, generate employment in a wide range of sectors of the general economy.
Low Cost Carrier (LCC)	Also known as low fares, no-frills or budget carriers. These are airlines that generally have lower fares and fewer amenities than network or legacy carriers. Although there is considerable variation in the business models, low cost carriers typically operate a single aircraft type (to reduce training and maintenance costs), do not offer first or business class travel, do not provide in-flight services such as meals and entertainment (or offer them at additional charge), and focus on point-to-point travel offering limited connecting options. Examples in Europe include EasyJet, Ryanair, Wizz Air, Norwegian Air Shuttle and Vueling.
MPPA	Million Passenger Per Annum
Multiplier Impacts	Economic multipliers are used to infer indirect and induced effects from a particular sector of the economy. These are typically derived from an Input-Output model.
Wider Economic Benefits	See Catalytic Impacts.

1.0 Introduction

- daa commissioned InterVISTAS Consulting (InterVISTAS) to conduct a study on the economic impact of Dublin Airport including:
  - The current economic impact of Dublin Airport to the economy of Ireland.
  - The future economic impact resulting from the full implementation of the airport's Capital Investment Programme which will support an increase in capacity.
  - The economic impact forgone and loss of connectivity if the planning cap on Dublin Airport remains at 32 million annual passengers.

1.1 What is Economic Impact?

Economic impact is a measure of the employment, spending and economic activity associated with a business, a sector of the economy, a specific project (such as the construction of a new facility), or a change in government policy or regulation. In this case, economic impact refers to the economic contribution associated with the ongoing activities at Dublin Airport. Economic impact can be measured in a number of ways:

- **Employment** – the number of people employed by businesses involved in activities linked to Dublin Airport.
- **Income/Wages** – the wages and salaries earned by the people employed in activities linked to Dublin Airport.
- **Gross Value Added (GVA**) – the income/wages of employees above plus the operating surpluses of business linked to Dublin Airport and the consumption of fixed capital. GVA is broadly equivalent to Gross Domestic Product (GDP), whereby the value-added of each industry sums to the total GDP of an economy.[6]

1.2 Categories of Economic Impact

There are four distinct types or categories of economic impact associated with airports, as described below.

1.2.1 Categories of Economic Impact

This is the employment, income and GVA associated with the operation and management of activities at Dublin Airport including firms on-site at the airport and airport-related businesses located elsewhere near the airport. This includes activities by the airport operator, the airlines, air traffic control, fixed base operators (General Aviation), ground handlers, airport security, immigration and customs, aircraft maintenance, etc.

While a straight-forward definition of the direct airport economic impact would be the activities and businesses located at the airport, this would not reflect the full extent of the airport's economic base. Other businesses closely connected to airport activities are not based at the airport (or only partially based at the airport), such as aircraft maintenance, logistics operators, aircraft parts suppliers, etc. These businesses would not exist, or would be much smaller, without the activities at the airport. Therefore, off-airport businesses closely linked to airport activities were also included as part of the direct economic impact.

[6] GDP is the sum of the GVA of all industries plus taxes less subsidies on production

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OPERATIONS
DUBLIN AIRPORT
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1.2.2 Indirect Economic Impact

The employment, income and GVA generated by upstream industries that supply and support the activities at Dublin Airport. For example, these include wholesalers providing food for inflight catering, companies providing accounting and legal services to airlines, travel agents booking flights, etc.

1.2.3 Induced Economic Impact

This captures the economic activity generated by the employees of firms directly or indirectly connected to the airport spending their income in the national economy. For example, an airline employee might spend his/her income on groceries, restaurants, childcare, dental services, home renovations and other items which, in turn, generate employment in a wide range of sectors of the general economy.

1.2.4 Catalytic Economic Impacts

While the aforementioned economic impact can be seen as resulting from activities at Dublin Airport, catalytic impacts (also known as Wider Economic Benefits) capture the way in which the airport facilitates the business of other sectors of the economy. As such, air transportation facilitates employment and economic development in the national economy through a number of mechanisms:

- Tourism. Air service facilitates the arrival of larger numbers of tourists to a region or country. This includes business as well as leisure tourists. The spending of these tourists can support a wide range of tourism-related businesses: hotels, restaurants, theatres, car rentals, etc. Of course, air service also facilitates outbound tourism, which can be viewed as reducing the amount of money spent in an economy. However, even outbound tourism involves spending in the home economy, on travel agents, taxis, etc. In any case, it is not necessarily the case that money spent by tourists flying abroad would be spent on tourism at home if there were no air service.

- Trade in Goods and Services. IATA estimates that while air cargo makes up 1% of trade by volume, it accounts for over 35% of trade by value, reflecting generally higher value goods which are often times perishable or time-critical.[7] Both the trade of goods and the trade of services are facilitated by passenger air services. Face-to-face meetings play a crucial role in making sales and delivering services and support. The ability to be at a client's side rapidly and cost-effectively is important to many industries. Much of the time, these functions cannot be replaced by teleconferencing or other forms of communication.

[7] "Value of Air Cargo Factsheet", IATA, https://www.iata.org/en/programs/cargo/sustainability/benefits/.

1.2.4 Catalytic Economic Impacts

A study in the UK found that a 10% increase in seat capacity increased goods exports by 3.3% and goods imports by 1.7%.[8]

Air transport connects businesses to a wide range of global markets, providing a significantly larger customer base for their products than would be accessible otherwise. It is particularly important for high-tech and knowledge-based sectors, and suppliers of time-sensitive goods.

- **Investment**. Air connectivity is important in attracting international business headquarters and foreign investment into a country. A key factor many companies take into account when making decisions about the location of offices, manufacturing plants or warehouses is proximity of an international airport. A study by IATA of 625 businesses in five countries (including China and the United States) found that 25% of the sales of the surveyed businesses were dependent on good air transport links. Further, 30% of Chinese firms reported that they had changed investment decisions because of constraints on air services.[9] Another study analysed the numbers of investors, the volume of investment and the return on investment in a location and found that institutional investors are more likely to invest and allocate more investment to firms headquartered at destinations that have better air connectivity with their location.[10] Ireland's island status makes air connectivity even more critical.

  Therefore, airports are essential assets for regions wishing to expand industrial activity. Their proximity encourages industrial development. Industries choose to locate close to airports in order to gain easy access to air transport and the associated infrastructure.

- **Productivity.** Air transportation offers access to new markets, which in turn enables businesses to achieve greater economies of scale; inward investment can enhance the productivity of the labour force (e.g., state-of-the-art manufacturing facilities); air access also enables companies to attract and retain high quality employees. All of these factors contribute to enhanced productivity, which in turn increases national income.

[8] PWC (2013), "Econometric Analysis to Develop Evidence on the Links Between Aviation and the Economy", Report for the UK Airports Commission, December 2013.

[9] Airline Network Benefits, IATA Economic Briefing No. 3, 2006.

[10] Zhia Da, U., Gurun, B. L., Warachka, M. (2019), "Investment in a Smaller World: The Implications of Air Travel for Investors and Firms", Management Science, Vol. 67, No.1, December 2019.

1.2.4 Catalytic Economic Impacts

One study found that a 10% increase in air connectivity led to a 0.24 to 0.44 increase in economic productivity.[11] Another study for Airports Council International (ACI) Europe found that a 10% increase in connectivity was associated with an increase in GDP per capita of 0.6%.[12]

Additional research evidence on the link between aviation and economic development is summarised in **Appendix B**.

In effect, the catalytic impact of aviation is to increase the productive potential of the economy (in economist terms, moving the production–possibility frontier). Improvements in aviation connectivity enable economies to attract more tourists, conduct more trade and draw more foreign investment. The overall effect of all these mechanisms is an increase in employment and economic output (GDP). Without effective air transportation links, it is much harder for economies to attract tourists, to conduct trade and attract investment from other countries. As a result, the country's economy and employment potential would suffer.

It should be noted that catalytic impacts are not a simple matter of the airport generating employment and economic activity in the same way that direct, indirect and induced impacts arise. National economies are far more complex than that. It clearly takes a wide range of players acting together to generate economic growth – government, business, infrastructure providers, residents, etc. For example, providing air connectivity alone does not guarantee large volumes of tourists. Hotels, restaurants, retail and entertainment etc. are also required. Nevertheless, without convenient air services, a destination will find it more difficult to attract tourists.

What the catalytic impacts capture is that without efficient airports and associated air services, the economy would be smaller and less affluent. Thus, catalytic impacts are about the economic value and employment that airports facilitate rather than generate. The connectivity enabled by airports is not sufficient on its own to fully support economic activity, but it is a necessary element of economic growth and development.[13]

[11] Gillen, D. 2021, "Wider Economic Benefits: What they are, how they manifest, and an example from network air services", Chapter 4, Air Transport and Regional Development Methodologies, Editors: Adler et al., Routledge.

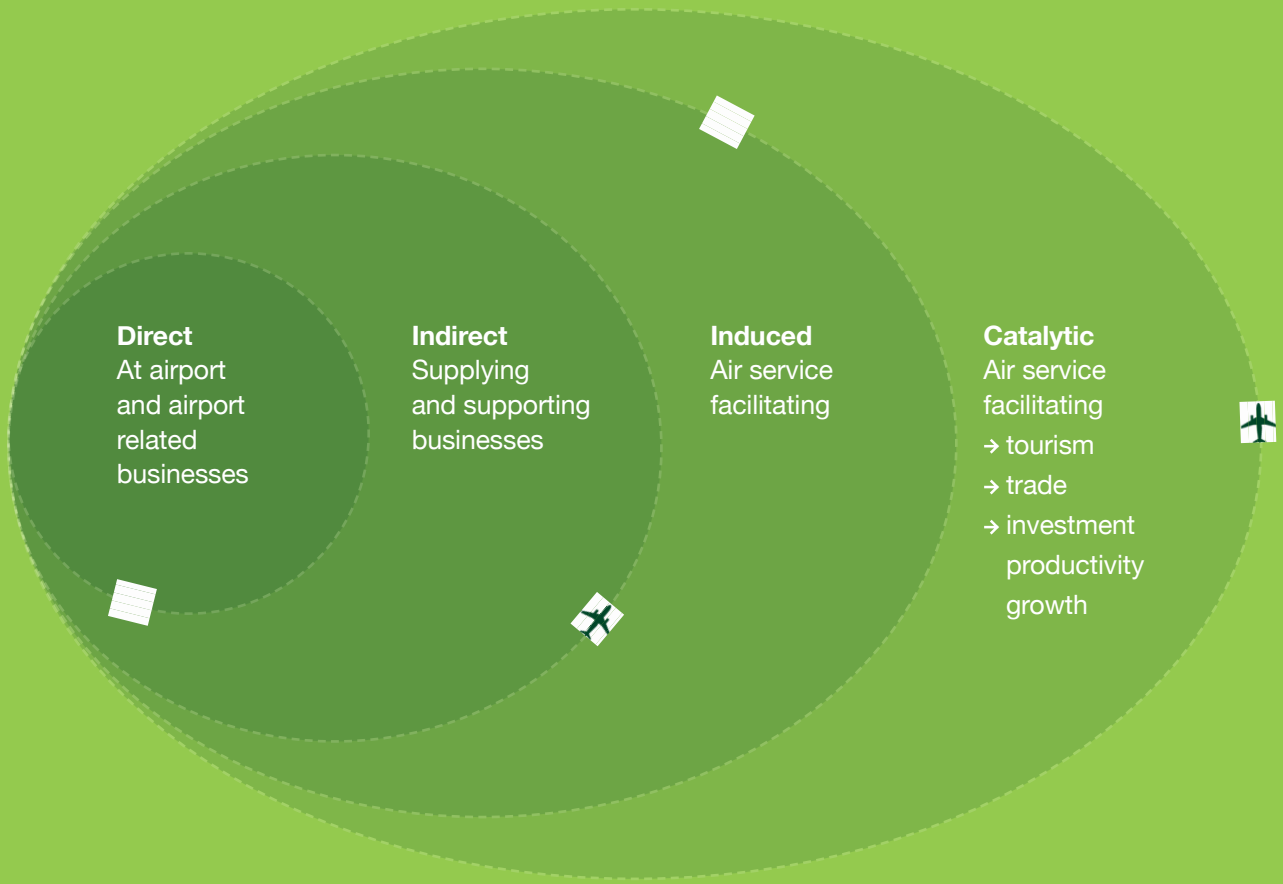
[12] InterVISTAS Consulting, "The Economic Impact of European Airports: A Critical Catalyst to Growth", ACI Europe, January 2015.

[13] In many parts of the world, airports are also the contributors of some of the other necessary elements for catalytic growth. Various airports have developed their own economic and urban hubs, which can comprise of hotels, offices, entertainment, and other commercial developments, which benefit from the adjacent air connectivity provided by the airport.

1.2.4 Catalytic Economic Impacts

In discussing catalytic impacts, the issue of causality often arises. For example, while air services can facilitate trade, it is also true that increased trade leads to increased demand for air services. This study recognises that there is a two-way relationship between air connectivity and economic growth. Economic growth stimulates demand for air services while at the same time, these air services open up new opportunities for tourism, trade, business development, etc. This in turn can stimulate further demand for air services, and so on, in a "virtuous cycle". The analysis in this study uses parameters that control for this two-way relationship.

These four categories of impacts are summarised in **Figure 1-1**.

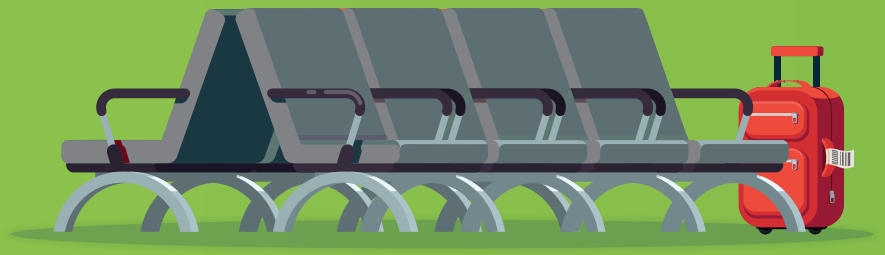


1.3 Report Structure

This report documents the methodology and findings of the study, and is structured as follows:

- Chapter 2 outlines the methodology used to estimate the current economic impact of Dublin Airport and the future economic impact of the airport under different traffic scenarios.
- Chapter 3 presents an overview of the traffic activity at Dublin Airport and the global connectivity it provides for Ireland.
- Chapter 4 sets out the current economic contribution of ongoing operations at Dublin Airport, including the catalytic impacts.
- Chapter 5 provides the economic impact projected to be generated by the additional traffic and activity facilitated by the Capital Investment Programme.
- Chapter 6 summarises the forgone economic impact resulting from maintaining the planning cap of 32 million annual passengers – the lost employment and GVA in Ireland that will result.

Additional details are provided in the appendices. Key Points text boxes are provided at the start of the chapters which summarise the key points in each chapter.



2.0

Methodology for the Economic Impact Study

This chapter describes the methodology and sources that were used to measure the economic impact of Dublin Airport. Results of this are provided in Chapter 5.

2.1 Updating the Economic Impact of Dublin Airport

In 2019, daa commissioned InterVISTAS to conduct an updated economic impact study of Dublin Airport. The study, released August 2019, estimated the direct, indirect, induced and catalytic impacts of the airport measured in terms of employment (jobs and FTEs), incomes and GVA. The estimated economic impact of Dublin Airport is documented in the report, "Economic Impact of Dublin Airport", InterVISTAS Consulting, August 2019, and is available at: https://www.dublinairport.com.

A modelling and data-driven approach was used to estimate the current economic impact of Dublin Airport based on traffic developments since 2019. As traffic grows at Dublin Airport, employment at the airport is also expected to increase. This includes employees at the airlines operating and supporting additional flights, as well as third party suppliers supporting the airline's operations. This would include additional ground handling services to supply, fuel and clean the increased number of aircraft and to handle the baggage of hub passengers. Government services such as security, customs, air traffic control, etc. would also require additional employment resources to handle greater passenger and aircraft traffic. Similarly, the traffic declines since the start of the COVID-19 pandemic resulted in a lower economic impact from Dublin Airport than would otherwise be the case. Layoffs and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redundancies in the aviation sector lower the direct impact of the airport while the indirect impacts are affected by reduced business-to-business spending by companies at the airport. To estimate the changes in direct employment since 2019, two approaches were deployed and combined into a single estimate:

- Employment elasticities were applied, reflecting the anticipated relationship between traffic development and employment between 2019 and 2022. To account for productivity gains and economies of scale, the direct employment impacts were estimated assuming an economic impact elasticity of 0.67, i.e., each 1% increase in traffic results in a 0.67% increase in airport activity. This elasticity was based on previous research on European airports for ACI Europe, which found evidence of economies of scale in airport employment.[14]

- Employment data for daa and the major employers at Dublin Airport was used to examine the changes in employment since 2019. In addition, data on the number of Airport Identification Cards issued by Dublin Airport was also used. These cards are issued to persons working in restricted areas of the airport, so capture a large proportion of the employment at the airport. The number of cards issued are not fully comparable with the direct employment as not all jobs require access to restricted areas, and the volume of cards can be impacted by the turnover of jobs. Nevertheless, the data provides a guide to the overall trend in employment.

