

Dublin Airport Economic Impact Study

PREPARED FOR daa

PREPARED BY InterVISTAS Consulting Ltd.

April 2015



FINAL REPORT

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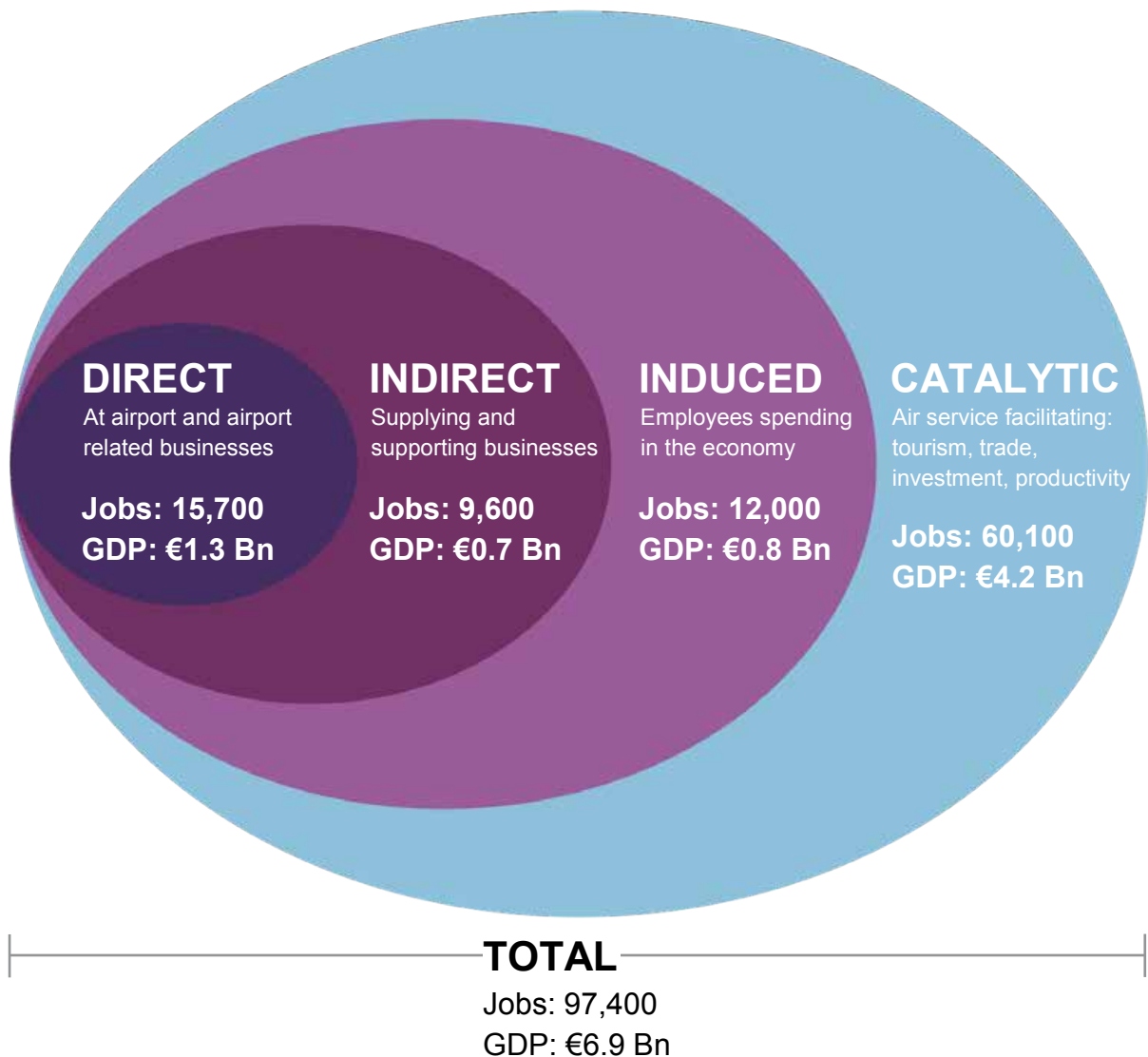
Executive Summary

“... the strategic importance of Dublin Airport extends far beyond its geographic catchment area and its future is critically bound up with the Irish economy e.g. inward investment, tourism, trade etc. This strategic importance is also reflected in the nature and extent of the competition that Dublin Airport faces.”

Department of Transport, Tourism and Sport, May 2014

It is clear that airports and economic activity are closely associated and in the context of a European single market and an increasingly global market, air transport is essential to economic progress. As a small, open economy, Ireland is crucially dependent on its air links to facilitate its economy. daa commissioned a study to quantify the contribution of Dublin Airport to the growth of the regional and national economy. The key findings are presented below.

Dublin Airport is a vital element of national infrastructure, a pivotal contributor to ongoing activity, and a key facilitator of economic development. Its economic importance is reflected in the estimated 97,400 jobs supported or facilitated by the airport and the €6.9 billion contributed to Gross Domestic Product.



Direct, indirect and induced impacts: day-to-day activity at Dublin Airport directly provides employment for 15,700 people. Together with the businesses that supply the goods and services to airport activity (indirect impacts) and spending of employees in the wider economy (induced impacts), a total of 37,300 jobs are supported by Dublin Airport.

The economic impact of airport activity is provided in **Figure ES-1**. 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)** – GVA is broadly equivalent to *Gross Domestic Product* (GDP), whereby the value-added of each industry sums to the total GDP of an economy.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.) amount to 15,700 jobs. Adjusting for part-time and seasonal employment, this amounts to 14,000 Full-Time Equivalent jobs (FTEs). The total income/wages of these employees is €639 million, which equates to an average of €45,600 per FTE, 16% higher than the national full-time earnings in 2013. The total direct GVA generated by Dublin Airport is estimated to be nearly €1.3 billion, equivalent to 0.7% of national GDP in 2013.

Adding in multiplier impacts (indirect and induced), the total employment supported by activities at Dublin Airport is estimated to be 37,300 jobs (or 33,100 FTEs), earning a total of €1.4 billion. To put that in context, this number of jobs is roughly equivalent to employing the entire town of Swords.² Total GVA is estimated to be €2.8 billion, 1.6% of national GDP.

Figure ES-1: Total Economic Impact of Dublin Airport

Impact Type	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Number of Jobs	15,700	9,600	12,000	37,300
Full-Time Equivalents (FTEs)	14,000	8,500	10,600	33,100
Income/Wages (€ Million)	639	373	397	1,409
GVA (€ Million)	1,256	717	781	2,753

Numbers may not add up due to rounding.

¹ 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. GDP is the sum of the GVA of all industries plus taxes less subsidies on production.

² Source: CSO Ireland: Census 2011 Results. Population of the town of Swords: 36,924.

Analysis in this study found that Dublin Airport is one of the best connected airports in Europe and is the primary contributor to Ireland having one of the highest connectivity levels on the continent relative to the size of its economy.

Air connectivity is essential in the international marketplace and it is fundamentally about access to markets and destinations. This is particularly the case for Ireland as a small open economy positioned on the western tip of Europe. Air access is critical for Ireland's economic development. 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 (FDI) in Ireland.

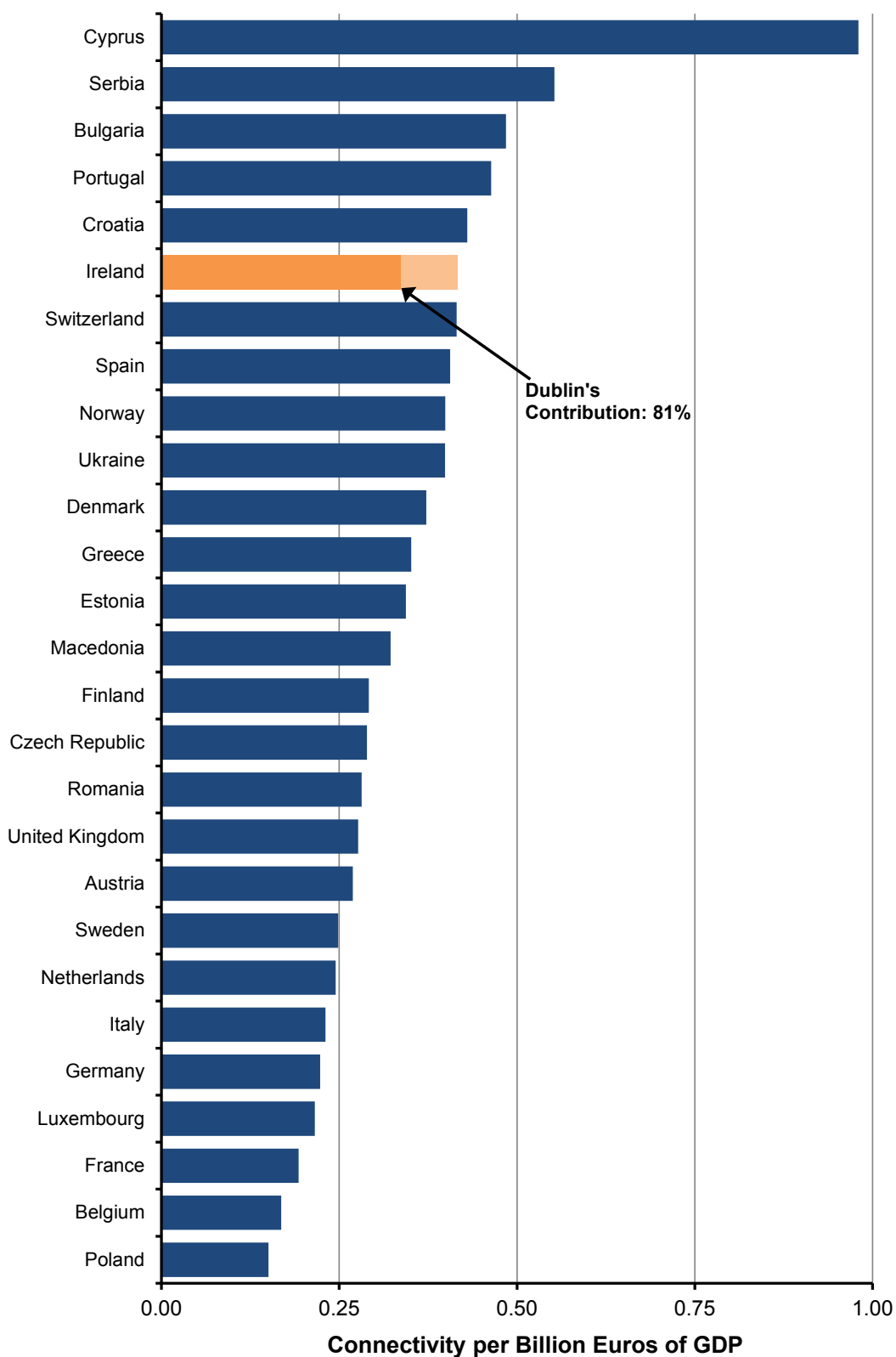
Few European airports can match Dublin Airport's connections to Ireland's established markets of Britain and the United States. For example, in 2014 Dublin Airport served more routes and operated more frequencies to Britain than either Frankfurt or Paris Charles de Gaulle and almost as many as Amsterdam. During Summer 2014, Dublin Airport had more weekly frequencies to North America than either Munich or Zurich. In addition, Dublin Airport is developing its European links and expanding into the Middle East, Africa and beyond.

The connectivity of Dublin against its peer airports was analysed using the IATA connectivity index, which measures the quality of the air transport network from the point of view of the country's economy. This revealed that Dublin Airport ranks 14th in Europe just behind Berlin and Dusseldorf and ahead of Stockholm, Brussels and Gatwick. Dublin ranks ahead of Gatwick, despite the latter handling considerably more passenger traffic (35.4 million vs 20.2 million at Dublin), due to Dublin's more extensive network, especially in long-haul.

Dublin Airport's contribution to connectivity is even more pronounced when compared against the size of its economy. **Figure ES-2** shows national connectivity divided by the country's GDP (Ireland's connectivity index includes the combined connectivity scores of all Ireland's airports, however, Dublin accounted for 81% of the connectivity score). As can be seen, Ireland has one of the highest GDP-adjusted connectivity scores in Europe, 50% higher than that of the UK and almost twice that of Germany. Dublin Airport alone contributes higher connectivity per Euro of GDP than either the UK or Germany. Similarly, Ireland's connectivity on a per capita basis is above most other European nations.

This analysis demonstrates that Dublin Airport is a major hub for the country and a critical contributor to Ireland's connectivity with the rest of the world. However, while Dublin Airport enables high levels of connectivity for Dublin and Ireland, a number of key competitor cities rank above it in terms of air connectivity (including Barcelona, Copenhagen, Berlin – see section 3.4) Given Ireland's location in the continent, and lack of alternative transport modes, it is more important than ever that Dublin Airport continues to enhance its connectivity, particularly long-haul connectivity to emerging, high growth economies. 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 dividend will be even greater economic growth and development for Dublin and Ireland, as increased air connectivity facilitates increased trade, tourism, investment and economic growth.

Figure ES-2: Connectivity Relative to Gross Domestic Product (2013) – Top 25 Countries



Source: Based on Diio Schedule Data, Passenger Traffic Data and World Bank Data for 2013.

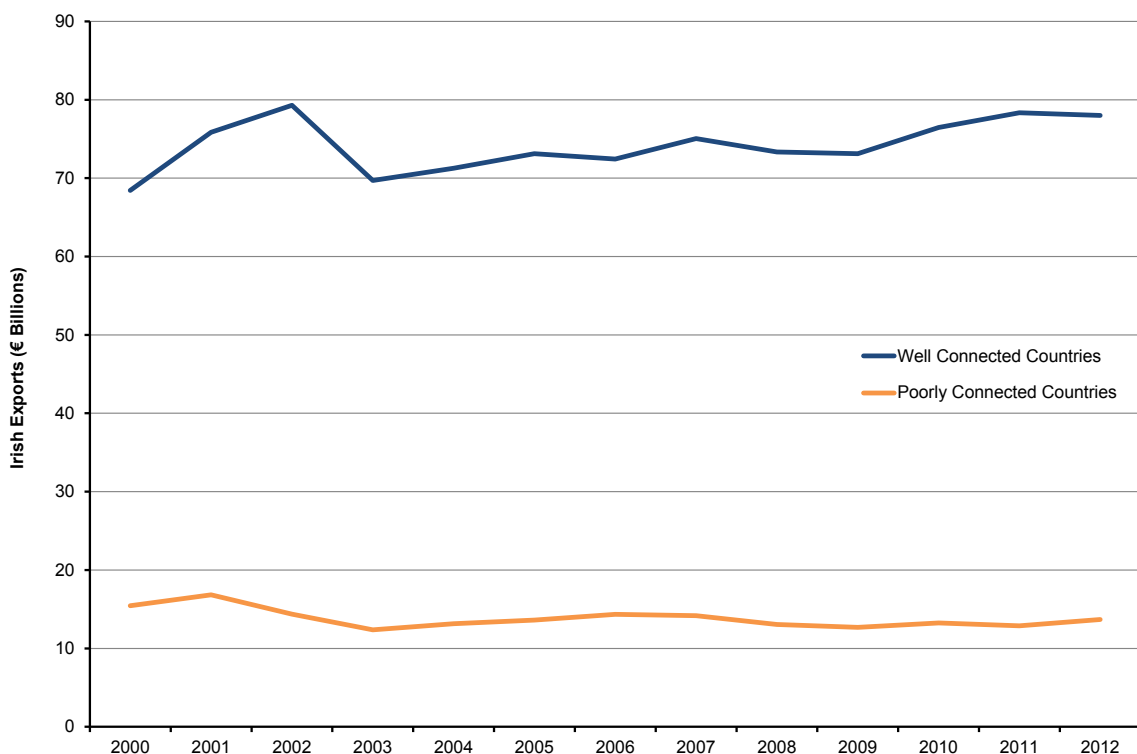
The connectivity provided at Dublin Airport plays a critical role in the economic development of Ireland, and has contributed to increased tourism, trade, investment and productivity for the nation, and needs to be enhanced to ensure future economic growth.

Using data from the past 10-15 years, analysis in this report demonstrates a clear linkage between Dublin Airport’s connectivity and tourism, trade, FDI and GDP growth.

The relationship between the connectivity of Dublin Airport and Ireland’s export trade is illustrated in **Figure ES-3**. 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 five to six times that of trade with poorly connected countries. Furthermore, between 2002 and 2012, the value of exports to well-connected countries increased by 14%, but declined by 11% to 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 ES-3: Ireland’s Exports and Direct Services from Dublin Airport, 2000-2012



Source: Diio Schedule Data, Central Statistics Office Ireland and U.N. Comtrade Database.

“The proximity of Dublin Airport to the city and the efficiency of the site is essential to our EMEA [Europe, Middle East & Africa] Headquarters given the number of staff members who travel into EMEA and other markets from Dublin. It is also critical for staff flying in from other offices to have a well-functioning, well-serviced airport at their disposal.”

Google, December 2014

Catalytic impacts: the connectivity provided by Dublin Airport helps attract tourists, facilitates trade and investment, and contributes to the growth of the regional and national economy. These catalytic impacts total 60,100 jobs and €4.2 billion in GVA.

The economy of Ireland is a diversified knowledge-based economy, focusing on services and high-tech industries and dependent on trade, industry and investment. Adjusted for cost of living (purchasing power parity), the IMF ranks Ireland fifth in Europe in terms of per capita GDP, behind Luxembourg, Norway, Netherlands and Switzerland, but ahead of Germany, Sweden, the UK and France.³

A large number of factors have contributed to Ireland’s economic success – business regulations, government policy, taxation, the education and skillset of the local population, geographic location, etc. Nevertheless, the quality and range of air services available at Dublin Airport is a contributing factor. Ireland’s position as a trading and business hub would not be possible without the high degree of air connectivity provided by Dublin Airport. The air service at Dublin Airport transports high-value exports around the world and enables employees of Irish and multinational 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 mobility that Dublin Airport provides.

Analysis was undertaken to estimate the catalytic impacts of Dublin Airport. The results of this analysis are provided in **Figure ES-4**. It is estimated that the catalytic impacts of Dublin Airport amount to 60,100 jobs (53,100 FTEs) and €4.2 billion in GVA (equivalent to the 2.4% of national GDP).

Figure ES-4: Catalytic Impacts Facilitated by Dublin Airport

Impact Type	Total Impact
Number of Jobs	60,100
Full-Time Equivalents (FTEs)	53,100
Income/Wages (€ Million)	2,109
Value-Added (€ Million) (% of national GDP)	4,155 (2.4%)

³ World Economic Outlook Database, IMF, 2013.

Total Impacts: combining the direct, indirect, induced and catalytic impacts, Dublin Airport generates or facilitates 97,400 jobs and contributes €6.9 billion to GDP.

The total economic impact of Dublin Airport is summarised in **Figure ES-5**. Including the activity directly related to the airport, the multiplier impacts that flow from it, and the other sectors of the economy facilitated by the airport, Dublin Airport contributes to the employment of 97,400 people in Ireland, equivalent to 86,200 full-time jobs, earning a total of €3.5 billion. Furthermore, a total of €6.9 billion is contributed to GDP, an amount equal to 4.0% of the national economy. To put these numbers into context, the total jobs figure (97,400) is more than the population of Limerick and about half the population of Cork.⁴

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 could have no commercial airports, instead relying on sea access to airports in the UK, or Dublin could have a small regional airport acting as a spoke 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 chose not to locate or expand in Ireland. The net effect of this would be a smaller, slower-growing economy.

It should be noted that these figures are not attempting to credit Dublin Airport with creating nearly 4% of the 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. For example, if no one had decided to build hotels in Ireland, tourism would also be substantially lower. 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.

Figure ES-5: Total Economic Impact Generated and Facilitated by Dublin Airport

Impact Type	Jobs	FTEs	Income (€ Million)	GVA (€ Million)	GVA as % of National GDP
Direct	15,700	14,000	639	1,256	0.7%
Indirect	9,600	8,500	373	717	0.4%
Induced	12,000	10,600	397	781	0.4%
Catalytic	60,100	53,100	2,109	4,155	2.4%
Total	97,400	86,200	3,518	6,909	4.0%

Numbers may not add up due to rounding.

⁴ Source: CSO Ireland: Census 2011 Results. Based on the population of the city and surrounding suburbs.

Based on the unconstrained air traffic forecasts for the airport, and including the Dublin Airport Central campus, the total economic impact of Dublin Airport could reach an estimated 194,000 jobs and €14.4 billion in GVA by 2043, roughly double the current economic impact.

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).

Analysis was undertaken to estimate the future economic impact of Dublin Airport, based on air traffic forecasts produced by daa. To do this, it was assumed that the economic impact (employment, income, GVA) associated with the airport will increase as traffic at the airport increases while allowing for significant productivity gains and economies of scale at the airport.

The economic impact estimate also includes the impact of the Dublin Airport Central development, a proposed commercial campus on airport land potentially comprising offices, retail, hotels and other facilities (documented in Section 8.2).

The estimated economic impact of Dublin Airport in 2043 is presented in **Figure ES-6**. Assuming airport capacity can fully accommodate demand, and including the Dublin Airport Central campus, the total economic impact of Dublin Airport is estimated to reach 194,000 jobs and €14.4 billion in GVA by 2043. This is roughly double the current economic impact of the airport.

**Figure ES-6: Forecast Economic Impact of Dublin Airport, 2043
(Based on Unconstrained CENTRELINE Forecast)**

Impact Type	Jobs	FTEs	Income (€ Million)	GVA (€ Million)
Direct	40,800	38,000	1,638	3,431
Indirect	23,400	21,600	911	1,870
Induced	24,900	22,600	856	1,805
Catalytic	104,900	92,700	3,680	7,252
Total	194,000	174,900	7,086	14,359

All financial figures are in 2013 prices. Numbers may not add up due to rounding.

A second runway at Dublin Airport is essential to enhancing the connectivity of Ireland, particularly to fast growing economies in Asia, Africa and South America. This will facilitate economic growth in the economy worth 31,200 jobs and €2.2 billion in GVA by 2043.

The forecast economic impact in Figure ES-6 assumes that there are no capacity constraints on Dublin Airport, i.e., that the airport has the necessary capacity to handle greater volumes of traffic and the capability to provide long-haul connectivity

In practice, achieving this will require the development of a second runway at Dublin Airport of sufficient length to fully enable long-haul air service. The runway will enable connections for both business exports and international tourists and enhance the potential to develop Dublin Airport as a strong secondary European hub.

