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The Impact of Air Transport on Ireland's Export Performance

FINAL REPORT

A Study submitted to the

Institute of International Trade of Ireland

by

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1997

Terms of Reference

The Terms of Reference state the aim of the study as being the identification of the importance and value of air transport in the various modes available to Irish exporters. In this regard, the study will investigate the contribution which air freight has made and can make to Ireland's international competitiveness. This assessment needs to be undertaken in a comparative way, so that the broader trends in international air freight markets can be understood and related to the Irish experience. The specific tasks involve an examination of the following :

- (i) Analysis of the volume and value of exports carried by air transport and its evolution in recent years
- (ii) Ireland's market for air transport
- (iii) The regulatory environment governing the operation of all services
- (iv) Factors constraining the growth of air transport
 - * Carrying capacity
 - * Pricing methods
 - * Regulations
 - * Physical facilities including regional airports
- (v) Opportunities to develop/extend the market

Executive Summary

The aim of this study is to identify the importance and value of air transport, in all of its forms, to Irish exporters. The study takes a supply side view by focusing on the providers of air freight services in an Irish and European context. Air freight has contributed to and benefitted from the rapid growth in the Irish economy in the last five years. The growth in the frequency and range of services available to Irish exporters represents an important attraction factor in encouraging new firms to operate to and from Ireland.

The growth rates in Irish air freight traffic have been similar to the growth rates in total Irish trade (exports and imports) during the 1990s. Between 1990 and 1995, Irish *exports* grew by 90%, while air freight traffic increased by 70% in the same period. The shares of exports going to UK and EU markets have been declining (both declined by 9% between 1990 and 1995) recently with the trade share destined for beyond the EU growing. The value of Irish export trade per tonne tends to increase with distance to the destination market and it is in the longer haul markets particularly that air freight has significant advantages over surface modes. For all but one of the top 21 Irish trading partners which are located outside of the EU (9 in all), the volume of imports significantly exceeds the volume of exports. This trade imbalance along with differences in the average value per tonne of imports compared with exports gives rise to complicated logistical and schedule planning problems for the carriers operating into and out of Ireland. The significant growth in non-EU trade has stimulated the development of a small number of new long haul air freight services. A detailed examination of the relative values per tonne of imports and exports for existing trading partners could help to highlight potential demand for new long haul air freight services to and from Ireland.

The air freight industry has three main types of operator: line haul carriers (passenger, freight and combination airlines), courier or express operators (who offer multimodal transport and logistical services) and niche operators (who specialise in handling special or unusual consignments often to locations with poor infrastructural facilities). The share of air freight handled by the line haul carriers has been declining steadily in Europe and in Ireland and this is in line with global trends. The express operators are expected to account for 40% of total international cargo business by 2015, according to Boeing. Express operators currently

account for about 60% of the US domestic market and the US experience remains an important indicator of key future regional and global trends.

A survey of Irish carriers was undertaken to ascertain the available capacity, and seasonal and directional variations in capacity, in the Irish market in 1996. There was a 46% response rate and the following trends were noted:

- * Of the volume of air freight reported in the survey, 77% was 'heavy' freight, 19% was 'express freight' and 4% was mail.
- * The overall ratio of inbound to outbound volumes carried was 1.10 (I.e. 10% more freight on inbound flights), with higher ratios being recorded in the case of heavy freight (1.235).
- * Carriers busiest period was reported as being December-January with May-June being cited as the quietest period.

With roughly 80% of air freight being carried by line haul operators, these airlines' operating characteristics and route networks were examined further. It was noted that most of the routes operated to and from Ireland were short-haul intra-European routes which limited the capacity and size of consignments which could be line-hauled by air. Furthermore, because Ireland is located at a relatively short distance from the world's busiest international airport (London-Heathrow) where there is a wide range of direct long haul services available and a choice of operator on most long haul routes, 'air trucking' has grown significantly in Europe and in the Irish market particularly. According to Aer Rianta, air trucking of freight accounted for 21% of total Irish air cargo throughput in 1996. Air trucking involves moving freight between airport bonded warehouses by truck under air waybill (e.g. moving freight from Dublin airport to London Heathrow by truck, with the freight then being line hauled from London by air).

The Irish air freight market is very competitive and this environment exerts downward pressure on air freight rates. Regulatory changes in Europe are expected to encourage entry of new carriers and the development of new services in both passenger and freight sectors which will have the effect of continuing the downward influence on freight rates in the medium term. The recent changes in European air transport regulations, which liberalised the conditions under which carriers operate within Europe, are still being fine-tuned and extended to cover such areas as ground handling at airports and airport charging systems. The

slow pace of regulatory reform has given rise to relatively small changes in regional European aviation markets, in terms of the number of carriers operating and the size and scale of their European route networks. The EU's external aviation policy continues to be determined on a state by state basis so that for the most part, the number of designated carriers on extra-EU routes remains unchanged. For the freight sector, regulatory reform in the area of external aviation policy will be an important step towards developing a competitive and flexible air freight market based in Europe.

Several factors were identified as significant constraints on the growth of air transport to and from Ireland. These include

- * The significant growth of air trucking, which was discussed earlier
- * The reduction in freight carrying capacity of the passenger airlines. In the longer term, the express operators and all-cargo airlines can be expected to increase their share of the air freight market, as passenger carriers are forced to charge more realistic cargo rates which are in line with the costs of producing the services. Passenger carriers have been facing declining passenger and freight yields (revenue per seat km/tonne km) as competition has forced efficiencies on many aspects of their operations.
- * Environmental regulations which have reduced the fleets of older, noisier aircraft available and have delayed or altered the infrastructure planning process and contributed to the capacity constraints at many European airports. The noise and pollution requirements now in place at many of the large airports raise operating costs for many carriers.
- * The congestion of air transport infrastructure in Europe has been identified in several studies as a major bottleneck to the development of a competitive air transport sector.
- * Security problems were highlighted as being a key factor constraining the growth and development of both express operations and air trucking. A more flexible ferry sailings schedule was identified as a positive influence on Irish air trucking growth in the short to medium term.

The study concludes with five recommendations for developing and extending the Irish air freight market. These recommendations deal with (i) improving the flow of detailed trade information to exporters, so that new routes and services may be developed (ii) training in the logistics area, as integrated distribution services continue to grow in importance (iii) speedy implementation of ground handling directives at Irish and EU airports in order to

improve this aspect of air freight operations (iv) the need to reach agreement with the UK authorities in relation to security procedures in order to reduce delays and costs imposed on carriers (v) the need to plan for the expected growth in air freight by providing adequate facilities at Irish airports, particularly Dublin Airport. The increasing emphasis on express services with their intermodal operations should help to guide planning.

Introduction

For the past decade air freight has grown faster than air passenger volumes and this trend is expected to continue according to the major industry forecasts (e.g. ICAO, Boeing, Airbus). The correlation between world GDP and world air freight traffic forms the basis for forecasts. Accordingly, the growth is expected to be greatest in Asian markets (i.e. intra-Asia, North America-Asia and Europe-Asia and Australasia) with international air cargo traffic continuing to expand faster than domestic air cargo traffic. Irish air freight volume has grown at a rate of 11.5% per annum since 1990, with the total volume increasing by 86% in the 1990-96 period. Given Ireland's very high GDP growth rate in 1995-97, it is reasonable to expect significant growth in air freight volumes in the next five years. Because of the cyclical nature of GDP growth, air freight traffic growth is also subject to cyclical effects. The liberalisation or deregulation of markets is one factor which can significantly impact on the growth of all air traffic. In the EU, the regulations governing air transport operations have changed very dramatically in the last 10 years.

The process of physical distribution of freight has become a highly sophisticated operation with increasingly greater reliance being placed on the use of new technology to assist in the movement, storage and tracking of consignments. Transport is but one component in this logistics chain. It is most likely that the future development of air freight transport will continue to be integrated to an increasing degree with developments in logistics.

In the first chapter of this report, Ireland's recent export performance is described and analysed. The significant growth in trade and GDP is reviewed and the key factors contributing to these trends are identified. The likely short and medium term trends are outlined and the implications of key national and international policy developments (such as EMU) are briefly discussed. The role of air transport in facilitating the growth of trade is outlined using CSO data.

In the second chapter, a brief overview of the different types of operators in the air freight sector is given along with a review of some key economic principles operating for the different types of carrier. The supporting actors in the logistics chain are described and the

process of physical distribution using the air mode is set out. The Irish market for air freight is described in detail in this section.

Air freight markets in Europe are undergoing significant change given recent legislative changes in the EU's air transport regulations, most notably those contained in the so-called 'Third Package' of 1992 (Council Regulation No. L240) and the air cargo liberalisation agreements of 1991. These new regulations will apply to the 18 signatory countries by the end of 1997 and were fully implemented by April 1997. In addition, the EU is currently investigating the possibility of a larger scale liberalisation of air cargo among its members as a precursor to further external air passenger liberalisation. These long term legislative changes will facilitate growth in the volume carried by air freight and integrated carriers, as producers of goods and services strive to improve the quality of their production and distribution chains. The US experience highlights the significant changes possible under liberalised regulations. In the third chapter of this report, the current situation in OECD air freight markets is described. The market structures and policy developments are outlined for the EU and EFTA countries and for the US. The US experience receives particular attention because of the key industry trends to emerge there after deregulation in 1977. These developments have had a significant impact on the industry structure as well as on the composition of global air freight. The development of integrated transport services is a key trend to have emerged in the US and Europe. The regulatory and practical difficulties arising from this development are reviewed in the fourth chapter of the report as are other key factors constraining the growth of air freight in general and Irish air freight in particular. In the fifth chapter, opportunities to develop and extend the market are highlighted and several recommendations are put forward. The report concludes by summarising the main conclusions and recommendations.

1. Irish Export Performance: Key Trends and an Examination of the Role of Air Transport

In 1995, Irish external trade amounted to IR£47.5 billion, with exports accounting for IR£27.3 billion (58%) and imports accounting for IR£20.2 billion (42%). Ireland's GDP and trade growth in the last three years has been at very high levels by EU standards. In 1995, exports had increased by 20% and imports by 17% on their 1994 values. In this chapter, we begin by looking at the broad trade patterns for Ireland in the last five years and identify where the growth has been greatest. We also examine the destination of export trade for the 1990-95 period and look at the projections which have been made for the year 2000. In Section 1.2 of the chapter, we examine the 1995 trade statistics in more detail and look at the relative values and volumes of imports and exports among the top 20 trading partners. In this section also, we present the most recently published data on external trade by port and examine the shares carried by air. We discuss the implications of these trends and patterns for the air freight sector in section 1.3 and make recommendations on how the air freight sector could make a greater contribution to our export trade.

1.1 Pattern and Destination of Exports

The value of Irish exports has increased dramatically in nominal terms in the five year period from 1990 to 1995. The overall percentage increase in value of exports in this time period was 90.3%. The sections exhibiting the largest percentage increase in value were firstly, animal and vegetable oils where an increase of 108.9% was recorded, secondly, chemical and related products, which increased by 121.45% and finally machinery and transport equipment which increased by 110.1%. The section exhibiting the lowest increase in value was inedible crude materials except fuels. An increase of 7.5% in value in this section was recorded. Another way to see the changes is to examine the contribution to the overall growth of 90.3 per cent by section. The increase in chemicals accounted for 21.3 per cent of the increase while machines and transport equipment accounted for 38.2 per cent.

Table 1.1

Value of Exports by Sections of SITC 1990 and 1995 (£ '000)

SITC Section	1990	1995	% Change
Food and Live Animals	2,859,705	4,805,660	68.0
Beverages and Tobacco	326,559	465,634	42.6
Crude materials, inedible except fuels	516,845	555,809	7.5
Mineral fuels, lubricants and related material	90,635	118,369	30.6
Animal and vegetable oils, fats and waxes	11,221	23,437	108.9
Chemicals and related products	2,274,398	5,034,608	121.4
Manufactured goods classified chiefly by material	1,152,172	1,306,562	13.4
Machinery and transport equipment,	4,488,051	9,430,389	110.1
Miscellaneous manufactured articles,	2,039,593	3,681,853	80.5
Commodities and transactions, not classified elsewhere	583,817	678,511	16.2
Unclassified,	N/A	1,195,602	
Total Exports	14,342,997	27,296,716	90.3

The following table, Table 1.2, compares the value of exports in 1995 with those in 1990 by industrial origin.

Table 1.2
Exports According to Industrial Origin, 1990 and 1995

Year	Agricultural Produce	Forestry and Fishing Produce	Industrial Produce	Unclassified Exports	Total Exports
1990 £m	1,965.1	182.2	11,925.1	264.4	14,336.7
1995 £m	2,864.4	251.2	22,826.8	1,354.3	27,296.7
% Change	45.8	37.9	91.4	N/A	90.3

Industrial produce exhibited the largest increase in value of 91.4%. Industrial produce was also the most important in terms of share of total exports in both years, constituting 83.18% of exports in 1990 and 83.63% of exports in 1995. Thus 91.4% of the total change in exports was accounted for by the increase in value of industrial produce. These are value figures. In volume terms exports rose by 80% over the same period.

Table 1.3 shows the main destination countries for our exports in 1990 and 1995.