[14] "The Economic Impact of European Airports: A Critical Catalyst to Growth", ACI Europe, January 2015. Similar approaches have also been used in the regulatory analysis of airports.

The *indirect* and *induced* effects were estimated using economic multipliers, as is common practice for economic impact studies. These multipliers were based on the Input-Output model of the Irish economy maintained by the Central Statistics Office (CSO) Ireland. An Input-Output (I-O) model is a representation of the flows of economic activity within a region or country. The model captures what each business or sector must purchase from every other sector in order to produce a Euro's worth of goods or services. By tracing these linkages between sectors, I-O models can estimate indirect and induced impacts. The I-O models are described in more detail in **Appendix A**.

The *catalytic* impacts of Dublin Airport were calculated using generalised parameters drawn from statistical analysis of historical data. This analysis seeks to determine the contribution of air transport to economic growth by examining the relationship betweent these factors over time or compared between different countries (or both). The analysis attempts to control for other factors that also contribute to economic growth (education spending, government policies, investment, research and development spending, etc.), in order to isolate the impact of air transport.

The catalytic impact of Dublin Airport was estimated in this way, using findings from relevant research. The catalytic parameter was taken from a study undertaken by InterVISTAS on behalf of ACI Europe,[15] which was selected because it is the most recent study of this sort and is based on data from 40 European countries including Ireland. The parameter captures the aggregate net effect of a range of catalytic impacts, including tourism, trade, investment, business location, etc., which manifest themselves as greater per capita GDP.

2.2 Estimating the Future Economic Impact of Dublin Airport

The future economic impact of Dublin Airport was estimated using the same methodology described in the previous section. As air services and air traffic at Dublin Airport grows, the economic contribution of the airport is expected to grow as well. To account for future gains in productivity, an economic impact elasticity of 0.67 was applied, i.e., each 1% increase in traffic results in a 0.67% increase in airport activity. Indirect and inducted impacts estimated using existing multiplier ratios. Similarly, the catalytic impacts were based on forecasts of future connectivity derived from air traffic forecasts for Dublin Airport. It was assumed that catalytic impacts would grow at a slower rate than connectivity, so that the connectivity contribution is scaled down by 25% (e.g., a 10% connectivity increase results in a 7.5% increase in catalytic impacts). Forecasts of traffic at Dublin Airport were provided by daa under the fully developed Capital Investment Plan and with the 32 million passenger cap applied. The forgone economic impact associated with the 32 million cap is the difference between these two forecasts.

[15] "The Economic Impact of European Airports: A Critical Catalyst to Growth", ACI Europe, January 2015.

3.0

Overview of Dublin Airport

Key Points

- Dublin Airport staged a strong recovery in 2022 from the impacts of the COVID-19 pandemic in the previous two years, with passenger traffic through its terminals reaching 28.1 million, 85% of peak 2019 levels (32.9 million).
- Prior to the pandemic, the airport had experienced a rapid growth in traffic, with passenger volumes growing by an average of 6.7% per annum between the opening of Terminal 2 in 2010 to 2019.
- In 2022, Dublin Airport had direct service to over 180 destinations in 38 countries in Europe, North America, Africa and the Middle East.
- The airport is a home base for two major carriers, Ryanair and Aer Lingus, and receives service from another 40+ airlines.
- The airport is a primary contributor to Ireland having one of the highest connectivity levels on the continent relative to the size of its population and economy.
- This connectivity is critical to the economic development of Ireland, including trade, tourism, FDI and business location decisions.

Dublin Airport (DUB) is the largest airport in the Republic of Ireland (and the largest on the island of Ireland). The airport acts as a point of entry for those travelling to and from Ireland, but also services connecting flights from other international destinations. There are two major airlines which use Dublin Airport as a base for their operations: Aer Lingus and Ryanair.

In August 2022, construction of Dublin Airport's North runway was completed. At over 3.1 kms in length, this new parallel runway will facilitate larger aircraft supporting long haul connectivity as well as providing extra capacity at peak times of day. Completion of this runway is critical to Dublin Airport maintaining its status as a European hub airport and ensuring that the airport can support the connectivity required to aid Ireland's economic growth.

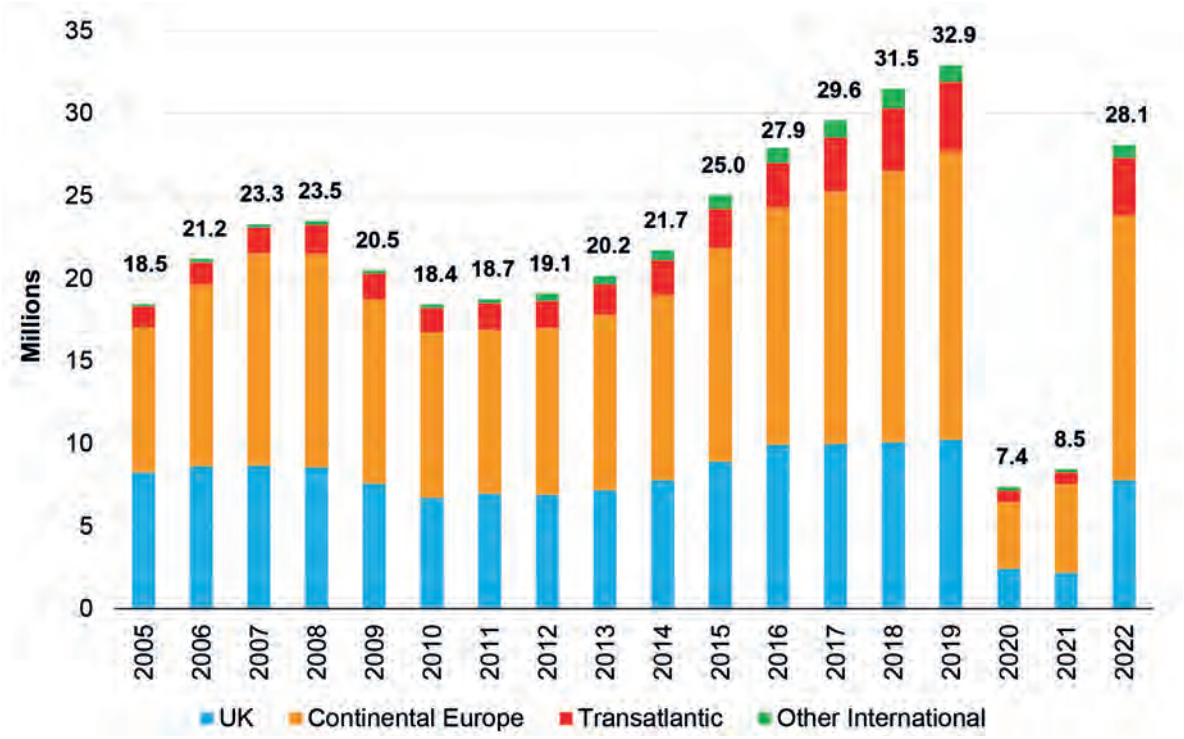

Bailiú Bagáiste agus Slí Amach
Baggage Reclai d Exit
Geataí
Gates
408-4

3.1
Air Passenger Movements

As shown in **Figure 3-1**, passenger traffic reached 32.9 million in 2019, having grown at an average rate of 6.7% per annum since the opening of Terminal 2 in 2010 and by 8.7% per annum in the previous five years (since 2014). Like most airports around the world, traffic levels were severely impacted by the COVID-19 pandemic in 2020 and 2021, due to government restrictions on travel. Passenger traffic declined 78% in 2020 and remained at a quarter of 2019 levels in 2021. However, as restrictions have lifted, there has been a strong recovery at Dublin Airport, with passenger traffic in 2022 reaching 28.1 million, 85% of 2019 levels.

Figure 3-1: Annual Passenger Movements at Dublin Airport, 2005-2022

Figure 3-1: Annual Passenger Movements at Dublin Airport, 2005-2022



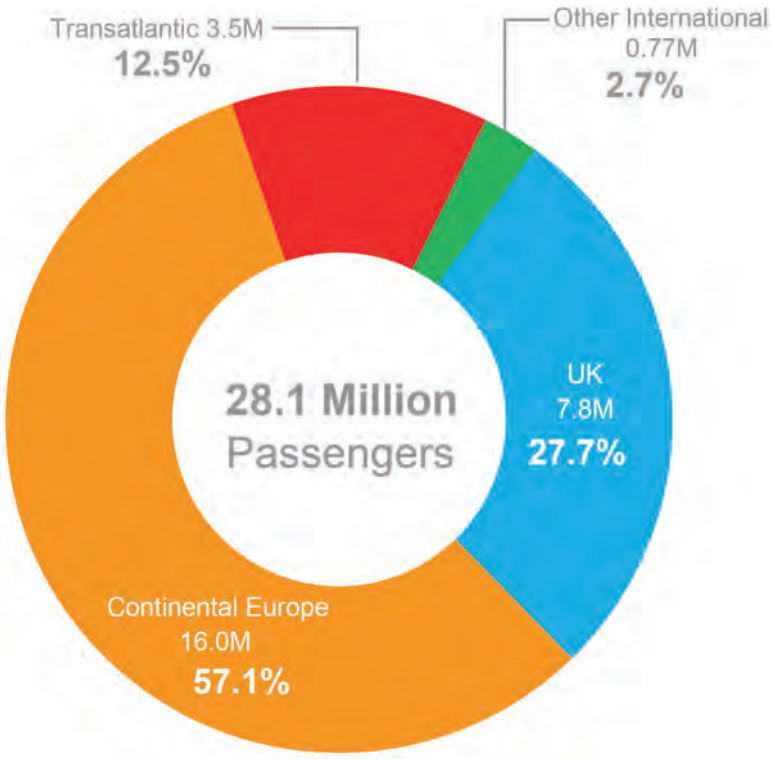
Source: daa.

Passenger traffic at Dublin Airport can be broken down into four categories: United Kingdom, Continental Europe (which includes a small amount of domestic travel), Transatlantic and Other International. Between 2010 and 2019, the fastest growing region was Other International, which includes traffic to/from China, the rest of Asia, Middle East and Africa. Over these nine years, passenger traffic on these routes increased by over 365%, from a small base. Over the same period, transatlantic traffic increased 183% while European and United Kingdom passenger traffic increased by 74% and 52% respectively.

In 2022, passenger traffic to/from Continental Europe had recovered most rapidly from the COVID-19 pandemic, with passenger volumes in 2022 at 92% of 2019 levels. By comparison, transatlantic was at 83% of 2019 levels, the UK at 76% and Other International at 76%.

Figure 3-2 shows the percentage share of passenger traffic by region in 2022. In terms of the share of passenger traffic by world region, Continental European traffic comprised 57% of all passengers in 2022 (up from 53% in 2019). The United Kingdom represented 28% of total passengers (down from 31% in 2019), followed by Transatlantic at 12% and Other International at 3%.

Figure 3-2: Passenger Movements by Region at Dublin Airport, 2022



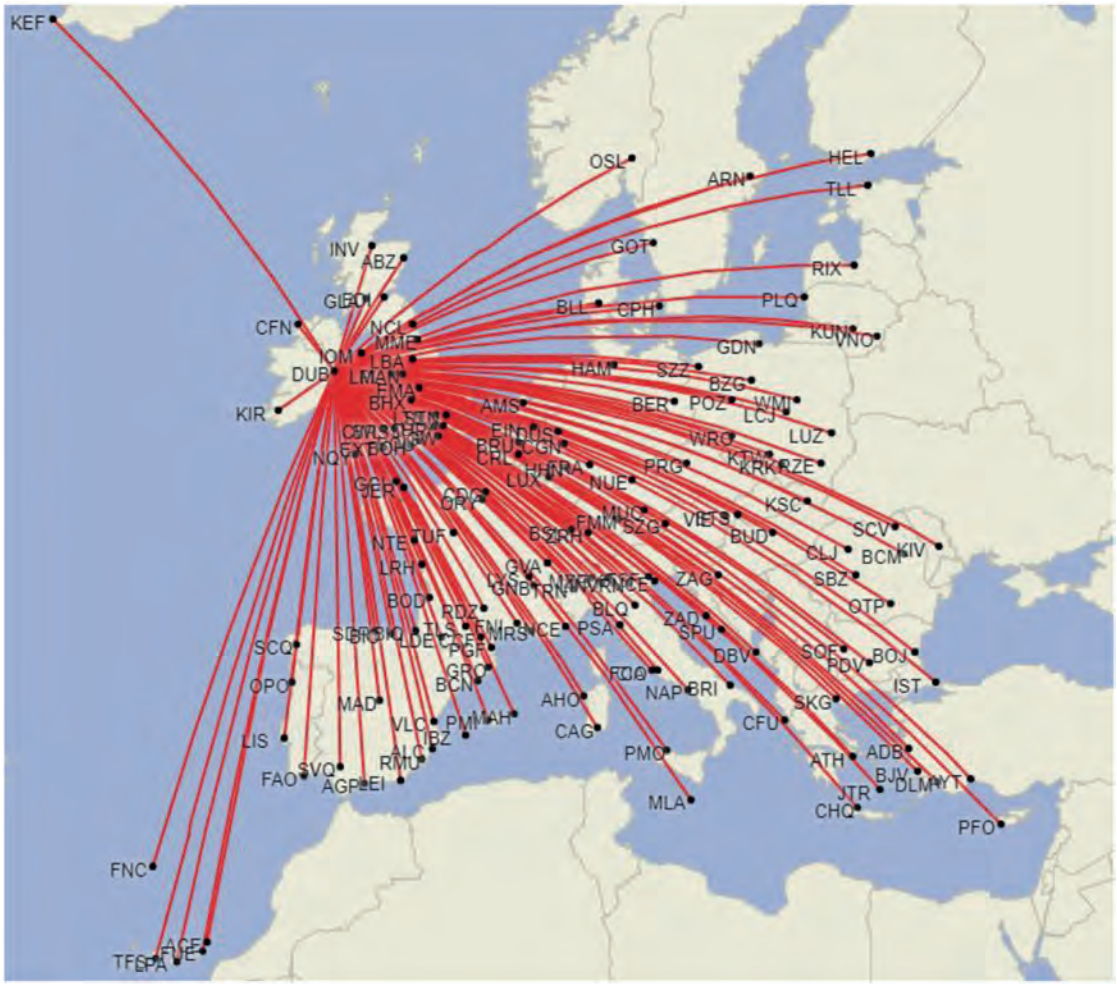
Source: daa.

3.2 Overview of Dublin Airport's Air Services

In 2022, Dublin Airport had regular scheduled service to over 180 destinations in Europe, North America, Africa and the Middle East. While over 20 routes had not yet returned following the COVID-19 pandemic, a similar number of new routes had started including Cairo (Egypt), Nuremberg (Germany), Guernsey (Channel Islands) and Antalya (Turkey).[16] Based on airline schedule data, total seats operated by carriers was at 90% of 2019 levels.

Figures 3-3 shows the scheduled passenger routes to Europe operated from Dublin Airport in 2022. Figure 3-4 shows the scheduled passenger routes operated from Dublin Airport for destinations outside of Europe in 2022. 2005-2022

Figure 3-3: Dublin Airport's European Route Network in 2022



Source: Cirium Diio Mi schedule data.

[16] Factors beyond the pandemic explain some of the service cancellations; for example, the crisis in Ukraine resulted in the ending of service to Russia and Ukraine in 2022.

Figure 3-2: Passenger Movements by Region at Dublin Airport, 2022

Source: Cirium Diio Mi schedule data.

The most popular country for travel to and from Ireland continues to be the United Kingdom. In 2022, 7.8 million people travelled between the two countries through Dublin Airport. On an average day in 2022, there were 38 departures between Dublin and London, and over 90 per day to the entire United Kingdom, with service to 25 separate airports (five in London).

Outside of the United Kingdom, the most well served countries in Europe are Spain (an average of 31 flights per day and 20 routes operated), Germany (18 flights per day and 9 routes) and France (17 flights per day and 17 routes).

New York is the most popular long-haul international destination with an average of 5.3 departures per day in 2022 to John F. Kennedy International (JFK) and Newark (EWR), operated by Aer Lingus, United Airlines, Delta Air Lines and American Airlines. A total of 14 U.S. destinations were served from Dublin Airport in 2022, aided by the airport's all-day U.S. preclearance facilities, Dublin being one of only two airports in Europe with such a facility.