Analysis was undertaken to estimate the economic impact that could be achieved with the timely development of a second runway at Dublin Airport, based on air traffic forecasts provided by daa. **Figure ES-7** shows the potential economic impact that could be unlocked by 2043 if a second runway is built: the Irish economy could generate an additional 31,200 jobs and €2.2 billion in GDP by 2043, an amount equivalent to a third of the current economic impact of the airport. The majority of this economic contribution is expected to occur outside of the aviation sector – 60% of the total impact is catalytic impacts (tourism, trade, investment, etc.) and another 23% are indirect and induced impacts (supplier and spending in the wider economy).

Figure ES-7: Estimated Economic Impact of the Second Runway by 2043

Impact Type	Jobs	FTEs	Income (€ Million)	GVA (€ Million)
Direct	5,200	4,700	212	390
Indirect	3,200	2,900	124	227
Induced	4,000	3,600	132	248
Catalytic	18,800	16,600	660	1,300
Total	31,200	27,800	1,128	2,166

All financial figures are in 2013 prices. Numbers may not add up due to rounding.

Glossary of Terms and Abbreviations

Catalytic Impacts	<p><i>Catalytic Impacts</i>, 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.</p> <p>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.</p>
CSO	Central Statistics Office, Ireland.
daa	State owned corporation responsible for the operation and management of Dublin and Cork airports.
Direct impacts	<p><i>Direct Impacts</i> 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.</p>
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	<i>Indirect Impacts</i> 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	<i>Induced impacts</i> 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, child care, 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.
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. See Chapter 2 and Appendix E for detailed information on how multiplier impacts were derived in this study.
Wider Economic Benefits	See <i>Catalytic Impacts</i> .

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1 Introduction

daa commissioned InterVISTAS Consulting Ltd. to conduct an economic impact study of Dublin Airport.⁵ This report documents the methodology and findings of the study, and is structured as follows:

- Chapter 2 outlines the methodology used to estimate the economic impact of Dublin Airport.
- Chapter 3 presents an overview of the traffic activity at Dublin Airport and the global connectivity it provides for Ireland.
- Chapter 4 provides the economic impact directly generated by the activities at Dublin Airport.
- Chapter 5 provides estimate of the down-stream multiplier impacts (indirect and induced impacts) generated by the activities at Dublin Airport.
- Chapter 6 discusses the catalytic impacts facilitated by air service at Dublin Airport and provides an estimate of the economic contribution to Ireland.
- Chapter 7 totalises the economic impact of Dublin Airport, including direct, indirect, induced and catalytic impacts.
- Chapter 8 contains forecasts of the future economic impact of the airport, based on traffic forecasts up to 2034, and the estimated economic impact that could be forgone if airport capacity is not allowed to fully accommodate demand.

Additional details are provided in the appendices. *Key Points* text boxes are provided at the start of Chapters 3 to 8 that summarise the key points in each chapter.

As part of the study process, meetings were held with a number of stakeholders:

- Irish Business and Employers' Confederation (IBEC)
- Tourism Ireland
- Dublin Chamber of Commerce
- Fingal County Council
- Irish Tourism Industry Confederation
- Irish Exporters Association
- Enterprise Ireland / IDA Ireland

In addition, other businesses and organisations were contacted regarding their use and requirements of Dublin Airport. The insights of these various organisations regarding the impact and importance of Dublin Airport are provided throughout this report.

⁵ daa is a state owned corporation responsible for the operation and management of Dublin and Cork airports.

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

It should be borne in mind that these measures attempt to assess the gross level of activity or expenditure associated with Dublin Airport. As such, they are not “net” measures that weigh benefits against costs, but nevertheless these measures can be useful in demonstrating the economic contribution of the airport.

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 Direct Economic Impact

This is the employment, income and GDP 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.

1.2.2 Indirect Economic Impact

The employment, income and GDP generated by down-stream industries that supply and support the activities at Dublin Airport. For example, these include: wholesalers providing food for inflight catering, oil refining activities for jet fuel, 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, child care, 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

“The efficient movement of people and goods will be central to Ireland's economic recovery and the timely delivery of enhanced airport infrastructure has a major contribution to make in this regard. As an island nation that does not benefit from a land connection to continental Europe, Ireland relies heavily on the aviation sector and Dublin Airport in particular.”

Irish Business and Employers' Confederation (IBEC), July 2014⁷

While the economic impact described above can be seen as down-stream impacts resulting from activities at Dublin, 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.** Although air cargo accounts for 1% of the volume of Ireland's export shipments, it accounts for over 33% of exports by value, meaning that air cargo is high value, often times perishable or time-sensitive.⁸ Both the trade of goods and the trade of services are facilitated by passenger air services. Face-to-face

⁷ <http://www.aviationreg.ie/fileupload/2014ddresponses/2014-07-31%20IBEC.pdf>.

⁸ Source: Irish Exporters Association: <http://www.atag.org/>.

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.

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. 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 enable 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 the national income.

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 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. There also needs to be hotels, restaurants, retail, entertainment, etc. to make a destination an attractive tourism destination. Nevertheless, without convenient air services, a destination will find it more difficult to attract tourists.

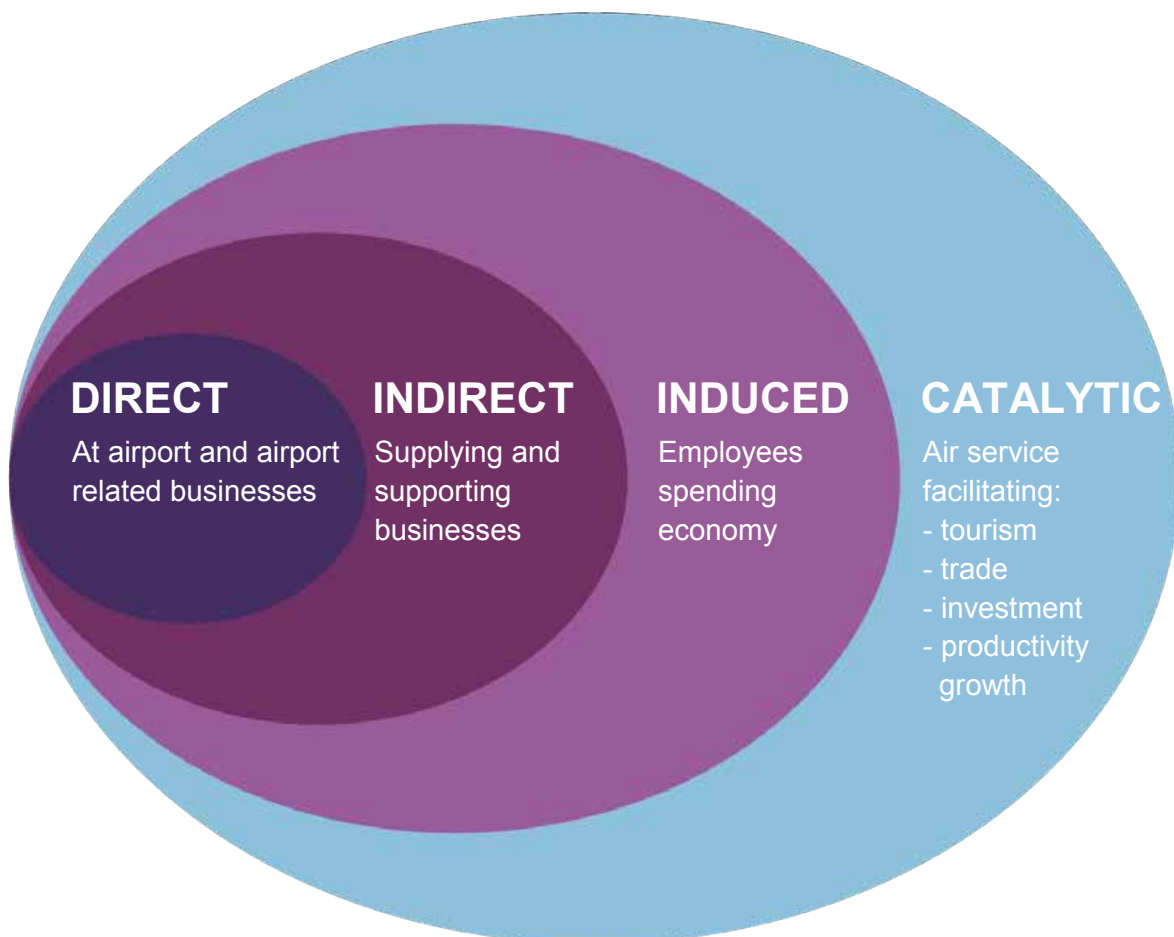
What the catalytic impacts capture is that without efficient airports and the air services they support, the economy would not be as large or affluent. Thus, catalytic impacts are about the economic value and employment that airports facilitate rather than generate. The

connectivity enabled by airports is not sufficient on its own to fully support economic activity, but it a necessary element of economic growth and development. ⁹

In discussing catalytic impacts, the issue of causality often arises. For example, while air service 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.

Catalytic impacts are discussed in greater detail in **Chapter 6**. These four categories of impacts are summarised in **Figure 1-1**.

Figure 1-1: Categories of Economic Impact Generated or Facilitated by Dublin Airport



⁹ 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.

2 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 4**.

2.1 Surveying Direct Impacts

The primary tool for estimating the economic impact of Dublin Airport was an employment survey. This was augmented by data from government and airport sources. Employment attributable to airport operations was measured by surveying businesses located at Dublin Airport, plus offsite businesses economically linked to the airport, along with ground transportation firms. A total of 157 firms were contacted for the survey. These businesses included passenger and cargo airlines, courier/integrators, ground handlers, government agencies, aircraft maintenance firms, air cargo, warehousing and logistics, car rental firms, hotels, airport retailers. While information on individual respondents is not provided in this report, in order to preserve the confidentiality of the respondents, further detail on the type and location of businesses surveyed is provided in **Appendix A**.

The survey questionnaire collected information on:

- Type of business
- Employment at the firm, broken down into full-time, part-time and temporary
- Annual payroll or average salary per employee
- Breakdown of employment by type of job
- Proportion of the firm's business related to the airport (as some businesses may also conduct business not related to the airport)¹⁰
- Proportion of business related to air cargo (where relevant)
- Expenditures on goods and services and the geographic location of that expenditure

The surveyed firms were asked to provide information for calendar year 2013 wherever possible. An example of the survey questionnaire is provided in **Appendix B**.

The questionnaires were initially sent out by email. Telephone follow-up was conducted to increase the response rate. Particular effort was made to ensure that survey responses were obtained from known large employers such as airlines, ground handling and aircraft maintenance. There was a strong response to the survey, with two thirds (66%) of the firms contacted providing information, these firms representing an estimated 86% of total employment represented in the survey.

¹⁰ Off-site employment reported by the businesses was scaled down by the percentage reported in the survey, to ensure that only airport-related employment was represented.

2.2 Inferring Employment

Employment was “inferred” for firms that did not respond to the survey by using other information sources, such as annual reports, or using information on similar firms that did respond to the survey. For example, if 15 retailers were sent surveys but only 10 returned them, and other information on these firms was not available, an average employment figure was derived from the responding firms. The employment number was the mean total employment of the responding firms excluding the highest and lowest employers (to avoid the mean being skewed by outliers). Further details are provided in **Appendix C**.

There may be firms which were not surveyed simply because it was not known that they existed. We do not include an estimate of employment for such unidentified firms because there is no basis for an assessment. In any event, we expect most of these to be very small in terms of missed employment.

2.3 Full-Time Equivalent Jobs

Often employment is measured by counting the number of jobs. However, when part-time and/or temporary workers are used, this can be a misleading measure resulting in an overstatement of economic impact. For example, one firm with 100 part-time employees may have a smaller overall economic impact than another firm with 100 full-time employees.

Therefore, the employment estimate was converted to full-time equivalents (FTEs), where the employment is weighted according to the number of hour typically worked. For example, 100 part-time employees working 20 hours a week would equate to approximately 50 FTEs. Further details can be found in **Appendix D**.

Whenever possible, employment impacts are provided both in terms of the number of jobs and the number of FTEs.

2.4 Economic Multipliers

While the direct employment and income/salary impacts of Dublin Airport were based on survey information, such an approach is not practical for estimating indirect and induced economic impacts. While it might be possible to conduct a survey of businesses impacted indirectly, the survey would need to cover thousands of companies. For induced employment, the entire economy would need to be scrutinised. In addition to the time and financial resources needed to conduct such surveys, the quality of responses may not be robust.

As an alternative to such surveys, indirect and induced effects were estimated using *economic multipliers*, as is common practice for economic impact studies. In addition, the *direct* value-added (GVA) impacts were also estimated using economic multipliers.

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. Using such a model, flows of economic activity associated with any

change in spending may be traced either forwards (spending generating income which induces further spending) or backwards (visitor purchases of meals leads restaurants to purchase additional inputs - groceries, utilities, etc.). By tracing these linkages between sectors, I-O models can estimate indirect and induced impacts. These indirect and induced impacts are represented by economic multipliers, normally expressed as a ratio of total impacts (i.e., direct plus indirect plus induced) to direct impacts. Using the I-O model, multipliers can be produced for employment, remuneration, valued-added and economic output, normally expressed in terms of a unit of direct impact (e.g., per dollar of direct economic output).

The size of these economic multipliers is a function of a number of factors:

- The nature of the industry or economic sector under consideration. Multipliers vary across different industries within the economy based on the mix of labour and other inputs, and the propensity of each industry to buy goods and services from within the economy. Some industries require large amounts of goods and services from other sectors of the economy and therefore have large multiplier impacts. Other sectors are more labour intensive and require fewer inputs from other sectors of the economy, resulting in smaller multiplier impacts.¹¹
- The amount of imports needed as an input to production. Industries or economic sectors that require large amount of imports have lower multiplier impacts as this part of the spending goes outside of the national economy (in essence, this part of the multiplier impact is occurring in another country).
- Propensity to consume domestic goods. The spending patterns of consumers in the national economy will affect the induced impacts. The greater the propensity to consume domestically produced goods and services, the greater is the multiplier effect. Similarly, higher spending on imports or higher savings rates will dampen the induced multiplier.¹²
- Government taxation and spending has a complex influence on the size of the multiplier impacts. Higher taxation rates can dampen multiplier impacts, although this can be offset by how the government chooses to spend these tax revenues.

The multipliers used in this study were based on the 2010 Input-Output tables (the I-O model output) produced by the Central Statistics Office Ireland.¹³ These were the most current I-O tables available at the time of the study. The economic multipliers developed from the I-O tables have been updated to reflect 2013 price levels, but no structural changes have been assumed. Structural changes might include changes in the input purchases of certain industries (e.g., consuming more or less goods and services from other industries for each unit of output, or purchasing more or less imports), changes in tax rates, and changes in the

¹¹ In such a case, the indirect impacts may be smaller than the induced impacts, as induced impacts are based on the spending of labour income.

¹² In the case of savings, this is a function of the time period examined. The multiplier impacts capture the economic impact occurring in a particular year. Savings represent deferred spending that will occur at some time in the future. However, there is not reliable technique for estimating these longer term multiplier impacts.

¹³ The 2010 I-O tables can be found here: <http://www.cso.ie/en/releasesandpublications/ep/p-sauio/supplyanduseandinput-outputtablesforireland2010/#.VFdqprkfyM8>.

consumption patterns. Such structural changes could result in smaller or larger multiplier impacts depending on the nature of the change. However, there was not data available to suggest what structure changes may have occurred or to conduct the necessary updating.

As with any model of a complex economy, I-O models have their limitations. For example, I-O models assume constant returns to scale (i.e., no economies or diseconomies of scale) and a fixed input structure with no substitution of inputs (e.g., one fuel type cannot be substituted for another). Furthermore, due to the large amount of data collection and analysis required, the I-O data can be released several years after the period on which they are based, so may not precisely represent current conditions. Nevertheless, I-O models are the most widely accepted and well-established means for estimating multiplier impacts and are based on data unparalleled in its detail and breadth.

Further details on the I-O tables, including the derivation of the multipliers, are provided in **Appendix E**.

2.5 Study Time Frame

The employment survey was conducted between October and November 2014 and the results reflect employment and financial information for calendar year 2013.

3 Overview of Dublin Airport

Key Points

- Passenger traffic at Dublin Airport reached 21.7 million in 2014.
- Dublin Airport is the 14th best connected airport in Europe. It is particularly strong in connections to the United States and Britain.
- Dublin Airport has direct service to 38 countries on four continents, including 26 out of 28 EU countries.
- Home base for two major carriers: Ryanair and Aer Lingus.
- The airport is a primary contributor to Ireland having one of the highest connectivity levels on the continent relative to the size of its economy.
- This connectivity is critical to the economic development of Ireland, including trade, tourism, FDI and business location decisions.

Dublin Airport, operated by daa, is the largest airport in the Republic of Ireland (and the largest on the island of Ireland). Located approximately 6 miles north of the centre of Dublin in the county of Fingal, the airport is the home base for Aer Lingus, Stobart Air (who operates regional services for Aer Lingus out of Dublin) and Ryanair.

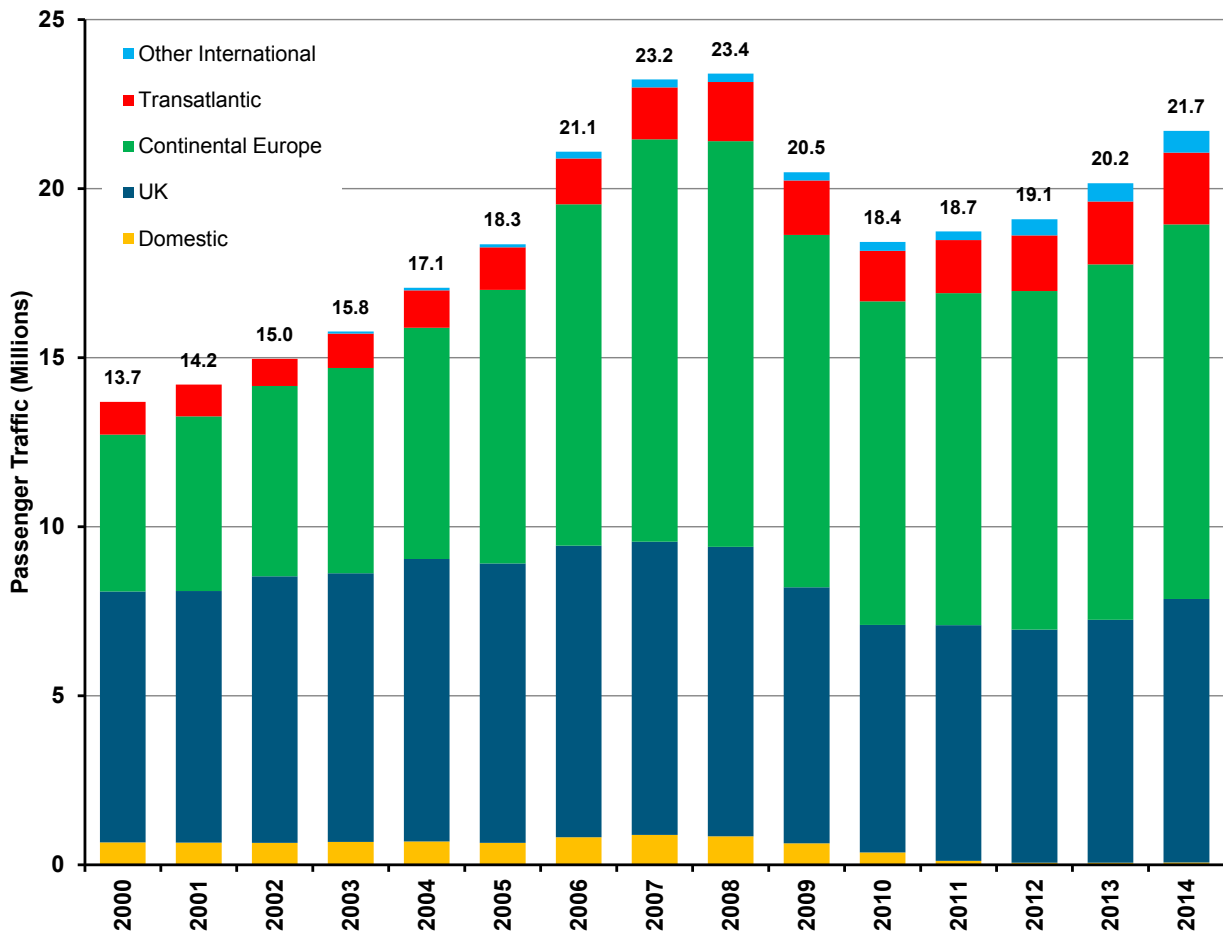
3.1 Air Passenger Movements

Passenger traffic at the airport has seen periods of growth and contraction over the past eleven years, as shown in **Figure 3-1**. Between 2000 and 2008, passenger movements at Dublin Airport increased from 13.7 million to 23.5 million, an average growth rate of 6.9% per annum. In 2009 and 2010, the airport experienced significant declines in air travel due to the global economic downturn, which impacted the Irish economy severely (the Irish economy was in recession for all of 2008 and 2009, contracting by over 10% in that period).¹⁴

However, passenger traffic at Dublin Airport has grown by 17.8% between 2010 and 2014, with the largest growth being seen in Transatlantic and Other International traffic.

¹⁴ Source: Central Statistics Office Ireland.