Table 1.3

Value of Exports by Country (£'000)

	1990-Value	% Share 1990	1995-Value	% Share, 1995
France	1,509,950	10.5	2,582,856	9.5
Germany	1,681,456	11.7	3945037	14.4
United Kingdom	4,833,860	33.7	6944083	25.4
Belgium and Luxembourg	632475	4.4	1189722	4.4
Netherlands	831977	5.8	1909756	7.0
Italy	633941	4.4	1032935	3.8
Spain	307855	2.1	653782	2.4
Sweden	275546	1.9	504634	1.9
Other EU	664751		951893	3.5
Total EU	11,163,956	77.8	18762805	68.7
USA	1178446	8.2	2269588	8.3
Japan	263968	1.8	815005	3.0
Other	1736627	12.1	5449318	20.0
Total	14342997	100.0	27296716	100.0

Exports to the current European Union (figures include Sweden, Finland, E. Germany and Austria for both years for comparative purposes) in 1990 accounted for 77.84% of our total exports. The United Kingdom took the largest share of our exports - 33.70% of our exports went to the United Kingdom alone. The next important country in terms of exports was Germany, which was the destination country for 11.72% of our exports. Outside the European Union, the most important destination country for our exports was the USA. The USA's share of our exports in 1990 was 8.22%. Comparing the 1995 export figures with the 1990 figures we can see that the relative significance of individual countries remains unchanged. The United Kingdom remained the most important country but its share of our exports fell to 25.44%. Germany remained the next most important country in export terms and its share of our exports increased to 14.45%. The most important non-EU country remained the USA, whose share of our exports remained relatively unchanged at 8.31%.

Tables 1.4 and 1.5 divide exports in 1995 according to the main destination countries and the most important SITC subdivisions. Tables 1.4 and 1.5 look at exports to the European Union and exports to non-EU countries respectively. The most important countries in each SITC subdivision are included only. These data indicate that there is a high degree of concentration by product.

Table 1.4

Exports to European Union Countries (£ '000s), 1995

Products	Total	EU	France	Neth.	Great Britain	Italy	Spain	Belg. & Lux.	Germ.
Beef & Veal (Bone)	145090	144403	67602		15099				
Beef & Veal (Boneless)	340222	329722			122593				
Amino Acids	165572	104476			70098	13070	13090		
Other cyclic amides	112599		102992					187036	
Heterocyclic compounds	507376	270655						110834	
Office machines	2126135	1843103	338871	158948	545282				320750
Data processing equipment	448038	411750			184594				
Parts & Accessories, Elect. machinery	2244245	1281258			507034				313986
Other switches	113973	111924					10625		97092
Digital monolithic integrated units	824980	199539							162258

The growth in the value and volume of exports has been very rapid in recent years. We are not primarily concerned with an analysis of the causal factors that lie behind this growth as this lies outside the scope of the project. However it is readily apparent from a consideration of imports of the main trading countries listed in Table 1.3 that over the period 1990-1995 exports in volume terms from Ireland increased three times the growth in imports in these other countries. The driving force behind this was increased supply, following the establishment and expansion of overseas companies in Ireland, coupled with the continued competitiveness of the indigenous sector. Both of these factors continue to operate. On current trends the volume of exports is likely to continue to grow almost as rapidly in the second half of the decade as in the first half. The pattern is likely to be somewhat similar, but with a greater emphasis on office equipment, and on new software and support services. The growth in chemicals/pharmaceuticals may be somewhat less, though the sector is still undergoing major rationalisation in Europe following the Single Market Programme, and the outcome in terms of location and production decisions is as yet unclear. Table 1.6 summarises the projections.

Table 1.5**Exports to Non-EU Countries (£ '000s), 1995**

Products	Total	Saudi Arabia	USA	Canada	Japan	Norway	Switz	Czech Rep.	Singapore	Malaysia
Beef & Veal (Bone)	687									
Beef & Veal (Boneless)	10501	3670								
Amino Acids	61096		30247	17679						
Other cyclic amides	62212		19656	27054						
Heterocyclic compounds	236721				99598					
Office machines	283032				30709	53494	75007			
Data processing equipment	36289		12700						17074	
Parts & Accessories Elect. machinery	962988		301530		237353			11913		
Other switches	2049									
Digital monolithic integrated units	625442		378331							163236

Table 1.6**Exports (volumes) 1995-2000 (£bn, 1995 prices)**

	1995	2000	% change
Food	4.8	6.0	25.0
Chemicals	5.0	10.0	100.0
Machinery and Transport equipment	9.4	19.0	102.0
Misc. Manuf	3.7	5.6	51.0
Other	4.4	6.5	45.0
Total	27.3	47.1	73.0

1.2 Analysis of the volume and value of exports carried by air transport and its evolution in recent years

Ireland's trade is heavily concentrated in the EU, with 66% of total trade taking place within the EU in 1995. The UK remains the single largest market, accounting for a continually

declining share of 27% (imports & exports) in 1995. The top twenty-one trading partners are indicated below in Tables 1.7 and 1.8. The non-EU countries such as the USA (2), Japan (6), Singapore (10), Switzerland (13), Malaysia (15), Canada (17), Taiwan (18), South Korea (20) and Hong Kong (21) show the highest values per tonne of exports and imports among the trading partners. It can also be seen from these tables that, with the exceptions of Hong Kong and Switzerland, the volumes of imports significantly exceed the volume of exports. Japan has a reasonably similar volume of imports and exports.

Table 1.7
Top 21 Irish Trading Partners in 1995: Imports and Exports by Value and Volume

Rank	Trading Partner	Exports			Imports		
		(KGs)	Value (IR£)	Value per KG	(KGs)	Value (IR£)	Value per KG
1	Great Britain	4541525073	6155175307	1.36	7215346519	6538128354	0.90
2	USA	195474067	2269588232	11.61	2489449661	3563044224	1.43
3	Germany	786169644	3945036905	5.02	1048731315	1406900487	1.34
4	France	896138778	2582856443	2.88	638206232	748477090	1.17
5	Netherlands	828951574	1909755682	2.30	937560958	543305736	0.57
6	Japan	64508905	815004693	12.63	59133442	1063691273	17.99
7	Belgium & Lux.	359364306	1189721815	3.31	296610510	252998045	0.85
8	Italy	256059649	1032934668	4.03	280067189	397562266	1.42
9	Northern Ireland	1911572822	789190447	0.41	1836824762	631750786	0.34
10	Singapore	10017136	166846947	16.66	12253111	806062892	65.78
11	Spain	197229479	653781847	3.31	353603961	191400374	0.54
12	Sweden	74533115	504634485	6.77	296524559	215813414	0.72
13	Switzerland	39090388	493741501	12.63	23744747	134486449	5.66
14	Norway	441295862	294396300	0.66	2049758530	278698889	0.13
15	Malaysia	18259047	217054459	11.89	78386429	330730606	4.22
16	Denmark	123907072	340602519	2.75	109826763	141680820	1.29
17	Canada	36748867	209242303	5.69	107800996	144757114	1.34
18	Taiwan	10183099	69158274	6.79	24636418	265187094	10.76
19	Finland	93304680	174166518	1.87	155041730	125061983	0.80
20	South Korea	9755760	99006430	10.15	18412404	167667272	9.11
21	Hong Kong	19729861	102148628	5.18	6656694	143562570	21.57

Source: CSO Trade Databank

Table 1.8
Top 21 Irish Trading Partners in 1995: Total Trade and Ratios of Imports to Exports

Rank	Trading Partner	Total Trade			Ratios of Imports to exports		
		(kgs)	Value (IR£)	Value per kg	(kgs)	Value (IR£)	Value per kg

1	Great Britain	11,756,871,592	12,693,303,661	1.08	1.59	1.06	0.66
2	USA	2,684,923,728	5,832,632,456	2.17	12.74	1.57	0.12
3	Germany	1,834,900,959	5,351,937,392	2.92	1.33	0.35	0.26
4	France	1,534,345,010	3,331,333,533	2.17	0.71	0.29	0.40
5	Netherlands	1,766,512,532	2,453,061,418	1.39	1.13	0.28	0.25
6	Japan	123,642,347	1,878,695,966	15.19	0.91	1.31	1.42
7	Belgium & Lux.	655,974,816	1,442,719,860	2.20	0.82	0.21	0.25
8	Italy	536,126,838	1,430,496,934	2.67	1.09	0.38	0.35
9	Northern Ireland	3,748,397,584	1,420,941,233	0.37	0.96	0.80	0.83
10	Singapore	22,270,247	972,909,839	43.69	1.22	4.83	3.95
11	Spain	550,833,440	845,182,221	1.53	1.79	0.29	0.16
12	Sweden	371,057,674	720,447,899	1.94	3.98	0.42	0.10
13	Switzerland	62,835,135	628,227,950	10.00	0.60	0.27	0.44
14	Norway	2,491,054,392	573,095,189	0.23	4.64	0.94	0.20
15	Malaysia	96,645,476	547,785,065	5.67	4.29	1.52	0.35
16	Denmark	233,733,835	482,283,339	2.06	0.88	0.41	0.46
17	Canada	144,549,863	353,999,417	2.45	2.93	0.69	0.23
18	Taiwan	34,819,517	334,345,368	9.60	2.42	3.83	1.58
19	Finland	248,346,410	299,228,501	1.20	1.66	0.71	0.43
20	South Korea	28,168,164	266,673,702	9.47	1.89	1.69	0.89
21	Hong Kong	26,386,555	245,711,198	9.31	0.33	1.41	4.17

Source: CSO Trade Databank

Table 1.9 gives the average value per tonne of imports and exports by port of entry /exit in 1988, 1990 and 1992, the last available published data in this series. In the table, it is clear that trade entering or exiting Ireland by air has a dramatically higher value per tonne than trade transported by land or sea. The data published for 1992 shows a significantly different trend for imports compared with data for the previous 5 years. In 1992, according to the CSO, the value per tonne of imports was £IR17 per kg, compared with average values of £IR53.6 and £IR48.5 per kilogram in 1990 and 1992 respectively. Since comparable data is not available for 1993 and subsequent years, it is not possible to explain these differentials in a satisfactory manner.

Table 1.9
Analysis of External Trade by Port, 1988-1992

Year	Port or Station of Entry/Exit			All trade	
	Value per kg.				
		Land	Airports		
		Seaports	Frontier		
1992	Imports	0.436	0.713	17.056	0.587
	Exports	1.377	1.063	110.259	1.567
	Vol. Ratios*	2.393	1.424	4.630	2.109

1990	Imports	0.433	0.661	53.611	0.563
	Exports	1.408	0.989	113.350	1.537
	Vol. Ratios*	2.701	1.524	1.800	2.368
1988	Imports	0.398	0.689	48.485	0.527
	Exports	1.191	1.054	100.500	1.357
	Vol. Ratios*	2.463	1.204	1.833	2.127

Note: * Volume ratio indicates the volume of imports relative to exports

Source: CSO Statistical Bulletin, 1989-94

The values and volumes are detailed in Table 1.10, and shows that while trade volumes carried by air are less than 0.5%, they account for 16-17% of the total value of Irish trade. The data published by the CSO on external trade by port is collated from data from the Revenue Commissioners and customs. These data were compared with the Aer Rianta data (which is published in their Annual Report), and other CSO series on transport traffic statistics. Table 1.11 gives a sample of the very significant variations in statistics on the volume of air freight from the three series. The detailed data reported by firms on external trade requests information on the first mode of transport utilised. The request made to firms should require more extensive details on the transport arrangements involved in importing and exporting, given that most freight travelling into or out of Ireland will be transported by at least two modes.

The CSO external trade by port series may reflect accounting and invoicing procedures by firms that would give rise to differences in the dates when shipments were actually made and when these were paid for. Accordingly, components of the trade may be moved between one year or another because of accounting practices. The Aer Rianta data relates to air freight volumes handled by all carriers at the three main Irish international airports, Dublin, Shannon and Cork, in a given year. The CSO air traffic statistics are derived from carrier surveys and are published with a considerable lag (e.g. 6-8 years). Air freight volumes have not been published since 1989. It is important to appreciate the discrepancies between the different sources and how they might arise, as they can give a very different and misleading picture of the air freight market and its characteristics.

Table 1.10
Analysis of Irish External Trade by Airport, 1988-92

Year		Value (£m)	(% Total Value)	Volume (Tonnes)	(% Total Volume)
1992	Imports	2132	16.6	125,000	0.6
	Exports	2977	18.3	27,000	0.3
	Total	5109	17.6	153,000	0.5
1990	Imports	1930	16.0	36,000	0.2
	Exports	2267	16.3	20,000	0.2
	Total	4198	16.1	56,000	0.2
1988	Imports	1600	16.2	33,000	0.2
	Exports	1809	15.1	18,000	0.2
	Total	3409	15.6	52,000	0.2

Source: CSO Statistical Bulletin, 1989-94

Note: Volumes and values exclude Shannon Free Airport Trade

Table 1.11
Comparison of Air Freight Volume Statistics

Source	1992-Total	1990-Total	1989-Dublin	1988-Dublin	1987-Total
CSO*	153000	56000	N/A	N/A	71000
AER	86661	78567	46932	46823	60646
ATS	N/A	N/A	34954	33513	54368

CSO: Analysis of External Trade by Port

AER: Aer Rianta data (Annual Report)

ATS: CSO Air Traffic Statistics

Note: * Volume excludes Shannon Free Airport trade

Comparison of Air Freight with Other Modes

Air freight is a significantly more expensive mode of carriage of goods, and will be used when the value per unit weight of shipments is relatively high and the speed of delivery is an important factor. Under these circumstances, the transport costs can comprise a small proportion of the revenue associated with the products. The advantages which movement by air offers shippers are the speed, particularly over long distances, the lower risk of damage, security, flexibility, accessibility for customers, and good frequency for regular destinations (see Simmons, 1994). For express operators, the guaranteed delivery and the facility to track consignments gives customers additional advantages over standard air freight carriage. These superior qualitative differences give rise to higher rates for express services.