Figure 3-5 lists the countries which are serviced directly from Dublin Airport and the number of destinations within each country in 2022. Passenger air services at Dublin Airport connect Dublin to 38 countries. Combined, these countries represent 15% of the world's population and 39% of global GDP.[18]

[18] Source: World Bank Data Catalog: http://data.worldbank.org/data-catalog. Based on 2021 population and GDP data.

Figure 3-5: Countries Directly Connected to Dublin by Air Service from Dublin Airport, 2022

Europe [32 countries]

Austria	(2)	Finland	(1)
Latvia	(1)	Portugal	(4)
Belgium	(2)	France	(18)
Lithuania	(3)	Romania	(5)
Bulgaria	(3)	Germany (	9)
Luxembourg	(1)	Slovakia	(2)
Croatia	(4)	Greece	(6)
Malta	(1)	Spain	(20)
Cyprus	(1)	Hungary	(1)
Moldova	(1)	Sweden	2)
Czech Republic (	1)	Iceland (	1)
Netherlands	(2)	Switzerland	(3)
Denmark (	2)	Ireland	(2)
Norway	(1)	Turkiye	(5)
Estonia	(1)	Italy	(16)
Poland	(11)	United Kingdom	(25)

North America [2 countries]

Canada	(5)
United States	(14)

Middle East 32 countries]

Qatar	(1)
United Arab Emirates	(3)

Africa [2 countries]

Egypt	(1)
Morocco	(2)

Source: Cirium Diio Mi schedule data. Figures in parenthesis indicate the number of routes operated to that country.

The most popular country for travel to and from Ireland continues to be the United Kingdom. In 2022, 7.8 million people travelled between the two countries through Dublin Airport. On an average day in 2022, there were 38 departures between Dublin and London, and over 90 per day to the entire United Kingdom, with service to 25 separate airports (five in London).

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Figure 3-5 lists the countries which are serviced directly from Dublin Airport and the number of destinations within each country in 2022. Passenger air services at Dublin Airport connect Dublin to 38 countries. Combined, these countries represent 15% of the world's population and 39% of global GDP.[18]

Figure 3-6: Outbound Seat Capacity by Carrier at Dublin Airport, 2022

Figure 3-6 shows the total scheduled seat capacity operated by the top 20 carriers at Dublin Airport in 2022. As shown in the table, Dublin's two home carriers, Ryanair and Aer Lingus, make up 78% of the total seat capacity. The services of the home carriers are augmented by a wide range of international carriers including major network and low cost carriers from across Europe and carriers from the Middle East and North America. In total, 44 airlines operated at Dublin Airport in 2022.

Carrier	Outbound Seat Capacity (Thousands)	% Share of Total Seat Capacity
1. Ryanair	8,352	47.5%
2. Aer Lingus	5,435	30.9%
3. British Airways	483	2.8%
4. Lufthansa	336	1.9%
5. Delta Air Lines	232	1.3%
6. American Airlines	215	1.2%
7. United Airlines	209	1.2%
8. KLM	197	1.1%
9. Emirates	181	1.0%
10. Turkish Airlines	158	0.9%
11. Air France	158	0.9%
12. Scandinavian Airlines	132	0.8%
13. Vueling Airlines	128	0.7%
14. Air Canada	127	0.7%
15. Qatar Airways	125	0.7%
16. SWISS	122	0.7%
17. TAP Portugal	95	0.5%
18. TUI Airways	87	0.5%
19. Etihad	84	0.5%
20. Blue Air	76	0.4%
Other Airlines	635	3.6%
Total	**17,567**	**100.0%**

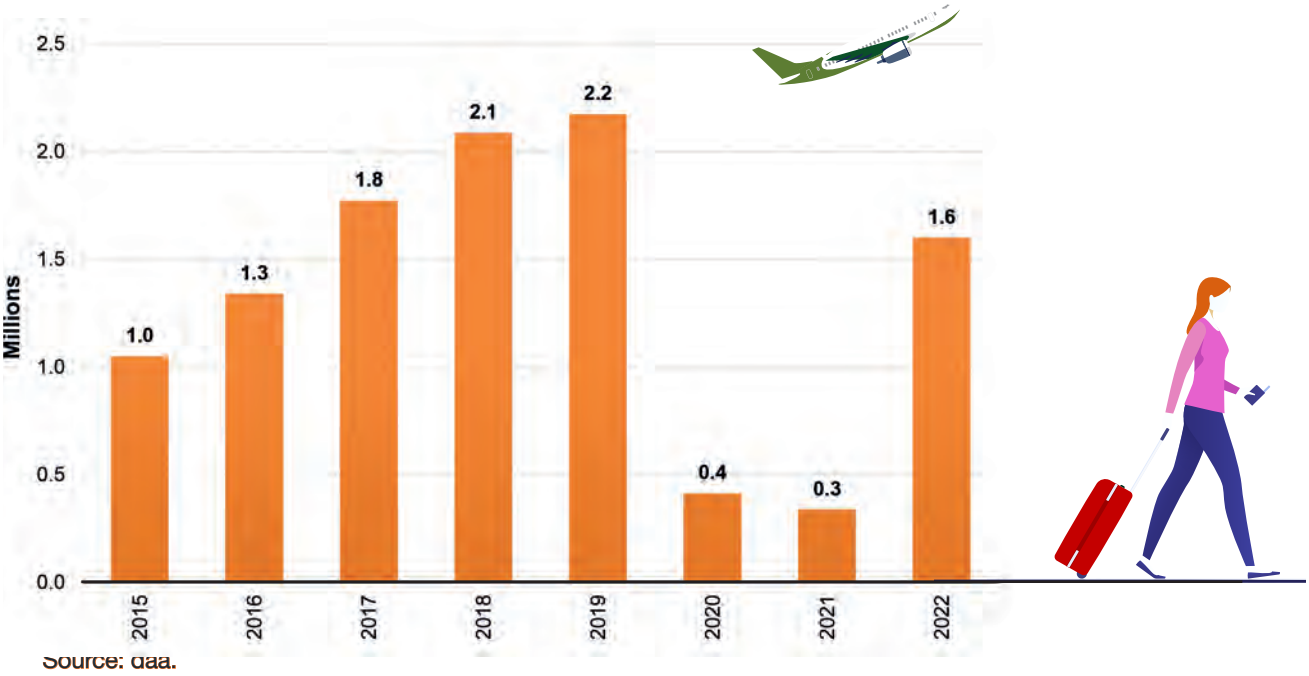
[18] Source: Cirium Diio Mi schedule data for 2022. Figures based on marketing rather than operating carrier. Notes: Numbers may not add up due to rounding..

3.3 Dublin Airport as a Secondary European Hub

Dublin Airport not only facilitates travel to and from Ireland but also operates as a hub airport supporting connecting traffic. This is passenger traffic that transfers between flights at Dublin Airport (transfer passengers) or stays on the aircraft when it makes stop at Dublin Airport (transit passengers).[19]

Figure 3-7 shows the development of connecting traffic at Dublin Airport. Connecting traffic more than doubled between 2015 and 2019, increasing its share of total traffic from 4.2% to 6.6%. Connecting volumes declined during the pandemic but recovered strongly in 2022, reaching 74% of 2019 levels. 2005-2022

Figure 3-7: Connecting (Transfer and Transit) Passenger Movements at Dublin Airport, 2015-2022



Source: daa.

Much of the connecting traffic at Dublin Airport are flows between Europe and North America. Not only is the airport geographically well positioned to facilitate these traffic flows, but it is one of only two European airports that has U.S. pre-clearance facilities, enabling passengers to clear U.S. customs and immigration at Dublin. This greatly speeds up the arrivals process in the U.S. and any onward connections at U.S. airports, and enables air services to domestic U.S. airports (i.e., those without or with limited immigration facilities).

[19] At Dublin Airport, around 90% of connecting traffic are transfer passengers, vs transit passengers.

a result, Dublin Airport can compete as a secondary European hub against airports such as Copenhagen, Brussels, Munich and Rome.[20]

The benefit of connecting traffic is that it creates economies of scale by pooling point-to-point traffic (traffic originating or terminating at Dublin) with connecting traffic. This means that Dublin Airport can support air services that could not be sustained on the basis of point-to-point traffic. For example, in 2019, 33% of passengers on flights to and from the U.S. transferred from another flight at Dublin Airport; this figure increases to 50% for home carrier Aer Lingus.[21] Without this transfer traffic, fewer frequencies would be operated and some routes would not be viable, diminishing the connectivity of the country. The generation of these additional services bring broader economic benefits to both Dublin and Ireland.

The importance of Dublin Airport as a secondary European hub is recognised by both national and local government. The National Aviation Plan 2015 states that "Dublin Airport will be promoted as a secondary hub airport." [22] The Fingal County Council Dublin Airport Local Area Plan published in 2020 detailed a framework to (among other things) support Dublin Airport develop as a secondary European hub.[23] This support is reiterated in the Fingal Development Plan, 2023.[24]

3.4 Measuring Airport Connectivity

Connectivity is essential in the international marketplace, and it is fundamentally about access to markets and destinations. A country or region that has continental and intercontinental linkages to only a limited number of destinations will be a less desirable place to do business. Travel costs for staff and for goods will be higher due to the need to purchase multiple flight legs to move people and goods. On the other hand, a community with direct access to a broad range of markets, especially the fastest growing markets, will be a lower cost place to do business. It will also enhance customer servicing and goods and support staff can easily and quickly get to a range of destinations.

This is a particularly important consideration for Ireland as a small, open island economy positioned on the western tip of Europe. Dublin Airport's pre-eminent position in the Irish aviation sector delivers the critical mass required to attract the necessary services to key short and long-haul destinations for both business and leisure markets. Direct connections are essential for both expanding Irish export trade and growing foreign direct investment in Ireland. Dublin Airport is also a key gateway for Northern Ireland.

[20] Primary European hubs would be those with a high proportion of connecting traffic, such as Paris CDG, Amsterdam Schiphol, Frankfurt and London Heathrow.

[21] Source: InterVISTAS analysis of Sabre MIDT ticket booking data, 2019.

[22] Action 4.3.1, Ireland Department of Transport, Tourism and Sport, A National Aviation Policy for Ireland, August 2015.

[23] Fingal County Council, Dublin Airport Local Area Plan, January 2020.

[24] Objective DA03, Fingal Development Plan 2023-2029.

To capture the importance of connectivity, the International Air Transport Association (IATA) has developed a measure of air service connectivity which aims to measure the quality of the air transport network from the point of view of the country's economy. The IATA connectivity index seeks to measure the scope of access between an individual airport, region or country, and the global economy. The index measures the number and size (in terms of passenger air traffic) of destinations served, as well as the frequency of service to each destination and the number of onward connections available from those destinations. Thus, the index recognises that connections to major global gateways provide greater global connectivity than connections to the same number of bespoke ends. For example, direct service to 40 small regional destinations does not have the same importance as direct connections to 40 major global markets.

The IATA index is calculated from airline schedule data for passenger services and is based on both domestic and international services. The connectivity index measures the number of frequencies and available seats to a particular destination. It then weights the number of available seats by the size of the destination airport (in terms of number of passengers handled in each year). This weighting reflects both the size and economic importance of the destination and the potential for convenient onward connections.

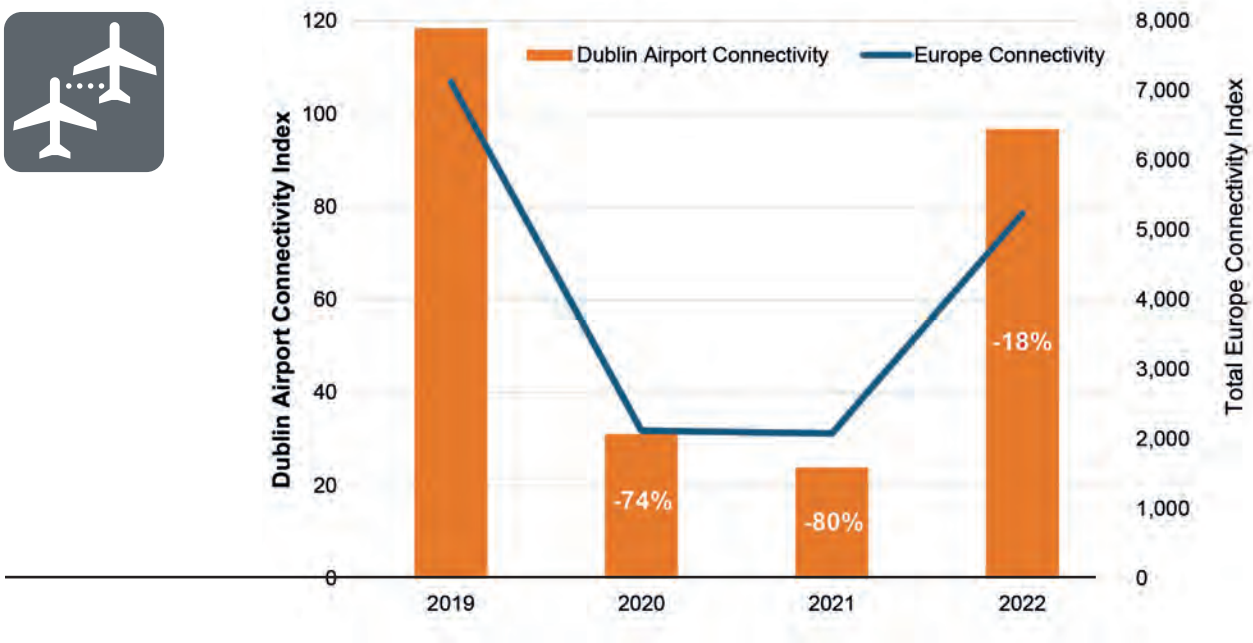
For example, in 2019, Atlanta airport was the world's largest airport, and so was given a weighting of one. London Heathrow, which handles 73.2% of the number of passengers handled by Atlanta, was given a weighting of 0.732 in 2019. Therefore, if an airport has 1,000 seats available to Atlanta it is given a weighted total of 1,000. But if it also has 1,000 seats available to London Heathrow, these are only given a weighted total of 732. The weighted totals are then summed for all destinations (and divided by a scalar factor of 1,000) to determine the connectivity indicator.

The connectivity index is therefore calculated as:

$$\frac{[\text{Number of destinations} \times \text{Weekly Frequency} \times \text{Seats per flight}] \text{ Weighted by the Size of the Destination Airport}}{\text{Scalar factor of 1000}}$$

A higher figure for the connectivity indicator denotes a greater degree of access to the global air transport network. Obviously, the pandemic has impacted connectivity around the globe and this is reflected in the connectivity score for Dublin Airport as shown in Figure 3-8. Dublin Airport's connectivity declined 74% in 2020 and remained depressed in 2021. There was a strong recovery of connectivity in 2022 as air traffic recovered, with connectivity just 18% below pre-pandemic levels. As shown on the chart, the loss in connectivity at Dublin Airport was broadly in line with that experienced across Europe.