Figure 3-1: Passenger Movements at Dublin International Airport, 2000-2014



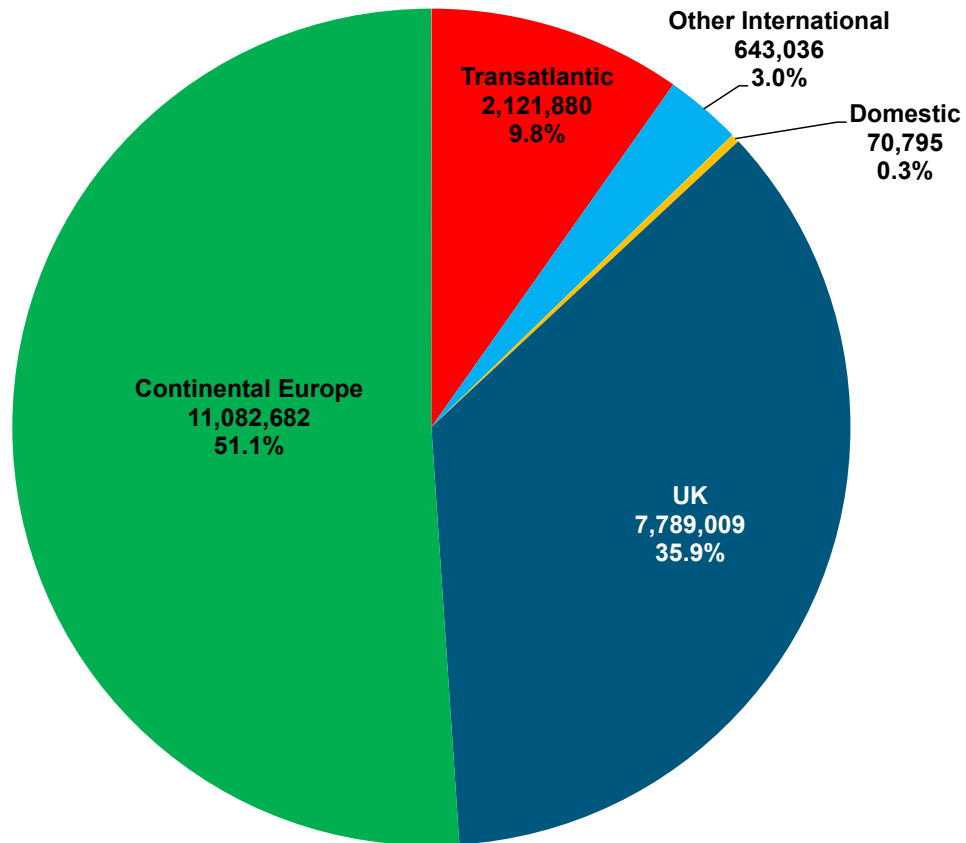
Source: daa.

Of the 21.7 million passenger movements in 2014, 21.0 million (96.5%) were origin/destination passengers (i.e., those starting or ending their air journey in Dublin), and 749,281 (3.5%) were transfer or transit passengers.¹⁵

Figure 3-2 shows 2014 passenger movements broken down by world region. Continental Europe accounted for 51.1% of passenger movements, followed by the UK at 35.9%, Transatlantic (North America) at 9.8%, other international destinations at 3.0% and domestic passenger traffic at 0.3%. Domestic traffic at Dublin Airport has declined from 917,379 in 2007 to 70,795 in 2014. This decline is due in part to the vastly improved road infrastructure between Dublin and other population centres.

¹⁵ Source: daa.

Figure 3-2: Passenger Movements by Region at Dublin Airport, 2014

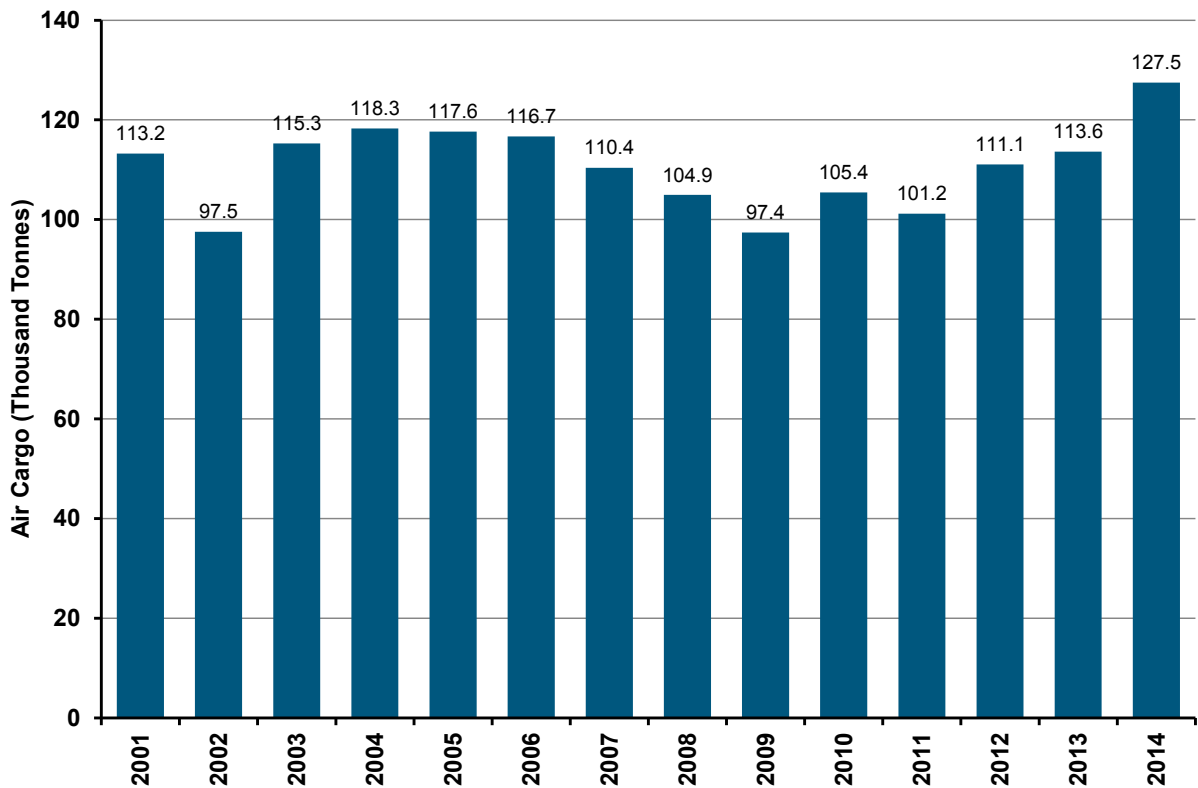


Source: daa.

3.2 Air Cargo and Aircraft Movements

Air cargo volumes have increased substantially at Dublin Airport from 2001 to 2014, reaching a record high of 127,471 tonnes in 2014, as depicted in **Figure 3-3**. Cargo volumes declined in 2009 due to the global economic recession, and again slightly in 2011. However, since 2011 air cargo volumes have grown by 26%, reflecting a return to growth in exports and an increase in capacity on long-haul routes, particularly the Middle East.

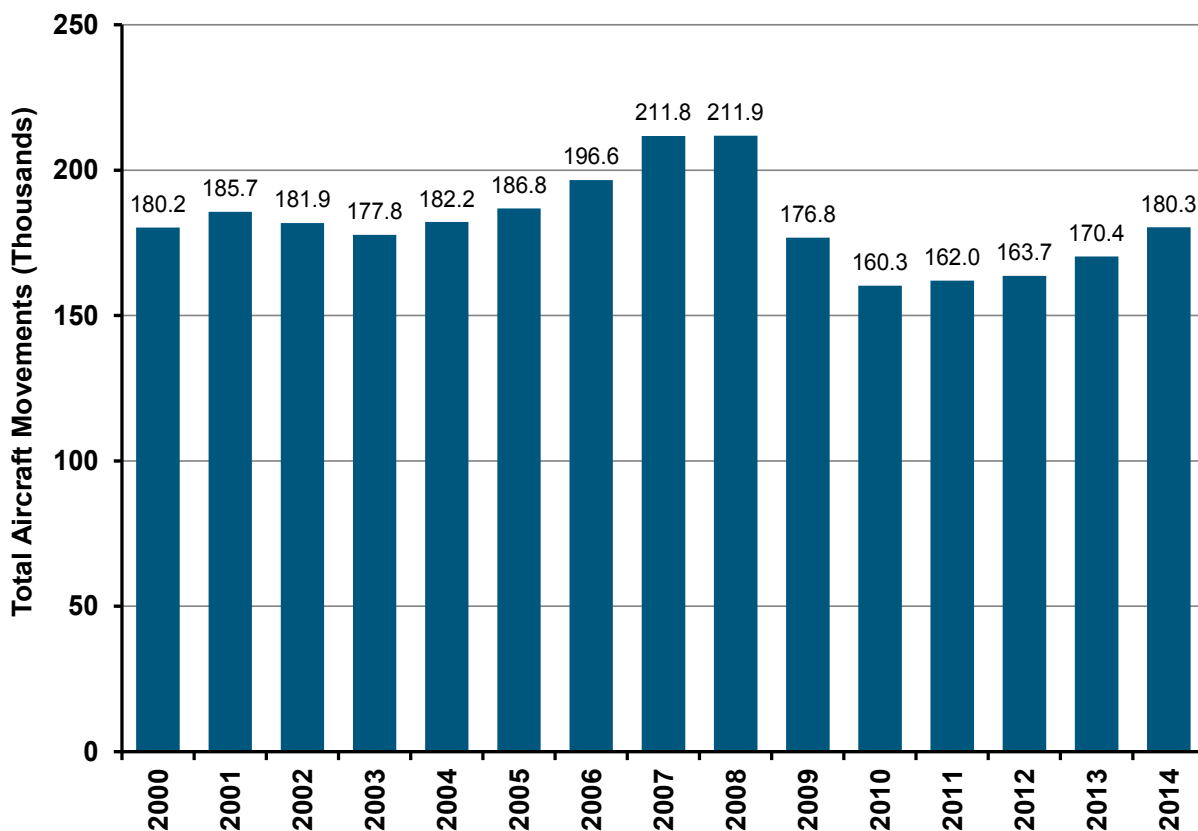
Figure 3-3: Air Cargo at Dublin Airport, 2001-2014



Source: daa.

Total aircraft movements (landings and take-offs) at Dublin Airport are shown in **Figure 3-4**. Aircraft movements reached a historic high in 2007 of nearly 212,000 annual movements. The impact of the global financial crisis on passenger numbers, as well as changes in aircraft types serving Dublin Airport, produced an overall reduction in the number of movements post-2008. Since 2010, total movements have grown by 12.4%.

Figure 3-4: Total Aircraft Movements at Dublin Airport, 2000-2014



Source: daa.

3.3 Overview of Dublin Airport’s Air Services

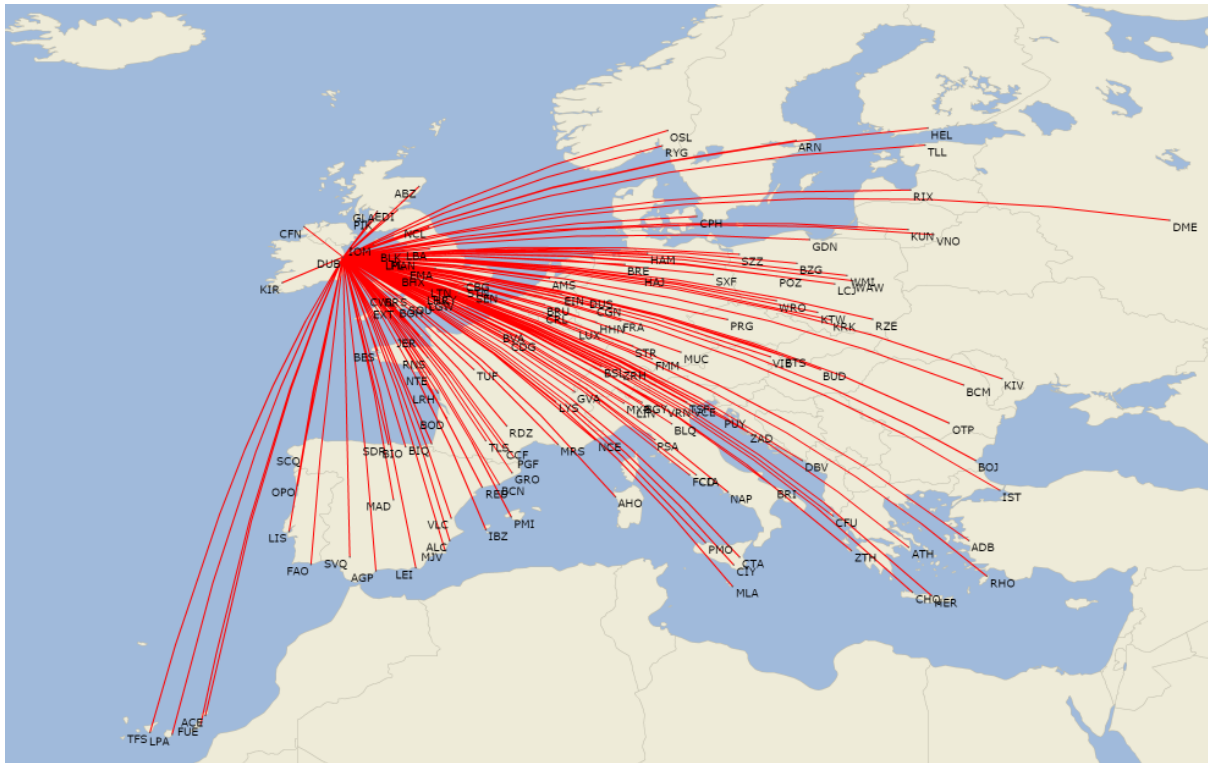
As Ireland’s largest airport, Dublin Airport serves as the nation’s primary regional and international gateway. **Figures 3-5** and **3-6** show the scheduled passenger routes served from Dublin Airport in 2014. A total of 174 non-stop scheduled routes were operated from Dublin Airport by 34 air carriers.¹⁶ Of these routes, 27% were served by more than one carrier and 83% were operated on at least a daily basis year round.¹⁷ A total of 61 non-stop destinations from Dublin Airport operated at least daily service, and 9 destinations were operated with five or more daily flights.¹⁸ On average, there were 222 scheduled commercial aircraft departures each day from Dublin Airport in 2014.

¹⁶ Source: Diio schedule data for 2014.

¹⁷ *Ibid.*

¹⁸ Destinations with five-times daily service or greater: London Heathrow, London Gatwick, Manchester, Paris Charles de Gaulle, Birmingham, London Stansted, Edinburgh, London City and Bristol.

Figure 3-5: Dublin Airport’s European Route Network (2014)



Source: Diio Schedule Data for 2014.

Figure 3-6: Dublin Airport’s Global Route Network (2014)



Source: Diio Schedule Data for 2014.

As summarised in **Figure 3-7**, passenger air services at Dublin Airport connect Dublin to 38 countries across four continents. In total, these countries represent 18% of the world’s population and 55% of global GDP.¹⁹ Dublin is directly connected by non-stop service to 154 destinations in Europe and to all but two of the 28 European Union member states.²⁰ In addition to the routes listed below, a number of new routes are scheduled to start in 2015 including Addis Ababa (Ethiopia), Reykjavik (Iceland) and Los Angeles (United States).

Figure 3-7: Countries Directly Connected to Dublin by Air Service from Dublin Airport (2014)

Europe [31 countries]	
Austria (3)	Luxembourg (1)
Belgium (2)	Malta (1)
Bulgaria (1)	Moldova (1)
Croatia (3)	Netherlands (2)
Czech Republic (1)	Norway (2)
Denmark (1)	Poland (12)
Estonia (1)	Portugal (3)
Finland (2)	Romania (3)
France (20)	Russia (1)
Germany (12)	Slovakia (1)
Greece (6)	Spain (19)
Hungary (1)	Sweden (1)
Ireland (2)	Switzerland (3)
Italy (17)	Turkey (2)
Latvia (1)	United Kingdom (26)
Lithuania (3)	
Africa [3 Countries]	Americas [2 Countries]
Egypt (1)	Canada (3)
Morocco (2)	United States (10)
Tunisia (1)	Middle East [2 Countries]
	Israel (1)
	United Arab Emirates (2)

Source: Diio Schedule Data for 2014.
 Figures in parenthesis indicate the number of routes operated to that country.

¹⁹ Source: World Bank Data Catalog: <http://data.worldbank.org/data-catalog>.

²⁰ Non-stop service is available to all EU28 countries except for Cyprus and Slovenia.

Figure 3-8 shows the total scheduled seat capacity operated by the top 15 carriers at Dublin Airport in 2014. Dublin Airport is home to two major carriers: Aer Lingus and Ryanair. The presence of two such carriers allows the airport to develop dense network of services to a wide range of destinations, particularly where passenger flows can be pooled to support developing air services.

Aer Lingus offered 5.8 million seats in 2014 (including regional capacity operated by Stobart Air) and Ryanair offered 5.3 million seats. Combined, the two home carriers accounted for over 80% of seat capacity at Dublin Airport. British Airways, Lufthansa, Etihad, Air France and Emirates are the five largest overseas airlines at Dublin Airport, by share of seat capacity, accounting for 8.8% of capacity. In total, 34 air carriers provided scheduled service at Dublin Airport in 2014.

Figure 3-8: Outbound Seat Capacity by Carrier at Dublin Airport, 2014

Carrier	Outbound Seat Capacity (Thousands)	% Share of Total Seat Capacity
1. Aer Lingus	5,754	41.8%
2. Ryanair	5,315	38.6%
3. British Airways	391	2.8%
4. Lufthansa	233	1.7%
5. Etihad Airways	199	1.4%
6. Air France	198	1.4%
7. Emirates	194	1.4%
8. FlyBE	176	1.3%
9. Scandinavian Airlines	167	1.2%
10. CityJet	153	1.1%
11. Delta Air Lines	125	0.9%
12. United Airlines	122	0.9%
13. US Airways	107	0.8%
14. Turkish Airlines	91	0.7%
15. American Airlines	84	0.6%
20. Iberia	47	0.3%
Other Airlines	408	3.0%
Total	13,764	100.0%

Source: Diio Schedule Data for 2014. Figures based on marketing rather than operating carrier.
Notes: Numbers may not add up due to rounding.

3.4 Measuring Airport Connectivity

“As an island nation, excellent air connectivity for passengers and freight is particularly important. Access to markets is one of the key factors for companies in deciding where to locate. Good international access (e.g. range of destinations, frequency, and cost) coupled with effective airport facilities and internal connectivity are key factors in mitigating the impact of Ireland’s peripheral location in the eyes of potential investors, overseas customers, mobile employees and tourists...

... Key to ensuring Ireland’s direct connectivity needs [is]... developing Dublin Airport as a hub to increase demand to support the development of greater long-haul direct connectivity particularly to the Far East.”

Joint Statement by Forfás/Enterprise Ireland/IDA Ireland, July 2014 ²¹

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 only to 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 particularly the case for Ireland as a small open economy positioned on the western tip of Europe. Air access is critical for Ireland’s economic development. 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.

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 spoke ends. For example, direct service to 40 small regional destinations does not have the same importance as direct connections to 40 major global markets.

²¹ <http://www.aviationreg.ie/fileupload/2014ddresponses/2014-07-31%20Enterprise%20Agencies.pdf>.

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 2013, Atlanta airport was the world's largest airport, and so was given a weighting of one. London Heathrow, which handles 80% of the number of passengers handled by Atlanta, was given a weighting of 0.80. 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 800. 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:

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

Scalar factor of 1000

A higher figure for the connectivity indicator denotes a greater degree of access to the global air transport network. **Figure 3-9** shows the connectivity scores of European airports in 2013. The highest ranked airports are major hubs such as Heathrow, Frankfurt and Paris CDG. Dublin Airport ranks 14th in Europe, just behind Berlin and Dusseldorf and ahead of Stockholm, Brussels and Gatwick. Dublin ranks ahead of Gatwick, despite the latter handling considerably more passenger traffic (35.4 million vs 20.2 million at Dublin), due to Dublin's more extensive network, especially in long-haul.

Few European airports can match Dublin Airport's connections to Ireland's established markets of Britain and the United States. For example, in 2014 Dublin Airport served more routes and operated more frequencies to Britain than either Frankfurt or Paris Charles de Gaulle and almost as many as Amsterdam.²² During Summer 2014, Dublin Airport had more weekly frequencies to North America than either Munich or Zurich.²³ In addition, Dublin Airport is developing its European links and expanding into the Middle East, Africa and beyond.

As shown in Figure 3-9, Dublin has achieved comparable levels of connectivity to Barcelona, Copenhagen, Berlin, Stockholm and Brussels, cities that are arguably competitors to Dublin for tourism, trade and FDI. However, to remain competitive with or overtake these cities,

²² Source: Diio Schedule Data for 2014. Dublin has service to 26 airports in Britain with a average daily frequency across all routes of 104 per day, This compares with 8 Routes / 37 per day for Frankfurt, 18 routes / 46 per day for Paris CDG, and 28 routes / 114 per day for Amsterdam.

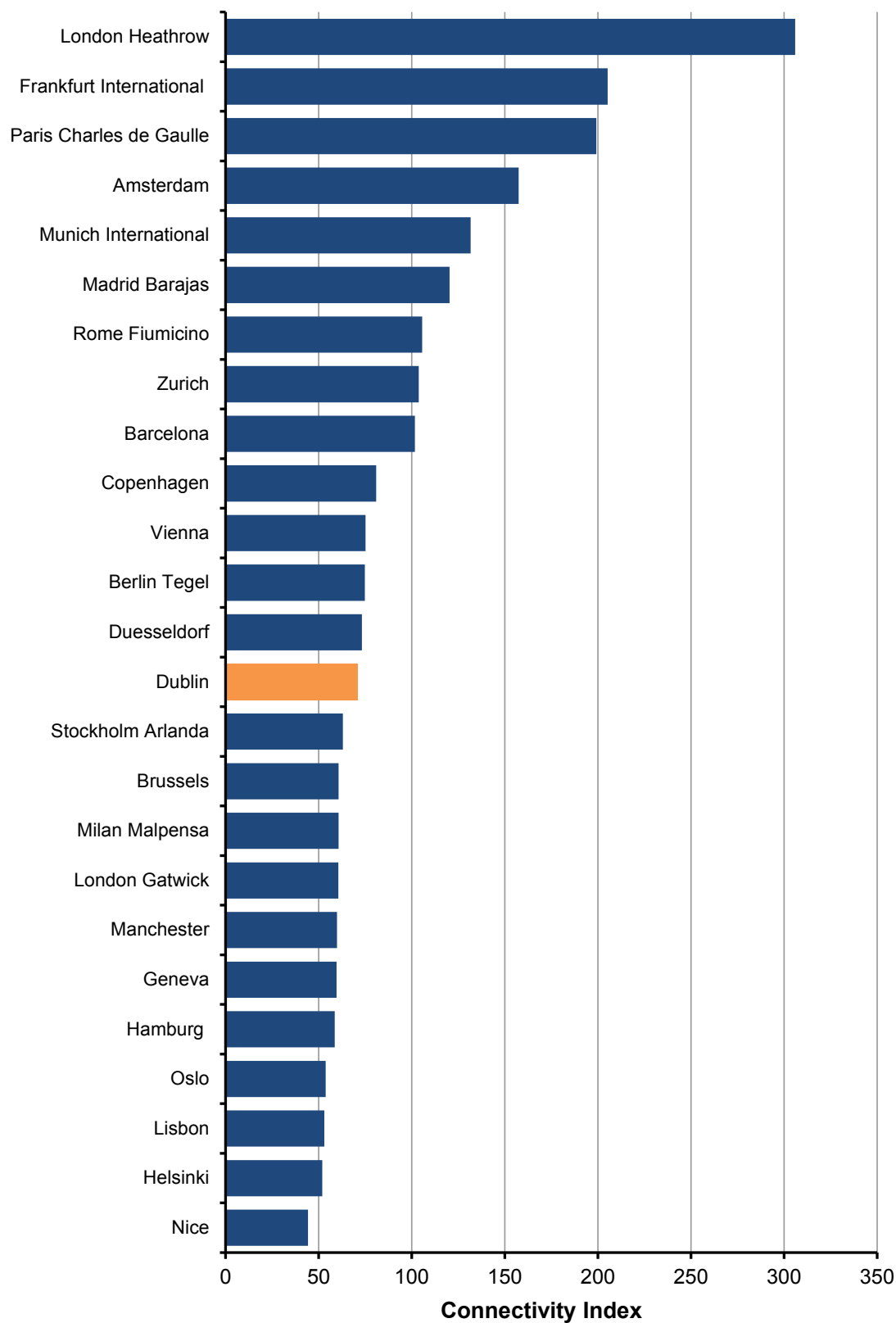
²³ Source: Diio Schedule Data for Summer 2014. Dublin had 268 frequencies per week to North America, compared with 262 for Munich and 234 for Zurich.