Over shorter distances, air transport faces stiff competition from surface modes, and in an Irish context, from combined road/sea services. Air freight demand varies by season, and this will be taken into account by carriers supplying airlift capacity. For long haul trade markets, the value per kilogram is expected to be greater so that transport costs represent a small percentage of revenue.

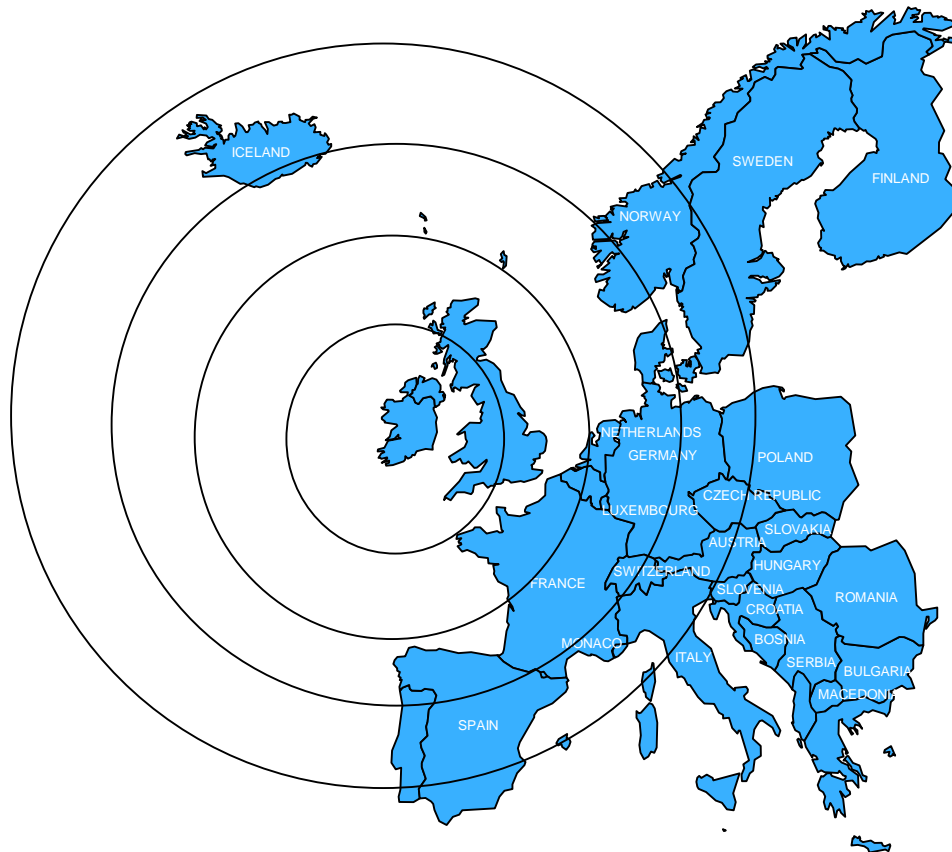
The value per kg. of exports is relatively high compared with imports for USA, Switzerland, Malaysia, Canada and South Korea. When we examine air freight capacity available, we have to consider how these patterns will impact on carrier routing decisions and on the potential to expand the air freight market in Ireland. Within the EU, we see a positive weight-distance relationship in operation for exports. This is illustrated in Figure 1.1. For example, ranking EU countries in terms of their average distance from Ireland, we can see that values per kg. of exports increase with distance. In terms of imports however, the same pattern is not observed, with values per kg. being significantly lower than the value per kg. of exports. These imbalances in both long haul and short-medium haul markets present difficulties in providing the Irish market with adequate and appropriate transport services.

Durkan and Reynolds-Feighan (1992) in their analysis of manufacturers transport costs, highlighted the fact that Ireland's average value per tonne of exports was the highest in the EU12 in 1990. This reflected the fact that industrial policy and exporters preferences were for relatively high-valued products, given the ratio of transport costs to sales revenue for a peripheral European country.

Passengers Air Carriers and Air Freight:

Most passenger carriers also carry some freight. In wide-bodied jets, substantial cargo space is available in the belly of passenger-configured aircraft. Combination passenger and freight aircraft are operated by most large carriers and in many instances, all-cargo aircraft or 'freighter services' are operated as well.

Figure 1.1 Value per kilogram of Imports and Exports of EU Trading Partners



Exports

Northern Ireland (0.41)	Great Britain (1.36)	France (2.88)	Germany (5.02)	Sweden (6.77)
		Belg & Lux (3.31)	Italy (4.03)	
		Netherlands (2.30)	Spain(3.31)	

Imports

Northern Ireland (0.34)	Great Britain (0.90)	France (1.17)	Germany (1.34)	Sweden (0.73)
		Belg & Lux (0.85)	Italy (1.42)	
		Netherlands (0.57)	Spain (0.54)	

There are however several important distinctions between passenger demand and shipper demands for air transport services. These distinctions place a different set of constraints and operating conditions on carriers depending on whether they are carrying cargo, passengers or both. Freight comes in a large variety of shapes, density and sizes, and must be loaded onto and off aircraft by equipment and handlers. Large units may have to be carried in freighter-only aircraft. The routing of cargo (including the number of stops or transfers) is unimportant to the shipper: what is important is the lapsed time between pick up and delivery. For passengers however, their preference is typically for daytime, non-stop flights. Shippers preferences are for night-time carriage of goods with early morning delivery.

One of the most significant differences between passenger and freight air transport (a factor which significantly affects the economic viability of cargo operations) lies in the fact that passengers typically travel on round-trip journeys while cargo travels from a point of production to a point of consumption. Matching demand with inbound and outbound capacity is a difficult task and can lead to different route organisations for freight services compared with passenger services. For combination carriers, this can pose difficulties since freight demand and passenger demand for principal destinations may not coincide. Carriers will take account of inbound and outbound requirements in considering whether or not to provide service on a route, and in deciding on the segments of the route and capacity available on each of the segments.

New all-cargo services have been initiated from Ireland in the last two years, but the routing and capacity available is less favourable from the viewpoint of exporters than from importers because of the relative volumes involved (e.g. non-direct services, less capacity). These issues will be discussed in more detail in subsequent chapters, when the Irish air freight market has been detailed and discussed.

Irish exporters would benefit from examining the detailed trade data which the CSO makes available in an electronic format. Summary analysis from these databanks have been presented here, but more detailed statistics giving commodity-specific information are included in the CSO dataset. The information compiled by the CSO could be improved by requesting firms to supply more detail on the various modes of transport used in importing and exporting tradable goods. Potential new markets and transport services to these new markets may be identified from analysis of the data. The development of new long haul air freight routes to/from Ireland is more likely to take place if information on existing trade flows is available.

2. Air Freight Markets: A Review of Recent Trends and Performance

Introduction

Air freight markets are difficult to delimit and analyse for a number of reasons. The air freight providers are a heterogeneous group of operators, offering different types of services and different levels of logistical expertise. In the first section of this chapter, the main types of air freight operator are identified and the economic characteristics of the different operators are outlined. Because air freight services involve predominantly international transportation and distribution flows, geographical analysis of markets must take account of the 'broader context', which in the analysis of Irish air freight involves an understanding and evaluation of (i) European market characteristics and trends (ii) North American trends and (iii) Asian developments and trends. In the second section of this chapter, the global air freight market is described and the performance of the European market is then reviewed in a comparative manner. The Irish air freight market is then described and analysed in detail.

2.1. The nature and organisation of air freight markets

There are three main categories of air freight operators:

1. Line haul operators
2. Integrated Carriers (such as TNT, Federal Express and DHL)
3. Niche operators

The different types of operators face a variety of cost, revenue and operating conditions and these are now highlighted.

(1) *Line Haul operators* move cargo from airport to airport and rely on freight forwarders or consolidators to deal directly with customers. Line haul operators can be

- (i) all-cargo operators (scheduled and non-scheduled), moving only freight in dedicated freighter/cargo aircraft (for example Cargolux (EU) and Arrow Air (USA));

(ii) combination passenger and cargo operators who use both dedicated freighter aircraft and the belly-holds in passenger aircraft to move freight (for example Lufthansa (EU) and Air France (EU));

(iii) passenger operators who use the belly-holds in passenger aircraft.

(2) *Integrated/Courier/Express operators* move consignments from door-to-door, with time-definite delivery services. Courier operators operate multimodal networks, combining air services with extensive surface transport to meet customer demands.

(3) *Niche operators* operate or leverage specialised equipment or indeed expertise in order to fill extraordinary requirements (for example Heavylift (Netherlands) and Challenge Air Cargo (USA)).

Basic industry economics for different classes of carrier:

(1) *Line Haul operators*: All-cargo operators offer relatively high reliability and have the capability to move large volumes over long distances. For the combination carriers, the cargo operations are mainly long haul, with a large amount of freight being interlined on to shorter haul feeder services. The high utilisation of long haul aircraft justifies the purchase of new aircraft for these services. Passenger carriers have tended to view cargo as a by-product of passenger operations. They are seen to offer the lowest prices and the least reliable service (GECAS, 1994). Passenger carriers move cargo in the belly-holds of passenger aircraft where it has traditionally taken second place to passenger services. If for example an aircraft has a full passenger and baggage load, the cargo/freight would be delayed until the next available flight. Unlike passenger services, shippers do not have access to price information analogous to passenger Computer Reservation Systems (CRSs). Freight forwarders play an important role in consolidating shipments for line hauliers.

(2) *Courier operators* offer a variety of products to shippers and supplement air services with extensive ground transport to provide time-definite delivery with continuous shipment tracking and, if necessary, logistical expertise to support Just-In-Time (JIT) inventory control strategies. In order for courier operators to be able to offer door-to-door next day deliveries, they require night-time operations. In terms of aircraft requirements then, they need to operate quiet, reliable aircraft with low utilisation levels (as few as two hours flying time per day in some cases). Courier operators seek to purchase a combination of new aircraft, with

high capital costs and better utilisation on long haul segments, with less expensive renovated second-hand aircraft for the medium haul operations with lower utilisations.

(3) *Niche operators* attract business through their capabilities for handling outside freight or special consignments, including line haul to locations with poor infrastructural facilities. For chartered freight and niche operators, the discontinuous use of aircraft makes it financially preferable to acquire freighter aircraft on a second-hand basis.

Pricing :

Air freight services are sold and marketed in a number of different ways. The line haul operators sell a relatively small proportion of their cargo space directly to their customers. The greater proportion of their space is sold through general sales agents (GSAs) or freight forwarders, who negotiate with the airlines for fixed amounts of space. The agents or forwarders then sell on the freight space to customers. The line haul airlines publish their cargo tariffs as agreed at IATA tariff conferences. In practice, only a small percentage of customers pay these published tariffs, which can be considered as an upper-bound on air cargo rates. As with passenger fares, discounting is widely applied and in the case of cargo, rates will be determined on the basis of a number of characteristics and circumstances, including the following

- Commodity type
- Volume, density and weight
- Routing
- Season
- Regularity of shipments
- Imports or exports
- Priority or speed of delivery.

Consolidated shipments aggregated by forwarders and carried by the line haul operators typically travel under a single air waybill. Integrated operators offer a variety of products or services depending on (a) the weight of the consignment and (b) the speed of delivery required by the customer. Discounting is applied to these services on the basis of the volume and regularity of custom. However because each consignment is treated as a separate piece of freight, with an individual air waybill and customs declaration, the integrated carriers provides and practice electronic tracking of individual shipments.

2.2 Global Air Freight Trends

Shares of international traffic:

Consistent and complete data on air freight markets is not available in any kind of detail. Boeing and Airbus Industries produce world air cargo forecasts which give the most detailed overview of the extent and regional distribution of scheduled and non-scheduled air freight. For country specific information, the International Civil Aviation Organisation (ICAO), the US Department of Transportation (USDOT) and the Association of European Airlines (AEA) data are used, although these data are increasingly less reliable as the scheduled national flag carrier's share of its national air freight traffic continues to decline. In the very recent period, significant numbers of carriers have failed or delayed reporting statistics to ICAO. The 1995 Boeing estimates of world air cargo are given in Table 2.1 below.

The Boeing data show a declining US share of the global air freight market from 43% of world air freight revenue tonne-kilometres (RTKs) in 1975 to 32% in 1995. The European share has remained relatively unchanged over the same period (i.e. 24.2% in 1975; 22.9% in 1995). The main growth region has been Asia and the Pacific. This region's share of world air freight RTKs has risen from 12.4% in 1975 to 28.5% in 1995. In 1995, non-US charter freight RTKs accounted for 6.6% of world air freight. A regional breakdown of this traffic was not available.

According to Boeing (1996), air cargo revenues now account for an average of 16% of airline revenues, with some carriers deriving more than 30% of their earnings from cargo. Cargo is now challenging the dominant position of passengers in the case of many airlines as a result. Boeing project an annual 6.6% growth rate in air cargo traffic over the next 20 years (compared to 5.1% growth in passenger traffic). They project a need for at least 2000 freighter aircraft in the same period in order to accommodate this growth and replace noisy and ageing aircraft.

The distribution of air freight tonne-kilometers among the 25 OECD countries is shown in Table 2.2. The data are compiled from ICAO statistics and relate to scheduled RTKs for 1989 and 1993.