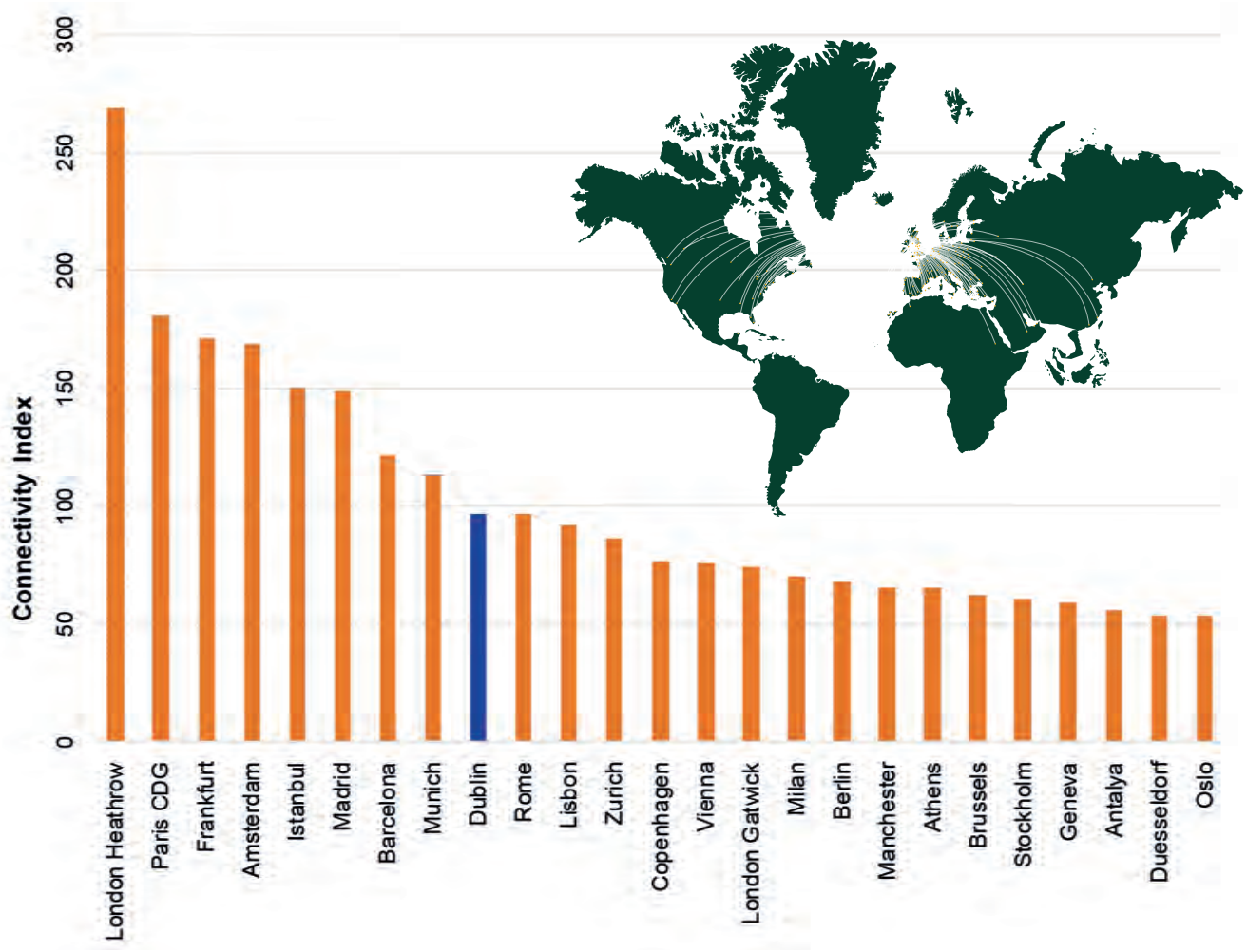
Figure 3-8: Dublin Airport Connectivity Index, 2019-2022



Source: daa.

Figure 3-9 shows the connectivity scores of European airports in 2022. The highest ranked airports are major hubs such as Heathrow, Frankfurt and Paris CDG. Dublin Airport ranks 9th in Europe, just behind Munich but ahead of Rome, Lisbon, Zurich and Copenhagen. Dublin ranked ahead of Gatwick, despite the latter handling more passenger traffic in 2022 (32.8 million vs 28.1 million at Dublin Airport), due to Dublin's more extensive network, especially in long-haul. Dublin has achieved comparable or higher levels of connectivity to Barcelona, Copenhagen, Berlin, and Vienna, cities that are arguably competitors to Dublin for tourism, trade and FDI.

However, to remain competitive with or overtake these cities, Dublin Airport will need to continue to enhance its connectivity. Achieving higher connectivity will require the efforts of all airport stakeholders and will be dependent on supportive and expansive aviation policy, regulation and planning regimes. Dublin Airport must also be enabled to expand its facilities to meet demand. The pay-off will be even greater economic growth as increased air connectivity facilitates increased trade, tourism, investment and economic growth (as documented in Appendix B). Chapter 5 documents the gains that can be achieved with further development of Dublin Airport while Chapter 6 examines the lost potential if the airport is constrained from growing.



Source: InterVISTAS analysis of Cirium Diio Mi Schedule data.

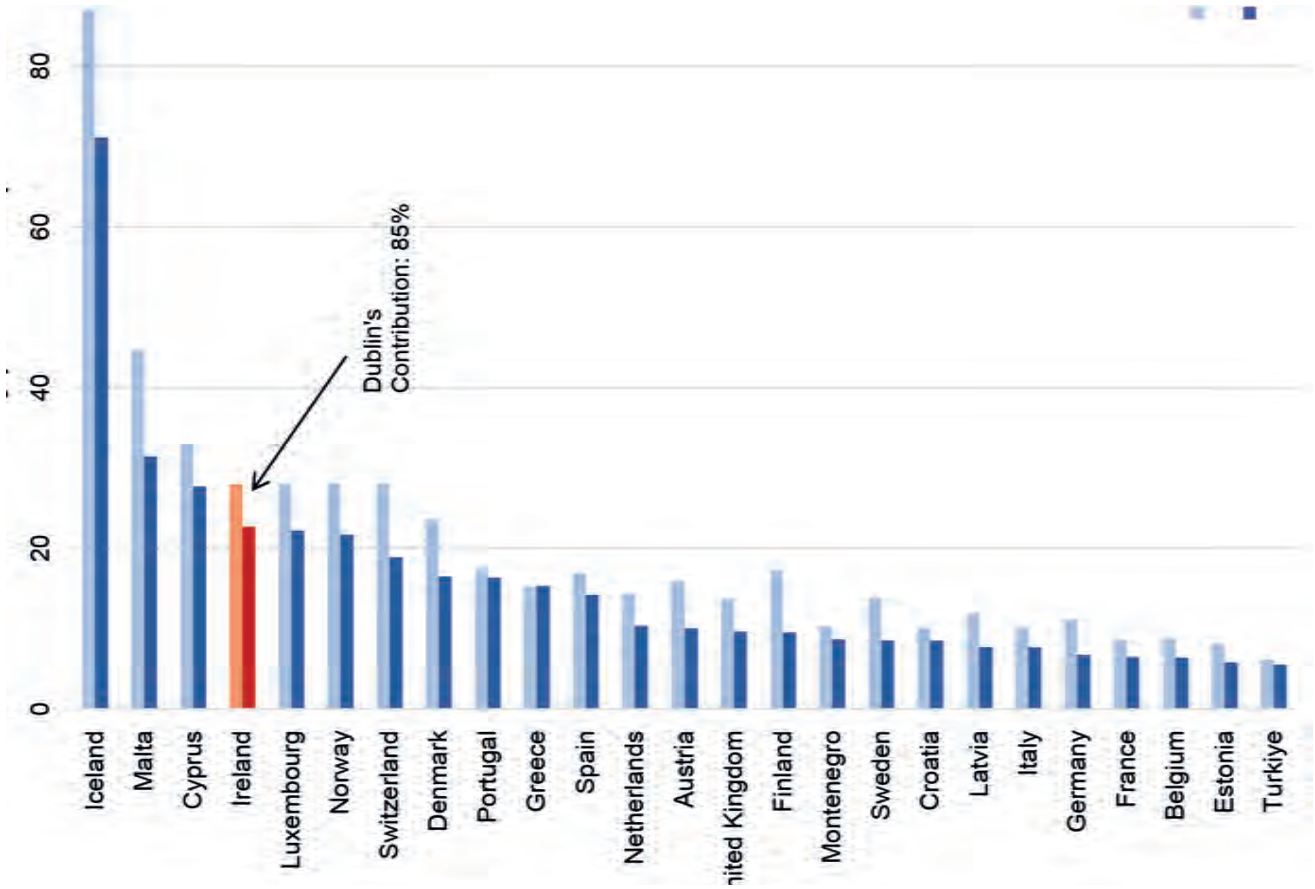
The airports with the highest connectivity tend to be those serving relatively large populations and large economies, such as the UK, Germany and France. Dublin Airport's contribution to connectivity is even more pronounced when compared against the size of its population as shown in Figure 3-10 which shows national connectivity (the aggregate of the connectivity scores of all major airports in the country) divided by the country's population. Ireland's connectivity index includes the combined connectivity

scores of Dublin, Cork, Shannon, Knock, Kerry and other airports. However, Dublin accounted for 85% of the nation's total connectivity score in 2019 and 2022.

As can be seen, Ireland has one of the highest per capita connectivity scores in Europe among major economies, ranked 4th in 2022 and 6th in 2019. Most of the countries with higher per capita connectivity are islands (including Ireland) or countries with somewhat inaccessible regions (e.g., Norway), reflecting the importance of air connectivity for these countries. Ireland's per capita connectivity is more than double that of the UK, and Dublin Airport alone contributes higher connectivity per capita than the UK in total.

This analysis demonstrates that Dublin Airport is a major infrastructure asset for the country and a critical contributor to Ireland's connectivity with the rest of the world.

Figure 3-10: Connectivity Relative to Population – Top 25 Countries

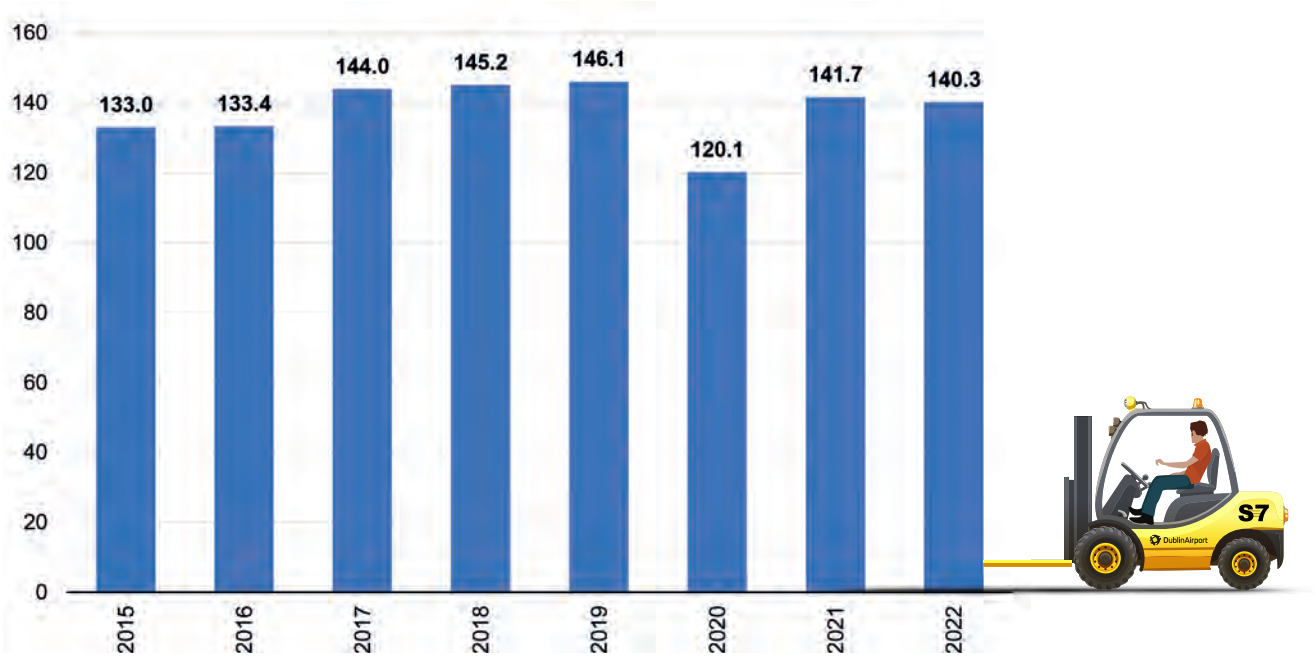


Source: InterVISTAS analysis of Cirium Diio Mi Schedule and World Bank Data.
Ranked based on 2022 connectivity.

3.5
Air Cargo

As well as passenger traffic, Dublin Airport is the main cargo airport for Ireland. **Figure 3-11** shows the total tonnage of cargo transport to and from Dublin Airport. In 2019, inbound and outbound cargo reached 146.1 million tonnes, accounting for 91% of all air cargo transported to and from Irish airports.[25] Cargo volumes declined by 18% in 2020 due to the COVID-19 pandemic. The decline was considerably less than passenger volumes (-78%) as fewer restrictions were placed on cargo activity and there was increased demand for e-commerce with consumers staying at home. Cargo volumes recovered closed to pre-pandemic levels in 2021 and 2022.

Figure 3-11: Air Cargo Tonnage at Dublin Airport, 2015-22

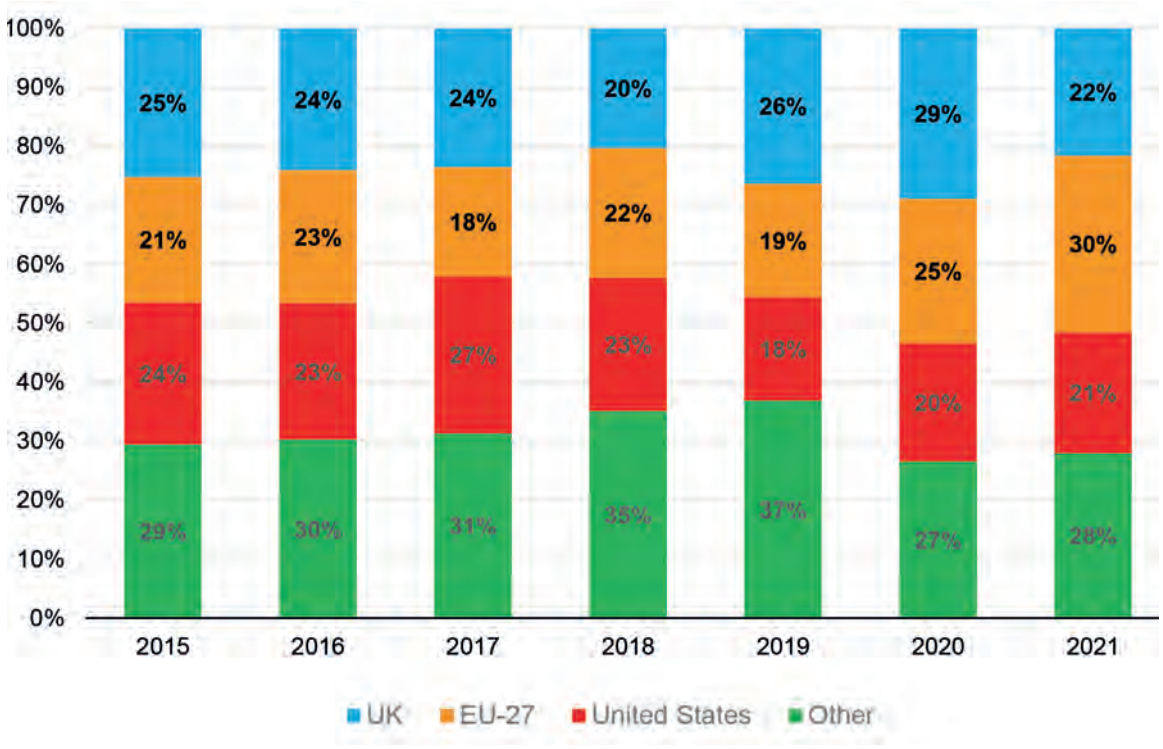


Source: daa.

As shown in **Figure 3-12**, the air cargo handled at Dublin Airport is transported to and from a variety of world regions. Cargo volumes to and from the UK have accounted for around a quarter of all cargo, while the European Union has accounted for 20-25%, as has the United States. Prior to the pandemic, the other region (largely comprising Asia) was the fastest growing segment, increasing from 29% to 37% of all cargo volumes.

[25] Source: Aviation Statistics, CSO: https://www.cso.ie/en/statistics/transport/aviationstatistics/.

Figure 3-12: Share of Dublin Airport Air Cargo by World Region, 2015-21



Source: Aviation Statistics, CSO. Figures not available for 2022.

Night flights (between 23:00 and 07:00) are particularly important for cargo, especially express freight. A study by Freight Transport Association Ireland found that night flights accounted for 38% of Dublin Airport's freight volume, of which 63% was transported by express freight operators.[26] The same study estimated that night flights at Dublin Airport carried 6% of Ireland's entire exports by value and 12% of Ireland's imports.

[26] "The Economic Impact of Cargo Night Flying at Dublin Airport", Freight Transport Association Ireland, March 2020.

4.0

Current Economic Impact of Dublin Airport

Key Points

- In 2022, direct employment at Dublin Airport is estimated to be 19,900 jobs (17,800 FTEs).
- Including multiplier impacts, the employment generated totals 44,900 jobs (39,900 FTEs), earning nearly €2 billion in income/wages.
- The catalytic impacts of Dublin Airport are estimated at 71,200 jobs and €5.7 billion in GVA.
- Dublin Airport contributes to the employment of 116,100 people in the Republic of Ireland, (102,800 FTEs) and contributes a total of €9.6 billion in GVA, equivalent to 2.3% of national GDP.

This chapter provides a summary of the updated economic impact of Dublin Airport, including the direct, indirect, induced and catalytic impacts, using the methodology documented in Chapter 2.

Economic Impact Study

InterVISTAS

4.1
Direct, Indirect and Induced Impacts

As described previously, the economic impact of Dublin Airport includes the direct impacts related to ongoing operations at Dublin Airport (including daa, airlines, air traffic control, ground handlers, airport security, immigration, customs, airport retail, etc.), as well as indirect impacts in businesses that supply the goods and services to the direct activities linked to the airport, and induced impacts resulting from direct and indirect employees spending their wages in the general economy.