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 and development for Dublin and Ireland, as increased air connectivity facilitates increased trade, tourism, investment and economic growth (as documented in Chapter 6).

“Dublin Airport is strategically important to businesses like PayPal and to our local and national economy. The Airport is the international gateway to Ireland. It makes a first and lasting impression on our visitors; whether they are tourists, business people or investors. Many of our PayPal teammates use the airport regularly – the ease with which they can access and travel through Dublin Airport helps them stay connected with friends and family overseas. Investment in Dublin Airport opened Ireland up to global opportunities and positioned us to win FDI and attract talent to our shores. Continued investment in Dublin Airport will continue to deliver rewards for existing and potential businesses, for our economy and for our country.”

PayPal, January 2015

Figure 3-9: Top 25 European Airports Based on the IATA Connectivity Index (2013)



Source: Based on Diio Schedule Data and Passenger Traffic Data for 2013.

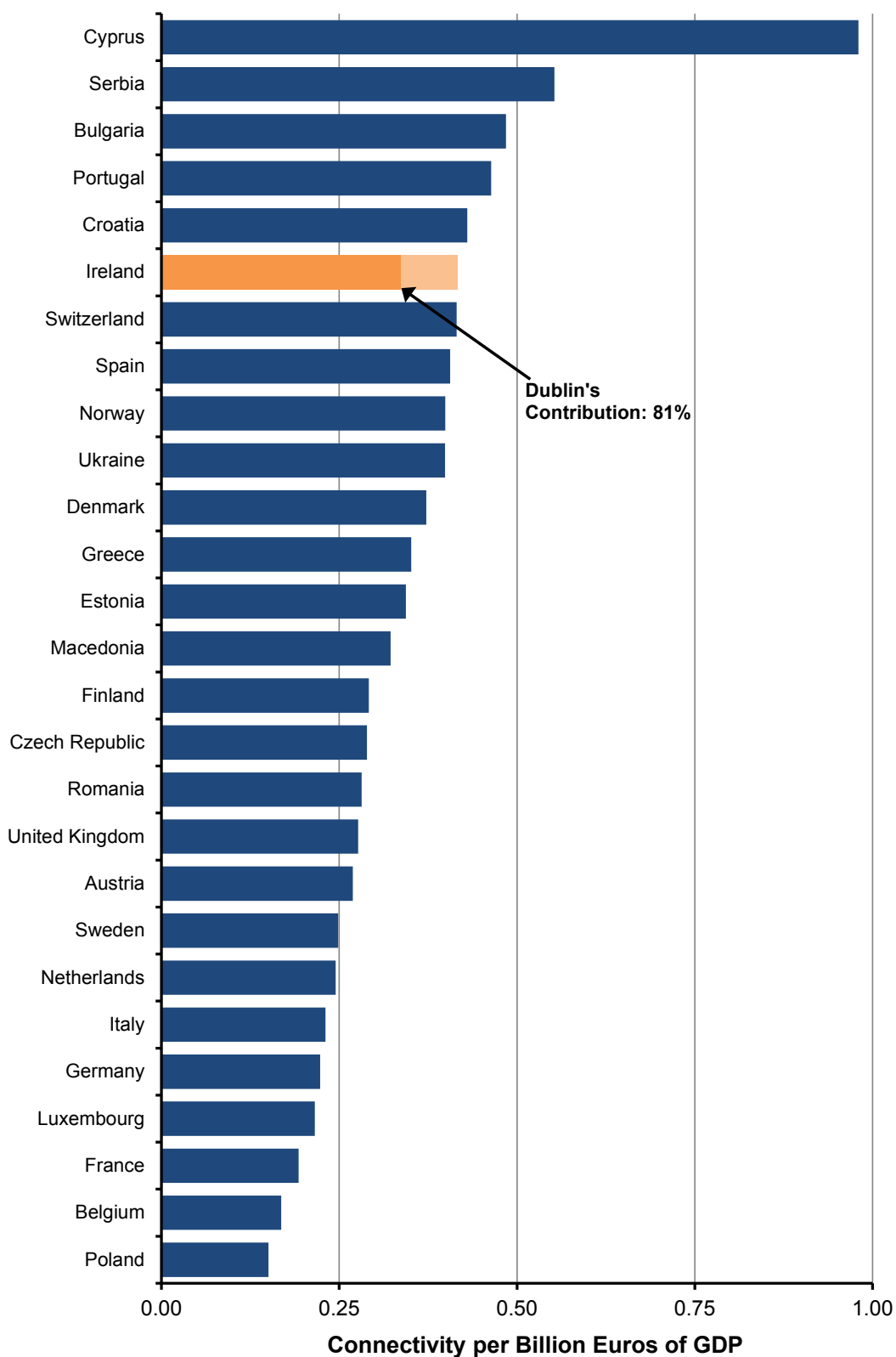
The airports with the highest connectivity tend to be those serving relatively large economies with large populations, such as the UK, Germany and France. Dublin Airport's contribution to connectivity is even more pronounced when compared against the size of its economy or its population. **Figure 3-10** shows national connectivity (the aggregate of the connectivity scores of all major airports in the country) divided by the country's GDP, while **Figure 3-11** shows national connectivity divided by population. Ireland's connectivity index includes the combined connectivity scores of Dublin, Cork, Shannon, Knock, Kerry and other airports. However, Dublin accounted for 81% of the nation's total connectivity score in 2013.

As can be seen, Ireland has one of the highest GDP-adjusted connectivity scores in Europe, 50% higher than that of the UK and almost twice that of Germany. Dublin Airport alone contributes higher connectivity per Euro of GDP than either the UK or Germany.

Similarly, Ireland's connectivity per million of population is above most other European nations. With the exception of Switzerland, the most highly connected countries on a per capita basis are islands or somewhat inaccessible (Norway), reflecting the importance of air connectivity for these sort of countries.

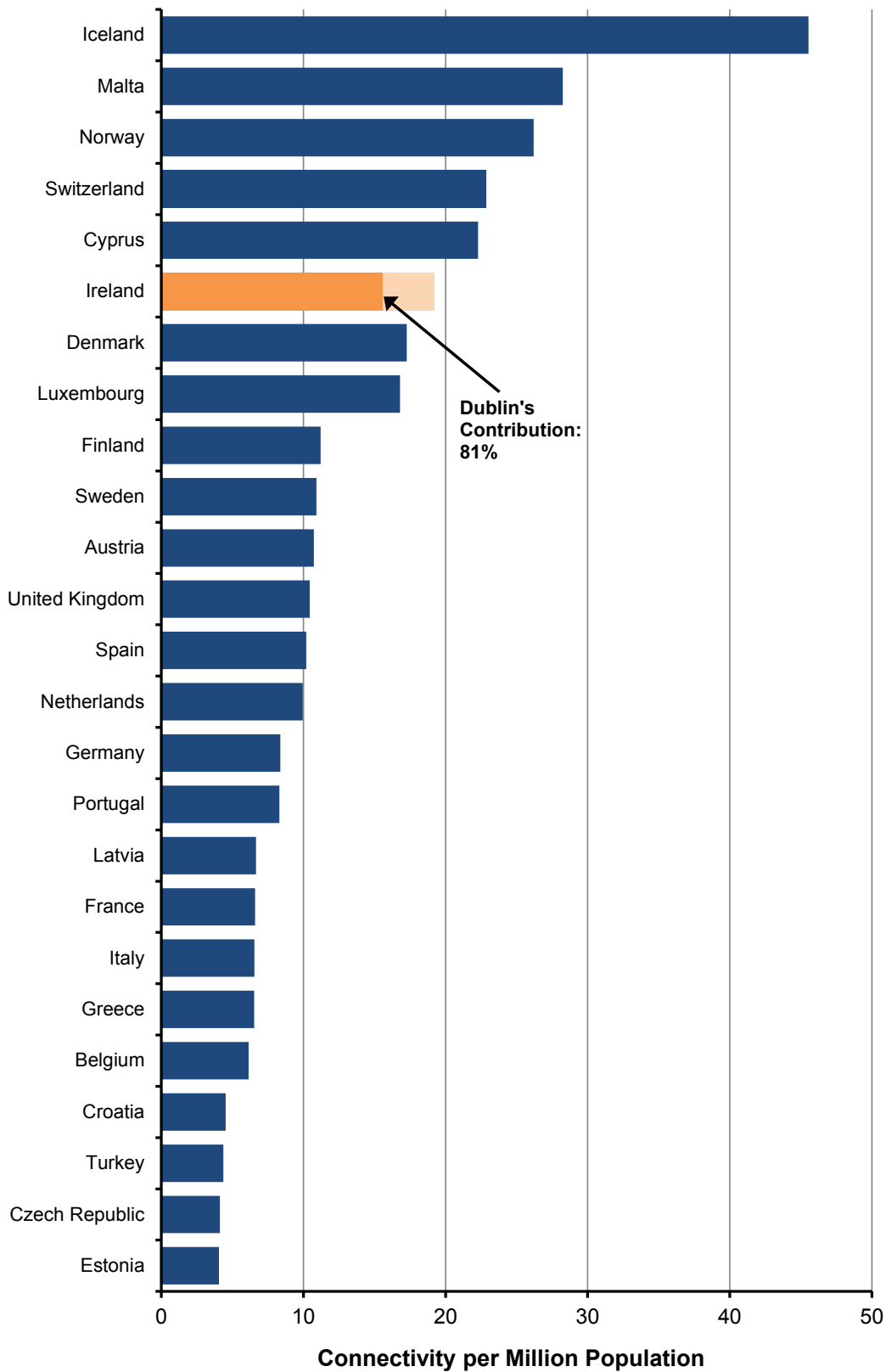
This analysis demonstrates that Dublin Airport is a major hub for the country and a critical contributor to Ireland's connectivity with the rest of the world. As Chapter 6 discusses, this connectivity has important implications for the wider economy of Ireland.

Figure 3-10: Connectivity Relative to Gross Domestic Product (2013) – Top 25 Countries



Source: Based on Diio Schedule Data, Passenger Traffic Data and World Bank Data for 2013.

Figure 3-11: Connectivity Relative to Population (2013) – Top 25 Countries



Source: Based on Diio Schedule Data, Passenger Traffic Data and World Bank Data for 2013.

4 Direct Employment Impacts of Airport Activity

Key Points

- Direct employment at Dublin Airport amounts to 15,700 jobs (14,000 FTEs).
- The average full-time wage/income is €45,600, 16% higher than the national average.
- Airport activity supports a range of occupations and skill levels. Over a quarter (27%) of the employment is in managerial or skilled employment
- While 83% of the employment is onsite at the airport, 2,680 jobs are created in the rest of the country, including Fingal, Dublin and the rest of Ireland.

This chapter documents the economic impact of ongoing operations at Dublin Airport in 2013 in terms of its direct employment and income/wages. Breakdowns of the employment and economic impact by industry, occupation and region are also provided.

4.1 Overall Direct Employment

“Dublin Airport is and has been for many years a major provider of a wide range of high quality jobs for large numbers of people in Fingal and the Dublin City Region which is why the Chamber believes that the future growth of Dublin Airport is important for the continued economic development of Fingal, the Greater Dublin Region and the country as a whole.”²⁴

“Dublin Airport is recognised as a key component in attracting Foreign Direct Investment companies to Ireland with its modern facilities and ease of access to the rest of the country. The opening of Terminal 2 provides an excellent example of investment in quality infrastructure supporting further growth in air travel. Long-haul airlines require facilities of this standard and will respond by growing their business through the airport. The routes to the Middle East are a prime example of this.”

Fingal Dublin Chamber, 2014

²⁴ <http://www.aviationreg.ie/fileupload/2014ddresponses/2014-07-31%20Fingal%20Dublin%20Chamber.pdf>.

The direct employment impacts of Dublin Airport are provided in **Figure 4-1**. Direct employment related to ongoing operations at Dublin Airport amounts to 15,700 jobs. After adjusting for part-time and seasonal employment, these jobs equate to 14,000 full-time equivalents (FTEs).

These employees received a total of estimated €639 million in income/wages in 2013, providing an average of €45,600 per FTE. This is 16% higher than the national full-time earnings in 2013.²⁵

Figure 4-1: Direct Employment Impacts Generated by Dublin Airport

	Direct Employment Impacts
Number of Jobs	15,700
Full-Time Equivalent Jobs (FTEs)	14,000
Income/Wages	€639 Million
Average Income per FTE	€45,600

As shown in **Figure 4-2**, the survey results show that the vast majority (77%) of direct jobs generated by Dublin Airport are permanent full-time positions, while 14% are permanent part-time positions and 9% are seasonal positions (e.g., additional employment at busy times of the year).

Figure 4-2: Full-Time, Part-Time and Seasonal Jobs Generated by Dublin Airport

	Direct Jobs	Percentage
Permanent Full-Time Jobs	12,100	77%
Permanent Part-Time Jobs	2,200	14%
Seasonal Jobs	1,400	9%
Total Jobs	15,700	100%

Numbers may not add up due to rounding.

²⁵ Based on data from Central Statistics Office Ireland, average earnings were €21.70 per hour in 2013. Multiplied by average hours per annum (see Appendix C), the average full-time wage is €39,300.

4.2 Direct Employment by Business Type

A breakdown of the direct employment (in terms of jobs) at Dublin Airport is provided in **Figure 4-3**:

- **Airlines** account for 5,290 jobs (4,720 FTEs) in 2013, 34% of the direct jobs generated by Dublin Airport. This category includes scheduled and charter air carriers.
- **daa**, the operator of Dublin Airport is the second largest employer group at the airport, accounting for 2,350 jobs (2,090 FTEs) at the airport in 2013, 15% of total direct employment. This is the employment associated with the operation and management of Dublin Airport and daa head office.²⁶ It does not include daa employment associated with the operation of Cork Airport.
- **Ground Handling and Other Support** includes ground-handling (loading and unloading of baggage, aircraft cleaning and turnaround, etc.), aircraft fuelling, private security services, cleaning services and other support services. This category of business employs 2,080 jobs (1,840 FTEs), 13% of the total.
- **Ground Transport** includes taxis, buses, car rental and car parking. This category accounts for 1,900 jobs (1,730 FTEs), 12% of all direct employment.
- **Retail and Food & Beverage** services in the Dublin Airport buildings account for 1,600 jobs (1,320 FTEs), 10% of the total.
- **Maintenance, Repair and Overhaul** accounts for 730 jobs (670 FTEs), 5% of total direct employment. These organisations manage the mechanical requirement of the aviation industry, such as aircraft maintenance and repair and parts supply and manufacturing.
- **Government Agencies** include the Irish Aviation Authority (including air traffic control), customs and immigration and U.S. preclearance. These agencies account for 720 jobs (5% of employment).
- **Logistics, Warehousing and FBOs (Fixed Base Operation or General Aviation)** account for 710 jobs (630 FTEs), 5% of total employment.
- **Hotels**, providing accommodation for airline crews and transiting passengers, account for 320 jobs (280 FTEs), less than 2% of employment.²⁷

²⁶ The figure includes daa employees involved in car parking and retail.

²⁷ Surveyed hotels were asked to estimate the proportion of their business that related to accommodating airline crews and transit passengers. Only that proportion of the employment has been included in the estimates.

Figure 4-3: Direct Employment (Jobs) by Business Type



The direct benefit to business related to airport activity is illustrated in the box below, which discusses the traffic volumes that bus and coach operator Bus Éireann has achieved on inter-regional routes serving Dublin Airport.

“Dublin Airport has been very important for our inter-regional services development, particularly in the last 4-5 years. Since 2010, passenger numbers on our services to/from Dublin Airport have grown by an average of 13% per annum. These trips are entirely based (origin/destination) outside Dublin City and County and as far away as Donegal, using Dublin Airport as a transport hub.”

Bus Éireann, December 2014

4.3 Direct Employment by Occupation

Dublin Airport is a source of a wide variety of job categories and positions. **Figure 4-4** shows the distribution of direct jobs by job category in 2013. As can be seen, the largest occupation type is customer services / cashiers, accounting for 20% of direct employment. This category includes airline customer services, retail and food & beverage cashiers, car rental agents and other sales staff. Nearly a quarter (24%) of the employment is in managerial or skilled employment (professional/managers, pilots, air traffic control and craftsmen/mechanics).

Figure 4-4: Direct Employment by Occupation (Jobs)

	Direct Jobs	Percentage
Cashiers / Customer Services	3,080	20%
Food Preparation / Cleaning / Manual	2,700	17%
Professional / Managers	2,180	14%
Flight Crew	1,750	11%
Drivers	1,190	8%
Security / Government	1,050	7%
Aircraft Loading / Unloading / Ramp	910	6%
Pilots	630	4%
Craftsmen / Mechanics	570	4%
Air Traffic Controllers	300	2%
Other	1,340	9%
Total Jobs	15,700	100%

Numbers may not add up due to rounding.

4.4 Direct Employment by Location

The location of the employment by region is provided in **Figure 4-5**. The location is based on the location of business where the employment takes place (rather than the residence of the employee). As can be seen, 83% of the direct employment is at the airport, with a further 6% in the surrounding Fingal region. Approximately 8% of employment is in the Rest of Dublin, the largest element of which is taxi employment (allocated on the basis of the location of the taxi firm), as well as company headquarters.

Figure 4-5: Direct Employment by Location (Jobs)

	Direct Jobs	Percentage
At Airport (On-Site)	13,020	83%
Rest of Fingal	930	6%
<i>Fingal Sub-Total</i>	<i>13,950</i>	<i>89%</i>
Rest of Dublin	1,220	8%
Rest of Leinster	100	<1%
Rest of Ireland	430	3%
Total Jobs	15,700	100%

Numbers may not add up due to rounding.

5 Indirect and Induced Impacts of Airport Activity

Key Points

- Including multiplier impacts, the employment generated totals 37,300 jobs (33,100 FTEs), earning €1.4 billion in income/wages.
- The total GVA generated is nearly €2.8 billion, approximately 1.6% of the GDP of Ireland in 2013.
- 52% of the total employment occurs in Fingal, due to the presence of the airport in that county. A further 23% occurs in the rest of Dublin and 25% occurs in the rest of the country.

As noted previously, the economic impact of Dublin Airport does not end with the direct impacts. Other sectors of the economy benefit from the activities at Dublin Airport. As described in Section 1.2, this includes *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. The indirect and induced impacts were estimated using economic multipliers derived from government data, detailed in Chapter 2 and the appendices. The direct GVA was also estimated using these economic multipliers.

5.1 Overall Multiplier Impacts of Dublin Airport

The direct and multiplier economic impact of Dublin Airport is summarised in **Figure 5-1**. Using economic multipliers, it was estimated that in addition to the 15,700 direct jobs, the airport generates 9,600 indirect jobs (8,500 FTEs) and 12,000 induced jobs (10,600 FTEs) in 2013. In total, the employment generated is 37,300 jobs (33,100 FTEs), earning a total of €1.4 billion in income/wages. To put that in context, this number of jobs is roughly equivalent to employing the entire town of Swords.²⁸

The total GVA generated is €2.8 billion, approximately 1.6% of the GDP of Ireland in 2013.²⁹

²⁸ Source: CSO Ireland: Census 2011 Results. Population of the town of Swords: 36,924.

²⁹ Based CSO data, the GDP of Ireland was €174.8 billion in 2013.

Figure 5-1: Direct and Multiplier Impacts of Dublin Airport

Impact Type	Jobs	FTEs	Income (€ Million)	GVA (€ Million)
Direct	15,700	14,000	639	1,256
Indirect	9,600	8,500	373	717
Induced	12,000	10,600	397	781
Total	37,300	33,100	1,409	2,753

Numbers may not add up due to rounding.

The ratio of indirect+induced jobs to direct jobs is 1.38, indicating that there are 1.38 indirect and induced jobs generated for each direct job.³⁰ Similarly, the ratio for GVA is 1.19 – for each €1 of direct GVA, there is €1.19 of indirect and induced GVA.³¹ While, as noted in Section 2.5, these multiplier ratios can vary depending on the nature of the industry and the structure of the economy, the ratios in this study are in line with results for other airports elsewhere in the world. For example, a 2014 study of Heathrow airport found an indirect+induced jobs to direct jobs ratio of 1.29.³² A study for Munich airport produced a ratio of 1.64,³³ and for Brussels Airport the ratio was estimated to be 1.90.³⁴

The total GVA estimate of €2.8 billion includes the nearly €1.4 billion in income/wages, as GVA is made up of income/wages, operating surpluses (profits) and consumption of fixed capital. Approximately 52% of the GVA impact is income/wages. The remaining 48% of GVA comprises the operating surplus of the relevant firms and their consumption of capital. The aviation industry is fairly capital intensive (e.g., aircraft, specialised equipment, airport infrastructure, etc.) and therefore capital consumption contributes considerably to the GVA figure.