Table 2.1

World Air Cargo Volumes by Market Segment (millions, RTKs)

		1980	(%)	1985	(%)	1990	(%)	1995	(%)
US Domestic									
	Scheduled Freight	4780.0	14.0	4579.1	9.8	5253.0	7.0	4578	4.2
	Charter Freight	425.4	1.2	1130.6	2.4	616.0	0.8	363	0.3
	Mail	1378.6	4.0	1767.9	3.8	2175.0	2.9	2781	2.5
	Express carriers	455.2	1.3	2383.3	5.1	6428.0	8.5	11275	10.3
	Total Domestic	7039.2	20.7	9860.9	21.1	14472.0	19.2	18997	17.4
US International									
	Scheduled Freight	3602.0	10.6	4201.6	9.0	7966.0	10.6	11943	10.9
	Charter Freight	741.8	2.2	845.2	1.8	1974.0	2.6	3120	2.9
	Mail	580.7	1.7	646.9	1.4	748.0	0.9	771.7	0.7
	Total International	4924.5	14.5	5693.7	12.2	10688.0	14.2	15834.7	14.5
US Total									
	Scheduled Freight	8382.0	24.6	8780.7	18.8	13219.0	17.5	16521	15.1
	Charter Freight	1167.2	3.4	1975.8	4.2	2590.0	3.4	3483	3.2
	Mail	1959.3	5.8	2414.8	5.2	2923.0	3.9	3513	3.2
	Express carriers	455.2	1.3	2383.3	5.1	6428.0	8.5	11275	10.3
	Grand Total	11963.7	35.1	15554.6	33.2	25160.0	33.3	34831.7	31.9
Europe									
	Scheduled Freight	8244.1	24.2	11737.0	25.1	17465.0	23.1	23977	22.0
	Scheduled Mail	601.2	1.8	767.0	1.6	885.0	1.2	971	0.8
	Scheduled total	8845.3	26.0	12504.0	26.7	18350.0	24.3	24948	22.9
Asia & Pacific									
	Scheduled Freight	5788.5	17.0	10312.0	22.0	19400.0	25.7	30216	27.7
	Scheduled Mail	292.1	0.8	422.0	0.9	927.0	1.2	868	0.8
	Scheduled total	6080.6	17.9	10734.0	22.9	20327.0	26.9	31084	28.5
Total Non-US Scheduled Cargo									
		19581.5	57.5	29209.0	62.4	46741.0	61.9	67147	61.5
Total Non-US Charter									
		2515.7	7.4	2056.0	4.4	3556.0	4.7	7174	6.6
Total Non-US Cargo									
		22,097.2	64.9	31,265	66.8	50,297	66.7	74,321	68.1
Total World Air Cargo									
		34060.9	100.0	46819.6	100.0	75457.0	100.0	109152.7	100.0

Source: Boeing World Air Cargo Forecast 1996/1997

The 25 OECD countries collectively accounted for 69.7% of *total* world scheduled air RTKs in 1993 and for 67.4% of *international* world air RTKs. Of the OECD's traffic share, the USA, Japan, UK, Germany and France account for just over three-quarters of the total RTKs (i.e. 76.1%) and 72.2% of the OECD's international RTKs. The average percentage of international RTKs compared to total RTKs is 91.5% for the OECD countries. Excluding the US, Mexico and Canada (where the average percentage is 60.5%), this average rises to 95.7%, reflecting the more typical trend that most countries' air freight is transported

internationally. Because of the large size of the US domestic air freight market, it will be examined in some detail in subsequent sections.

Table 2.2
OECD Air Freight Statistics, 1993

Country	Total Scheduled Traffic		Int'l Scheduled Traffic	
	Freight Tkm (millions)	% of OECD	Freight Tkm	% of OECD
	1993		1993	
Belgium	400.7	0.8	400.7	1.1
Spain	553.8	1.2	476.6	1.3
Ireland	97.4	0.2	97.3	0.3
France	3715.5	7.9	3500.8	9.3
Norway	127.0	0.3	115.8	0.3
Denmark	121.5	0.3	115.8	0.3
Luxembourg	0.5	0.0	0.5	0.0
Canada	1369.2	2.9	1058.3	2.8
Sweden	192.3	0.4	185.2	0.5
Portugal	170.8	0.4	154.1	0.4
Iceland	35.3	0.1	35.0	0.1
Japan	5479.1	11.7	4847.4	12.9
USA	16343.0	34.9	8687.2	23.2
Italy	1335.0	2.9	1310.8	3.5
Germany	4639.9	9.9	4619.4	12.3
Finland	157.1	0.3	155.2	0.4
Greece	127.0	0.3	118.9	0.3
Mexico	150.9	0.3	77.2	0.2
Netherlands	2770.7	5.9	2770.6	7.4
Australia	1569.5	3.4	1358.2	3.6
Switzerland	1247.0	2.7	1241.7	3.3
New Zealand	473.0	1.0	450.0	1.2
UK	5404.9	11.6	5399.4	14.4
Turkey	161.7	0.3	151.7	0.4
Austria	129.6	0.3	129.4	0.3
OECD Total	46772.4		37457.2	
OECD as %	69.7		67.4	
World	67122		55576	

Dominant Air Cargo Flows: In global terms, the dominant air cargo flows are in 3 main markets, namely (1) the North Atlantic (2) Europe - Far East and (3) Pacific rim. These 3 markets accounted for 60% of world scheduled traffic in 1993. Detailed breakdowns of traffic flows by market segment rather than by country of origin are difficult to obtain and piecemeal. These data are available in Europe for the scheduled flag or national carriers through the AEA yearbooks. The data are not available however for the US or Asian markets.

The two main submarket areas will now be examined separately, before some general issues are identified and discussed.

The Europe-Asia market is expected to have one of the top growth rates over the period 1996-2015. Boeing (1996) estimates that air freight on this sector will grow by 7.4% per annum. Intra-Europe freight has the lowest forecast growth rate of 4.3%. The international air express market is expected to grow at a tremendous rate over this period. Boeing forecasts an annual growth rate of 18% which they claim will result in express services accounting for c.40% of the total international cargo business by 2015. It currently accounts for 5% of the total market. This mirrors the US experience, where express services accounted for 4% of the US market in 1977 and with an average annual growth rate of c25%, express operators now claim close to 60% of the US domestic market in 1996 (Air Cargo World, 1996). It is believed that this experience in the US raised customer expectations for air freight services world-wide.

Boeing anticipates a long term yield decline of 1% per annum. Boeing expect that in terms of air freight capacity changes, large freighters (with more than 50 tonnes) will show the greatest proportional increase. The small and medium capacity fleets will be increasingly dominated by freighters of express carriers.

Air freight markets are shifting as the economic growth pattern of developing countries accelerates past that of already industrialised economies. Boeing suggest that the main influences or drivers behind these trends are:

1. Primary influence of world economic activity (world GDP is the best single measure of global economic activity with a high correlation between changes in world GDP and changes in world air cargo RTKs).
2. Impact of the range of services in the express and small package market
3. Inventory management techniques
4. Deregulation and liberalisation
5. National development programmes
6. Stream of new air-eligible commodities

In terms of longer run global changes Boeing suggest that “ Low cost production is moving as the cost of labour increases and Taiwan and South Korea are losing this industry while Indonesia, Thailand and Malaysia and Vietnam gain it. Air cargo will follow”.

2.3 The EU/EFTA Air Freight Markets

The EU and EFTA air freight markets are dominated by the flag carriers of the member states as are the passenger markets. Table 2.3 shows that on average, 94% of total revenue tonne kilometres (RTKs) are performed by the flag carrier. The main exception is the UK where BA performs about 51% of total RTKs. Europe's air freight is carried by passenger carriers and by combination passenger-cargo carriers (such as Lufthansa and Air France). The integrated carriers have increased the size of their European operations in recent years and it has been suggested that they now perform most of the total Intra-European RTKs (Triangle Management Services (1990)). Comprehensive data on the integrated carrier services and volumes at the European level are not available however.

All of the flag carriers offer freight services on passenger aircraft with Lufthansa, Air France and Iberia for example also offering substantial all-freight services. BA and KLM handle just under 10% of their air freight using all-freighter aircraft. Table 2.3 shows the proportion of freight carried on combination (passenger and freight) and freighter (freight-only) services by the members of the Association of European Airlines (AEA) in 1993. For 19 OECD countries, their national or flag carrier is a member of the AEA. Using data for the 19 carriers, the breakdown of freight traffic between "Geographical Europe", "North Atlantic", "Other long haul" and "Total International" categories were collated. Air freight within Europe (carried by the AEA carriers) tends to account for a small proportion of carrier's total RTKs and tonnes carried. For the AEA carriers covered by the Third Package, intra-European traffic accounts for 17% of RTKs on average, and for 36% of freight tonnes. For many of the carriers, the North Atlantic is the most important market sector for freight, averaging 41% of total RTKs and 27.5% of freight tonnes carried. This reflects the significantly larger stage length on these long haul routes compared with intra-European routes. Long haul routes more generally (i.e. North, mid- and South Atlantic, sub-Saharan Africa, Far East/Australasia and other routes) account for an average of 78% of RTKs and

50% of freight tonnes. The breakdowns for individual carriers are given in Tables 2.3 and 2.4.

Table 2.3

Breakdown of Freight Traffic by Market Segment for AEA Airlines, 1993

Carrier	Country	Percentage of Country's Freight (RTKs)	Percentage of Freight on Pax Services Within Europe		European Freight as Percentage of Total Scheduled Freight	
			(RTKs)	(Tonnes)	(RTKs)	(Tonnes)
Aer Lingus	Ireland	100.0	61.7	53.0	11.9	52.1
Air France	France	97.4	94.6	98.1	1.3	9.2
Alitalia	Italy	99.4	79.4	78.3	3.6	17.8
Austrian Air	Austria	66.9	100.0	100.0	22.8	63.7
British Airways	UK	50.6	100.0	100.0	2.9	17.3
British Midland	UK	0.0	100.0	100.0	67.2	67.3
Finnair	Finland	99.7	71.8	70.7	12.7	40.6
Iberia	Spain	98.2	65.2	73.8	8.1	22.7
Icelandair	Iceland	100.0	62.2	64.0	38.7	49.1
KLM	Netherlands	100.0	61.9	64.7	2.7	19.4
Lufthansa	Germany	99.9	69.0	72.9	3.1	17.5
Luxair	Luxembourg	90.0	100.0	100.0	100.0	100.0
Olympic	Greece	100.0	100.0	100.0	31.9	36.5
Sabena	Belgium	100.0	100.0	100.0	4.6	24.2
SAS	Scandinavia	95.4	100.0	100.0	11.1	40.4
SwissAir	Switzerland	99.6	100.0	100.0	5.4	30.6
TAP	Portugal	99.8	99.4	99.4	18.8	40.4
Turkish Airlines	Turkey	99.8	88.2	88.5	26.5	32.5
Average		84.0	81.8	82.3	19.6	35.9

The proportion of freight carried on freighter-only services is greater for the long haul routes than for short/medium haul routes, for those carriers offering freight-only services. This reflects the fact that on longer haul routes, as distance increases, the cargo capacity of passenger aircraft becomes increasingly constrained by the weight of passengers, baggage and fuel (this is not the case for the B747-400 and B777 aircraft).

Table 2.4

Breakdown of Freight Traffic by Market Segment for AEA Airlines, 1993

Carrier	Country	Nth. American Freight as Percentage of Total Scheduled Freight		Total Long Haul Freight as Percentage of Total Scheduled Freight		Freight-only services as Percentage of Total Scheduled	
		(RTKs)	(Tonnes)	(RTKs)	(Tonnes)	(RTKs)	(Tonnes)
Aer Lingus	Ireland	88.0	42.6	88.0	42.6	50.5	45.9
Air France	France	30.9	29.0	93.9	82.6	52.8	46.9
Alitalia	Italy	49.3	37.9	93.4	68.9	41.4	35.3
Austrian Air	Austria	46.7	18.7	66.9	26.0	0.0	0.0
British Airways	UK	44.7	42.2	90.3	73.6	5.0	2.6
British Midland	UK	0.0	0.0	0.0	0.0	0.0	0.0
Finnair	Finland	44.0	27.3	86.4	51.8	3.6	11.9
Iberia	Spain	30.0	17.4	80.4	41.3	19.1	24.3
Icelandair	Iceland	60.3	41.0	60.3	41.0	14.6	17.7
KLM	Netherlands	37.6	37.0	94.2	76.0	18.6	15.3
Lufthansa	Germany	37.6	30.6	90.0	65.7	49.8	43.8
Luxair	Luxembourg	0.0	0.0	0.0	0.0	0.0	0.0
Olympic	Greece	22.8	5.8	56.7	14.1	0.0	0.0
Sabena	Belgium	50.4	40.8	92.9	71.8	0.0	0.0
SAS	Scandinavia	49.9	23.8	84.5	38.3	0.0	0.0
SwissAir	Switzerland	43.6	32.2	90.6	59.6	0.0	0.0
TAP	Portugal	23.7	14.5	73.4	38.8	0.8	1.6
Turkish Airlines	Turkey	48.4	16.2	64.6	24.0	34.1	13.8
Average		37.2	24.1	68.8	42.9	15.3	13.6

The EU Third Package of air transport liberalisation measures was adopted by the EU12 Ministers of Transport in 1992 and came into effect in January 1993. By 1997, it is expected that 18 states will have adopted these regulations. [i.e. EU15 and EFTA countries]. The measures give complete cargo pricing freedom (although these have been permitted since 1991) and free access to intra-European air routes. The Commission has not adopted a common external policy as yet, so that most flag carriers' air freight markets are not subject to competition from other European carriers (i.e. on international extra-European routes). The integrated carriers have moved to extend their operations on different continents by setting up, or taking over, locally registered firms in Europe, Austral Asia and North America and transferring or distributing express freight between these different operations.