Economic impact can be measured in a number of ways:

- **Employment** – the number of people employed by businesses involved in activities linked to Dublin Airport. This is measured in terms of jobs and full-time equivalents (FTEs), the latter of which allows for the fact that some jobs are not full-time (i.e., part-part or seasonal jobs are weighted less than full-time jobs).
- **Income/Wages** – the wages and salaries earned by the people employed in activities linked to Dublin Airport.
- **Gross Value Added (GVA)** – GVA is broadly equivalent to Gross Domestic Product (GDP), whereby the value-added of each industry sums to the total GDP of an economy.

The 2022 estimated economic impact of Dublin Airport is summarised in **Figure 4-1**. Direct employment supported by ongoing operations at Dublin Airport amounts to 19,900 jobs. Adjusting for part-time and seasonal employment, this amounts to 17,800 Full-Time Equivalent jobs (FTEs). The total direct GVA generated by Dublin Airport is estimated to be €1.8 billion.

Adding in multiplier impacts (indirect and induced), the total employment supported by activities at Dublin Airport is estimated to be 44,900 jobs (or 39,900 FTEs), earning a total of €2.0 billion and generating GVA of €3.9 billion.

Figure 4-1: Total Economic Impact of Dublin Airport (2022)

	Number of Jobs	Full-Time Equivalents (FTEs)	Income (€ Millions)	GVA (€ Millions)
Direct	19,900	17,800	€906	€1,832
Indirect	11,700	10,300	€534	€1,020
Induced	13,300	11,800	€516	€1,024
Total	**44,900**	**39,900**	**€1,957**	**€3,876**

Updated figures based on projected 2022 traffic level. All financial figures are in 2022 prices. Numbers may not add up due to rounding.

As documented in Chapter 2, the economic impact of Dublin Airport has been updated by modelling its development based on traffic growth. The direct economic impact of Dublin Airport in 2018 was estimated to be 21,500 jobs. Direct jobs in 2022 was 7% lower as traffic levels have not recovered to pre-pandemic levels and passenger traffic in 2022 was 11% lower than in 2018. Employment has not declined to the same extent as passengers due to the need to maintain staffing levels for operational and safety reasons and to position the airport for further recovery and growth. The economic impact numbers are confirmed by data provided by daa on the aggregate number of permanent Airport Identification Cards issued by Dublin Airport. These cards are issued to persons working in restricted areas of the airport, so capture a large proportion of the employment at the airport. The number of cards issued are not fully comparable with the direct employment as not all jobs require access to restricted areas, and the volume of cards can be impacted by the turnover of jobs. Nevertheless, the data provides a guide to the overall trend in employment.

This data showed that the number of cards issued in 2022 was 4% lower than in 2018. The modelling suggested a larger decline in employment implying greater reductions in unrestricted and off-airport areas. Nevertheless, the results were of a similar magnitude and conservative relative to the Airport Identification Card data.

The scale and diversity of the businesses impacted by spending at Dublin Airport is illustrated in **Figure 4-2**, which shows the spending by Dublin Airport on Irish vendors since 2015. The airport has spent a total of €1.8 billion since the start of 2015 with an average of €227 million per annum. In addition, Dublin Airport is currently engaged and progressing with tendering processes that are valued at close to €2.5 billion in total and in time, will generate significant associated jobs and economic benefits for Ireland. Note that this is only spending of Dublin Airport itself and does not include spending by other businesses based at the airport (airlines, ground handlers, government agencies, etc.).

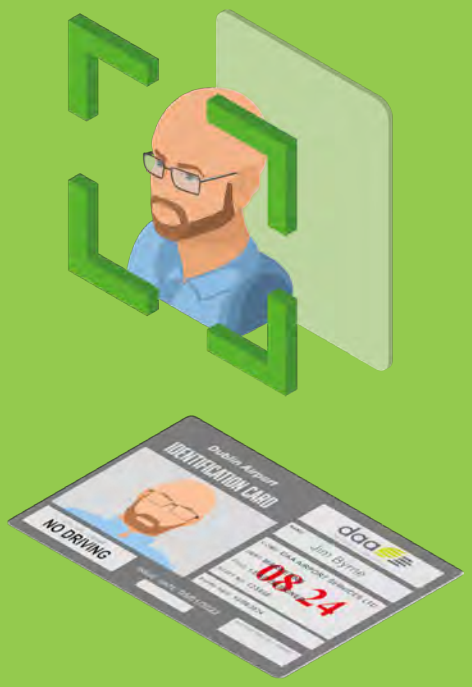


Figure 4-2: Dublin Airport Spending on Irish Vendors, 2015-2022

	Total Spend on Irish Vendors	Number of Vendors
2015	€ 189.1 Million	1,114
2016	€ 184.5 Million	1,054
2017	€ 239.5 Million	1,087
2018	€ 207.1 Million	1,042
2019	€ 278.1 Million	1,241
2020	€ 287.1 Million	1,060
2021	€ 186.3 Million	990
2022	€ 242.2 Million	1,188
Total	**€ 1,813.9 Million**	

Source: daa.

4.2
Catalytic Impacts

The catalytic impacts capture the way in which Dublin Airport facilitates the business of other sectors of the economy. This includes facilitating tourism, trade, investment and productivity growth which ultimately leads to employment growth and economic development. **Appendix B** summarises general research demonstrating the linkage between aviation connectivity and trade, investment, productivity and economic growth.

To illustrate Dublin Airport's contribution to the national economy, analysis was conducted of the relationship between connectivity at the airport and tourism, trade and economic output. Due to the impact of COVID-19 on both air traffic and economic activity, the analysis uses data from prior to the pandemic.

Tourism

Out of the 28.1 million passengers to/from Dublin Airport in 2022, it is estimated that 12.3 million were overseas visitors to Ireland (the remaining 15.8 million were residents of Northern Ireland and the Republic of Ireland and transfer passengers).27 This means that Dublin Airport facilitated approximately 6.1 million overseas visits to Ireland in 2022.[28]

The wide range of visitors through Dublin Airport is shown in Figure 4-3. Visitors from the British mainland accounted for 34.4% of international visitors through Dublin Airport, while U.S. residents accounted for 20.7%. Visitors for mainland Europe accounted for approximately 39%. Other prominent countries include Canada and Australia.

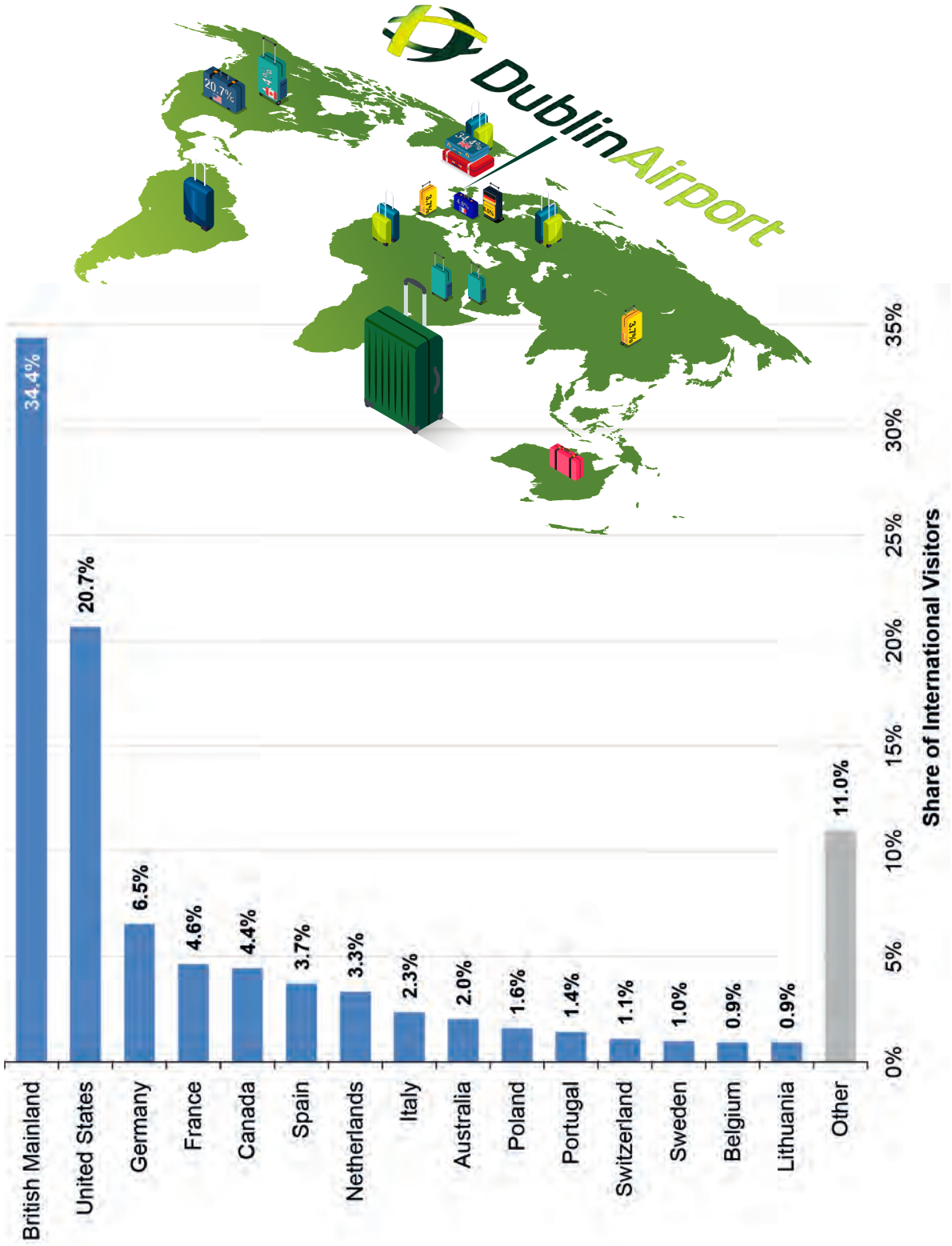
Each visitor through Dublin Airport spends money in the Irish economy on hotels, retail, restaurants, transportation, entertainment, etc. Tourism Ireland figures indicate that each visitor from the UK spends an average of € 293 per person, while visitors from mainland Europe spend € 514 and from the United States spend € 897 per person.[29] This injection of spending generates jobs and GVA for the Irish economy.

[27] Source: daa.

[28] Dividing the 13.4 million overseas passengers by two (the same visitor arrives and departs the airport).

[29] Source: Tourism Ireland, 2019. Spend rates are an overall average for Republic of Ireland.

Figure 4-3: Origin of International Passenger Arrivals at Dublin Airport, 2022

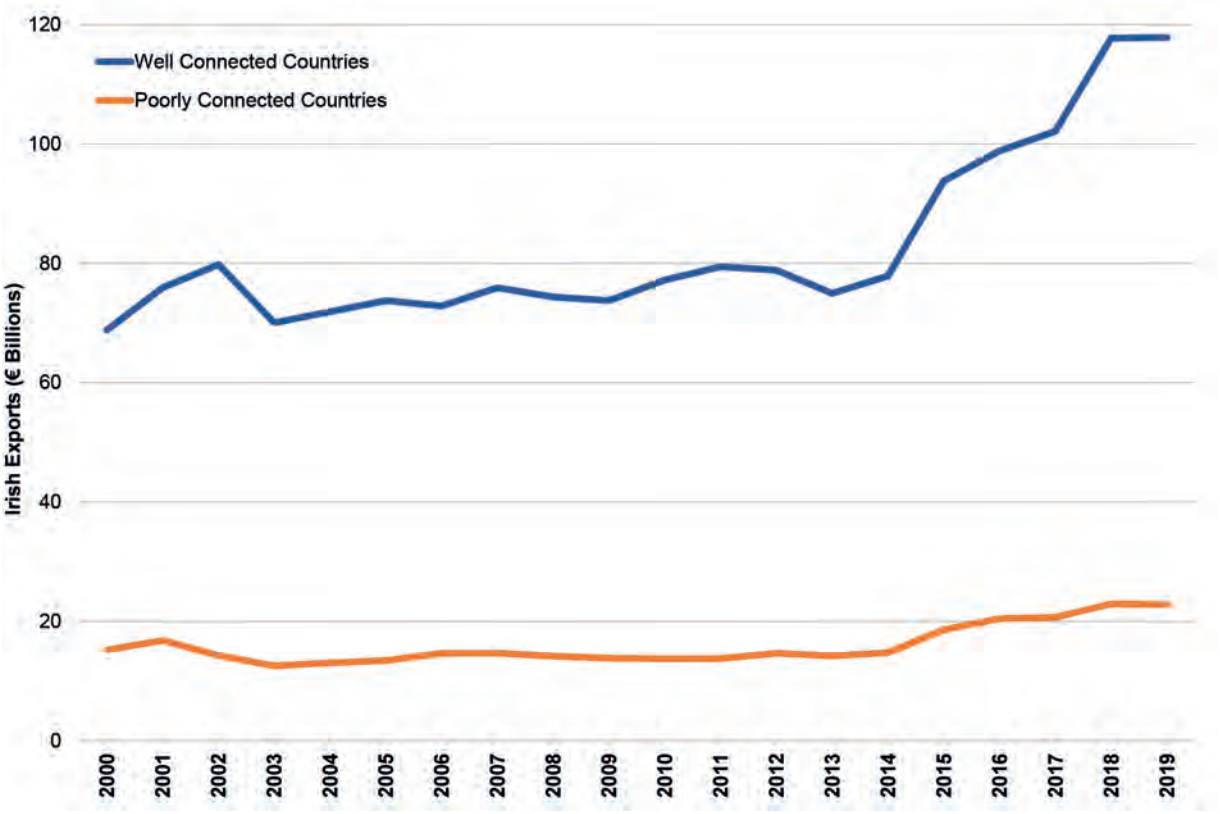


Source: daa.

Trade

The relationship between the connectivity of Dublin Airport and Ireland's export trade is illustrated in **Figure 4-4**. It shows the value of merchandise exports (i.e., goods) from Ireland to countries with frequent air service from Dublin (at least five times per week on a year-round basis) and to those countries with limited or no frequencies from Dublin. The value of exports with the well-connected countries is over five times that of trade with poorly connected countries. While air connectivity alone cannot create trade, it is a necessary requirement for trade development. Poor air connectivity to a country will hinder the ability to develop business contracts, service clients and to compete with businesses in better connected countries.

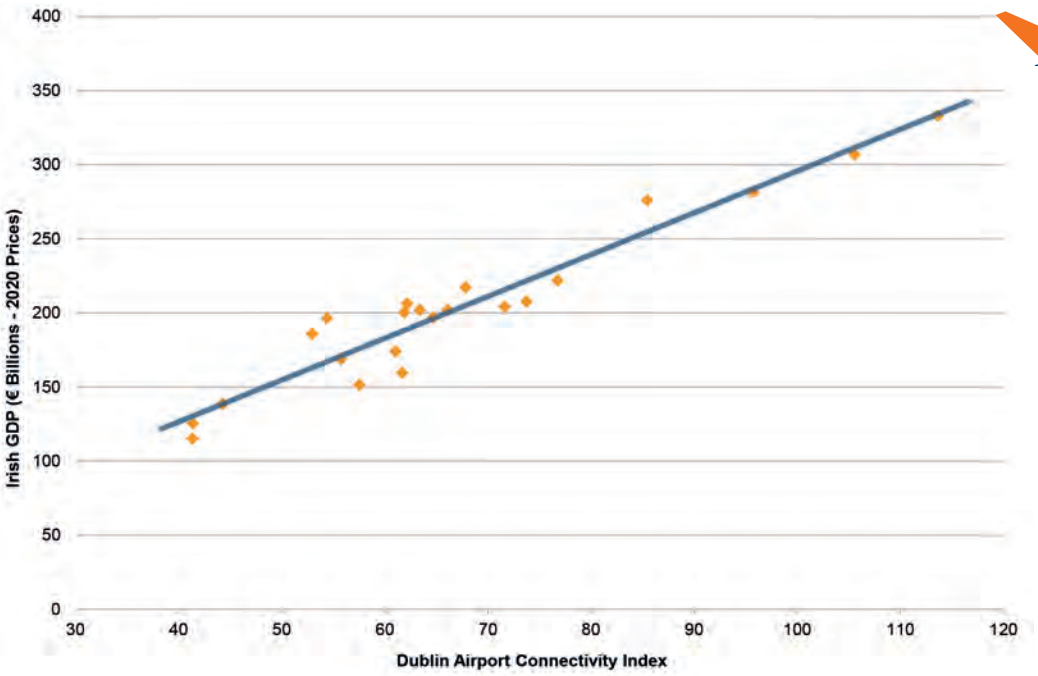
Figure 4-4: Ireland's Exports and Direct Air Services from Dublin Airport, 2000-2019



Source: Diio Schedule Data and Central Statistics Office Ireland

Figure 4-5: National GDP and Dublin Airport Connectivity, 1997-2019

Figure 4-5 shows the relationship between Dublin Airport's connectivity (using the IATA connectivity index) and national GDP. It shows a clear and fairly strong relationship between connectivity and GDP over time, consistent with findings in other research.