³⁰ $(37,300 / 15,700) - 1 = 1.38$.

³¹ $(2,753 / 1,256) - 1 = 1.19$.

³² <http://your.heathrow.com/wp-content/uploads/2014/05/TBF-Volume-2-72dpi-jm.pdf>.

³³ <http://www.munich-airport.de/en/company/dialog/oekonom/effekte1/index.jsp>.

³⁴ <http://www.brusselsairport.be/en/mediaroom/news/37532/>.

“Dublin Airport handles 80% of Irish air traffic and is the most critical access for air transport in the country. Dublin Airport is essential to the continued development of the economic, business and tourism life both for Dublin and the country as a whole.

If Dublin, and the Greater Dublin Area, is to realise its potential as the engine of national growth, it is important that it has an airport with the necessary infrastructure that supports the long run requirements of businesses, tourists and international workers.”

Dublin Chamber of Commerce, July 2014 ³⁵

5.2 Multiplier Impacts by Region

The estimated direct and multiplier impacts by region are provided in **Figure 5-2**. The location of the multiplier impacts were estimated using responses to survey questions regarding the location of the business spending on goods and services, and CSO Ireland data on the national distribution of employment and GVA.

Including multiplier impacts, 52% of the employment (19,550 jobs) occurs in Fingal, due to the presence of the airport in that county. A further 23% (8,720) occurs in the rest of Dublin and 25% (9,030 jobs) occurs in the rest of the country (i.e., Rest of Leinster and Rest of Ireland).

³⁵ <http://www.aviationreg.ie/fileupload/2014ddresponses/2014-07-31%20Dublin%20Chamber.pdf>.

Figure 5-2: Direct and Multiplier Impacts of Dublin Airport by Region

Region	Direct	Indirect	Induced	Total
Employment (Jobs)				
Dublin Airport/Fingal	13,950	3,100	2,500	19,550
Rest of Dublin	1,220	3,700	3,800	8,720
Rest of Leinster	100	1,600	2,600	4,300
Rest of Ireland	430	1,200	3,100	4,730
Total	15,700	9,600	12,000	37,300
GVA (€ Million)				
Dublin Airport/Fingal	1,116	232	165	1,513
Rest of Dublin	98	278	248	623
Rest of Leinster	8	116	166	290
Rest of Ireland	34	91	202	327
Total	1,256	717	781	2,753

Numbers may not add up due to rounding.

6 Facilitating the Wider Economy – The Catalytic Impact of Dublin Airport

Key Points

- There is extensive evidence of the linkage between air connectivity and trade, tourism, FDI, business location decisions, productivity growth and economic growth (known as catalytic impacts).
- Analysis of national and regional data shows evidence of the underlying relationship between Dublin Airport's connectivity and economic development.
- The catalytic impacts of Dublin Airport are estimated at 60,100 jobs and €4.2 billion in GVA, equivalent to the 2.4% of national GDP.

Chapter 3 describes the connectivity that Dublin Airport provides for the Irish economy. This high level of connectivity has established Dublin Airport as an important hub for air traffic and the air transport industry generally, which has contributed the direct, indirect and induced economic impacts documented in Chapters 4 and 5. However, it is not just the air transport sector, its suppliers and employees that benefit from air services at Dublin Airport. The air services at Dublin Airport facilitate many other sectors of the economy, including tourism and trade, and contribute to Ireland's attractiveness as a place to do business and to invest. Industries and activities that would otherwise not exist in the country can be attracted by improved air transport connectivity.

As introduced in Chapter 2, the role of air transport in facilitating other parts of the economy is referred to as *catalytic impacts*. These impacts are not generally reflected in Input-Output models of the economy of the sort used to estimate indirect and induced impacts. Input-Output models reflect the purchasing decisions of businesses within the economy, whereas catalytic impacts capture a different relationship between businesses. For example, hotels, restaurants and entertainment places in Ireland do not purchase services from airlines to any great extent, but they do benefit from the large number of tourists arriving in Ireland by air that spend money in their businesses.³⁶ Similarly, a multinational company's decision to locate an office or facility in Ireland partially on the basis of air connectivity is not reflected in the Input-Output models.

Section 6.1 below discusses in more detail the nature of these catalytic impacts and growing evidence of its impact and magnitude. This is followed in Sections 6.2 and 6.3 by estimates of the catalytic impacts facilitated by Dublin Airport.

³⁶ These businesses may purchase air services to support their business activities (e.g., visits to headquarters) but not for the larger number of tourists that benefit their business.

6.1 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.

6.1.1 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) ³⁷	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) ³⁸	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) ³⁹	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.
Poole (2010) ⁴⁰	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) ⁴¹	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%.

³⁷ Cech P. (2004), "The Catalytic Effect of the Accessibility to Air Cargo Services", TIACA Graduate Research Paper Competition.

³⁸ 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.

³⁹ 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

⁴⁰ Poole, J. (2010), "Business Travel as an Input to International Trade", <http://www.scu.edu/business/economics/upload/Poole.pdf>

⁴¹ PWC (2013), "Econometric Analysis to Develop Evidence on the Links Between Aviation and the Economy", Report for the UK Airports Commission, December 2013.

6.1.2 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) ⁴²	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) ⁴³	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) ⁴⁴	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.
Bel and Fageda (2008) ⁴⁵	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.

⁴² 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.

⁴³ 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.

⁴⁴ *Airline Network Benefits*, IATA Economic Briefing No. 3, 2006.

⁴⁵ Bel, G. and Fageda, X. (2008), "Getting There Fast: Globalization, Intercontinental Flights and Location of Headquarters", *Journal of Economic Geography*, Vol. 8, No. 4.

Paper	Methodology	Key Findings
Arndt et al. (2009) ⁴⁶	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) ⁴⁷	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.

6.1.3 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) ⁴⁸	Used data from 321 US metropolitan areas in 1994 to regress 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) ⁴⁹	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.

⁴⁶ 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.

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

⁴⁸ 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.

⁴⁹ Button, K. and Taylor, S. (2000), "International air transportation and economic development", *Journal of Air Transport Management*, Vol. 6, Issue 4, October 2000.

Paper	Methodology	Key Findings
Brueckner (2002) ⁵⁰	Regressed employment in 94 metropolitan areas in the US against a number of factors including measures of air service.	A 10 percent increase in passenger enplanements in a metropolitan area leads to an approximately 1 percent increase in employment in service-related industries.
Ishutkina and Hansman (2009) ⁵¹	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.
PWC (2013) ⁵²	Estimated an Error Correction Model of UK GDP and air seat capacity between 1991 and 2010.	A 10% change in the growth rate of seat capacity leads to approximately a 1% change in the growth rate of GDP. The analysis also found evidence of a two-way relationship between the variables – GDP growth causes seat capacity and seat growth causes GDP growth.
ACI Europe/ InterVISTAS	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.

⁵⁰ Brueckner, J. (2002), “Airline Traffic and Urban Economic Development”.

⁵¹ 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.

⁵² PWC (2013), “Econometric Analysis to Develop Evidence on the Links Between Aviation and the Economy”, Report for the UK Airports Commission, December 2013.

6.1.4 Conclusions

A body of research has developed over the last 15 years or so 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.

6.2 Linkage Between Dublin Airport's Connectivity and the Economy

“With nearly 70% of all visitors to the Republic of Ireland arriving through Dublin Airport it is vital that we continue to invest in enhancing the airport to deliver the best possible arrival experience in line with our reputation for a great welcome. Tourism Ireland is very committed to delivering ten million visitors to Ireland by 2025, in line with the National Tourism Policy for Ireland, and the increased air connectivity needed to deliver this stretching goal will require an early commitment to the substantial expansion of the services available at Dublin Airport in particular.”

Tourism Ireland, November 2014

To explore Dublin Airport's contribution to the national and regional economy, analysis was conducted of the relationship between connectivity at the airport and key economic indicators over time. Connectivity at Dublin Airport was measured using the IATA connectivity index described in Section 3.4, and the economic indicators were:

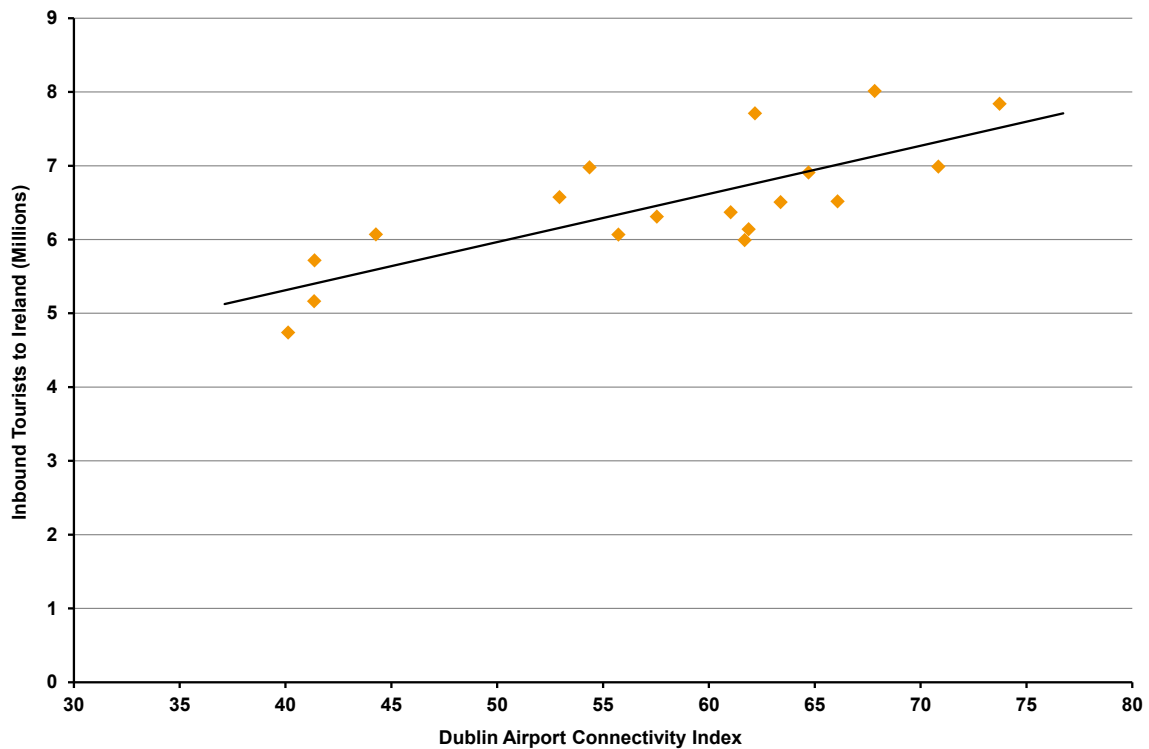
- Inbound tourism to the Republic of Ireland;
- The total value of exports from Ireland;
- Inward Foreign Direct Investment (FDI);
- The GDP of the Republic of Ireland;
- The regional GVA of Dublin and the Mid-East region.

The scatter plots below show the relationship between connectivity at Dublin Airport and each of these economic indicators for a period of 10-15 years (depending on data availability). In each case, the plots demonstrate a positive correlation between connectivity and the economic indicator. In some cases, there is considerable scatter of observations which is not surprising, given that there a large number of other factors that affect the economic indicators. However, even given these sources of variation, there appears to be a clear pattern visible with these simple plots.

Tourism

Figure 6-1 shows a clear and fairly strong relationship between connectivity and inbound tourism over time. Increases in air connectivity are associated with increases in tourism. As noted in Chapter 1, it is not being argued that air service creates tourism but rather than it facilitates tourism. Without effective air links, the volume of tourism would be considerably lower than would otherwise be the case.

Figure 6-1: Inbound Tourists to Ireland and Dublin Airport Connectivity, 1996-2013

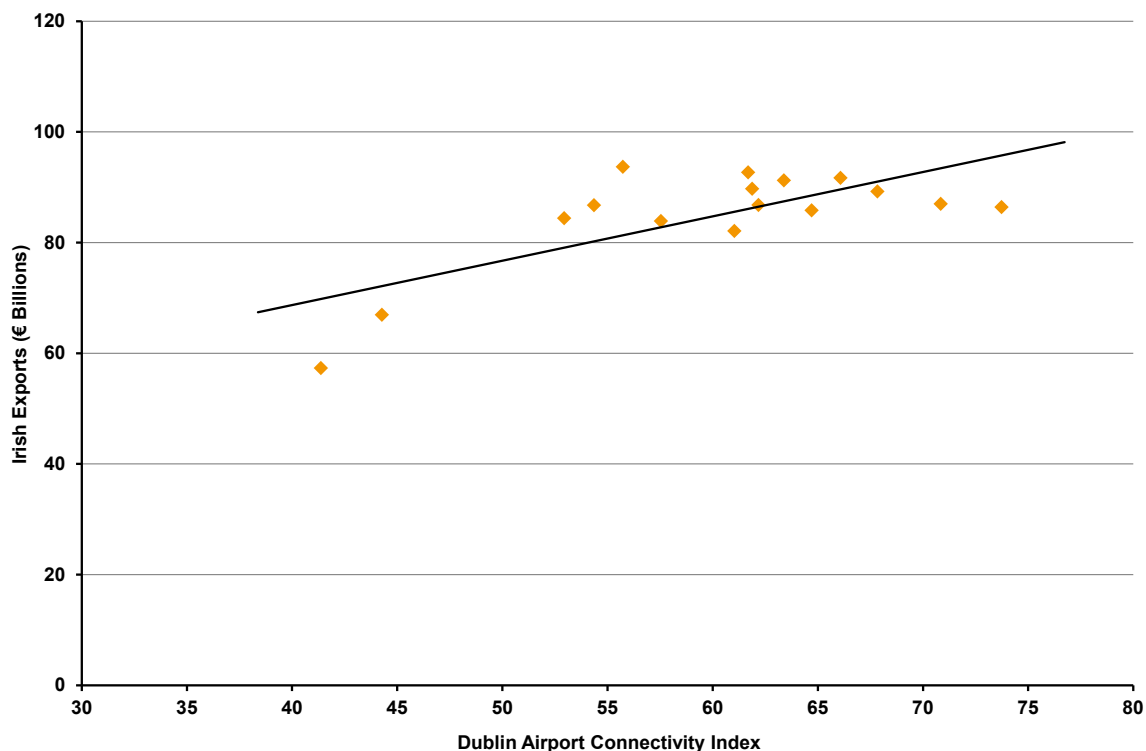


Source: Diio Schedule Data and Failte Ireland.

Exports

Similar to the previous chart, **Figure 6-2** shows a clear and fairly strong relationship between connectivity and the value of Irish exports, indicating that increases in air connectivity are associated with increases in Ireland’s total exports.

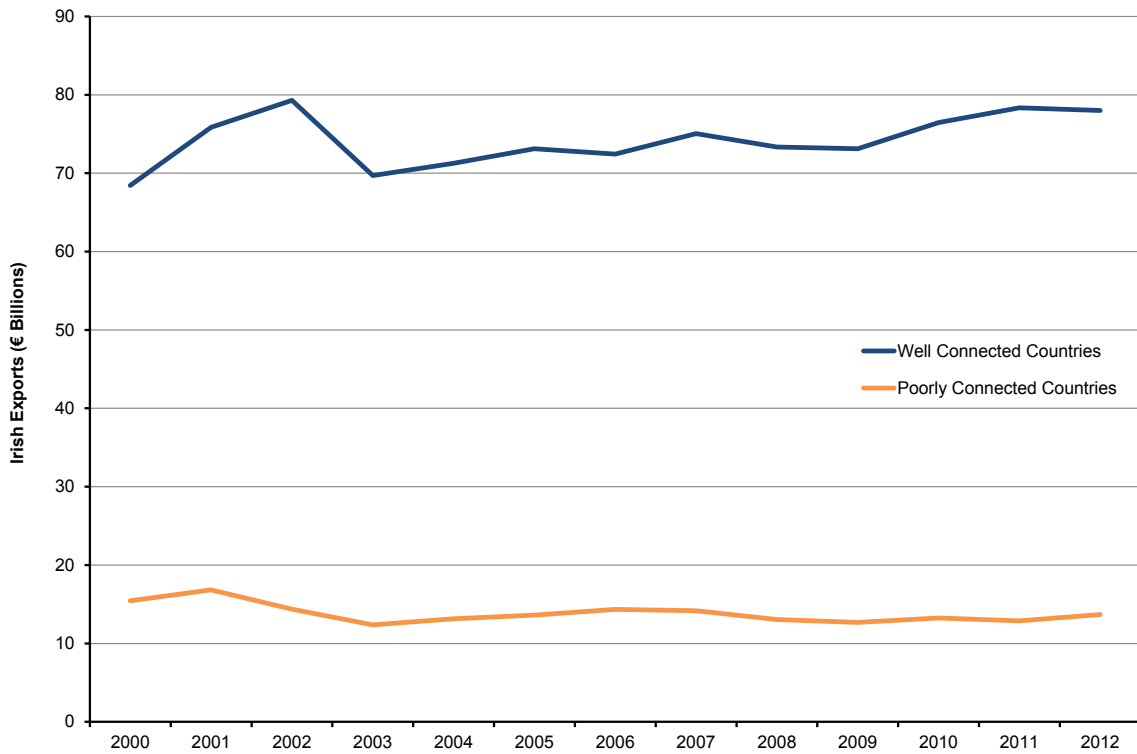
Figure 6-2: Irish Exports and Dublin Airport Connectivity, 1998-2013



Source: Diio Schedule Data and Central Statistics Office Ireland.

The relationship between connectivity of Dublin Airport and Ireland’s export trade is further illustrated in **Figure 6-3**. 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 five to six times that of trade with poorly connected countries. Furthermore, between 2002 and 2012, the value of exports to well-connected countries increased by 14%, but declined by 11% to poorly connected countries.

Figure 6-3: Ireland’s Exports and Direct Services from Dublin Airport, 2000-2012



Source: Diio Schedule Data, Central Statistics Office Ireland and U.N. Comtrade Database.

Passenger services play a vital role in the development of trade through the bellyhold capacity provided on such services.

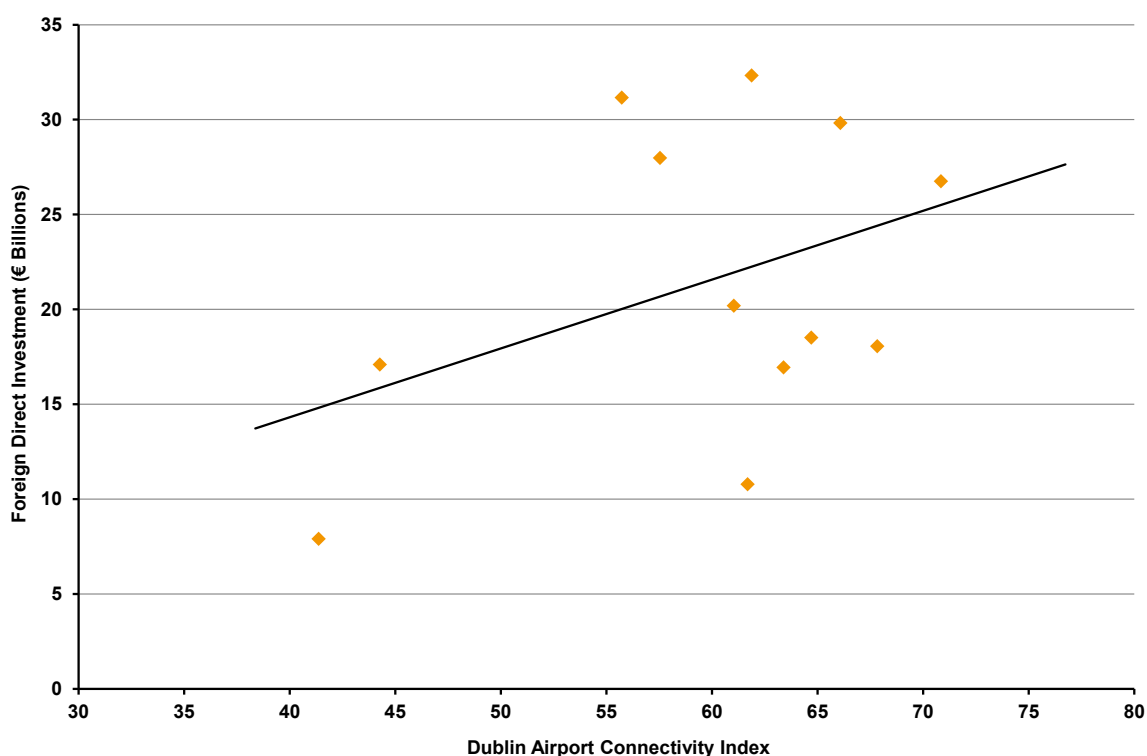
In 2013, cargo tonnage at Dublin Airport reached a record level of 127,471 tonnes, an increase of 26,300 tonnes since 2011. daa calculate that over half this increase (16,000 tonnes) has been driven by rapid growth in cargo to Abu Dhabi and Dubai. This market has tripled in size since 2011, facilitated by significant expansion from Emirates and Etihad. A further 3,600 tonnes have been driven by growth on transatlantic routes, helped by the new service to San Francisco. Altogether, almost 75% of the growth in cargo throughput has come via growth in the long-haul market.

There is a two-way relationship between air cargo and trade development. Just as cargo potential plays a key part in the business case for new long-haul routes, new long-haul links open up new markets for Irish exports, a mutually beneficial relationship.

Foreign Direct Investment (FDI)

A positive relationship is illustrated in **Figure 6-4**. There is considerably greater scatter to this relationship than the other economic indicators. FDI is a combination of building new facilities, mergers and acquisitions, reinvestment of earnings and intra-company loans. Therefore, it is affected by a great number of factors, (e.g., it can be affected by the performance of the stock market),⁵³ and can reflect business decisions made over a number of years. Nevertheless, the overall relationship between connectivity and FDI is evident.