Within Europe, competition from surface modes has a negative impact on air freight potential. The fact that passenger airlines have traditionally looked on cargo as a by-product of their passenger operations (with the marginal cost of cargo considered close to zero) and priced accordingly, means that rates have been low relative to the economic costs of the services. Domestic markets account for a small share of the total RTKs (averaging less than 2% of RTKs) but a more substantial 10% of total freight tonnes.

Earlier it was stated that there has been air cargo pricing freedom in Europe since 1991, and access to intra-European routes. Because of the small geographical size of the European internal market (compared with the US domestic market), significant developments and growth in European carrier's air cargo traffic are expected to emerge in the long-haul markets. Air express is expected to continue to grow at a much faster rate than 'heavy' cargo or airmail services. The North Atlantic and Europe-Asia markets are expected to record 6.5-7% annual growth rates in RTKs according to Boeing. The forecast for intra-Europe growth is a more modest 2-3% per annum for the same period (1993-2013).

Air trucking in European markets: Within Europe, competition from surface modes has had a downward impact on air freight growth rates. This factor along with a relatively low overall economic growth rate explain the below-average long term growth rate for air freight. 'Air trucking'¹ has been expanding at a rate of 15% per annum since 1975, according to Boeing (1996), with an estimated 6,650 frequencies per week in Europe in 1995. They suggest that the number of routes served within Europe has expanded from 38 in 1975 to 386 in 1995, including four domestic and five international Irish routes. In their report to the European Commission in 1990, Triangle Management Services suggested that air trucking in Europe,

“initially was a key product of the carriers’ effort to provide shippers with a substantial range of services, i.e. a road-based routing where there was no real option. In doing so they have now undermined the basic economics of running a substantial conventional all-cargo operation, particularly Intra-European.”

(Triangle Management Services (1990), page 9.

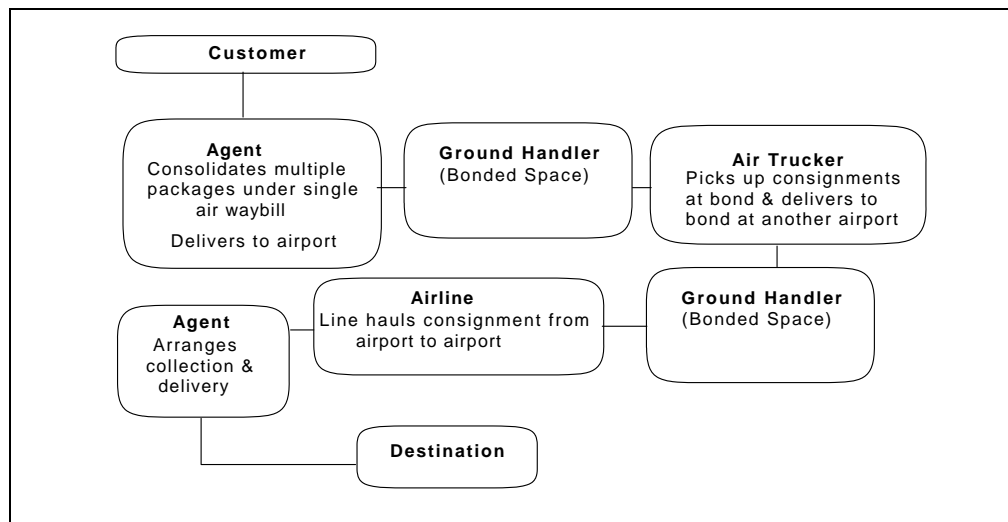
¹Air trucking involves the movement of air cargo by road under air waybill.

In 1971, international airlines through IATA introduced and adopted IATA Resolution 507b, which clearly defined the circumstances under which trucking could be undertaken. The main circumstances involved:

- The lack of available space on aircraft
- Where consignments could not be handled on aircraft operated by an airline due to the size, weight or nature of the consignments (certain commodities may only be shipped in freighter or all-cargo aircraft) or because the carrier refuses carriage on some other grounds
- Where the carriage by air will result in delayed transit times or in carriage not being accomplished within 12 hours of acceptance
- Where carriage by air will result in missed connections

Today the practice of air trucking is predominantly oriented towards moving intercontinental freight traffic to gateway airports. This process is described diagrammatically in Figure 2.1.

Figure 2.1
Air Trucking in the Freight Logistics Chain

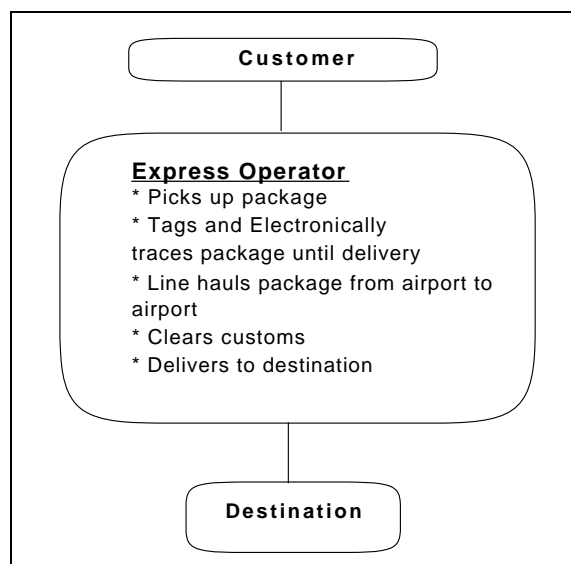


Integrated carrier services in Europe: As was pointed out earlier, Europe’s internal air freight market has seen significant growth and development in the express sector, with many of the line haul carriers reducing or discontinuing their intra-European freight operations. Data on Europe’s express market is piecemeal, of variable quality and not published or available for

all of the EU states. Because this sector has experienced such rapid growth in a relatively short period of time, the lack of data makes it difficult to identify trends and key characteristics of the European sector. There is urgent need for a comprehensive study of this sector in Europe in order to describe the European market and present a basis for identification of key policy issues relating to the sector's operations and development. The express sector is expected to be the key growth sector in air freight in Europe (and indeed world-wide) in the next decade.

In Figure 2.2, the express operator's service chain is presented in schematic form. This facilitates a comparison with the air trucking process illustrated earlier. The key advantages of the express operators service over traditional air freight services are (i) the relatively small lapsed time between pickup and delivery, and (ii) the fact that a single company handles the package or freight from pickup to delivery. Customers can purchase different services based on speed and delivery requirement².

Figure 2.2
Freight Logistics Chain of Express Operators



The express operator will typically provide electronic tracking of packages, with customers having access to this tracking facility. Each package/consignment is separately tagged and

²For example, TNT Express Worldwide offer next-day parcels and freight services, 2/3 day services or 4 day parcels and freight within Europe. With their Worldwide services, customers can also choose different pickup and delivery options (e.g. door to door or door to airport).

tracked and will be cleared through customs. Customs services in most European countries now operate electronically, so that consignments receive clearance en route to their destination airport. The customs authority can notify the operator of consignments which will be required to be cleared on the ground and this information can be forwarded to the customer via the tracking system. Because each consignment requires separate documentation and custom clearance, charges are levied individually.

2.4 The Irish Air Freight Market

In 1996, 146,192 tonnes of air freight were carried through Irish airports. This represented a 16% increase on the 1995 volume, and an 86% increase since 1990. These rates are similar to the growth rates of total trade in the same period. Irish air freight volumes for the period 1984-96 are illustrated in Figures 2.3 and 2.4, where trends at the three main Aer Rianta airports are given. Typically, 70% of the air freight volume passes through Dublin, with 27% handled at Shannon and 3% at Cork. The Irish air freight market is served by the three main types of operators described earlier in this chapter. In 1996, there were 13 cargo airlines operating to/from Ireland of which 3 were express carrier specialists. In addition, some 24 scheduled passenger or combination carriers served Ireland. There are two ground handling agents operating at Dublin and Cork airports, Aer Lingus and Servisair (since 1991).

Air Carrier Survey:

A postal survey of carriers/handlers serving the Irish market was undertaken in order to ascertain

- The available capacity in the market and the seasonal and directional variation in this capacity in a given year (1996)
- The routes served (including segments or links)
- The equipment used
- The total volume of freight broken down by 'heavy' freight, express and mail.

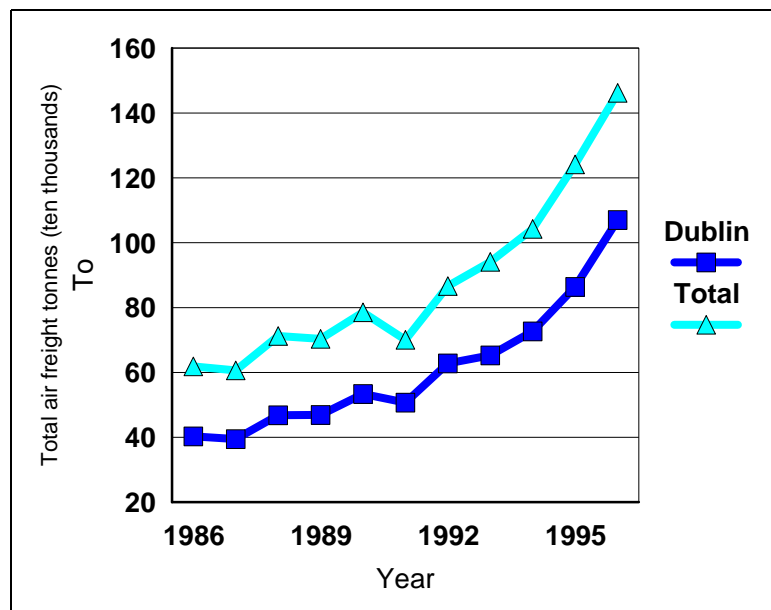
In addition to the postal survey, interviews were held with several carriers and this process helped to identify key patterns and to identify policy or operational difficulties facing the market.

The questionnaire was sent to 35 air carriers and handlers who, according to Aer Rianta, are operating cargo services into and out of Ireland. A copy of the questionnaire is presented in the appendix.

Figure 2.3

Irish Air Freight Volumes, 1986-96

Total Volume of Air Freight through Aer Rianta Airports and through Dublin Airport



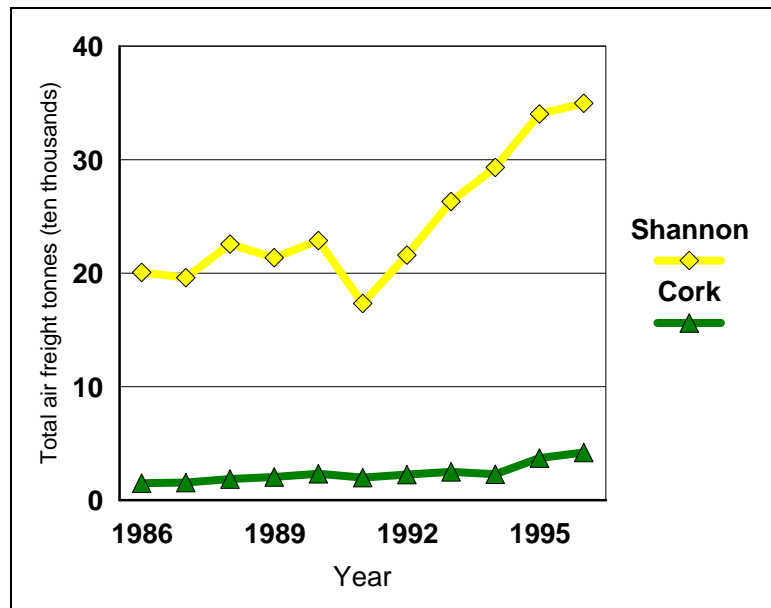
There were 16 responses received (46%), although 7 of those received did not provide most or all of the information requested either because (a) the carrier subcontracted all of its cargo sales and handling to agents or forwarders or (b) the carrier had ceased offering cargo services to the Irish market. The total air freight volume handled by the 9 remaining respondents represented 89.9% of total Irish air freight in 1996. This proportion is very high mainly because of the response of the two handling agents at Dublin airport. Of the volume reported in the survey, 77.03% was 'heavy' freight, 18.8% was express freight and 4.17% was mail. The overall ratio of inbound to outbound freight volumes was 1.10 (i.e. 10% more freight came into Ireland than went out). This ratio was higher in the case of heavy freight (1.235) compared with express (0.902) and mail (0.298). The ratios also varied considerably from carrier to carrier, depending on the type of carrier (all-cargo, combination or integrator), the market share and the carriers home base. For passenger carriers, the available capacity tends to be similar on inbound and outbound segments and this capacity can vary

considerably in a given year depending on passenger demand and load factors. In the periods of low passenger demand, cargo capacity is greater.

Figure 2.4

Irish Air Freight Volumes, 1986-96

Volume of Air Freight through Shannon and Cork Airports



Carriers were asked to indicate their busiest and quietest months in terms of air freight volumes carried, and to detail their load factors during these periods. Seven respondents provided this information. December-January was identified by five carriers as the busiest period, with May-June being the quietest period. For cargo carriers including express operators, the inbound and outbound capacity available varies, in some instances by up to 65%, reflecting the trend observed in Chapter 1 that larger volumes of air freight are imported. The cargo carriers reported relatively high load factors of between 70 and 90%. Looking at the total volume of air freight reported by respondents in their busiest and quietest months, on average 102% more was carried in the busiest month compared with the quietest month. The average inbound to outbound ratio for the busiest months was 1.152 and 1.244 for the quietest month.