Source: daa.

The plots presented above are indicative of the underlying relationship between Dublin Airport's connectivity and economic development. More detailed analysis would be required to control for other factors affecting the economic indicators (e.g., government policy, general economic environment, etc.) and to establish the nature of the causal relationship between connectivity and the economic indicators. For example, air connectivity alone cannot create trade – a new air service to a country will not guarantee a surge in trade with that country. That said, it is also the case that poor air connectivity to a country will hinder the ability to develop business contracts, service clients and to compete with businesses in better connected countries.

[19] At Dublin Airport, around 90% of connecting traffic are transfer passengers, vs transit passengers.

As described in Section 2.1, use has been made of the results from a larger European study in order to estimate the catalytic impact of Dublin Airport, which are presented below.

The employment, income and GVA associated with the catalytic impacts of Dublin Airport are based on the previous economic impact study, updated to reflect 2022 traffic levels. These are presented in **Figure 4-6**. It is estimated that a total of 71,200 jobs are associated with the catalytic impacts of Dublin Airport, earning €2.9 billion in income and wages. The catalytic impacts of Dublin Airport facilitated €5.7 billion in GVA.

Figure 4-6: The Catalytic Impacts of Dublin Airport (2022)

Impact	Number of Jobs	Full-Time Equivalents (FTEs)	Income (€ Millions)	GVA (€ Millions)
Direct	71,200	62,900	€2,919	€5,723

Updated figures based on projected 2022 traffic level. All financial figures are in 2022 prices. Numbers may not add up due to rounding.

4.3
Total Impacts

The total economic impact of Dublin Airport (direct, indirect, induced and catalytic combined) is shown in **Figure 4-7**. Dublin Airport contributes to the employment of 116,100 people in the Republic of Ireland, equivalent to 102,800 full-time jobs, earning a total of €4.9 billion. Furthermore, a total of €9.6 billion is contributed in GVA, an amount equal to 2.3% of the national economy. [30]

While these figures are substantial, it is worth considering how Ireland's economy might look if the country did not have a hub airport of the size of Dublin Airport offering the scope of air services currently provided. At the most extreme, Ireland might have no commercial airports, instead relying on sea access to airports in the UK, or Dublin could have smaller regional airports acting as spokes for other hubs in the UK and the rest of Europe, so that passengers would have to travel via these hubs to get to many parts of the world. In such scenarios, it is easy to imagine that tourism to Ireland would be much lower, that Dublin would not be able to attract as many carriers to operate services (or to have aircraft maintained and repaired in Ireland), that the overall volume of trade would be substantially lower, and that some companies would choose not to locate or expand in Ireland. The net effect of this would be a smaller, slower-growing economy.

Impact	Number of Jobs	Full-Time Equivalents (FTEs)	Income (€ Millions)	GVA (€ Millions)	GVA as % of National GDP
Direct	19,900	17,800	€906	€1,832	0.4%
Indirect	11,700	10,300	€534	€1,020	0.2%
Induced	13,300	11,800	€516	€1,024	0.2%
Catalytic	71,200	62,900	€ 2,919	€ 5,723	1.3%
Total	**44,900**	**39,900**	**€1,957**	**€3,876**	**2.3%**

Updated figures based on 2022 traffic levels. All financial figures are in 2022 prices. Numbers may not add up due to rounding.

[30] Based on CSO estimates of 2021 GDP: https://www.cso.ie/. GVA figures were adjusted to 2021 prices for comparison with 2021 GDP.

4.4
Impacts by Region

Previous economic impact research of Dublin Airport has quantified the location of the jobs and economic activity generated by the airport across Ireland (based on the location of businesses where the employment takes place). This research has been used to estimate the current distribution of jobs and GVA, based on the estimated 2022 totals. The estimated impacts by regions are provided in **Figure 4-8**. With the airport based in Fingal, 90% of the direct impact (17,900 jobs out of 19,900) is generated in Fingal. A further 8% is generated in the rest of Dublin and the remaining 2% in Leinster and the rest of Ireland.

The multiplier and catalytic impacts are much more widely distributed, reflecting the airport's contribution to the entire Irish economy. Approximately 27% of total employment and 29% of total GVA is located in Fingal, a further 21% of employment and 24% of GVA is located in the rest of Dublin, 22% of employment and 20% of GVA is located in the Rest of Leinster, and 31% of employment and 28% of GVA are located in the Rest of Ireland.

Region	Direct	Indirect	Induced	Catalytic	Total	% Share of Total
Employment (Jobs)						
Dublin Airport / Fingal	17,900	3,800	2,800	6,300	30,800	27%
Rest of Dublin	1,600	4,400	4,200	14,600	24,800	21%
Rest of Leinster	100	2,000	2,900	20,000	25,000	22%
Rest of Ireland	300	1,5003,	40030,	30035,	500	31%
Total	**19,900**	**11,700**	**13,300**	**71,200**	**116,100**	**100%**
GVA (€ Millions)						
Dublin Airport / Fingal	1,649	333	214	607	2,803	29%
Rest of Dublin	146	385	323	1,402	2,256	24%
Rest of Leinster	12	168	222	1,476	1,879	20%
Rest of Ireland	26	133	265	2,238	2,662	28%
Total	**1,832**	**1,020**	**1,024**	**5,723**	**9,599**	**100%**

Updated figures based on 2022 traffic levels. All financial figures are in 2022 prices. Numbers may not add up due to rounding.

5.0

Future Economic Contribution of Dublin Airport

Key Points

- The €2.9 billion Capital Investment Programme will facilitate an increase in capacity to 40 million passengers by 2030 and will deliver infrastructure which will provide for a quality passenger experience.

  The design and construction phase of the Capital Investment Programme will support a total of 27,070 job-years and generate €2.0 billion in GVA.

- Unconstrained traffic forecasts produced by daa project that passenger traffic levels will grow by an average rate of 2.1% per annum after 2022 to reach 55 million by 2055 (roughly double 2022 traffic levels).

- Based on these traffic forecasts, the economic impact of Dublin Airport is projected to increase by 66% to reach 191,600 jobs and €15.8 billion in GVA.

This chapter provides a summary of the updated economic impact of Dublin Airport, including the direct, indirect, induced and catalytic impacts, using the methodology documented in Chapter 2.

Economic Impact Study

InterVISTAS

Chapter 4 documents the current economic impact of Dublin Airport as the aviation sector recovers from the effects of the COVID-19 pandemic. Traffic is anticipated to further recover in the next few years and Dublin Airport will return to a long term growth trend driven by economic growth and route development. This chapter provides estimates of the future potential economic impact of Dublin Airport associated with this traffic growth.

Further air service growth at Dublin Airport will require investment in capacity and facilities to support a higher volume of traffic. daa has set out a Capital Investment Programme (CIP) totalling €2.9 billion out to 2030 to upgrade facilities and expand capacity. The CIP was approved by the Commission for Aviation Regulation (CAR) following consultation with airlines and other key stakeholders. Key elements of the CIP include:

- **Upgrades** and capacity expansion at Terminal 1.
- **Development** of an additional pier (Pier 5) at Terminal 2.
- **Expansion** of U.S. Customs Pre-Clearance capacity.
- **Development** of the North Apron to provide more gate capacity.
- **A runway** underpass to improve access and safety for operations vehicles.

Airport development and growth has to be delivered in a sustainable manner and daa recognises that it has an important role to play in achieving the government's target of a 51% r eduction in Scope 1 and 2 emissions at Irish airports by 2030. The aviation sector as a whole has made significant commitments to achieving net zero carbon emissions by 2050 (relative to 2005) and daa has made a commitment to achieve net zero carbon emissions across its operations within that same period. Therefore, there is a strong focus on environmental sustainability at the project and operational level for all parts of the business, including infrastructure and construction projects, for which sustainability guidelines and carbon reduction objectives have been developed. These align with the wider Group

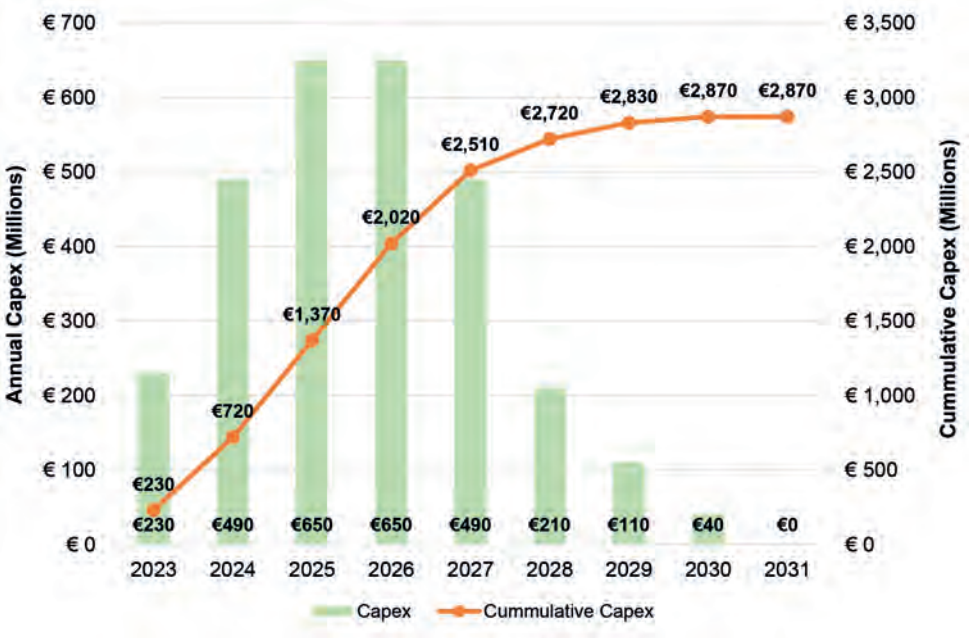
environmental sustainability agenda and targets, and with daa's Sustainability Policy. daa is committed to delivering a quality airport experience and the associated infrastructure requirements to meet demand, however, sustainability will be very much to the fore of its development plans.

This chapter documents the future economic impact of Dublin Airport resulting from the CIP and continued growth in traffic volumes. This includes employment and economic activity resulting from expenditures on design and construction during the CIP as well as the economic impact resulting from expanded traffic levels at Dublin Airport.

5.1
Economic Impact of the CIP Capital Expenditure

The CIP is projected to result in capital expenditures of €2.9 billion between 2023 and 2030, with the schedule of expenditure set out in Figure 5-1.

Figure 5-1: CIP Capital Expenditure, 2023-30



This expenditure will result in additional employment and economic activity in the Irish economy during the design and construction phases. Input-Output (I-O) tables from the CSO were used to estimate the employment and the GVA generated by the capital expenditures as shown in **Figure 5-2**.[31]

The entire €2.9 billion expenditure between 2023 and 2030 is estimated to generate 11,666 direct job-years and 27,070 job-years including multiplier impacts (businesses that supply the construction industry and the spending of workers in the general economy).[32] The direct GVA generated during the CIP is estimated to be €890 million, and the total impact including multipliers is estimated to be over € 2 billion. The employment and GVA impacts are projected to be greatest in 2025 and 2026 when capital expenditures are at their highest.

The economic impact of the CIP is different to those of the airport operations itself as the former occurs only during the period of the CIP, while the latter persists every year and increases as airport traffic grows. The next section discusses the economic impact resulting from Dublin Airport's traffic growth.

[31] Some of the capital expenditures will be on imports – materials, equipment and even labour from other countries. The input-output models account for this leakage out of the Irish economy and produce results only for the expenditure remaining within Ireland.

[32] A job-year is equivalent to employment for one year. E.g., a job lasting six months would be equivalent to 0.5 job-years, a job lasting three months would be equivalent to 0.25 job-years, etc.

Figure 4-3: Origin of International Passenger Arrivals at Dublin Airport, 2022

	Direct	Indirect	Induced	Total
Employment (Job-Years)				
2023	920	717	497	2,134
2024	2,001	1,561	1,081	4,643
2025	2,641	2,061	1,427	6,128
2026	2,645	2,064	1,429	6,138
2027	1,965	1,533	1,061	4,559
2028	859	670	464	1,993
2029	462	360	249	1,072
2030	174	136	94	404
Total	**11,666**	**9,102**	**6,302**	**27,070**
GVA (€ Millions)				
2023	70.1	48.6	39.4	158.1
2024	152.6	105.8	85.7	344.1
2025	201.4	139.7	113.1	454.2
2026	201.7	139.9	113.2	454.9
2027	149.8	103.9	84.1	337.8
2028	65.5	45.4	36.8	147.7
2029	35.2	24.4	19.8	79.4
2030	13.3	9.2	7.5	30.0
Total	**889.6**	**617.1**	**499.5**	**2,006.2**

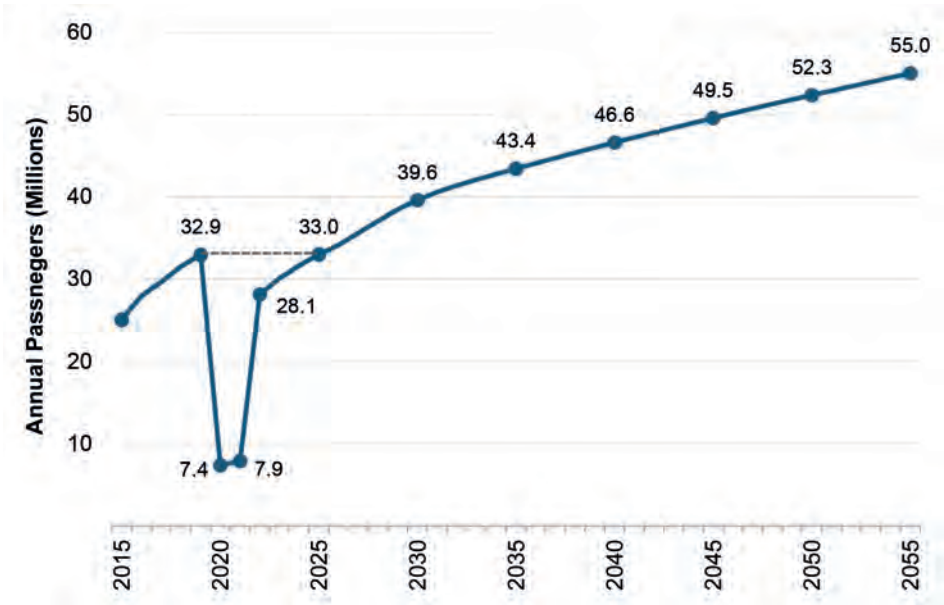
All financial figures are in 2022 prices. Numbers may not add up due to rounding.

5.2
Air Traffic Forecasts

The future economic impact estimates were calculated from air traffic forecasts produced by daa in November 2022. These forecasts were based on the underlying demand for air travel and the expected supply of air services to 2055. They represent an "unconstrained" view of passenger growth at the airport and take account of the recent decision to revise planning conditions which govern the operation of the airport's runway system as part of the Relevant Action planning application (FCC Ref: F20A/0668, ABP Ref PL06F.314485). This decision is currently the subject of an appeal to An Bord Pleanála. The forecasts of passenger movements are shown in Figure 5-3.

These air traffic forecasts indicated that passenger volumes would recover to 2019 levels by around 2025, however, it should be noted that Dublin Airport is currently experiencing a strong growth in passenger numbers which is likely to result in an earlier than expected recovery to pre-pandemic levels. Notwithstanding this, in the five years daa forecasts that passenger volumes will recover to 2019 levels by around 2025. In the five years after 2025, traffic is forecast to grow at 3.7% per annum, reaching 39.6 million by 2030. Traffic is then projected to reach nearly 46.6 million by 2040 and 55.0 million by 2055. The average growth between 2025 and 2055 is forecast to be 1.7% per annum.

Figure 5-3: Unconstrained Forecasts of Passenger Traffic at Dublin Airport, 2022-2055



Source: daa.


InterVISTAS

5.3 Estimated Economic Impact Under the Unconstrained Forecasts

The future economic impacts were estimated using the methodology described in Section 2.2. In summary, the future economic impact was estimated based on forecast traffic with adjustments to allow for the impact of productivity improvements and economies of scale.