Figure 6-4: Foreign Direct Investment to Ireland and Dublin Airport Connectivity, 2001-2012



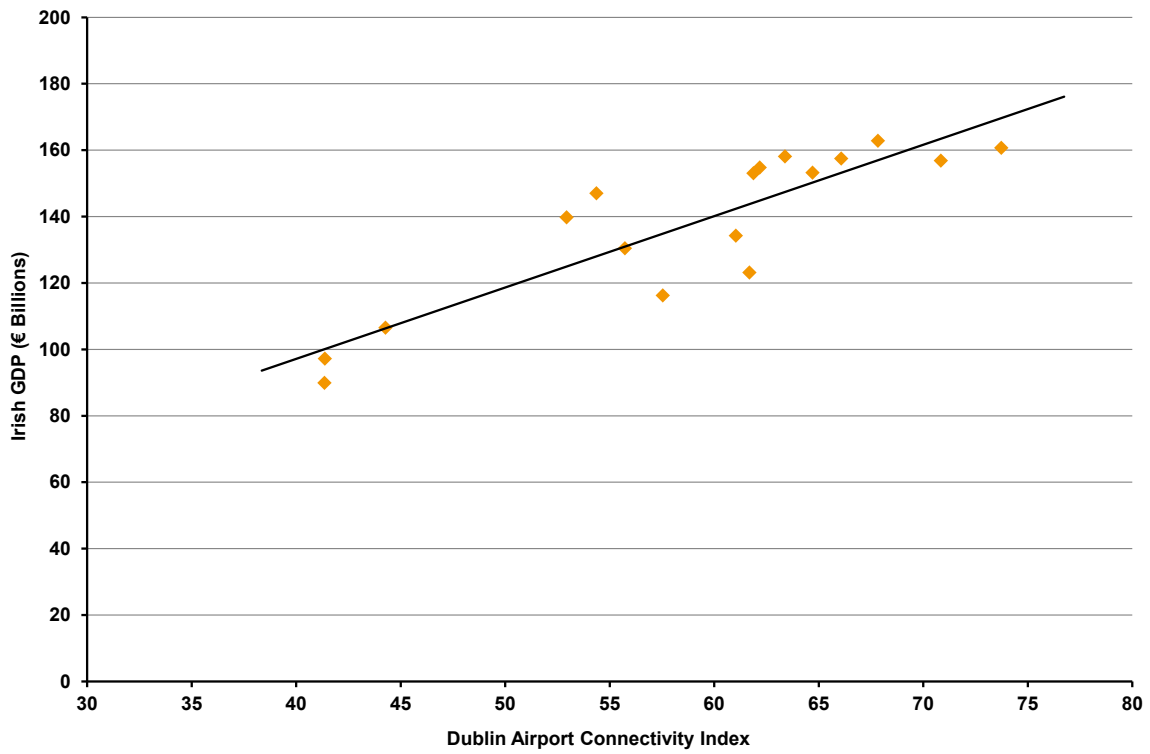
Source: Diio Schedule Data and Failte Ireland.

⁵³ Although FDI does not include so-called *passive investment* in shares traded in stock exchanges, the performance of the stock market can affect the amounts paid in mergers and acquisitions.

Economic Growth

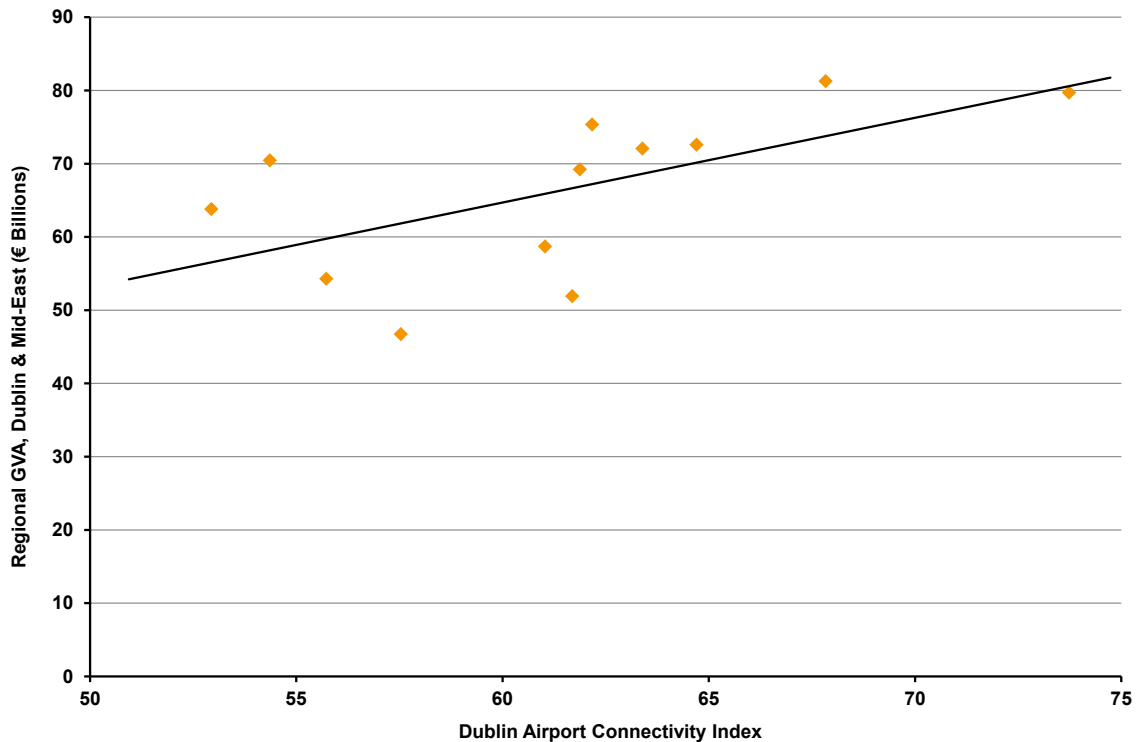
Figures 6-5 and 6-6 show the relationship between connectivity and national and regional economic activity. In both cases, there is a clear positive correlation.

Figure 6-5: National GDP and Dublin Airport Connectivity, 1997-2013



Source: Diiio Schedule Data and Central Statistics Office Ireland.

Figure 6-6: Regional GVA (Dublin and Mid-East) and Dublin Airport Connectivity, 2000-2011



Source: Diio Schedule Data and Central Statistics Office Ireland.

Summary

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.

As the data in these charts is not sufficiently large to conduct a more detailed analysis which controls for other factors, use has been made of the results from a larger European study in order to estimate the catalytic impact of Dublin Airport. This is described in Section 6.3.

6.3 Estimating the Catalytic Impact of Dublin Airport

“While just 1% of Irish export volume is by air, this represents about 33% of our export value. The development of new routes and services at Dublin Airport is vital for exporters to improve connectivity to new and emerging markets. In order to serve these new markets and support export growth, it is also time to investigate runway extension and improved facilities for large aircraft to access these markets.”

Irish Exporters Association, January 2015

The economy of Ireland is a diversified knowledge-based economy, focusing on services and high-tech industries and dependent on trade, industry and investment. Adjusted for cost of living (purchasing power parity), the IMF ranks Ireland fifth in Europe in terms of per capita GDP, behind Luxembourg, Norway, Netherlands and Switzerland, but ahead of Germany, Sweden, the UK and France.⁵⁴ This is despite the severe economic downturn Ireland suffered starting in 2008. There are now signs that the Irish economy has turned a corner, and is set to return to strong growth.⁵⁵

A large number of factors have contributed to Ireland’s economic success – business regulations, government policy, taxation, the education and skillset of the local population, geographic location, etc. Nevertheless, the quality and range of air services available at Dublin Airport is a contributing factor. Ireland’s position as a trading and business hub would not be possible without the high degree of air connectivity provided by Dublin Airport. Section 6.1 documented research showing the importance of air service to business location decisions and how air service facilitates other sectors of the economy. The air service at Dublin Airport transports high-value exports around the world and enables employees of Irish and multinational 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 mobility that Dublin Airport provides.

Quantifying the catalytic impacts that Dublin Airport provides to the Irish economy is difficult. To do so in detail would require a massive survey covering the majority of businesses based in Ireland. Even with such a survey, some aspects of the catalytic impact would be difficult to ascertain. While measuring the tourism and trade transported by air would be fairly easy, it is far more difficult to determine and value Dublin Airport’s role in affecting business location decisions, investment and expansion decisions, facilitating corporate mobility, and attracting international talent.

An alternative approach is to use 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 between these factors over time or compared between

⁵⁴ World Economic Outlook Database, IMF, 2013.

⁵⁵ “Ireland set to become fastest-growing EU economy”, Irish Times, 4 November 2014.

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 recent research.

The connectivity parameter was taken from a recent study undertaken by InterVISTAS on behalf of ACI Europe.⁵⁶ This study was previously referenced in Section 6.1.3. It was selected because it has been recently completed using the most current data and was based on data from 40 European countries including Ireland.

The parameter from that study found that a 10% increase in air connectivity increased GDP per capita by 0.5%. The measure of connectivity used for this parameter is the IATA index presented in Section 3.4. While the outcome from the parameter is expressed in terms of GDP per capita, it 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.

To estimate the catalytic impact of Dublin Airport, the analysis was based on the growth in air connectivity Dublin Airport over the last 20 years – 1993 to 2013. The year 1993 was selected as it ties in with the completion of the European Union’s de-regulation of aviation (the “third package” came into place in 1993, which fully opened up the EU market for all EU airlines) and the start of the Low Cost Carrier phenomenon. Using the results from the ACI Europe study, the analysis estimated the GDP per capita that has been facilitated by the growth in connectivity at Dublin Airport since 1993. In other words, it is that the amount of GDP that would have been foregone if air connectivity at Dublin Airport had been unchanged since 1993. Arguably, this is a conservative approach to estimating the catalytic impacts, as it does not consider connectivity changes prior to 1993.

Between 1993 and 2013, Ireland’s connectivity index (divided by GDP) increased by 66%, of which Dublin Airport was responsible for 85%. Applying the catalytic parameter, this suggests that the contribution to per capita GDP growth was $85\% \times 0.05 \times 66\% = 2.8\%$.⁵⁷ In other words, without the connectivity provided at Dublin Airport since 1993, the GDP per capita of Ireland would be 2.8% lower (due to less trade and tourism, less investment, fewer companies based in Ireland, etc.).

⁵⁶ InterVISTAS Consulting Inc., “The Economic Impact of European Airports: A Critical Catalyst to Growth”, ACI Europe, January 2015.

⁵⁷ In Section 3.4, it is stated that Dublin Airport accounted for 81% of Ireland’s connectivity score in 2013. However, in terms of the *growth* of connectivity between 1993 and 2013, Dublin Airport contributed 85% of this growth.

This percentage was applied to the GDP per capita of Ireland in 1993 (inflated to 2013 prices) and multiplied by the estimated 2013 population of Ireland to estimate the overall GDP impact:

$$€35,600 \times 2.8\% \times 4.59 \text{ million} = €4.16 \text{ billion}$$

The GDP attributable to the catalytic impacts of Dublin Airport is the result of incremental economic activity supported and stimulated by air connectivity – increased tourism visits and spending, greater trade, new investment, etc. This activity supports additional jobs in the economy, which were estimated by dividing the GDP estimate by the average GDP per worker in Ireland. Similarly, the income impacts were based on the average wage figures.

These employment and economic estimates are presented in **Figure 6-6**. It is estimated that a total of 60,100 jobs are associated with the catalytic impacts of Dublin Airport, earning €2.1 billion in income and wages. The catalytic impacts of Dublin Airport facilitated €4.2 billion in GDP, which is equivalent to approximately 2.4% of the total GDP of Ireland in 2013.⁵⁸

Figure 6-7: The Catalytic Impacts of Dublin Airport

Impact Type	Total Impact
Number of Jobs	60,100
Full-Time Equivalents (FTEs)	53,100
Income/Wages (€ Million)	2,109
Value-Added (€ Million)	4,155
(% of national GDP)	(2.4%)

⁵⁸ Based CSO data, the GDP of Ireland was €174.8 billion in 2013.

6.4 Breakdowns of the Catalytic Impacts by Region

The estimated regional breakdown of the catalytic impacts is provided in **Figure 6-8**. The breakdowns are based on the distribution of employment and GDP across Ireland available from CSO Ireland. In terms of employment, about 31% of employment impact occurs in Dublin (including Fingal), 28% in the rest of Leinster and 41% in the rest of Ireland.⁵⁹

Figure 6-8: The Catalytic Impacts of Dublin Airport by Region

Region	Jobs	FTEs	Income (€ Million)	GVA (€ Million)
Fingal	5,600	4,900	239	471
Rest of Dublin	13,300	11,700	553	1,090
Rest of Leinster	16,600	14,700	533	1,050
Rest of Ireland	24,600	21,800	784	1,544
Total	60,100	53,100	2,109	4,155

⁵⁹ The figures do not include Northern Ireland. It is likely that Dublin Airport has a catalytic impact on Northern Ireland, given the fairly substantial number of passengers from Northern Ireland using the airport. However, it was not possible to model those impacts.

7 Summary: Total Economic Impact of Dublin Airport

Key Points

- Including the activity directly related to the airport, the multiplier impacts that flow from it, and the other sectors of the economy facilitated by the airport, Dublin Airport contributes to the employment of 97,400 people in Ireland.
- To put these numbers into context, this employment is more than the population of Limerick and about half the population of Cork.
- The people in these jobs receive almost €3.5 billion in income/wages.
- The total GVA generated is nearly €6.8 billion, approximately 4.0% of the GDP of Ireland in 2013.
- 48% of the employment impact occurs within Dublin (including Fingal), a further 21% occurs within the rest of Leinster and 31% occurs across the rest of Ireland.

The total economic impact both generated and facilitated by Dublin Airport is shown in **Figures 7-1** and **7-2**. Including the activity directly related to the airport, the multiplier impacts that flow from it, and the other sectors of the economy facilitated by the airport, Dublin Airport contributes to the employment of 97,400 people in Ireland, equivalent to 86,200 full-time jobs, earning a total of €3.5 billion. To put these numbers into context, the total jobs (97,400) is more than the population of Limerick about half the population of Cork.⁶⁰ A total of €6.9 billion is contributed to GDP, equal to 4.0% of national GDP.

Figure 7-1: Total Economic Impact Generated and Facilitated by Dublin Airport (Direct+Indirect+Induced+Catalytic)

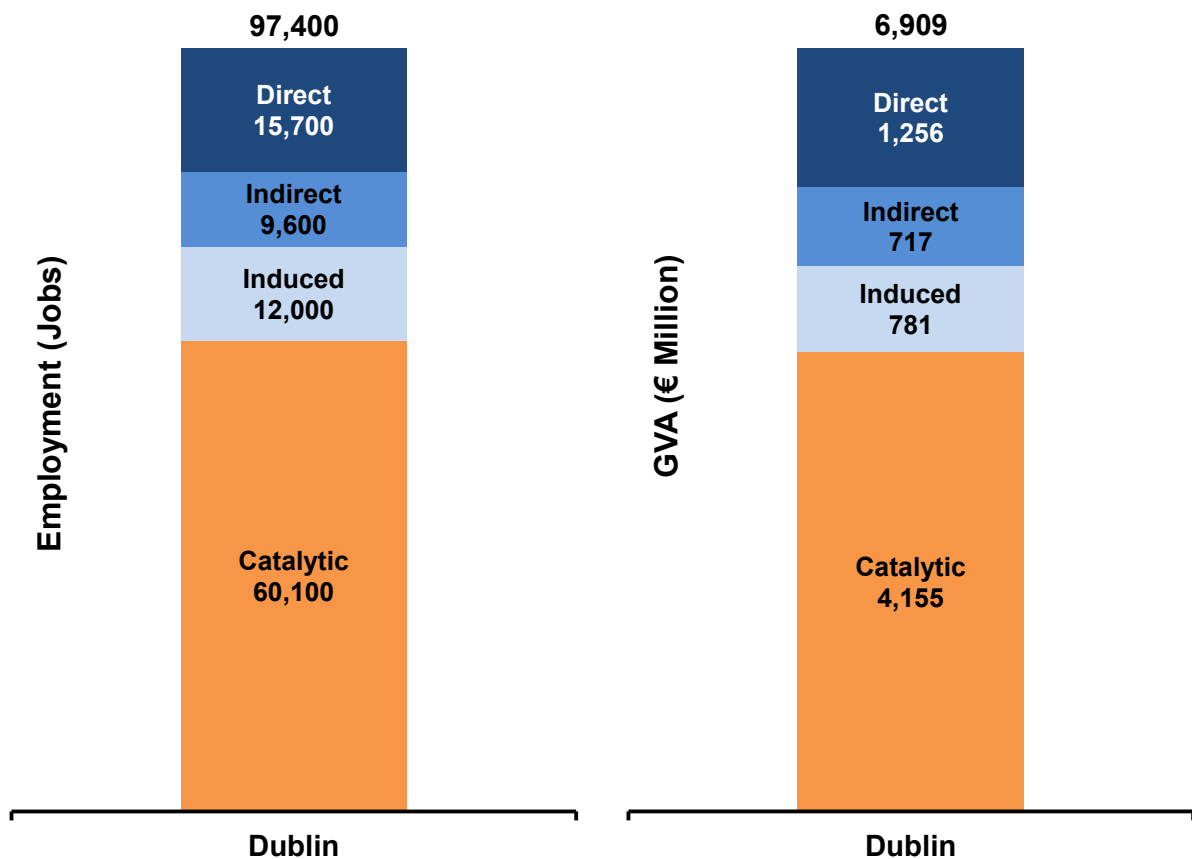
Impact Type	Jobs	FTEs	Income (€ Million)	GVA (€ Million)	GVA as % of National GDP
Direct	15,700	14,000	639	1,256	0.7%
Indirect	9,600	8,500	373	717	0.4%
Induced	12,000	10,600	397	781	0.4%
Catalytic	60,100	53,100	2,109	4,155	2.4%
Total	97,400	86,200	3,518	6,909	4.0%

Numbers may not add up due to rounding.

⁶⁰ Source: CSO Ireland: Census 2011 Results. Based on the population of the city and surrounding suburbs. Population of Limerick: 91,454; population of Cork: 198,582.

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 could 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 these 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 chose not to locate or expand in Ireland. The net effect of this would be a smaller, slower-growing economy.

Figure 7-2: Total Employment and GVA Impact Generated by Category



The total economic impact broken down by region is provided in **Figure 7-3**. About 48% of the employment impact (47,170 jobs) occurs within Dublin (including Fingal). A further 21% (20,900 jobs) occurs within the rest of Leinster and 31% (29,330 jobs) occurs across the rest of Ireland.

Figure 7-3: Total Economic Impact Generated and Facilitated by Dublin Airport by Region (Direct+Indirect+Induced+Catalytic)

Region	Jobs	FTEs	Income (€ Million)	GVA (€ Million)	% of GVA
Fingal	25,150	22,400	1,011	1,984	18.9%
Rest of Dublin	22,020	19,300	873	1,713	3.3%
Rest of Leinster	20,900	18,500	682	1,341	3.1%
Rest of Ireland	29,330	26,000	951	1,871	3.4%
Total	97,400	86,200	3,518	6,909	4.0%

Numbers may not add up due to rounding.

% of GVA: Gross Value Added generated in the region as a percentage of estimated total GVA in that region.

8 The Future Economic Impact of Dublin Airport

Key Points

- Based on the unconstrained Centreline traffic forecasts,⁶¹ and including the Dublin Airport Central campus, the total economic impact of Dublin Airport could reach an estimated 194,000 jobs and €14.4 billion in GVA by 2043, roughly double the current economic impact.
- A second runway at Dublin Airport is essential to enhancing the connectivity of Ireland, particularly to fast growing economies in Asia, Africa and South America.
- A second runway will facilitate economic growth in the economy worth 31,200 jobs and contribute to €2.2 billion to national GDP by 2043.

In 2014, Dublin Airport handled 21.7 million passenger movements, an 18% increase on traffic levels during the depth of the global recession. Traffic volumes at Dublin Airport are expected to continue growing, as the Irish economy returns to growth, strong economic growth in emerging economies opens up new markets, and new high technology aircraft (e.g., the Boeing 787 and Airbus A350) makes more routes economically viable.

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).

InterVISTAS estimated the following:

- The future economic impact of Dublin Airport up to 2043, primarily based on traffic forecasts produced by daa. The economic impact estimate also includes the impact of the Dublin Airport Central development, a proposed commercial campus on airport land potentially comprising offices, retail, hotels and other facilities (described in Section 8.2).
- The economic impact that will potentially be delivered by the timely building of a second runway at Dublin Airport, allowing it to fully accommodate traffic demand.

⁶¹ Forecast DAPF14-02 (produced November 2014).

8.1 Forecast Traffic Development at Dublin Airport

“Beyond the objective of seeking aggregate growth rates, airports are incentivised to seek out high-value traffic, which opens up new destinations and increased connectivity to a region or country. In particular, new long-haul services are particularly valued by airport authorities and the society they serve as they open up new tourism and trade opportunities while increasing aeronautical revenues and airport retail opportunities.”

“The increasing importance of high-growth and high potential markets, such as Brazil, Russia, India and China, Middle East and Far East has been recognised by the Government and articulated in: A strategy and action plan for Irish Trade, Tourism and Investment to 2015. A critical part of realising the opportunities that exist in these markets lies in ensuring good air connectivity to these markets, through both established and newly emerging air links.”

**Quotes from “A National Aviation Policy for Ireland – Draft”, May 2014
Department of Transport, Tourism and Sport,**

The future economic impact estimates are based on air traffic forecasts produced by daa.⁶² These forecasts are derived from a sophisticated econometric forecast model. All the major air traffic routes are represented separately in the model, with the remaining routes divided into various groups (i.e. Domestic, UK, North Europe, Southern Europe, Transatlantic, Other Long-Haul and Charter). Projections are then made for each route/route group with the results added together at the end of the process to get total passenger and movement forecasts.

The daa traffic forecast model assumes that passenger traffic growth can be expressed as a function of economic growth, and that it is the economic growth of the passenger’s country of residence which is relevant. daa uses the historic relationship between GDP and traffic growth to derive future passenger growth rates from the available GDP forecasts.

daa’s forecasting methodology has been extensively reviewed by independent third parties – while the latest of such reviews was conducted in 2005, the methodology has not materially changed since then. In 2005, Mott MacDonald undertook a review of daa’s forecasting methodology for the Commission for Aviation Regulation. The review concluded that the forecast methodology represents the application of “best practice” and that “the process adopted and the depth of thinking behind the development of the forecasts is impressive”.