The two handling agents³ at Dublin and Cork handle a roughly similar share of freight volumes: 44% of freight in 1996 was handled by Servisair at Dublin. The air routes served from Ireland are determined largely by passenger demands. In 1995, there were direct routes to 60 locations, 24 of which were in the UK, 26 on mainland Europe, 6 domestic and 4 transatlantic. Many of the cargo airlines operate short haul services to European hubs where Irish freight is consolidated or broken out of larger consignments. No comprehensive information was available on routes operated by charter operators. Singapore Airlines commenced direct long haul inbound services from Asia in late 1996. This is the first such scheduled air freight service to Asia. The outbound routing involves a short segment to Europe followed by a long haul segment to Asia/Australia. The capacity available out of Ireland is less than one third of the available inbound capacity. This reflects the imbalance noted in the trade flow in Chapter 1, and the significantly higher value per tonne of imports (see Tables 1.7 & 1.8).

Freight Forwarders:

There are roughly 30 freight forwarders operating in the Irish market who use air transport services⁴, although 80-90% of air freight turnover is performed by the top 8 firms. The distinction between freight forwarders, line hauliers and some integrators is becoming increasingly blurred as liberalisation/deregulation in the various transport modes allows firms to operate a wider range of logistics services. The freight forwarders process a high proportion of cargo business for the scheduled passenger and cargo airlines, typically in excess of 80% of available capacity.

As in the US, European airlines have been losing market share to express operators because these operators offer an integrated service with what is accepted to be a higher quality of service. This is because shipments are handled in-house and responsibilities lie within a single management structure. In order for the line haul carriers to compete with the integrators, there is a need for closer co-operation between airlines and freight forwarders. This realisation was apparent to the airlines and forwarders who highlighted the issue during interviews. Internationally there were significant moves towards this kind of co-operation in September 1996 when IATA's Air Cargo Committee organised a working session exploring how the two groups might work more closely (Air Cargo News, 1996). The US experience

³DHL has self-handling rights at Dublin under an agreement negotiated in the early 1980s.

⁴A full listing of freight forwarders in the Irish market can be found at website <http://www.itco.ie/freight/freight.htm>

shows the rapid growth and dominance of the integrators in the US domestic market in a relatively short period of time. The emergence of the integrators raised customer expectations of service standards and quality.

Airlines operating in the Irish market generally use short haul aircraft reflecting the short stage length and the fact that cargo services are hubbed through European airports. The economic viability of short haul air freight services is precarious. Aer Lingus, for example, withdrew their short haul European freighter service in 1996 because of lowering yields. Surface modes can compete effectively with air when distances are less than 500 miles and total travel time is 24-48 hours. The rise in air trucking in Europe and in Ireland highlights the potential for erosion of air freight's share of trade tonnage.

Air trucking:

Air trucking of freight has grown in the last 5 years from an estimated 13% of total cargo throughput in 1992 to 21% in 1996, according to Aer Rianta. In Ireland, there was one air trucking operator (Interpalace) serving the market until 1994 when a second company began offering services. There are three main reasons why Ireland has significant volumes of air freight trucked by road.

These are

- Most of the air routes from Ireland, and particularly from Dublin are short haul intra-European routes: the cargo space available in the aircraft serving these routes is limited and cannot facilitate large pallets/loads, unless large combination or all-cargo aircraft are utilised.
- Ireland is located at a relatively short distance from the World's busiest international airport (London-Heathrow), where there are a wide range of direct long haul services available and a choice of operator on most of the long haul routes.
- For security purposes, air freight consignments that cannot be x-rayed or scanned must be held for 12 hours prior to being loaded onboard aircraft. Until recently, most of the air freight being trucked from Ireland was boarded directly onto aircraft in the UK once it

had been accepted at the Irish airport bonded space 12 hours earlier. Thus the trucking journey time made use of 12 hour wait to relocate the consignment.

Because of the security problems highlighted by the Pan-Am Lockerbee disaster and the TWA explosion on the East coast of the USA in 1995, security of air freight has been given greater prominence, particularly by the UK authorities. While some operational procedures for dealing with baggage and air freight were changed within a relatively short period of these disasters, other longer term reviews have been gradually changing security policies in Europe and among ICAO member states. The EU does not expect to introduce or adopt a community-wide policy on air freight security in the foreseeable future and has left initiatives to the member states. Because of Ireland's heavy reliance on the UK market, the more stringent regulations imposed by the UK authorities, will have a significant impact on air trucking developments in the next five years. One immediate impact has been the diversion of trucks to other EU airports such as Amsterdam and Frankfurt, where security requirements are less stringent. The costs of x-raying freight and the provision of explosion-resistant freight containers by airlines, increases their overheads as well as imposing time delays. Shippers are very sensitive to the price-time trade off and will substitute surface transport whenever possible. For example, companies that use air freight services in a given week from Monday through to Thursday will send shipments by surface on Fridays because of the extra time available for delivery at weekends.

There are several factors in the Irish market which constrain the development of air trucking, but may improve in the longer term and increase further the share of air freight that is trucked. Air trucking in Ireland depends on ferry times which are determined largely by passenger demands. Ideally ferry services operating around midnight would best suit freight carriers. This would allow for greater flexibility in collecting loads after close of business and allow time for consolidation and travel to ports. Exporters located outside of the Eastern region of Ireland are under additional time constraints because of the journey times to bonds at the two main international airports. The current sailing times from East coast ports requires exporters in the West or South of the country to send shipments in the morning only. Because of a three to four hour drive to the bond and then to the ports, driver work time regulations may require higher staffing levels in moving trucks to the UK or mainland Europe, thus

increasing the relative costs. Improvements in ferry services for freight will positively impact on air trucking and negatively on air freight volumes.

Express Operations in Ireland:

Many of the issues highlighted above will help to determine the pattern of growth and development in the Irish express market also, since express operators will utilise a variety of transport modes depending on the speed of service required by the customer. As was detailed earlier, the express operators offer differentiated services based primarily on the speed of delivery required by the customer. Irish operators and their customers are very sensitive to the transport options available for distributing freight into and out of Ireland. In the computer hardware sector for example, several of the large multinational companies operating in Ireland have managed to build in increasing amounts of time between order and delivery of computers and accessories. This time gives the manufacturers (or their designated express operator) greater flexibility in selecting transport requirements, mostly notably allowing for deliveries entirely by surface mode rather than by air or air/truck.

Pricing:

Because of the highly competitive nature of the Irish air freight market and the significant differentials in inbound and outbound freight volumes, air freight rates from Ireland are generally considered to be 'competitive'. Rates have remained relatively stable over the last 5 years and carriers and integrators operate with low profit margins. In the integrator segment, rates on small parcels and documents have been kept low because of the strong competition for market share among the three main operators, all of whom have reported poor financial performance in the Irish market.

The greater emphasis on security for air freight and for heightened security in the door-to-door movement of shipment by trucks will necessitate increases in freight rates and express service rates in the next couple of years ⁵. The integrators have had to train staff in new security procedures and equip vehicles with tracking and immobiliser devices.

⁵The nature of the shipments being carried by air by the integrators (typically very high value products, such as data processing equipment and computer components) along with the ready black market for the products and the fact that the components may not be traceable, has made them targets for local theft in the last two years.

The liberalisation of road haulage and air transport were identified earlier in this chapter as key influences on the growth rates of air freight. Regulatory changes tend to have a downward influence on prices and costs. Liberalisation of airport services particularly ground handling can help contribute to improved quality and choice, and to reduce some elements of carrier costs. The regulatory environment governing air transport in Ireland and in Europe is explored in the next chapter.

3. The Regulatory Environment

3.1. EU Air Transport Policy

The EU took substantial steps towards liberalising the internal European air transport market in July 1992 with the adoption of Council Regulations No. L240, the so-called 'Third Package' relating to several key aspects of the industry's operation including access for community air carriers to intra-community air routes, licensing, and fares. The previous packages (the first package of 1987 and second package of 1989) represented more modest moves to liberalisation and came in the wake of European Court of Justice rulings applying, for the first time, articles 85 and 86 of the Treaty of Rome (relating to antitrust-type restrictions) to air transport⁶. The first two packages were related only to scheduled passenger services. The adoption of the Third Package came at a time of crisis for the airline industry, with the sector in Europe and elsewhere coming to terms with the effects of the gulf war and subsequent recession. The Third Package applied to the 12 member states from January 1st 1993 and also to Norway and Sweden from mid-1993 because of the unusual situation of co-operation between the three Scandinavian countries in international aviation. The second package of air transport liberalisation measures (with more limited liberalisation of passenger fares, full cargo pricing freedom, capacity restrictions (60/40) and some fifth freedom rights and public service obligations) was adopted in Austria, Finland and Iceland on January 1st 1994 with the Third Package to be adopted in 1995. Switzerland is expected to be included in the EEA air transport market from 1997 although it has not yet adopted the Third Package. So by the end of 1997, it is expected that 18 countries will be covered by these regulations. This amounts to 20% of the global scheduled air transport passenger market in terms of revenue passenger kilometres (RPKs) (21% in terms of passengers carried) and 32% of global scheduled air freight RTKs [ICAO (1994)].

The Third Package removed the distinction between scheduled and non-scheduled operations in air transport although it has to be noted that the distinctions were becoming more ill-defined over time as scheduled carriers had been offering increasing numbers of charter services or setting up subsidiary charter companies. The charter carriers for their part have

⁶For a review of the legal and political progress towards the Third Package, see Button and Swann (1992), McGowan (1994).

been offering scheduled services on a limited number of North-South intra-European routes in recent years. Europe's charter industry accounted for over half of all intra-European passengers and about two-thirds of total intra-European RPKs. These shares have remained relatively constant for the last 10 years [Avmark Aviation Economist, April 1994; Doganis (1994)].

Council Regulations No 2407/92 through 2411/92 cover a wide range of issues in the scheduled and non-scheduled passenger and cargo markets. Council Regulation 2407/92 deals with common licensing arrangements and the rights of community registered carriers to operate aircraft owned anywhere in the Community. The licensing regulation requires that the principal place of business and registered office be located in the state in which the carrier is registered, that the carrier carries insurance and that air transport is the main concern of the licensee. Licensed carriers are not required to own their own aircraft, but they must have at least one at their disposal. These aircraft must be registered in the State's aircraft register, although it is left to the discretion of the Member State to issue a license to the carrier if the aircraft at their disposal are registered elsewhere in the EU.

Council Regulation 2408/92 covers access to intra-community air routes. This includes the abolition of capacity restrictions between member states, and the removal of restrictions concerning fifth-freedom⁷ and multiple designation⁸ rights along with a gradual phasing-in of cabotage⁹ rights. Full cabotage is not required before April 1997. Consecutive cabotage is permitted where a carrier uses less than 50% of its seasonal capacity on a service on which the cabotage segment is an extension or preliminary to an interstate route. This regulation also makes provision for the imposition of public service obligations and permits entry to be restricted on new routes between regional airports (these aspects are discussed in detail in Reynolds-Feighan (1995a; 1995b). Provision is made for member states to establish non-discriminatory rules for distributing air traffic between airports within an airport-system (eg. the London or Paris airport systems). These regulations permit carriers to significantly extend their market areas and offer substantial opportunities for greater efficiency for airlines

⁷A fifth freedom right is the right to carry passengers and/or freight between two foreign countries on a route originating or destined for the country of registration or ownership of the carrier.

⁸Multiple designation is where multiple carriers are permitted to offer air services on an international route.

⁹Cabotage is the right of a carrier of one state to carry traffic exclusively between two points within another state. Consecutive cabotage occurs when a carrier flies between two points within another state as a preliminary or continuation of a service to the home state.

through scale and scope economies. On the demand side, greater product differentiation will have a significant effect on traffic volumes.

Council Regulation No 2409/92 grants freedom for Community carriers to set air fares and rates for services, except in specific limited circumstances. In Council Regulation 2410/92, the Community competition rules are formally extended to the air transport sector while amendments to certain categories of agreements and concerted practices in the air transport sector are made in Council Regulation No 2411/92. Several of the negative outcomes associated with deregulation in the US are now subject to safeguard provisions in the European liberalisation programme [i.e. computer reservation system ownership and bias, predatory pricing practices, slot allocation issues relating to hub airport dominance [Van De Voorde (1992); Button and Swann (1992); Bjarnadottir (1994); AEA (1996)]. These regulations will impact on the pattern of consumer demand, on carrier profitability and airline industry structure. The empirical and theoretical literature to emerge in the US after deregulation suggests the possible consequences of these forces for carrier network structure. These will be briefly outlined in the next section.

3.2. US Air Freight Markets

With the passage of the Domestic All-Cargo Deregulation Statute of 1977, Civil Aeronautics Board (CAB) control over entry into and exit from the all-cargo market was eliminated. CAB control over air freight rates was also substantially curtailed. One year later, the CAB eliminated the necessity to file tariffs and allowed completely free entry to the cargo and passenger markets. In addition, the CAB allowed carriers the right to refuse specific types of freight. In terms of mergers and acquisitions, the CAB did not require new carriers to have approval for consolidations. The deregulation of air freight raised cargo rates as expected¹⁰ (see Taneja, 1979). Under CAB regulation of air freight, all-cargo operators were unable to generate reasonable profits with the result that the quantity and quality of service deteriorated. Since 1977, the domestic and international markets have greatly expanded. Scheduled air freight services were commenced to many new communities and as with passenger services, network reorganisation was permitted.

¹⁰This was because the quality and range of services improved.

Air freight rates increased prior to 1977 and had increased by an average of 20% by 1980. Rates decreased on some routes and increased very substantially for particular types of commodities (e.g. live animals and hazardous materials). Air freight carriers became liable for the full value of the freight. Since 1977, shippers have greater choice among carriers with respect to rates, consequential damages and excess value charges (Taneja ,1979).