The resulting forecasts of the future economic impact of Dublin Airport are provided in Figure 5-4. Including direct, indirect, induced and catalytic impacts, the economic impact of Dublin Airport is projected to reach 151,000 jobs and €12.5 billion in GVA by 2030 and 191,600 jobs and €15.8 in GVA by 2055. While passenger traffic is forecast grow by 106% by 2055, relative to 2022, the economic impact of Dublin Airport is projected to be only 65% higher due to assumed productivity and economies of scale effects.

Figure 5-4: Projected Economic Impact of Dublin Airport (Unconstrained Traffic Forecast)

	Number of Jobs	Full-Time Equivalents (FTEs)	Wages (€ Millions)	
Current 2022 Impact (26.9 million passengers)				
Direct	19,900	17,800	€ 906	€ 1,832
Indirect	11,700	10,300	€ 534	€ 1,020
Induced	13,300	11,800	€ 516	€ 1,024
Catalytic	71,200	62,900	€ 2,919	€ 5,723
Total	**116,100**	**102,800**	**€ 4,876**	**€ 9,599**
2030 Impact (39.6 million passengers)				
Direct	24,700	22,100	€ 1,127	€ 2,277
Indirect	14,500	12,900	€ 664	€ 1,267
Induced	16,600	14,700	€ 641	€ 1,273
Catalytic	95,200	84,200	€ 3,904	€ 7,654
Total	**151,000**	**133,900**	**€ 6,336**	**€ 12,471**
2040 Impact (46.6 million passengers)				
Direct	27,600	24,600	€ 1,256	€ 2,539
Indirect	16,200	14,300	€ 741	€ 1,413
Induced	18,500	16,400	€ 715	€ 1,420
Catalytic	107,700	95,100	€ 4,413	€ 8,652
Total	**170,000**	**150,400**	**€ 7,125**	**€ 14,025**
2050 Impact (52.3 million passengers)				
Direct	29,800	26,600	€ 1,358	€ 2,745
Indirect	17,500	15,500	€ 801	€ 1,528
Induced	20,000	17,700	€ 773	€ 1,534
Catalytic	117,500	103,800	€ 4,816	€ 9,443
Total	**184,800**	**163,600**	**€ 7,748**	**€ 15,250**
2055 Impact (55.0 million passengers)				
Direct	30,800	27,500	€ 1,404	€ 2,838
Indirect	18,100	16,000	€ 828	€ 1,580
Induced	20,700	18,300	€ 799	€ 1,587
Catalytic	122,000	107,800	€ 5,000	€ 9,803
Total	**191,600**	**169,600**	**€ 8,031**	**€ 15,807**

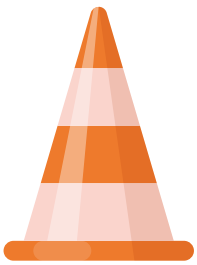
All financial figures are in 2022 prices. Numbers may not add up due to rounding.

6.0

Forgone Economic Impact Resulting from Restricted Terminal Capacity

Key Points

- The 32 MPPA cap will have implications for the wider economy of Ireland, impacting trade, tourism, investment and economic growth.
- The cap runs counter to the stated objectives of the National Aviation Policy, in particular the development of new routes and services, the fostering of competition and to enhance Ireland's global connectivity.
- It is estimated that with the 32 MPPA cap, the Irish economy will forgo 17,800 jobs and €1.5 billion in GVA by 2030, increasing to 53,300 jobs and €4.4 billion in GVA by 2055.



Under current planning regulations (condition no. 3 of the Terminal 2 Planning Permission and condition no. 2 of the Terminal 1 Extension Planning Permission), the terminal capacity of Dublin Airport is capped at 32 million passengers per annum (MPPA). As shown in previous chapters, passenger traffic reached those levels in 2019 and following the COVID-19 pandemic are forecast (under an unconstrained scenario) to reach those volumes by 2025.

Given that without these restrictions passenger traffic is forecast to reach almost 39.6 million in 2030 and 55.0 million by 2055, maintaining the cap at 32 MPPA will result in a large proportion of demand being unfulfilled. This will also result in less employment and economic activity at the airport, and in the downstream industries supporting the airport, as there will be fewer flights and passengers to service.

6.1 Implications for the Economy

The economic impacts will also extend across the entire economy, due to the lower connectivity that Dublin Airport would be able to offer:
The range of destinations connected to Ireland will be capped, impacting business and tourism. The 32 MPPA cap will ultimately constrain the ability of airlines to add frequencies and new routes in line with underlying demand. While airlines may make some adjustments to services to focus on the most high-value services, connectivity will be largely frozen. This means it will not be possible to add direct service to new source markets from which Ireland can attract tourists and to develop trade and investment.[34]

This inability to grow connectivity will very soon make Ireland a more difficult destination to visit for some tourists, especially those from emerging markets without service currently, and will reduce its attractiveness for businesses considering locating or investing in Ireland. In addition, this will put Irish businesses at a competitive disadvantage to businesses located in regions with less restricted access to air services. It will also make the Republic of Ireland a less attractive location to base international businesses, especially those seeking a base for their European operations.

[34] These markets may still be accessed through connecting air services, but these are less attractive and more time consuming. Even here, the 32 MPPA cap will limit these traffic flows, in order to stay within the cap.

The terminal capacity restriction will hamper Dublin's ability to develop as a hub airport. As discussed in Section 3.3, Dublin Airport is able to pool both point-to-point traffic (traffic originating or terminating at Dublin) and connecting traffic to support air services that could not be sustained on the basis of point-to-point traffic. For example, an air service to a secondary destination in the United States may only be viable through the inclusion of transfer traffic.

However, the 32 MPPA cap will hamper these operations as airlines try to work within the constraint. Airlines may focus on Dublin Airport as an end-point airport rather than a hub, with transfer traffic moving to other airports. As a result, routes and connectivity will be lost. Consider the example of Heathrow, which is subject to operational and regulatory capacity constraints. Between 2014 and 2019, passenger traffic at Heathrow grew at 1.9% per annum, considerably slower than its competitor hubs in Europe: Amsterdam: 5.5%, Frankfurt: 3.2%, Paris CDG: 3.5%.[35]

[35] Source: Airports Council International statistics.

Source: daa.

Dublin Airport has a unique role among airports in Ireland. Dublin Airport provides international connectivity on a range and scale that cannot be replicated by other airports in Ireland, which play a key role in providing point to point services for their regions.

There are a number of reasons for this. Firstly, much of the demand is in and around Dublin – of the 5.1 million people living in Ireland, 2.1 million (41%) live in Greater Dublin.[36] In addition, Dublin is Ireland's only hub airport, meaning it is able to support a much higher level of connectivity by pooling both point-to-point traffic and transfer traffic. This is crucially important to enabling Ireland to compete with other European airports for routes and services.

That traffic to and from Ireland is concentrated at Dublin Airport is in line the pattern seen in most countries in Europe. In the Netherlands, with a population of over 17 million (over three times that of Ireland), the vast majority of its air services are operated at Amsterdam Schiphol. Similarly, Austria (population 9 million) has air services concentrated at Vienna. Countries with much larger populations than Ireland, such as the UK, Germany and France, have more than one major airport, but even these tend to have one airport where long haul services are concentrated: Heathrow, Frankfurt and Paris CDG, respectively.

Air fares could increase. Empirical analysis has found that capacity constrained airports (as Dublin would become under the 32 MPPA cap) tend to have higher air fares (the fare charged by airlines to passengers) as demand exceeds supply. For example:

- PWC (2013) – analysed fare data at 15 European airports and found fare yields were 18% higher at capacity constrained airports (after controlling for other factors).[37]
- Frontier Economics (2014) – analysed fares at London airports and found that fares at Heathrow were 18% higher than other London airports due to capacity constraints.[38]
- SEO (2017) - analysed fare data at over 35 European airports and found that air fares at constrained airports were 6-9% higher than at unconstrained.[39]

The 32 MPPA cap at Dublin Airport could ultimately result in higher air fares, to the detriment of air passengers and other sectors of the economy that make use of or rely on air services (tourism, business travel, etc.).

Air connectivity is important in attracting international business' headquarters and foreign investment into a country. A key factor many companies take into account when making decisions about the location of offices, manufacturing plants or warehouses is proximity of an international airport.

Therefore, limiting the capacity and ultimately the connectivity of Dublin Airport will have implications for the wider economy, as documented in **Section 6.3**.

[36] Source: CSO Ireland.

[37] "Fare Differential: Analysis for the Airports Commission on the Impact of Capacity Constraints on Air Fares", PWC, 2013.

[38] "Impact of Airport Expansion Options on Competition and Choice", Frontier Economics, 2014.

[39] "The Impact of Airport Capacity Constraints on Air Fares", SEO Economics, 2017.

Implications for Irish National Aviation and Planning Policy

The Department of Transport, Tourism and Sport published a National Aviation Policy for Ireland in 2015.[40] The purpose of report is to provide a policy framework for the country's aviation sector and to enable the industry to remain competitive in the global market. The National Aviation Policy has the following key goals:

- **Enhance Ireland's connectivity** – respond to the needs of businesses, tourism and consumers through safe, secure and competitive access.
- **Foster growth of aviation enterprise** – support employment in the sector and maintain Ireland's strong tradition and reputation in aviation.
- **Maximise economic contribution of aviation sector** – commit to maximising the benefits of aviation to Ireland's economic growth and development.

In order to achieve these goals, specific policies and actions are provided in the document that aim to encourage increased services to and from Ireland. This includes creating conditions that support the development of new routes and services to new and emerging markets. The National Aviation Policy also commits that airlines operating in the Irish market will have a high level of competition. Furthermore, to enhance connectivity, the national policy seeks to optimise the Irish airport network to benefit air travellers, businesses and tourism.

- **The National Planning Framework**, part of Project Ireland 2040, also has as one of its strategic outcomes high-quality international connectivity.[41] The report states that effective airport and port connections are vital to the country's survival, its competitiveness and its future prospects. The report specifically references the development of additional runway and terminal facilities at Dublin Airport.

It is clear that the 32 MPPA cap contradicts the aims and commitments of both the National Aviation Policy and the National Planning Framework, as it will severely limit the growth of air services and international connectivity. Consequently, the restricted traffic and air services due to the 32 MPPA cap will result in forgone employment and economic contribution to the national economy, as quantified in the section below.

[40] Ireland Department of Transport, Tourism and Sport, A National Aviation Policy for Ireland, August 2015.

[41] Government of Ireland, Project Ireland 2040 National Planning Framework, January 2019.

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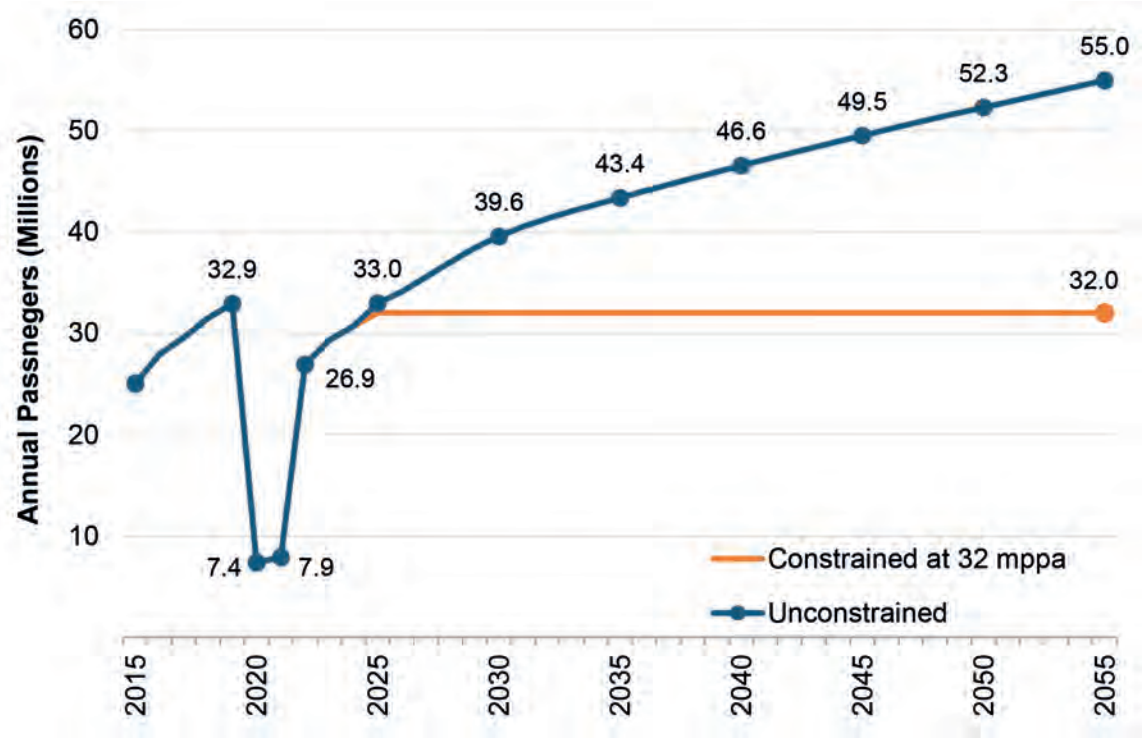
6.3
Forgone Economic Impact Estimates

The forgone economic impact associated with the terminal capacity restrictions was estimated using the methodology described in Section 2.2. The methodology was applied to the unconstrained forecasts (as previously documented in Chapter 5) and a constrained forecast which assumes that passenger traffic would not grow to beyond 32 million passengers per annum, which is a planning constraint on the airport's terminals. These forecasts are shown in **Figure 6-1**.

Figure 6-1: Constrained and Unconstrained Forecasts of Passenger Traffic at Dublin Airport, 2022-2055



Source: daa.

The forgone economic impact was then calculated by subtracting the economic impact under the constrained forecast from the economic impact under the unconstrained forecast.

The resulting estimates of forgone economic impact in 2030, 2040, 2050 and 2055 are presented in **Figure 6-2**. The analysis suggests that as a result of the 32 MPPA cap, the Irish economy could forgo an additional 17,800 jobs and €1.5 billion in GVA by 2030, relative to unconstrained traffic growth, increasing to 53,300 jobs and €4.4 billion in GVA by 2055.

The majority of this forgone economic impact is expected to occur outside of the aviation sector – 59% of the total impact is catalytic impacts (tourism, trade, investment, etc.) and another 22% are indirect and induced impacts (supplier and spending in the wider economy). This forgone economic impact is approximately 12% of the total projected economic impact of Dublin Airport in 2030 and 28% of the total by 2055. In other words, the economic contribution of Dublin Airport will be reduced by 12% in 2030 and by 28% in 2055 if the 32 MPPA cap remains in place until 2055.

Figure 6-2: Forgone Economic Impact Resulting from the 32 MPPA Cap

Impact	Number of Jobs	Full-Time Equivalents (FTEs)	Wages (€ Millions)	GVA (€ Millions)
2030 Impact				
Direct	3,300	2,900	148	299
Indirect	1,900	1,700	87	167
Induced	2,200	1,900	84	168
Catalytic	10,400	9,200	424	832
Total	**17,800**	**15,700**	**744**	**1,466**
2040 Impact				
Direct	6,100	5,400	278	562
Indirect	3,600	3,200	164	313
Induced	4,100	3,600	158	314
Catalytic	20,900	18,500	856	1,678
Total	**34,700**	**30,700**	**1,456**	**2,866**
2050 Impact				
Direct	8,300	7,400	379	767
Indirect	4,900	4,300	224	427
Induced	5,600	4,900	216	429
Catalytic	28,700	25,400	1,177	2,308
Total	**47,500**	**42,000**	**1,996**	**3,931**
2055 Impact				
Direct	9,300	8,300	425	860
Indirect	5,500	4,900	251	479
Induced	6,300	5,500	242	481
Catalytic	32,200	28,500	1,320	2,588
Total	**53,300**	**47,200**	**2,239**	**4,408**

All financial figures are in 2022 prices. Numbers may not add up due to rounding.

Appendix A: Further Information on the Input-Output Tables and the Economic Multipliers

As described in Chapter 2, the economic impact multipliers (indirect and induced) impacts were based on an Input-Output (I-O) model of the economy of the Republic of Ireland maintained by the Central Statistics Office Ireland. The Input-Output data can be found at: **https://www.cso.ie/en/statistics/nationalaccounts/supplyandusetablesforireland/**

The I-O model output was used to estimate the direct, indirect and induced economic effects in this study. This approach has been widely accepted as the most comprehensive approach for the study of economic impact.


Críochfort
Terminal 2
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The Input-Output Model

The I-O model of an economy links the gross output of an industry to the final demand for that industry and to the intermediate demands made by other sectors for its output. Figure A-1 illustrates the basic structure of the input-output model.