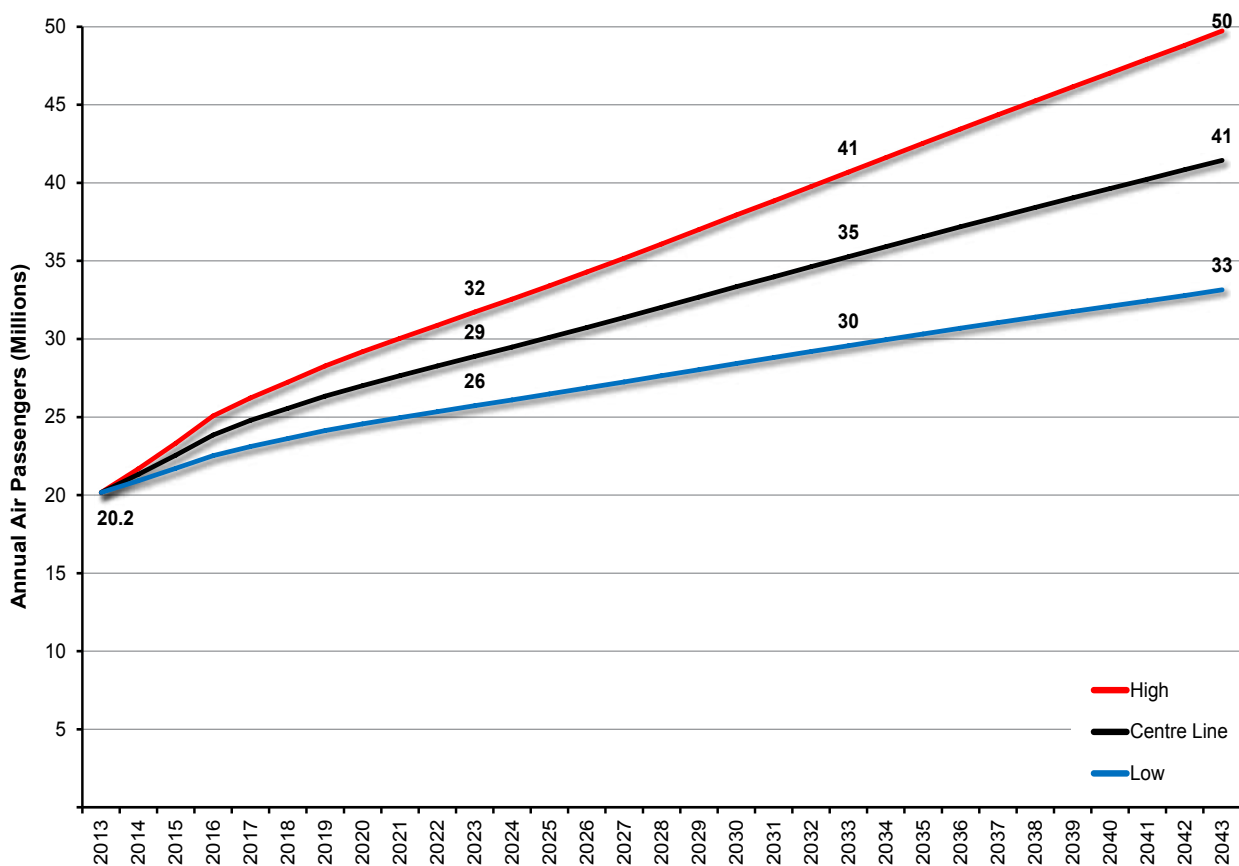
The forecasts of passenger traffic at Dublin Airport are provided in **Figure 8-1**. These show the underlying demand for air travel, unconstrained by any possible capacity constraints at the airport. The Centreline forecast is the most likely long term traffic trend, based on anticipated economic and air carrier growth over the next 30 years. In this forecast, passenger traffic is projected to grow from 20.2 million in 2013 to 29 million in 2023, 35 million in 2033 and 41 million in 2043. This is an average growth rate of 2.4% per annum

⁶² Forecast DAPF14-02 (produced November 2014).

between 2013 and 2043. Lower growth is forecast for the short-haul market (averaging 2.2% per annum) than for the long-haul market (4.0% per annum), reflecting its greater market maturity and lower economic growth potential.⁶³

In addition to the Centreline forecast, Low and High forecasts have been generated assuming different levels of economic growth and air service development. In the Low forecast, passenger traffic is projected to reach 33 million by 2043, 20% lower than the Centreline forecast. In the High forecast, passenger traffic is forecast to reach 50 million, 20% above the Centreline forecast.

Figure 8-1: Unconstrained Forecasts of Passenger Traffic at Dublin Airport, 2013-2043



Source: daa, forecast DAPF14-02 (produced November 2014).

⁶³ Short haul includes domestic, UK, rest of Europe and North Africa. Long-haul includes the Americas, Middle East, Asia and the rest of Africa.

8.2 Estimating the Economic Impact of Dublin Airport Under the Unconstrained Forecasts

8.2.1 The Impact of Traffic Growth

The future economic impact derived from traffic growth at Dublin Airport was estimated based on the unconstrained forecasts documented in the previous section. To do this, it was assumed that the economic impact (employment, income, GVA) associated with the airport will increase as traffic at the airport increases. However, our experience has been that the aviation sector achieves significant productivity gains and economies of scale, handling increasing numbers of passengers per employee as traffic increases. Therefore, the increases would not be linear, i.e., a 1% increase in traffic would lead to a less than 1% in the economic impact.

To estimate the future economic impact, the following assumptions were made:

- To account for future gains in productivity, 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.
- The multiplier impacts (indirect and induced) were estimated from the direct impacts, using the 2013 multipliers, described in Appendix E.
- The estimates of catalytic impacts were based on forecasts of future connectivity derived from the air traffic forecasts. The forecasts of short-haul and long-haul passengers were applied to the short-haul and long-haul elements of the connectivity index for Dublin Airport. Calculating the short-haul and long-haul elements separately, allows the analysis to fully capture the higher connectivity growth and catalytic potential expected in long-haul markets (relative to short-haul markets).
- The connectivity parameter described in Chapter 6 was then applied to projected increase in connectivity to estimate the catalytic impacts. To be conservative, it was assumed that the catalytic impacts would grow at a slower rate than connectivity, such that the connectivity contribution is scaled down by 25% (e.g., a 10% connectivity increase is scaled down to a 7.5% connectivity increase).⁶⁴

8.2.2 Dublin Airport Central

As noted previously, the future economic impact of Dublin Airport also includes the Dublin Airport Central campus.

daa has an extensive land bank of approximately 2,500 acres/1,000 hectares. This land bank provides significant opportunity for the development of both aviation and non-aviation business. daa hopes to use some of this land bank to launch and develop a new cluster of commercial development at Dublin Airport. A master plan was recently completed for the development, which will be delivered over the next 20 years and includes hotels, ancillary

⁶⁴ Both short haul and long-haul connectivity were scaled by 25%.

retail, offices and car parking. This development is largely additive to the projections of the future economic impact of the airport.

daa commissioned a separate study to estimate the economic impact likely to be generated by the development phase of the project (from capital expenditure) and the day-to-day operation of the campus (from operational expenditure).⁶⁵

The study estimated that, including multiplier impacts, the campus could create approximately 13,200 FTE jobs and contribute over €1.8 billion to the Irish economy during the construction phase. The campus is anticipated to be developed in phases, with the first phase of the campus operational by 2023, and additional phases becoming operational beyond that date. The first phase could generate an estimated 20,190 FTE jobs and contribute over €4.8 billion to national output annually. When fully developed, it is estimated that Dublin Airport Central could create as much as 38,934 FTE jobs and contribute over €9.2 billion in national output each year.

The estimates of the economic impact of operation of Dublin Airport Central from the separate study were added to economic impact derived from traffic growth at the airport (the economic impact associated with construction has not been included).⁶⁶ The economic impact of the campus added to the future economic impact of Dublin Airport reflects the project phasing, so that the incremental economic impact is smaller in earlier years.⁶⁷ Furthermore, to be conservative, the economic impact of the campus was scaled down by 30% to allow for the possibility that the campus may capture some of the employment already included in the future catalytic impact of Dublin Airport. As a result, 14,133 jobs associated with Dublin Airport Central were added to the total employment impacts in 2023 ($70\% \times 20,190 = 14,133$), and 27,253 jobs ($70\% \times 38,934$) were added to the total employment impacts in 2033 and 2043.

8.2.3 Results

The resulting forecasts of the economic impact of Dublin Airport, assuming no capacity constraints at the airport and including the Dublin Airport Central campus, are provided in **Figures 8-2 to 8-5**. Figure 8-2 summarises the employment impacts, while the tables provide separate results for the Centreline, High and Low forecasts.⁶⁸

⁶⁵ PWC, "Project Skyline, Dublin Airport – Economic Impact Analysis", September 2014.

⁶⁶ Specifically, the direct, indirect and induced impacts of the day-to-day operation of the campus were added to the direct, indirect and induced impacts of the airport.

⁶⁷ The PWC report provides national output figures. This is not the same as the GVA figures used in this report. Roughly speaking, national output = GVA *plus* intermediate consumption. Additional analysis was carried out to calculate the GVA impacts based on ratios in the input-output tables that were used to estimate the multiplier (indirect and induced) impacts. In addition, the PWC report also did not provide income/wages information. This again was calculated based on ratios in the input-output tables.

⁶⁸ The economic impact of the Dublin Airport Central campus is the same in each forecast.

Under the Centreline forecast, assuming airport capacity can fully accommodate demand and including the Dublin Airport Central campus, the total economic impact of Dublin Airport is estimated to reach 194,000 jobs and €14.4 billion in GVA by 2043. This is roughly double the current economic impact of the airport.

Unsurprisingly, the future economic impact of Dublin Airport is projected to be lower under Low air traffic forecast, reaching 173,200 jobs and €13.4 billion in GVA by 2043, 11% below the economic impact under the Centreline forecast. Conversely, the High forecast results in 213,500 jobs and €16.3 Billion in GVA by 2043, 10% higher than under the Centreline forecast.

Figure 8-2: Forecast Economic Impact (Employment) of Dublin Airport

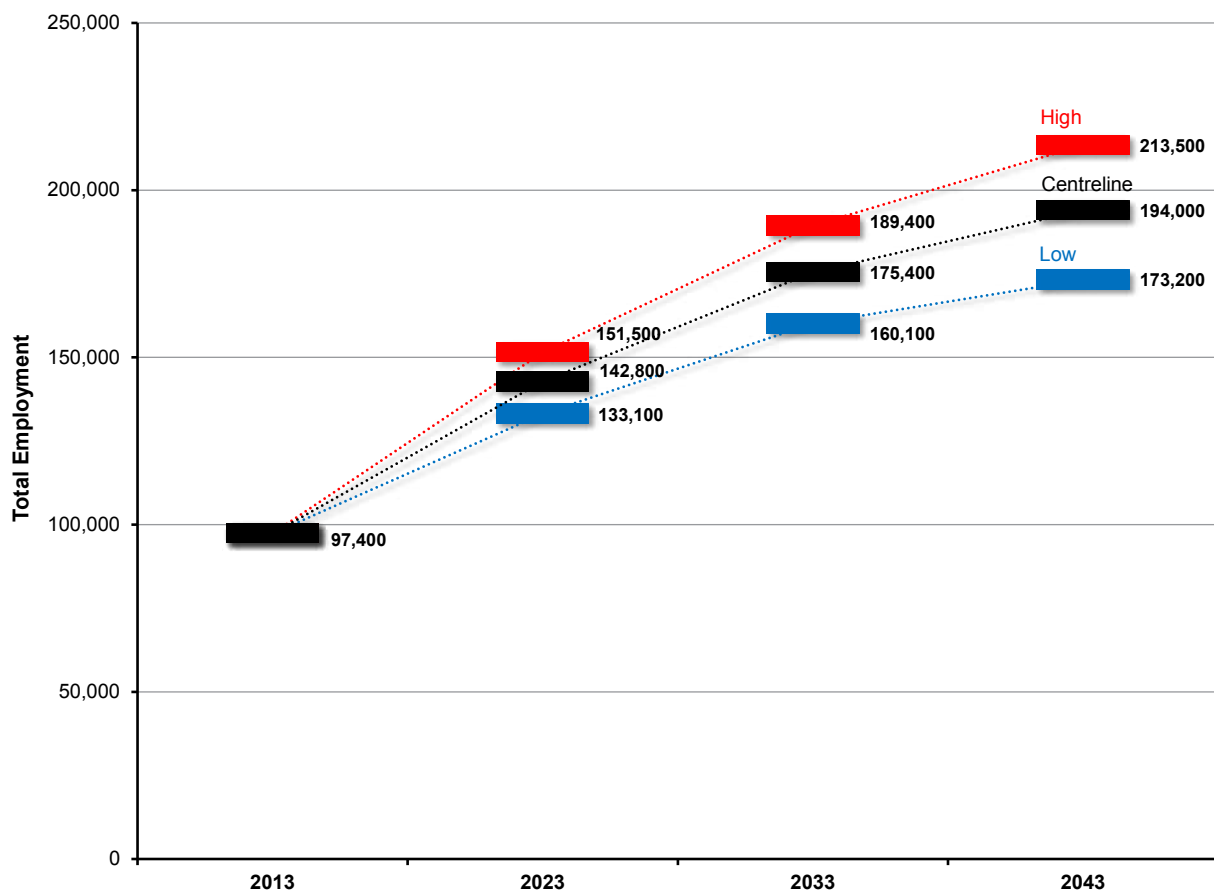


Figure 8-3: Forecast Economic Impact of Dublin Airport (Unconstrained CENTRELINE Forecast)

Impact Type	Jobs	FTEs	Income (€ Million)	GVA (€ Million)
Current 2013 Impact				
Direct	15,700	14,000	639	1,256
Indirect	9,600	8,500	373	717
Induced	12,000	10,600	397	781
Catalytic	60,100	53,100	2,109	4,155
Total	97,400	86,200	3,518	6,909
2023 Impact				
Direct	27,700	25,500	1,116	2,300
Indirect	16,000	14,600	625	1,261
Induced	17,900	16,100	608	1,258
Catalytic	81,200	71,700	2,849	5,614
Total	142,800	127,900	5,199	10,433
2033 Impact				
Direct	37,800	35,300	1,516	3,192
Indirect	21,600	20,000	841	1,735
Induced	22,600	20,500	780	1,655
Catalytic	93,400	82,500	3,277	6,457
Total	175,400	158,300	6,414	13,040
2043 Impact				
Direct	40,800	38,000	1,638	3,431
Indirect	23,400	21,600	911	1,870
Induced	24,900	22,600	856	1,805
Catalytic	104,900	92,700	3,680	7,252
Total	194,000	174,900	7,086	14,359

All financial figures are in 2013 prices.
Numbers may not add up due to rounding.

Figure 8-4: Forecast Economic Impact of Dublin Airport (Unconstrained LOW Forecast)

Impact Type	Jobs	FTEs	Income (€ Million)	GVA (€ Million)
Current 2013 Impact				
Direct	15,700	14,000	639	1,256
Indirect	9,600	8,500	373	717
Induced	12,000	10,600	397	781
Catalytic	60,100	53,100	2,109	4,155
Total	97,400	86,200	3,518	6,909
2023 Impact				
Direct	26,200	24,200	1,055	2,180
Indirect	15,100	13,800	590	1,194
Induced	16,700	15,100	569	1,180
Catalytic	75,100	66,400	2,635	5,192
Total	133,100	119,500	4,849	9,746
2033 Impact				
Direct	35,300	33,100	1,032	2,150
Indirect	20,000	18,600	486	934
Induced	20,700	18,900	1,591	3,566
Catalytic	84,100	74,300	2,951	5,814
Total	160,100	144,900	6,059	12,464
2043 Impact				
Direct	37,300	34,900	1,113	2,310
Indirect	21,300	19,700	537	1,031
Induced	22,200	20,200	1,640	3,664
Catalytic	92,400	81,600	3,242	6,388
Total	173,200	156,400	6,532	13,393

All financial figures are in 2013 prices.
Numbers may not add up due to rounding.

Figure 8-5: Forecast Economic Impact of Dublin Airport (Unconstrained HIGH Forecast)

Impact Type	Jobs	FTEs	Income (€ Million)	GVA (€ Million)
Current 2013 Impact				
Direct	15,700	14,000	639	1,256
Indirect	9,600	8,500	373	717
Induced	12,000	10,600	397	781
Catalytic	60,100	53,100	2,109	4,155
Total	97,400	86,200	3,518	6,909
2023 Impact				
Direct	29,100	26,800	1,173	2,412
Indirect	16,900	15,400	660	1,328
Induced	19,000	17,100	645	1,330
Catalytic	86,500	76,400	3,035	5,980
Total	151,500	135,700	5,513	11,050
2033 Impact				
Direct	40,200	37,400	1,231	2,542
Indirect	23,000	21,200	603	1,158
Induced	24,400	22,100	1,713	3,807
Catalytic	101,800	89,900	3,572	7,038
Total	189,400	170,600	7,118	14,545
2043 Impact				
Direct	44,200	41,000	1,394	2,862
Indirect	25,500	23,400	700	1,344
Induced	27,500	24,900	1,816	4,008
Catalytic	116,300	102,800	4,080	8,041
Total	213,500	192,100	7,990	16,256

All financial figures are in 2013 prices.
Numbers may not add up due to rounding.

8.3 The Traffic and Connectivity Benefits of Building a Second Runway

“Global trade growth has shifted extensively to Asia and Africa, where 80% of trade growth is forecast to come from according to the WTO. Hence, Irish exporters reliance on efficient effective airfreight routes and providers, is increasing daily. In addition, the continuation of trade growth with the US, particularly in the high value added life sciences sector where Ireland / US, is extensively reliant on airfreight services.”

Irish Exporters Association, April 2013 ⁶⁹

The previous forecasts assume that there are no capacity constraints on Dublin Airport. In practice, that would mean that a second runway would need to be built at the airport to fully accommodate underlying demand. Currently, the airport is close to runway capacity at peak hour times. As traffic grows at Dublin Airport, the pressure on peak capacity is likely to increase, which will impact the ability of airlines to serve both short-haul and long-haul demand, and the ability to effectively serve transfer traffic which could be critical to support long-haul services. Without a second runway, traffic will be lost as airlines have to compromise on the services offered and transfer traffic shifts to unconstrained airports.

The strategic value of a parallel runway will not only be the additional capacity, but also the ability to open up new markets for trade and commerce, and to provide full resilience for the existing main runway. In order to facilitate such new routes and markets, it will be critical to provide a runway which delivers full flexibility for airlines, without weight restriction.

Figure 8-6 shows the top 20 cities ranked in order of their expected contribution to global GDP in 2025. In line with the Draft National Aviation Policy, it is the intention to link Dublin Airport with such key locations in a manner that they may be reached without penalty to the airline operating a range of aircraft. This will enable connections for both business exports and international tourists and enhance the potential to develop Dublin Airport as a strong secondary European hub.

⁶⁹ http://www.irishexporters.ie/wp-content/uploads/2014/05/Air_freight_New_policy_IEA_Submission.pdf.

Figure 8-6: Top 20 Cities Based on Projected contribution to Global GDP in 2025

Rank	City	Current Direct Service from Dublin
1	New York	✓
2	Tokyo	
3	Shanghai	
4	London	✓
5	Beijing	
6	Los Angeles	✓ (Starting 2015)
7	Paris	✓
8	Chicago	✓
9	Rhein-Ruhr (Dusseldorf)	✓
10	Shenzhen	
11	Tianjin	
12	Dallas	
13	Washington DC	✓
14	Houston	
15	Sao Paulo	
16	Moscow	✓
17	Chongqing	
18	Randstad (Amsterdam)	✓
19	Guangzhou	
20	Mexico City	

9/20 Currently Connected

Source: daa.

A second runway at Dublin Airport has the potential to provide connectivity to a range of crucial long-haul destinations, particularly in fast growing economies in Asia, Africa and South America.

Figure 8-7 summarises analysis by daa illustrating the type of routes that could develop at Dublin Airport with an additional runway of sufficient length to fully enable long-haul air service, based on expected demand growth. The longer length of the second runway allows more economical longer haul aircraft to operate at Dublin Airport than would otherwise be the case. Current and anticipated models of long-haul aircraft will require a longer runway to reach this range of destinations without onerous penalties on the amount of passengers and cargo that can be uplifted from Dublin.