Cargo deregulation led to consolidation among the bigger carriers and encouraged the growth of noncertificated carriers like Federal Express. Federal Express, founded in 1971 had become the most profitable US carrier by 1982 and the World's largest air cargo carrier by 1989 when it took over Flying Tiger (the second largest all-cargo operator in 1989). Cargo deregulation enabled other courier operators to expand their operations and offer integrated carrier services with door-to-door delivery of freight loads of all sizes. Deregulation thus increased the variety of products offered and allowed for competitive rates determined by the characteristics and cost of the service. Under Civil Aeronautics Board (CAB) regulation, air freight forwarders were required to file and publish their tariffs. Since deregulation air freight forwarders have not been subject to these requirements and have been permitted to offer line-haul services themselves. Surface shipments in the US are regulated by the Interstate Commerce Commission (ICC).

In 1979, the combination passenger/cargo carriers handled in excess of 75% of the total air freight market. After deregulation, combination and passenger carriers developed interactive hub-and-spoke networks (see Reynolds-Feighan, 1994). The network structure operated by these carriers was driven more by passenger demands than cargo demands on the combination services. The cargo operations tended to focus on the international gateways operated by the carriers. The combination passenger carriers have been gradually losing their share of the freight market to all-cargo and express operators (their share of total US air freight tonnes fell from 83% in 1977 to 44% in 1989).

The all-cargo operators reacted to deregulation in several ways. In addition to free entry and exit from markets, deregulation permitted the all-cargo carriers to operate surface transport as well. Air freight forwarders were permitted to offer direct line-haul services by air. Several new all-cargo operators entered the market after 1977, and as mentioned earlier, noncertificated carriers, like Federal Express, were awarded certificates and thus permitted to

operate large jet aircraft. The all-cargo carriers greatly increased their share of the air freight market between 1977 and 1989. Federal Express, even prior to its acquisition of Flying Tiger in 1989, had the largest share of the US air freight market. Federal Express operated a single hub network system in its air transport operation at Memphis, Tennessee. The interactive hub-and-spoke system (where multiple regional hubs are interconnected) does not suit the all-cargo air operator for several reasons. For example, when there is a greater number of transfers between aircraft, the reliability of service is reduced as the possibility of damage to the cargo increases. Under regulation, it was generally felt that freight carried by air travelled longer distances than was necessary because surface modes could not be used to support the carrier's operation (Taneja, 1979). Integrated carriers now offer multimodal service which takes advantage of the distance/cost/time trade-off which the different modes offer.

US air RTKs declined in the mid-1970s with the all-cargo market share of the US total market (i.e. domestic plus international) being less than 17%. After air cargo deregulation in 1977, the express carrier emerged as a significant new type of operator in the air freight sector. Express carriers experienced very rapid and dramatic increases in their freight volumes throughout the 1980s and 1990s. In 1980 and 1985 for example, the express carriers experienced annual increases of 27.8% and 21.9% in RTKs respectively. By 1993, over half of the RTKs (56%) in the US domestic market were carried by express operators.

US all-cargo and express operators continue to gain market share in domestic and international sectors from the combination and passenger airlines. Passenger airlines recently have reduced their capacity by reducing the size of their fleets and thus reducing their cargo capacity. In 1993, the US all-cargo carriers, including express operators accounted for 56% of the US domestic market. Because of changes in the USDOT's reporting requirements for carriers, detailed breakdowns of traffic distribution on international routes are not available after 1989. The express carriers have been gradually handling larger shares of standard freight in addition to express freight. These carriers are successfully bidding for market share by offering a diversified range of related services combined with the line-haul requirements (e.g. pickup and delivery; tracking services; warehousing and stock control; logistics management¹¹). In order to provide these 'service chains', regulations governing the operation of other transport modes can have a significant impact on the operators ability to diversify the

¹¹For example, in early 1993, National Semiconductor Inc. contracted Federal Express to set up and operate its distribution network for its Asian subsidiaries (Economist, 17 April 1993).

range of products it can offer. While air transport was deregulated in the US in the 1977 and 1978 Acts, problems remained until very recently for the integrated/express carriers who were subject to state regulations particularly in relation to ground operations. These regulations on occasion required that express operators contracted to ship good by air within a state had to ship the goods by air out of the state before returning to deliver the goods to a location in the original state. Under an amendment to the Federal Aviation Act in 1994, interstate ground operations of all intermodal all-cargo air carriers were deregulated. The Act extends the definition of carrier types covered by several state regulations (notably Texas) (see Traffic Management, May 1994).

3.3 Remaining Problems in the Liberalised European Air Transport Market

From a regulatory viewpoint, several key difficulties remain in the European market which are expected to slow up the development of competition in air transport. In assessing the current liberalised air transport regime in Europe, several significant barriers to entry and to competition remain in the industry which limit the extent to which a truly competitive market can evolve. Several recent papers detail these problems [Doganis (1994); Balfour (1994); Comité Des Sages (1994)]. Europe's air transport markets remain highly concentrated with the majority of routes being single carrier or two carrier routes. Doganis (1994) suggests that in relation to passenger services, three specific factors indicate that the expected benefits and market changes associated with successful liberalisation have not emerged in Europe. These are (i) that no serious competition has emerged within Europe to challenge the dominance of existing flag carriers (ii) there has been a growing concentration within the European airline industry due to mergers and share purchases among major carriers, along with the collapse of some smaller carriers and failure of new entrants (iii) while limited competition has increased on some intra-European routes (most notably those out of London), and a wider range of fares has emerged on these routes, on the majority of routes which continue to be operated by two flag carriers, "fare competition and innovation tend to be limited". It has already been noted however that the European liberalisation came at a time of recession in the industry and that comprehensive data which would help assess the short term impact of liberalisation in Europe are not available as yet.

The Comité Des Sages report of 1994 showed great concern about capacity constraints at European airports and argued that 'slots will again become the crucial issue for achieving real liberalisation of the market' (page 20). The Comité called for an increase in overall airport capacity as a matter of urgency. Balfour (1994) argues that in relation to the slot allocation rules which were adopted by the Commission in 1993 [Commission Regulation 95/93, OJ L141, 22.1.93] "the regulation as eventually adopted by the Council departs little from normal practice and creates few opportunities for new entrants except by extending the 'use it or lose it' rule to a certain degree". Because of this, "new entry, and hence competition, on many major routes remain virtually impossible".

The Comité comprehensively reviewed the main problems facing the European industry. They demanded that state aid to national carriers be permitted only in limited circumstances and that carrier restructuring plans should ultimately lead to privatisation. The Comité called, for the most part (there were two dissensions), for complete liberalisation of ground handling services as soon as possible. With regard to external policy, the Comité felt that in order to reduce competitive imbalances currently existing between member states, a common external policy was vital. Without it, the process of improving the competitive position of the European industry was undermined. The slow pace with which problems were being addressed in the area of air traffic control came in for criticism as did the lack of development of a European airport system serving the internal market, rather than being left to local planning agencies. Removal of VAT on internal air transport was called for along with rejection of any carbon tax proposals. In relation to the environment, the Comité called for harmonisation of the legal basis and procedures for planning and construction of airport facilities so as to reduce delays and costs associated with lengthy hearings on such cases. In summary, several key barriers to competition remain in the industry despite the significant liberalisation in the Third Package.

These barriers to entry and to effective competition will have a significant impact on the extent to which carriers (both new and incumbents) will be able to reorganise and optimise their networks. Reynolds-Feighan (1994) has shown that the European flag carriers in 1990 organised their traffic flows around a single hub network. This network system suits both passenger and freight operations. The extent to which schedules can be optimally co-ordinated in time and space is constrained by such factors as air traffic control delays and

by airport slot availability. One of the most dramatic effects of US deregulation was the move by carriers to concentrate traffic and co-ordinate its flows through multiple interactive hub-and-spoke network systems. The reasons why this network system developed were discussed in the previous section. Empirical evidence for the US can be found in Borenstein (1992) and Hansen and Kanafani (1990). For the air cargo sector, these barriers to competition will constrain its development and its ability to organise carrier networks in an efficient manner. However in addition to many of the practical difficulties outlined above, the air cargo sector faces several additional constraints which restrain the development of an efficient and competitive air cargo sector in Europe. These issues will be explored in the next chapter.

In interviews with the staff at the EU Transport Directorate, it was suggested that the current political climate does not favour the introduction of significant new developments in liberalising markets beyond the Third Package signatory countries. While the OECD completed a study in 1996 examining the possibilities for more widespread liberalisation, these developments are not likely in the short-medium term. Irish external policy will thus continue to be governed by bilateral agreements. The Irish Government has successfully negotiated bilaterals with several non-EU countries in the last two years¹². For some markets however, because there is pressure to negotiate bilateral agreements with a large number of countries, Irish negotiations will be delayed where there is no urgency on the part of air carriers seeking to commence new air services. Where necessary, interest in new external air routes needs to be expressed to Aer Rianta and to the Department of Transport, Energy and Communications in order to expedite the process of international air route bilateral agreements.

¹²Recent bilaterals were negotiated with Australia; Belarus; Bulgaria; Canada; *Croatia; Cuba; Czechoslovakia; *Estonia; Georgia; Hungary; Iceland ; India; *Iran; *Israel; *Kuwait; Malaysia; Malta; Norway; Poland; *Romania; Russia; Singapore; *Slovenia; South Africa; Switzerland; Turkey; *Ukraine; *United Arab Emirates; United States. (Note: * indicates that the air transport agreement was not signed as of October 1996). (See <http://www.irlgov.ie/21b6.htm>).

4. Factors Constraining the Growth of Air Transport

In the forecasts for the air cargo markets produced by Boeing and Airbus industries, the two main factors influencing growth in RTKs are (i) growth of GDP globally and in particular submarkets (ii) share of the market held by courier or express operators. With uneven recovery from the global recession, air freight volumes are suggested as a good leading indicator of short to medium term economic prospects. However because of declining freight yields, profitability in the air freight sector is minimal. This is attributed to intensifying competition which was particularly strong during the recent recession in the industry. Passenger carriers offer strong competition to 'heavy freight' carriers because of their cargo capacity and low rates. In the express carrier markets however, because of the need for time definite delivery, competition has up until now been between similar types of operator (offering multimodal pickup and delivery services). The experiences of US carriers in the European market highlight some of the difficulties in liberalising international air cargo markets and internal European market problems. In this chapter, six main areas are identified and discussed. These factors negatively impact on air freight traffic and its potential growth. The final chapter of the report suggests some measures which may act to expand the market and reduce the extent of these constraints.

Significant growth of 'air trucking': Because of the relatively small size of the intra-European market in relation to the US, and because of the general emphasis on long-haul services for most carriers offering freight-only service, the phenomenon of air trucking can be expected to increase. This issue was explored in a European and Irish context in the previous chapter. The full extent to which this is occurring already in Europe is not clear. For the US, Boeing estimate that the frequency has increased substantially in the last 10 years from 4,000 frequencies per week in 1985 to 15,800 frequencies per week in 1993. Boeing suggest that a considerable amount of 'road feeder services' serve international markets requiring pickup and delivery. While air trucking to and from Ireland was quantified in Chapter 2, reports from air carriers and forwarders indicate that significant volumes of freight are being trucked without air waybills.

Currently, Eurostat and the CSO reporting requirements mandate that firms give detailed information on their activities particularly in relation to tradable goods. In Chapter 1 it was

pointed out that the CSO only require firms to list the first mode of transport used to ship goods internationally. If firms were requested to list the two main modes used, indications of the true air freight volumes and values could be ascertained. This information is of use for policy purposes in assessing long term infrastructural requirements. The Irish air freight market has expanded in response to the demands of shippers who require an increasing range of services in order to distribute their products. This growth of air services has in turn contributed towards attracting new firms to locate in Ireland. This view is supported by survey evidence which indicates that air access to markets is an important influence on hi-tech firm's location decisions. If the potential exists for increased air services, then this potential needs to be assessed. Air trucking acts to dissipate the potential for direct air services and concentrate cargo traffic in a relatively small number of large centres.

Carrying capacity: Carrying capacity constraints arise for Irish exporters in two significant ways. First, the short haul nature of the services from Ireland limits the size of consignments shipped by air. Secondly, the potential for new long haul services depends principally on the volumes and values of trade to/from long haul destinations and the existence of bilateral agreements permitting services to operate. The onus to promote and encourage new freight services does not lie with any particular agency. From Tables 1.7 and 1.8, it is apparent that there are potential new long haul air markets worth exploring. Responsibility for developing a strategy to encourage new freight services should be explored.

New aircraft technologies have tended to reduce the available cargo capacity. For example, the new generation of passenger jet aircraft have relatively smaller amounts of freight capacity. The impact of this change on air freight volumes to/from Ireland depends on how the frequency of service is affected when new aircraft are utilised. For example, Aer Lingus withdrew their B747 aircraft from the Atlantic routes in 1995, but now have greater freight capacity available despite the smaller aircraft, because the frequency of service has increased.

Air cargo operators can adopt one of two approaches in their provision and sale of lift capacity. The operator can decide to sell a limited amount of space to shippers on the basis of willingness to pay. Under these circumstances, the lift capacity will be less than peak-period demand. Alternatively, the operator may ensure that there is always excess capacity available and charge a premium for the guarantee of available lift. The heavy freight carriers tend to

adopt the former approach, while express or integrated carriers are more likely to utilise the latter approach. The two approaches give rise to different price-capacity-speed trade-offs which were explored in Chapter 2.