Figure A-1: A Highly Simplified Input-Output Accounting Framework:

	Industries (Purchases)	Final Demand	Total Output
Industries (Sales)	Z	Y	X
Value-added (primary inputs)	V		
Total output	X		

Analytically, we have the following basic identity for sector *i*,

$$X_i = Z_{i1} + Z_{i2} + \cdots + Z_{in} + Y_i, \quad i = 1, \cdots, n. \quad (1)$$

In **Figure A-1**,

- The first row characterizes the "purchasing sectors" (purchasers), while the first column captures the "selling sectors" (sellers).
- Each data column under "Industries" represents the sales from other sectors to sector i; that is, sector i's purchases of the products of various producing sectors in the economy. Hence the column represents the sources and magnitudes of sector i's inputs.
- On the other hand, in engaging in production, a sector also pays for other items – for example, labor and capital – and uses other inputs as well, such as inventoried items. All of these together are termed the value-added in sector i. In addition, imported goods may be purchased as inputs by sector i All of these inputs (value added and imports) are lumped together as purchases from what is called the payments sector (Vi in Figure A-1).

In the case of Ireland, the net final demand (Y) is the sum of the following items:

- Final consumption of households;
- Government consumption expenditure;
- Gross capital formation;
- Change in inventory;
- Exports.

For Ireland, the total value-added (V) is the sum of the following items:

- Imports of goods and services;
- Operating surplus;
- Compensation of employees;
- Consumption of fixed capital;
- Product and other indirect taxes less subsidies.

In other words, referring back to Figure A-1, each row for sector i=1 to n records the sales of that sector's output to other industrial sectors in the economy plus sales to private consumers, government, capital formation, inventory and overseas purchasers. Each column for sector i=1 to n records the purchases of production inputs for that sector in order to produce its total output. This includes purchases from other sectors of the economy, purchases of imports, payment for labour, payment of government taxes, and generation of profits.

Input-Output Coefficients

Input-output table becomes an economic tool when Leontief introduced an assumption of fixed-coefficient linear production functions related to input used by a sector along each column to its output flow, i.e., for one unit of every industry's output, a fixed amount of input of each kind is required.[42] That is, we define the following coefficients:

$$a_{ij} = \frac{Z_{ij}}{X_j}.$$

This ratio is termed a technical coefficient, commonly known as input-output coefficient or direct input coefficient. With this specification of production technology, the model basically assumes that the industry shows constant returns to scale, which is a reasonable approximation in short run, but nevertheless is also a limitation of the model.

[42] See Leontief, Wassily W. Input-Output Economics. 2nd ed., New York: Oxford University Press, 1986.

Input-Output Coefficients

Once the notion of a set of fixed input-output coefficients is accepted, the system of equations (1) can be represented as follows:

$$X_i = a_{i1}X_1 + a_{i2}X_2 + \cdots a_{in}X_n + Y_i, \quad i = 1,\cdots,n. \quad (2)$$

This leads to the matrix representation:

$$X = A\,X + Y \quad (3)$$

Hence, with the net final demand vector Y, we can solve for the output vector, via matrix inverse as follows:

$$X = (I - A)^{-1}\,Y \quad (4)$$

where I stands for the identity matrix. And the matrix $(I - A)^{-1}$ is the Leontief inverse coefficients. These measure the total amount of output in each sector that is required to be produced in order to satisfy the direct and indirect demands produced by one unit increase in the final demand for a given sector (i.e., the direct + indirect multiplier). The economic interpretation of the Leontief inverse coefficients is consistent with the derivation of the Keynesian multipliers (e.g., expenditure multiplier) that are commonly used in macroeconomics. In other words, it can be interpreted as a result of successive rounds of iterations. An important implication of this connection with the Keynesian multiplier is that the inverse coefficients capture both direct and indirect effects of the final demand from all sectors identified in the ***I-O*** table.
In practice the multipliers from I-O tables are usually expressed in values so that coefficients measure the requirements in dollars on sector i when sector j increases its final demand by one dollar.

Indirect and Induced Impacts - Open System and Closed System

The economic impact multipliers are expressed as ratios that measure the impact on the total economy as a result of an initial autonomous change in any of the final demand components. The action of the multiplier can be illustrated by the sequence of events that follow after the initial autonomous change. Different kinds of multiplier can be generated depending on the purpose of analysis. The common multipliers used are output, valuedadded, employment, and income multipliers. For comparative purposes, multipliers use usually expressed with respect to a unit of autonomous change in final demand.

Open Model: Direct and Indirect Impacts

Each of the multipliers listed above can be generated from two different models: open and closed. The intrinsic difference between them is the treatment of household income and personal consumption expenditure. In the open model, all final demand components are assumed to be exogenous. Hence the open model captures the production-induced effects resulting from a change in final demand. The multipliers generated using the open model are also known as simple multipliers or Leontief multipliers. This kind of model is described as open because at each round of the multiplier process, there is leakage from the system. The leakage consists of payments for imports and primary inputs and the recipients are assumed to make no use of their receipts. Even if a small part of the receipts were spent on goods and services, there would be further multiplier repercussions. In our analysis, Leontief multipliers capture the direct and indirect effects of an autonomous change in final demand.

Closed Model: Direct, Indirect and Induced Impacts

Conversely, in the closed model, the household sector is treated as endogenous to the system. The household sector receiving income from the work done in the production process would spend some of this income on local products. This increase in consumption would in turn increase the level of output of the products. In other words, the closed model accounts for both the production-induced effects as well as the consumption-induced effects. The multipliers generated using the closed model are commonly known as the total multipliers or Leontief-Keynes multipliers. In our analysis, Leontief-Keynes multipliers will capture the direct, the indirect AND the induced effects.

The total multiplier from the closed model is by definition larger than the simple multiplier from open model. The difference between the two multipliers is the induced impact.

Appendix B: Overview of Catalytic Impacts

As discussed in Chapter 1, catalytic impacts capture the way in which aviation facilitates the business of other sectors of the economy. This comprises:

- **Tourism** – air service facilitates the arrival of larger numbers of tourists to a country. This includes business as well as leisure tourists. The spending of these tourists can support a wide range of tourism-related businesses: hotels, restaurants, entertainment and recreation, car rentals, and others.
- **Trade** – air transport provides connections to export markets for both goods and services.
- **Investment** – a key factor many companies take into account when making decisions about the location of offices, manufacturing plants or warehouses is the proximity of an international airport.
- **Productivity** – air transportation offers access to new markets which in turn enables businesses to achieve greater economies of scale. Air access also enables companies to attract and retain high quality employees.

A number of studies have demonstrated that air transportation plays an important role in trade, investment and business location decisions, while additional studies have uncovered empirical evidence demonstrating a strong linkage between air service and employment and economic growth. Provided below is a summary of this research examining the catalytic impact of aviation, taken from academic and industry research.

Trade

A number of research papers have produced evidence that aviation positively contributes to the trade of both goods and services.

Paper	Methodology	Key Findings
Cech (2004)[43]	Used a cross-section statistical comparison method to investigate how air cargo services affect the economies of 125 U.S. counties.	Higher levels of air cargo services contribute to increased earnings and increased employment.
EUROCONTROL (2005)[44]	The study estimated the net contribution of air transportation to trade (i.e., export minus imports).	Net contribution of air transportation to trade was €55.7 billion in 2003 across the 25 current EU members..
UK Institute of Directors (2008)[45]	Surveyed 500 UK businesses about their use and the importance of air transportation.	The use of air travel strongly linked to business trade and sales. Almost three quarters of businesses using passenger air services said that their business would be adversely affected if the amount of air travel they could undertake was significantly curtailed.

[43] Cech P. (2004), "The Catalytic Effect of the Accessibility to Air Cargo Services", TIACA Graduate Research Paper Competition.

[44] Cooper, A. and Smith, P. (2005), "The Economic Catalytic Effects of Air Transport in Europe," Commissioned by EUROCONTROL. EUROCONTROL is a civil and military organisation established in 1963 to facilitate a safe, seamless pan-European Air Traffic Management (ATM) system.

[45] UK Institute of Directors (2008), "High Fliers: Business Leaders' View on Air Travel", http://www.iod.com/MainWebSite/Resources/Document/policy_paper_high_fliers.pdf

Poole (2010)[46]	Econometric analysis of U.S. trade and travel data from 1993 to 2013.	A 10% increase in business travel to the U.S. by non-residents led to a 1.2% increase in the volume of exports from the U.S. and 0.3% increase in export margins. The effect was strongest for travel from non-English speaking countries, suggesting that business travel help overcome language barriers in trade relationships.
PWC (2013)[47]	Examined the relationship between the UK's international air seat capacity and international trade, controlling for other factors affecting trade	A 10% increase in seat capacity increased goods exports by 3.3% and goods imports by 1.7%.

[46] Poole, J. (2010), "Business Travel as an Input to International Trade", http://www.scu.edu/business/economics/upload/Poole.pdf

[47] PWC (2013), "Econometric Analysis to Develop Evidence on the Links Between Aviation and the Economy", Report for the UK Airports Commission, December 2013.

Investment and Business Location

The impact of aviation on investment and business location decisions has been the subject of a number of papers. These papers have found evidence of air connectivity contributing to increased investment and beneficial location decision for the surrounding regions or the country.

Paper	Methodology	Key Findings
Hansen and Gerstein (1991)[48]	Used data from 1982 to 1987, the analysis related the amount of Japanese investment in each US state to measures of level of air service operated between Japan and that state (and other background factors).	The amount of Japanese investment in each US state was causally linked to the air service between Japan and that state.
EUROCONTROL (2005)[49]	Analysed the relationship between air transportation and business investment in the EU.	A 10% increase in air transportation usage increases business investment by 1.6% in the long run (the impact takes approximately five years to fully manifest).
IATA (2005)[50]	IATA surveyed 625 businesses in five countries (China, Chile, United States, Czech Republic and France).	25% of surveyed businesses in five countries indicated that 25% of their sales were dependent on good air transport links; 30% of Chinese firms reported that they had changed investment decisions because of constraints on air services.

[48] Hansen, M. and R. Gerstein "Capital in Flight: Japanese Investment and Japanese Air Service in the United States During the 1980s," Logistics and Transportation Review, 1991, Vol. 27, No. 3, pp. 257-276.

[49] Cooper, A. and Smith, P. (2005), "The Economic Catalytic Effects of Air Transport in Europe," Commissioned by EUROCONTROL. EUROCONTROL is a civil and military organisation established in 1963 to facilitate a safe, seamless pan-European Air Traffic Management (ATM) system.

[50] Airline Network Benefits, IATA Economic Briefing No. 3, 2006.

Bel and Fageda (2008)[51]	Statistically analysed the relationship between international air service and the location of large firm's headquarters across major European urban areas.	A 10% increase in supply of intercontinental air service was associated with a 4% increase in the number of large firm headquarters located in the corresponding urban area.
Arndt et al. (2009)[52]	Survey of 100 foreign-owned businesses in Germany.	Air connectivity was one of the four most important factors affecting location decisions, and that 57% of businesses would have chosen another location had connectivity been less good.
PWC (2013)[53]	Econometric analysis of the UK's air connectivity, air seat capacity and Foreign Direct Investment (FDI).	A 1% increase in international seat capacity was associated with a 0.47% increase in FDI inflows and a 0.19% increase in FDI outflows.
Zhia Da, Gurun and Warachka[54]	Analysed the numbers of investors, the volume of investment and the return on investment in a location against a number of explanatory factors including measures of air connectivity.	Institutional investors are more likely to invest and allocate more investment to firms headquartered at destinations that have better air connectivity with their location. Air traffic appears to facilitate investment by increasing the familiarity of investors with distant firms.

[51] Bel, G. and Fageda, X. (2008), "Getting There Fast: Globalization, Intercontinental Flights and Location of Headquarters", Journal of Economic Geography, Vol. 8, No. 4.

[52] Arndt, A., et al. "Economic catalytic impacts of air transport in Germany–The influence of connectivity by air on regional economic development." ATRS Conference. 2009.

[53] PWC (2013), "Econometric Analysis to Develop Evidence on the Links Between Aviation and the Economy", Report for the UK Airports Commission, December 2013.

[54] Zhia Da, U., Gurun, B. L., Warachka, M. (2019), "I
nvestment in a Smaller World: The Implications of Air Travel for Investors and Firms", Management Science, Vol. 67, No.1, December 2019.

Impact on Employment, Economic Growth and Productivity

The increased trade, investment, business activity and tourism facilitated by aviation ultimately results in increases in economic productivity (e.g., GDP per worker), in GDP and in employment (e.g., increased trade facilitated by air services results in increased employment in the businesses producing the traded goods and services). A number of research papers have examined the overall impact on the economy and employment as a result of the catalytic effects of aviation.

Paper	Methodology	Key Findings
Button, Lall, Stough and Trice (1999)[55]	Used data from 321 US metropolitan areas in 1994 to regressed high-tech employment against a number of controlling factors including a dummy indicating that the region was served by a hub airport.	The analysis found that the presence of a hub airport increased high-tech employment by an average of 12,000 jobs in a region.
Button and Taylor (2000)[56]	Used data for 41 metropolitan areas in the US to regress "new economy" employment against a number of control factors including the number of direct routes to Europe offered by airports in the region.	Increasing the number of routes between the US and Europe from 3 to 4 at an airport generated approximately 2,900 "new economy" jobs in the surrounding region.
Brueckner (2002)[57]	Aggregate and individual country-level data were analysed in terms of the relationship between air transportation passengers and GDP. A data analysis of 139 countries over	Found statistical evidence of a (two-way) feedback relationship between air transport and economic activity.

[55] Button, K., Lall, S., Stough, R. and Trice, M. (1999), "High-technology employment and hub airports," Journal of Air Transport Management, Vol. 5, Issue 1, January 1999.

[56] Button, K. and Taylor, S. (2000), "International air transportation and economic development", Journal of Air Transport Management, Vol. 6, Issue 4, October 2000.

[57] Brueckner, J. (2002), "Airline Traffic and Urban Economic Development".

Ishutkina and Hansman (2009)[58]	Aggregate and individual country-level data were analysed in terms of the relationship between air transportation passengers and GDP. A data analysis of 139 countries over a time period of 30 years (1975 to 2005).	Found statistical evidence of a (two-way) feedback relationship between air transport and economic activity.
ACI Europe/ InterVISTAS (2015)[59]	Analysed the relationship between national air connectivity and GDP per capita using data for 40 European countries between 2000 and 2012.	This recently completed analysis found that a 10% increase in connectivity was associated with an increase in GDP per capita of 0.6%. Additional analysis found evidence that this relationship was two-way. That is, as an economy grows, it supports a larger air transport sector, but it appears to also be the case that growth in air transport supports economic growth.

[58] Ishutkina M.A. and Hasnman R.J. (2009), "Analysis of the interaction between air transportation and economic activity: a worldwide perspective", PhD thesis, Department of Aeronautics and Astronautics, Massachusetts Institute of Technology.

[59] PWC (2013), "Econometric Analysis to Develop Evidence on the Links Between Aviation and the Economy", Report for the UK Airports Commission, December 2013.

Baker, Merkert and Kamruzzaman (2015)[60]	Analysed 88 regional airports in Australia over a period of 1985–86 to 2010–11 to determine the catalytic impacts of regional air transport on regional economic growth.	A significant bi-directional relationship was established: airports have an impact on regional economic growth and the economy directly impacts regional air transport.
Coscia, Neffke and Hausmann (2020)[61]	Analysed corporate travel booking data and estimated a causal links between business travel and employment, trade, migration and investment.	Business travel has a statistically significant impact among a range of bilateral relations between countries, such as trade, foreign direct investments and migration.
Gillen (2021)[62]	Analysed the impact on Multifactor Productivity (MFP) for various industries in the U.S. of various aspects of network air services: number of airlines, domestic and international departures, number of destinations.	Found a statistically significant relationship showing at air connectivity does appear to affect productivity across many sectors. A 1% increase in air connectivity led to a 0.024 to 0.044 increase in MFP.

Conclusions from Previous Research

A body of research has developed over the last 15-20 years which has examined and quantified the contribution of air transport to trade, investment and economic growth. Through the use of different empirical methods and data sets, this research has consistently found a significant and positive relationship between aviation and economic growth. Furthermore, much of the research has established that air transport growth has been the cause of economic growth, rather than simply economic growth leading to increased air transport levels.

[60] Baker, D., Merkett, R. and Kamruzzaman, M. (2015), "Regional aviation and economic growth: cointegration and causality analysis in Australia", Journal of Transport Georgraphy, Vol. 43, February 2015, pp. 140-150.

[61] Coscia, M., Neffke, F., and Hausmann, R. 2020, "Knowledge Diffusion in the Network of International Business Travel", Nature Human Behaviour 4 (10): 1011–1020.

[62] Gillen, D. 2021, "Wider Economic Benefits: What they are, how they manifest, and an example from network air services", Chapter 4, Air Transport and Regional Development Methodologies, Editors: Adler et al., Routledge.

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