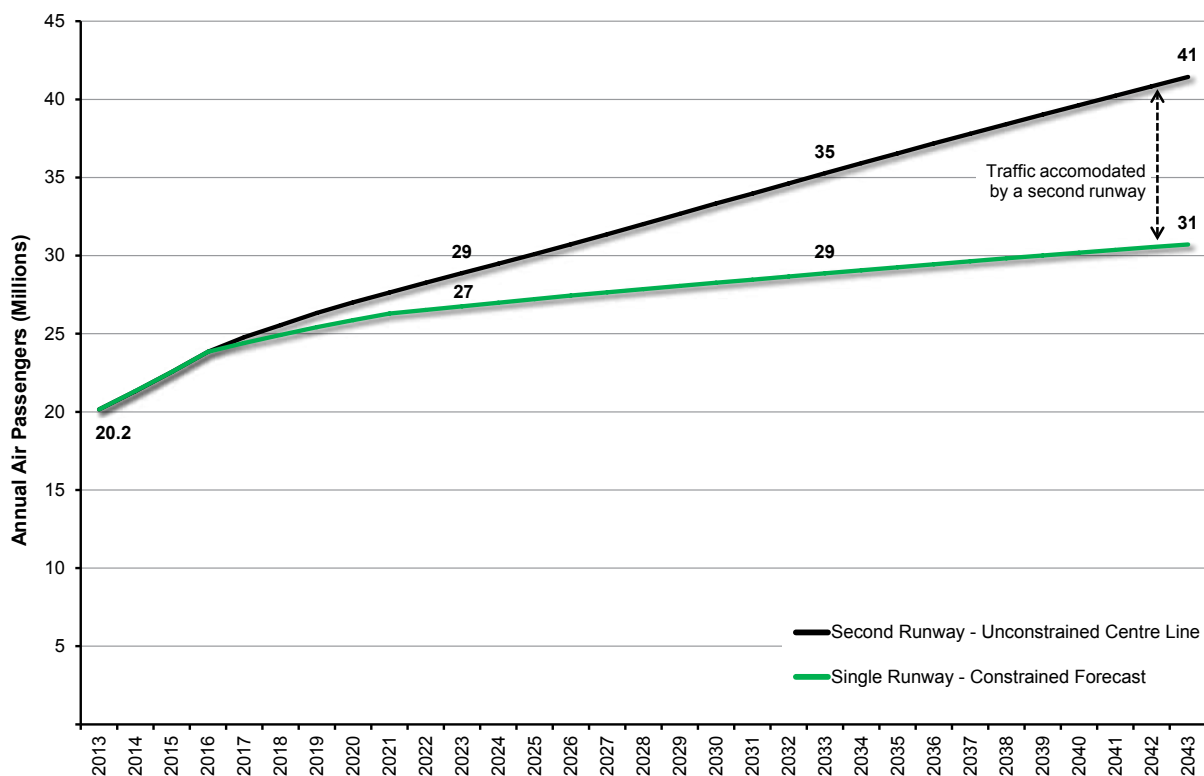
Figure 8-7: Illustrative Routes Possible at Dublin Airport with a Second Runway

Region	Medium to Long Term Opportunities
North America	Vancouver Phoenix Honolulu
China	Beijing Shanghai Guangzhou
Africa	Cape Town
South East Asia	Tokyo Hong Kong Singapore Denpasar Bangkok
South America	Sao Paulo

The potential traffic gain associated with second runway is shown in **Figure 8-8**, which shows the unconstrained Centreline forecast and a constrained forecast assuming that Dublin Airport is limited to its existing single runway. The capacity constraint begins to hit as early as 2017 due to capacity constraints at peak times, and results in an ever increasing volume of traffic being unserved.

In about 20 years' time (2033), it is projected that the second runway will allow an additional 6.4 million passengers to be accommodated (compared with a single runway airport), about 18% of unconstrained demand in that year. By 2043, it is forecast that the second runway will allow Dublin Airport to accommodate over 10 million annual passengers, about 25% of total unconstrained demand.

Figure 8-8: Forecast Passenger Traffic at Dublin Airport with a Second Runway, 2013-2043



Source: daa, forecast DAPF14-02 (produced November 2014).

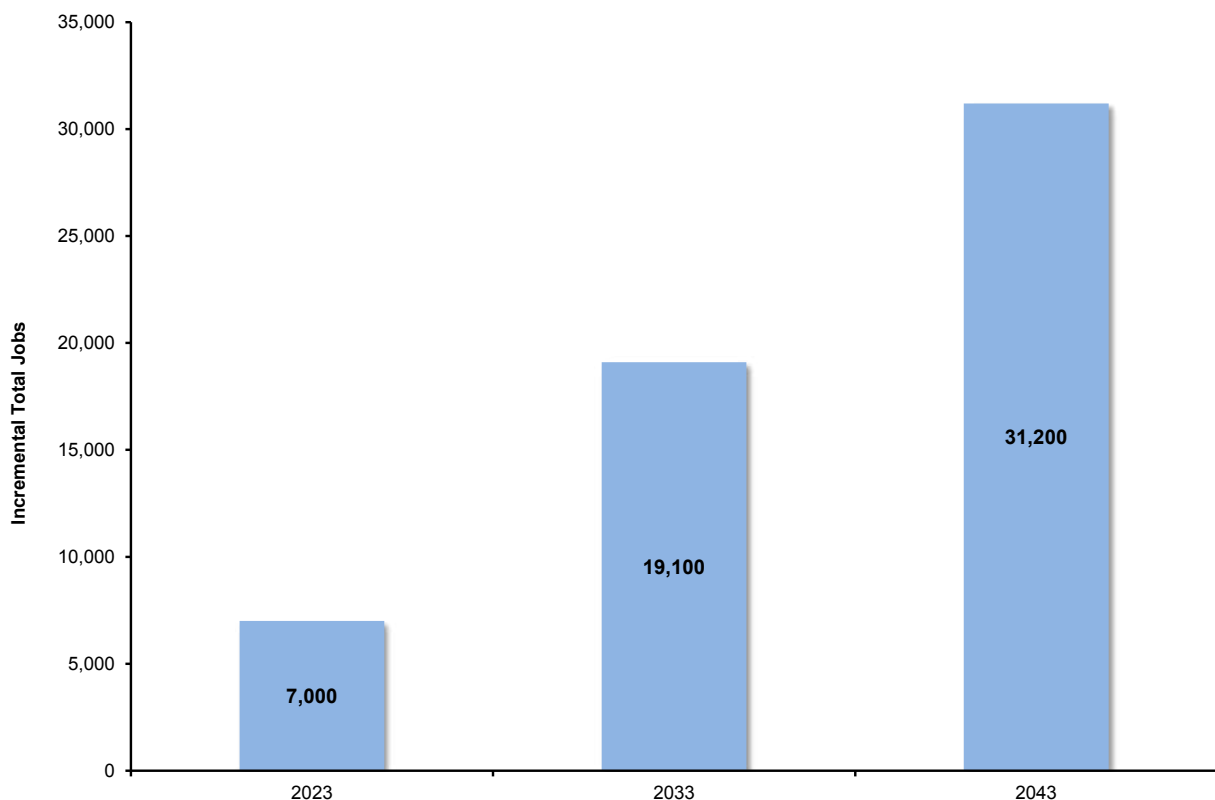
While the increase in passenger traffic associated with a second runway is substantial, the impact on connectivity is likely to be even greater. Applying the passenger traffic forecasts to the IATA connectivity index (described in Chapter 3), suggests that a second runway will result in a 22% gain in connectivity by 2034 (as measured by the index) and a gain of 31% by 2034, relative to the unconstrained Centreline forecast. This is larger than the gain in passenger traffic (18% and 25% respectively) due to the increase in connectivity to large long-haul destinations in Asia, the Americas and Africa.

8.4 The Economic Impact of a Second Runway

The future economic impact of a second runway at Dublin Airport was estimated using the same methodology described in Section 8.2, applied to the two-runway (unconstrained Centre Line) and single runway (constrained) forecasts.⁷⁰ The economic impact under the single runway forecasts was then subtracted from the economic impact of the unconstrained economic impact to estimate the incremental economic impact of a second runway. These results are provided in **Figures 8-9** and **8-10**.

The analysis suggests that with the second runway at Dublin Airport, the Irish economy could gain an additional 31,200 jobs and €2.2 billion in GDP by 2043, relative to a single runway airport. This amount is roughly a third of the current economic impact of the airport. The majority of this economic contribution is expected to occur outside of the aviation sector – 60% of the total impact is catalytic impacts (tourism, trade, investment, etc.) and another 23% are indirect and induced impacts (supplier and spending in the wider economy).

Figure 8-9: Estimated Employment Impact Provided by a Second Runway



⁷⁰ As this analysis focusses solely on the incremental economic impact associated with a second runway, it does not include the estimated economic impact generated by the proposed Dublin Airport Central campus.

Figure 8-10: Estimated Economic Impact Provided by a Second Runway

Impact Type	Jobs	FTEs	Income (€ Million)	GVA (€ Million)
2023 Impact				
Direct	1,200	1,000	49	96
Indirect	700	600	27	52
Induced	900	800	30	59
Catalytic	4,200	3,700	147	290
Total	7,000	6,100	253	497
2033 Impact				
Direct	3,200	2,800	130	256
Indirect	2,000	1,800	78	149
Induced	2,500	2,200	83	163
Catalytic	11,400	10,100	400	788
Total	19,100	16,900	691	1,356
2043 Impact				
Direct	5,200	4,700	212	416
Indirect	3,200	2,900	124	239
Induced	4,000	3,600	132	260
Catalytic	18,800	16,600	660	1,300
Total	31,200	27,800	1,128	2,215

All financial figures are in 2013 prices.
Numbers may not add up due to rounding.

Appendix A: Employment Survey Sample

A total of 157 businesses were surveyed about their employment and other aspects of the businesses, of which 104 provided information, a response rate of 66%. The categories of businesses surveyed were:

Airlines

All of the airlines operating at the airport, based on contact information provided by daa, were sent a survey form. This included both passenger and cargo airlines and both home and foreign carriers.

Airport Tenants

All tenants on airport property were sent a survey form, using contact information provided by daa. This included government agencies, security providers, retail and food and beverage outlets, car rental firms, ground handlers, aircraft maintenance and repair, and others.

Offsite Businesses

Using directory and internet searches, businesses in and around Dublin were identified in the aviation and aerospace industries with possible linkages to Dublin Airport. The businesses included integrators/couriers not based at the airport, aircraft maintenance and repair, aircraft parts suppliers and manufacturers. To ensure only employment directly linked to the airport was captured, the businesses were asked to state what percentage of their business directly related to the airport. The total employment of the business was then scaled by this percentage.

Hotels

A number of other hotels located near to the airport, or known to be used by airlines, were also surveyed. These hotels were asked about the proportion of their business that was related to accommodating transiting passengers or airline crews. Only this proportion of the employment was counted as part of the direct economic impact of the airport to avoid double-counting with catalytic (tourism) impacts.

Ground Transportation

Bus and coach companies that partially or wholly serve airport passengers. To ensure only employment directly linked to the airport was captured, the businesses were asked to state what percentage of their business directly related to the airport traffic. The total employment of the business was then scaled by this percentage.

Appendix B: Sample Survey Form

Údairís Aerfort Bhaile Átha Cliath opt
Príomhoifig: Aerfort Átha Cliath, Éire

T: 353-1-814 1111
F: 353-1-814 4120
www.daa.ie

Dublin Airport Authority plc
Head Office: Dublin Airport, Ireland



29 September 2014

To All Members of the Dublin Airport Business Community

Dublin Airport Economic Impact Study

The success and development of Dublin Airport is built on the contribution of a wide range of businesses including your own. We want to understand the full range of activities, employment and value of businesses that are associated with the airport, and communicate the economic benefits generated for the region and the country as a consequence of the combined airport business community. In order to achieve this we have commissioned InterVISTAS Consulting LTD and TOBIN Consulting Engineers to conduct a study of the economic impact of Dublin Airport.

We are asking all businesses on the airport campus and in close proximity to the airport to complete the attached survey so we can build a full picture of our combined impact. The completed survey can be submitted directly to InterVISTAS via one of the following methods:

- Clicking on the [Submit Form] icon on the top right hand corner of the survey form;
- Emailing to daasurvey@intervistas.com; or
- Fax to +44-1225-330-209, Attention: Ian Kincaid

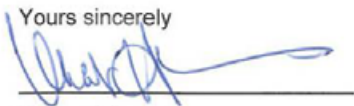
We appreciate that some of the information requested in the survey may be of a sensitive nature to your company. Please be assured that InterVISTAS and TOBIN will maintain the confidentiality of your survey response, and that any data provided to daa will not identify individual respondents. Only aggregate survey totals will be published in the final report or in press releases.

This economic impact survey is conducted under the supervision of Ian Kincaid. Should you have any questions regarding the study or the survey, please contact Ian at +44-208-144-1835.

We will contribute €5.00 for every completed survey to the Dublin Airport Charity of the Year Programme which supports the Jack & Jill Foundation, Cystic Fibrosis and Special Olympics Ireland this year.

I want to thank you sincerely for your cooperation in this study and look forward to sharing the report's outputs with you once the study is completed.

Yours sincerely



Vincent Harrison
Managing Director Dublin Airport

An Bord Stairfoiréil Board of Directors: Pádraig Ó Riordáin - Cathaoirleach/Chairman, Niall Greene, Patricia King, John Lynch, Colm McCarthy, Des Mulally, Barry Nowak, Eric Nolan, Ann Marie O'Sullivan, Paul Scholtz (Somali), Donal Smyth, Gerry Walsh, Kevin Toland - Príomhoifigheir/Chief Executive

Oifig Chláraithe: Aerfort Bhaile Átha Cliath, Co. Bhaile Átha Cliath, Unit 18 Chláraithe: 9401 Éire
Registered Office: Dublin Airport, Co. Dublin, Registered Number: 9401 Ireland

Dublin Airport
Employment and Activity Survey



The figures you provide in the following sections are **strictly confidential** and will be viewed only by InterVISTAS Consulting LTD and TOBIN Consulting Engineers. Only aggregate survey totals will be published in the final report.

For the purposes of this study, it is important that the figures you provide are as accurate as possible. However, where it is not possible to provide precise information, we would appreciate estimates rather than no response at all.

Please complete this survey electronically by responding directly into the form. Alternatively, you can print out the form and complete by hand. Wherever possible, please state figures for calendar year 2013 (please indicate where this is not the case).

Name of Company: _____

Address of Company: _____

Contact Person: _____ Phone number: _____

Email: _____

Q1. Principal Business Activity

Please indicate your principal business activity. If you are involved in more than one of the businesses below, please choose the one that best describes your business (i.e., contributes the largest proportion of revenues).

Air Carriers

- 1. Scheduled Air Passenger Carrier
- 2. Charter Air Passenger Carrier
- 3. Dedicated Cargo Carrier
- 4. Courier / Integrator
- 5. General Aviation Operator
- 6. Other: _____

Other Business Types

- | | |
|--|--|
| <input type="checkbox"/> 7. Airport Authority | <input type="checkbox"/> 16. Aviation Related Manufacturing |
| <input type="checkbox"/> 8. Freight Forwarder, Cargo Agent, etc. | <input type="checkbox"/> 17. Aviation Related Training |
| <input type="checkbox"/> 9. Warehousing | <input type="checkbox"/> 18. In-flight Catering Company |
| <input type="checkbox"/> 10. Customs Broker | <input type="checkbox"/> 19. Security Services |
| <input type="checkbox"/> 11. Aircraft Maintenance, Repair and Overhaul | <input type="checkbox"/> 20. Airport Retail Outlet, Restaurant, etc. |
| <input type="checkbox"/> 12. Airport Ground Handler | <input type="checkbox"/> 21. Government Agency/Department |
| <input type="checkbox"/> 13. Fuelling Company | <input type="checkbox"/> 22. Car Rental |
| <input type="checkbox"/> 14. Fixed Base Operator | <input type="checkbox"/> 23. Taxi, Bus |
| <input type="checkbox"/> 15. Aircraft Parts Supplier | <input type="checkbox"/> 24. Hotel |
| | <input type="checkbox"/> 25. Other: _____ |

<p>Dublin Airport Employment and Activity Survey</p>	 <small>a company of Royal HaskoningDHV</small>	 <small>Consulting Engineers</small>
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Q2. Employment at Your Company

We want to be able to document the employment linked to Dublin Airport. Please state the number of staff (permanent, temporary and contract staff) employed in 2013 by your company both on-site at Dublin Airport and off-site (but within the Republic of Ireland). Please break down the employment into permanent, temporary, full-time and part-time.

Location	Permanent Employees		Seasonal / Temporary Employees	
	Full-Time	Part-Time	Full-Time	Part-Time
On-Site (Dublin Airport)				
Off-Site (in Ireland)				

Note: Full-time = 30 hours or more per week.
 Part-time = Less than 30 hours per week.
 Seasonal/Temporary = Less than 6 months of the year.
 For employees that split their time between on-site and off-site locations, please allocate them to the location where they spend the most time.

Q3. Employment Related to Dublin Airport

To ensure that we do not overstate the employment related to Dublin Airport, please estimate the proportion of employment in Question 2 that is related to activities at Dublin Airport. For example, some businesses will derive all their business from airport related activities, while others will do business in other sectors of the economy (e.g., maritime shipping). Please estimate the percentage of on-site (at Dublin Airport) and off-site (in Ireland) employment related to Dublin Airport.

On-site Employment - % Related to Dublin Airport	%
Off-site Employment - % Related to Dublin Airport	%

Q4. Employment Related to Air Cargo

We would like to be able to document the impact of the airport's air cargo services. Please help us by indicating the proportion of your employment that is related to servicing air cargo at Dublin Airport.

On-site Employment - % Related to Air Cargo	%
Off-site Employment - % Related to Air Cargo	%

Note: the percentages entered should be the same or less than those entered in Question 3.

Dublin Airport
Employment and Activity Survey

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Q5. Employment by Occupation

We would like to illustrate the range of employment opportunities offered by businesses linked to Dublin Airport. Please estimate the number of on-site and off-site employees included in Question 2 that are in the following occupation categories. The figures entered in each column should sum to the same on-site and off-site totals as Question 2 or sum to 100%.

Occupation Category		Number or % of Employees	
		On-Site	Off-Site
Airline & Airline Servicing Trades	Airline Pilots		
	Flight Attendants		
	Aircraft and Equipment Mechanics		
	Customer Service Agents		
	Aircraft Servicing (cleaning, catering, etc.)		
	Baggage Loading/Unloading		
	Air Cargo Ramp Staff		
Support Services	Air Traffic Control		
	Security Personnel		
	Fire Services		
	Food Service Workers		
	Drivers / Delivery / Couriers		
	Dispatchers		
	Call Centre / Reservations		
	State Services (e.g., customs, immigration, agriculture, etc.)		
Retail Trades	Sales / Cashiers		
	Food & Beverage Preparation		
General	Managerial / Supervisory (e.g., chief executives, general managers, heads of finance, marketing, human resources, etc.)		
	Professionals (e.g., engineers, accountants, lawyers, etc.)		
	Craftsmen and Trade Workers (e.g., electricians, carpenters, etc.)		
	Cleaners, Manual Labourers and Similar		
Other (Please specify)			

Dublin Airport
Employment and Activity Survey

InterVISTAS
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Q6. Payroll and Wages

In order for us to estimate the earnings associated with Dublin Airport, please state the total payroll paid by your company in 2013 for the employees included in Question 2 previously. As indicated previously, these figures will be kept strictly confidential.

This figure should include all full-time, part-time and temporary workers and any contract employees. If you are unable to estimate payroll for 2013, please provide figures for your last financial year, and indicate which year that was.

Total Annual Payroll (2013):	€
Financial year (if not calendar year 2013):	

Alternatively, if you are unable to answer this question, please provide an approximate estimate of the average annual wage/salary per employee.

Average Salary/Wage: € _____ per annum.

Q7. Expenditures on Goods and Services

We want to be able to demonstrate how airport related businesses such as yours benefit other businesses in the region and elsewhere. To help us with this, please estimate your company's total expenditure on goods and services related to operations at Dublin Airport in 2013.

If you are unable to estimate your expenditures for 2013, please estimate your expenditures in the last accounting year, and indicate which year that was. Please do not include any contract employment already accounted for in Question 2.

Total good and services expenditures (2013):	€
Accounting year (if not calendar year 2013):	

Dublin Airport
Employment and Activity Survey

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TOBIN
Consulting Engineers

Q8. Expenditures by Location of Supplier

Please estimate how much of your expenditures in Question 7 were with suppliers located in the following areas.

Area	€ or % of Expenditure
On-site at Dublin Airport	
Elsewhere in Fingal County	
Rest of Greater Dublin	
Rest of Leinster	
Elsewhere in the Republic of Ireland	
Northern Ireland	
Outside of Ireland	

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Clarifications and Comments:

If you have any clarifications on the information you have provided, or any other related comments, please enter them in the box below. If you have any files or reports that you think would be relevant to this study, please email them to daasurvey@intervistas.com.

Thank you for your assistance in completing this survey.

Please complete and return this survey by the 24th October, 2014.

Please return the completed survey electronically by clicking the [Submit Form] icon on the top right hand corner, or by email / fax to:

Email: daasurvey@intervistas.com

Fax: +44-1225-330-209, Attention: Ian Kincaid

If you have any questions, please contact:
Ian Kincaid at ian.kincaid@intervistas.com or +44-208-144-1835.

Appendix C: Calculating Inferred Employment

InterVISTAS' approach was to utilise information from responding firms for each type of business, along with publicly available information on individual non-responding firms, to make inferences. This approach is generally deemed to be the best approach, and indeed is often used for developing the national income and products account (i.e. partial survey with inference for non-surveyed or non-responding firms based on responses of surveys received).

The employment data in this report was constructed from a combination of two sources:

1. Employment reported by employers on surveys.
2. Employment inferred for employers who did not provide a survey response. Inferred employment was based on employment information from firms in each business type that did respond to the survey. The mean employment of respondents in each business type was calculated, excluding outliers. For example, especially large firms were excluded from the analysis, and any firms with employment more than two standard deviations from the raw mean. This "adjusted mean" employment for each business type was then applied to the non-respondent firms.

For example: if 15 retail businesses were sent surveys but only 10 returned them, and other information on the non-responding firms was not available, an average employment figure was derived from the responding firms, excluding outliers, and applied to the non-responding firms.

Appendix D: Calculation of Full-Time Equivalent Jobs

The average number of employment hours comprising a Full-Time Equivalent (FTE) job is as follows:

Number of Days per Year	365
Minus	
Weekends (52 x 2)	104
Number of Public/Bank Holidays	9
Average Number of Vacation Entitlements ⁷¹	20
Average Sick Days Taken ⁷²	5.5
Total Working Days:	225
Average Number of Hours Worked Per Day:	8
Multiply by number of working days (8 x 225)	1,812 Hours

A Full-Time Equivalent job is equivalent of 1,812 hours of labour per annum.

⁷¹ Source: http://www.citizensinformation.ie/en/employment/employment_rights_and_conditions/leave_and_holidays/.

⁷² Source: <http://www.ibec.ie/IBEC/Press/PressPublicationsdoclib3.nsf/vPages/Newsroom~new-ibec-survey-shows-absenteeism-fell-during-crisis-20-11-2014?OpenDocument?OpenDocument#.VHNgarkfyM8>.

Appendix E: 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 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.

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 E-1** illustrates the basic structure of the input-output model.

Figure E-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 ,

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

In Figure E-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 (V_i in Figure D-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; and
- 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 D-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.⁷³ 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.

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

⁷³ See Leontief, Wassily W. *Input-Output Economics*. 2nd ed., New York: Oxford University Press, 1986.

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

This leads to the matrix representation:

$$\mathbf{X} = \mathbf{A} \mathbf{X} + \mathbf{Y} \quad (3)$$

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

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

where \mathbf{I} stands for the identity matrix. And the matrix $(\mathbf{I} - \mathbf{A})^{-1}$ 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, valued-added, 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.