Passenger carrier developments: With liberalisation of air passenger services within Europe and with the reorganisation of most carrier's fleets to comply with noise and emission standards, passenger carriers' view of air freight and its contribution to profitability are likely to change. Within Europe already, several carriers have reorganised their freight operations and begun to view them as more significant sources of revenue. The US experience showed that under liberalisation, passenger carriers' share of the total freight market declined. In addition, the range of air freight products available diversified significantly. The opportunities for dedicated air freight operators and express operators will increase as the international markets become more liberalised, and as passenger carriers (particularly in Europe) are forced to produce services more in line with costs.

On the North Atlantic market at present, the traditional wide body jets are being replaced by small long haul aircraft. This will result in a reduction in passenger aircraft belly space over time and again may present opportunities to all-cargo operators (or those offering all-cargo services) to increase their market share.

So in summary, as passenger carriers generally utilise aircraft with relatively smaller amounts of cargo space and find their markets increasingly competitive, these influences can result in (i) specialist cargo operators increasing their market share (ii) cargo rates increasing generally (in an increasingly competitive market) and (iii) the reliability and quality of service improving.

Regulations:

Following from Chapter 3 of the study, remaining regulatory constraints were identified for air freight operations. These included slot allocations, EU external policy and ground handling. Environmental constraints limiting airport operating hours and requiring fleet replacement for many carriers reduce the ability of the air freight sector to gain from economic liberalisation. For integrators, where city centre to city centre elapsed times are crucial, the further development of multimodal networks may be problematic. Rail-air links

(between state owned rail and air operators) together with alliances between state owned postal services may hinder the growth of private integrated or express carriers, although some of these operators have now formed alliances with the national postal services (e.g. TNT, which is now owned by the Dutch Postal Service). Establishing a presence in the express market requires a significant air network and surface distribution system at local levels, with strong marketing of services. The entry costs are high. Further integration of existing distribution networks reduces the entry costs for specialist firms and may in the long term lead to improved product choices and quality, if competition between the logistical operators emerges.

Express services account for a significant proportion of total air freight volumes. In Chapter 2, two long run trends were noted, namely (i) the trend towards integrator market share approaching almost one half of all air freight traffic and (ii) the fact that air transport services are becoming increasingly combined with other logistical services. These patterns must be acknowledged by policy-makers and reflected in the development of an appropriate regulatory framework. Such a framework should seek to facilitate and encourage the growth of sustainable multimodal logistical networks.

Environmental regulations:

North American, Asian and European governments have agreed to the phased reduction of 'Chapter 2' aircraft by the end of the decade. The aircraft noise legislation agreed by European ministers of transport related to two areas. These are (i) non-addition of "Chapter 2" aircraft to EU aircraft registers after 1992, and (ii) a ban on Chapter 2 aircraft and engines after 1997. For some all-cargo operators, low utilisation rates make newer aircraft uneconomic. New entrants after 1997 will be competing for aircraft equipment purchases/leases as well as trying to compete in offering air services. Higher operating costs in all market sectors will place upward pressure on cargo rates, but with consistent adoption of noise and emission standards, competitive disadvantages will not be imposed on particular states and their carriers. The introduction of road pricing in various forms should act to force polluters to pay their full economic costs in all modes.

Physical facilities including regional airports:

Congestion difficulties brought about through insufficient capacity at many of Europe's airports will impact on the growth and development of the air freight sector. The slot constraints at several key hub airports (which will impact on all classes of operators) will force some carriers to develop cargo hubs at secondary centres. Because of the multimodal nature of some air freight carriers' networks, the regulatory and infrastructural constraints in other modes will need to be highlighted and considered simultaneously. In relation to slot allocations, particularly at congested airports in Europe, scheduled passengers operations have been prioritised until recently. While charter passenger carriers can expect more favourable treatment under the new regulations, cargo carriers will still face disadvantages. One alleviating factor arises because of the different preferences which cargo carriers face compared to passenger carriers - where passengers have a preference for daytime direct routings, shippers have a preference for early morning delivery with the elapsed business time between pickup and delivery being minimised. The carriers routing is less important. However, noise regulations and airport curfews restrict the choice of airports for the cargo operators and in many instances will force cargo developments to be centred on secondary European hubs rather than the main hubs. For new entrants to the markets, these secondary centres may impose additional costs on cargo operations because they increase total journey times, particularly for door-to-door services. The expansion of existing infrastructures has also been increasingly constrained by environmental and planning regulations. These aspects combine to make infrastructural constraint alleviation a long term process.

At London's Heathrow airport, a new dedicated freight terminal has been planned and is expected to double current freight handling capabilities by 2005. The multimodal nature of freight services dictates that high capacity surface access to the new facility be put in place as a matter of priority. In an Irish context, air cargo facilities at Dublin airport particularly need to be strategically planned to cater for the expected long run industry trends outlined earlier. Carriers and forwarders interviewed as part of the survey reported in Chapter 2, highlighted the delays associated with the limited cargo handling capabilities currently available. The introduction of self-handling for cargo operators must also be considered as new facilities are planned.

There has been public discussion in the last two years about introducing some form of competition in airport service provision. Having a second airport in the Dublin area is not advisable since the traffic base would be split. Dublin is the main passenger and freight hub in Ireland and splitting the traffics in this way would result in an overall reduction in volumes. The idea of a hub airport, be it a passenger or freight hub, is that traffic is concentrated at a single location. As the volume of traffic increases, additional routings can be added to carrier schedules because the volumes of transfer and originating traffic combined can support the new services. The idea of introducing competition in airport services at a single location however has merit and should be explored further particularly in relation to cargo terminal services.

The recent Government initiative announced for the regional airports is a welcome development in terms of encouraging the use of these facilities for freight services (see Irish Times 30/04/97). In the next chapter, the opportunities to extend and develop the air freight market will be outlined.

5. Opportunities to Develop the Market

Conclusions and Recommendations

Introduction

In this Chapter, the main factors which have the potential to help develop and/or extend the market will be discussed. These factors have been identified in earlier chapters. While there is a long list of constraints facing the industry, the more general shift in European policies towards a free and single market will help to put pressure on national and local governments for change. Reference to experiences in the US and in Asia has helped to pinpoint new opportunities in Europe and in the global market for the air freight sector.

5.1. Conclusions and Summary

Irish exports have a relatively high value per unit weight compared with other EU countries. Irish industrial policy has emphasised the growth and development of high value products, where transport costs will not account for a significant proportion of revenue. With very high GDP and export growth rates experienced in the last 2-3 years, it can be expected that the demand for air freight services will increase, since GDP growth is the main determinant of air freight volume forecasts. The recent experience has shown that air freight traffic growth has been at similar levels to export growth rates. Integrated carriers market share (of a greatly increase market) has grown rapidly in the US and in Europe, replacing the traditional freight-forwarder- airline service with a single world-wide integrated service of high quality and reliability. The Irish express market has developed in the last 5 - 10 years and offers a variety of competitively priced time-definite delivery services. Rates have been kept low because of the strong competition for market share from the four operators. The survey results presented in Chapter 2 suggested that 18% of Irish air freight in 1996 was 'express'.

The Irish air freight market offers a range of different service products to shippers, through standard 'heavy' freight services and integrated service provision. The market is generally thought to be competitive with rates for exporters being attractive because of the significant volumetric differential between imports and exports. The quality of service is of a high

standard, with carriers reporting the high quality expectations of Irish shippers for air freight services.

Air freight services to and from Ireland typically involve short haul routes, with short to medium haul aircraft available. This constrains the extent to which large consignments can be shipped and has given rise to a significant volume of air trucking in the last 5-10 years. Over one fifth of the Irish air freight volume is moved to/from Ireland by truck under air waybill. It was suggested in Chapter 4 that data detailing the transport arrangements for tradable commodities should be gathered and analysed, and used in infrastructural planning.

In the air cargo sector, the industry forecasts suggest that growth will continue at a rate of 1-2% higher than for passenger services. In long haul markets with liberalisation, growth of dedicated cargo operators' market share can be expected, along with increased differentiation of cargo services. Consistent adoption of environmental standards and of the liberalisation of surface transport modes will facilitate these developments. Within Europe, the air freight sector is faced with several constraints limiting its growth and development and these confirm the need for these consistencies. Environmental constraints limiting airport operating hours and requiring fleet replacement for many carriers reduce the ability of the air freight sector to gain from liberalisation. Slot constraints at several key hub airports will force some carriers to develop cargo hubs at secondary centres. For integrators, where city centre to city centre elapsed times are crucial, the further development of multimodal networks may be problematic because of infrastructure congestion. These difficulties were discussed in the previous chapter.

Freight rates and integrated services rates can be expected to rise in the short term for a variety of reasons, particularly related to greater security requirements. While there is strong competition from road haulage or air trucking for high value commodities transported over distances of 500 miles or less, rates for these operators will increase also because of the security requirements. The current schedule of ferry sailings limits the extent to which surface operators can compete with the air mode for time-sensitive business. New developments in maritime transport organisation, management and finances should bring about improvements in this mode in the next 5 years. The frequency of ferry services to/from

Ireland has already improved in the recent period. These developments will have a negative impact on air freight performance especially in the short haul intra-European market.

5.2 Recommendations

The main recommendations arising from this study of the Irish air freight market and its contribution to export performance relate to factors which will impact on air freight rates and capacity in the short to medium term.

1. Irish exporters should be made aware of the existing range of air freight services available to and from Ireland, and of the current pattern of trade flows to the main trading partners. It is suggested that detailed trade statistics be requested and distributed in digestible form to exporters so that potential users of existing services or of new services may investigate expansion into new markets using logistical freight chains. Gauging the level of interest in new services could improve the speed with which new services are initiated. This requires a forum for reflecting exporter preferences and for informing operators of new potential. This is particularly important for new long haul route developments.

2. Closer links between freight forwarders and the scheduled cargo and passenger airlines will lead to improved quality and range of logistical services available in the European and global markets. It is anticipated that the trend towards out-sourcing of distribution and warehousing services will accelerate in the next 5 years and this trend will be stimulated by such arrangements. **Training in the logistics area needs to be prioritised** so that Irish operators can participate in the development of international logistical networks. These developments will lead to intensified competition between integrators and should keep rates at competitive levels. The US experience demonstrated that deregulation led to an increase in air freight rates generally, with shippers willing to pay more for a greater range of better products. As was explained in the previous chapter, Irish air freight traffic has expanded in response to the demands of shippers who require an increasing range of services in order to distribute their products. This growth of air services has in turn contributed towards attracting new firms to locate in Ireland.

3. From a regulatory standpoint, two key areas requiring attention from the Irish government relate to ground handling and security of air freight. The Commission of the European

Communities approved a new Directive on ground handling in 1996. The directive sets out dates for the introduction of either self-handling (January 1998 for airports with passenger throughputs of less than one million) by carriers or third-party handling (1998 or 1999 for airports with passenger throughputs of 2 or 3 million respectively), but because of several derogations, these requirements may be delayed until 2003. For European carriers this imposes higher costs (time and money costs) at airports which delay implementation of the Directive. The Irish Government should put pressure on other EU members to implement the ground handling directive sooner rather than later, so that Irish shippers and carriers avoid the extra costs associated with some current practices.

4. In relation to security, it is important that some agreement is reached with the UK authorities in order to prevent Irish operators suffering disadvantages because of costly security delays. Consistent standards for declaring Irish operators and producers as 'known', should be sought and adopted as a matter of urgency.

5. Air freight and air express service operators will require expanded facilities at Irish airports, particularly at Dublin Airport in the next five years. In the previous chapter, the capacity constraints already existing at Dublin airport were briefly outlined. There is an urgent need to address the infrastructural needs of the air cargo sector in the next five to ten years particularly in the light of (i) the rapid growth of this sector in the last 5 years (ii) the continued growth which is expected in the integrators' share of the Irish and European air freight markets and (iii) the increasing emphasis on intermodal or combined transport in the movement of goods.

The new Government initiative which provides tax incentives in the vicinity of the regional airports is a welcome policy development. Facilitating and encouraging the development of new services to and from Ireland has a circular and cumulative effect economic activity. At the same time a flexible policy is essential in a market environment which is characterised by increasing emphasis on new technologies and subject to short term fluctuations and change.

The air freight market contributes in a significant way to Ireland's export performance. Facilitating the development of high quality logistical services will benefit the tradable sector and continue to contribute to economic growth and employment creation.

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APPENDIX

Irish Air Freight Capacity Survey

1. What was your monthly capacity (freight tonnes) into and out of Ireland in 1996 for (a) your busiest month and (b) your quietest month ? (See table below). Please indicate your typical load factor in the busiest and quietest months, distinguishing between inbound and outbound services. (See table below)

<COMPANY>	Monthly Carrying Capacity	Average monthly load factor
Busiest	Inbound:	Inbound:
	Outbound:	Outbound:
Quietest	Inbound:	Inbound:
	Outbound:	Outbound:

2. Do you operate predominantly scheduled [] or unscheduled [] services ? (please tick)

3. What type(s) of aircraft do you typically operate into/out of Ireland ? _____

4. Do you plan to expand freight services or capacity into Ireland in 1997 (please indicate the extent of any planned expansion) ?

Inbound: _____

Outbound: _____

5. Which handling agent do you use at Dublin ? (Please tick) Aer Lingus _____ Servisair _____

6. Please indicate if you operate freight services on behalf of another carrier/operator.

7. Please indicate the routes which you serve from/to Ireland

Routings to Ireland: _____

Routings from Ireland: _____

8. What total volume of cargo did you carry to/from Ireland in 1996 ?

<i>1996 Cargo Volumes</i>	Heavy Freight	Express	Mail
Inbound			
Outbound			

Thank you for your help.