

**THE PERFORMANCE OF DUBLIN AIRPORT:
THE FINDINGS OF THE COMPARATIVE
REPORTS OF THE TRL AND THE ATRS**

MAY 2005

TABLE OF CONTENTS

1	INTRODUCTION	2
2	MAIN TRL FINDINGS ON THE RELATIVE OPERATING COSTS OF DUBLIN AIRPORT	3
3.	MAIN ATRS FINDINGS ON THE RELATIVE PERFORMANCE OF DUBLIN AIRPORT	9
3.1	Airport Sub-Samples	9
3.2	Airport Characteristics	10
3.3	Input and output measures	10
3.3.1	Partial productivity measures: labour	14
3.3.2	Partial productivity measures: capital	15
3.3.3	Partial productivity measures: soft costs	17
3.4	Variable factor productivity measures	18
3.5	Cost Measures	20
3.6	Input costs and unit input costs	22
4	CONCLUSIONS	24

1 INTRODUCTION

As part of the process leading to its forthcoming 2005 airport price determination, the Commission sought international comparative information on the performance of Dublin Airport. Two bodies were asked to supply reports to the Commission, namely, the UK Transport Research Laboratory (TRL) and the International Institute of Transport and Logistics (IITL)¹ of Vancouver, Canada.

This note summarises the main findings of the TRL and ATRS reports on the relative performance of Dublin Airport.

¹ The IITL analysed the airport performance database of the Air Transport Research Society (ATRS) and so the material is hereafter called the ATRS report.

2 MAIN TRL FINDINGS ON THE RELATIVE OPERATING COSTS OF DUBLIN AIRPORT

The TRL provided comparative data for 2001 and 2002; 2003 data is due to be provided by the TRL in June 2005.

Methodologically, the TRL approach is to compare across airports the values of

- *core* aeronautical **costs** i.e. costs associated with the provision of aeronautical services but excluding non-core services (such as retailing and car parking) as well as out-sourceable services (such as cleaning).

The TRL comparisons between airports are therefore made on the basis of a consistent metric.

Dublin Airport's performance is compared to:

- the total TRL dataset, and
- the 25-entity European TRL data.

The full TRL dataset comprises 48 entities made up of 34 individual airports and 14 airport groups; the European subset is made up of 15 airports and 10 groups.

In this note, Dublin Airport's performance is also compared in more detail to 7 European airports that are similar to Dublin Airport in terms of their 2003 passenger size (see Table 1). Vienna, Oslo, Stockholm, Brussels, Zurich, Copenhagen and Manchester comprise the 7. (These are labelled the '7' airports and exclude Dublin Airport itself.) In addition, the airports of Rome, Munich, Barcelona and Orly – which are perhaps 25% larger than Dublin Airport in terms of annual passenger throughput - are also included in the ATRS comparisons, in the next section of the note. If Dublin Airport continues to grow at its present fast pace, it could be similar in size to these latter airports in the near future.

For reference, the best performing airport on each indicator is also reported in the following tables.

Table 1: Passenger Numbers of Comparator Airports in 2003

TRL-7 Average Group of Airports	Passengers
Manchester	19,699,256
Copenhagen	17,714,007
Zurich	17,024,937
Dublin	15,856,084
Brussels	15,192,952
Stockholm	15,100,000
Oslo	13,646,890
Vienna	12,784,504

Note: These passenger figures are taken from ATRS Report on Dublin Airport Performance Measurement.

A point to consider when assessing the comparative tables that follow is whether such continental and Scandinavian airports constitute a challenging or unchallenging point of reference for Dublin Airport's performance (i.e. whether they might be considered 'high performance' businesses); in this regard, Copenhagen Airport has received the European Efficiency Excellence Award based on the results of the 2004 ATRS Benchmarking Report.

Note that the TRL data are expressed in terms of Special Drawing Rights (SDRs), a kind of 'virtual' international currency, the use of which is designed to offset the distortion that would otherwise be caused by sudden relative currency shifts².

² For example, a sudden shift in the value of the euro would cause an apparent shift in the relative performance of airports inside and outside the Euro zone.

Total Dataset

In comparison to the airports/groups in the complete 48-entity dataset, in respect of core costs per passenger, Dublin Airport emerges in the lower part of the fourth quintile. It ranked in 35th position in 2002. The overall distribution of the costs in 2002, vary from approximately 32 SDRs per passenger to approximately 2 SDRs per passenger, as follows:

- Osaka Kansai and Tokyo Narita, the two Japanese airports, spend approximately 31 SDRS per passenger;
- 14 further airports/entities charge between 10 and 13 SDRs per passenger;
- 20 further airports/entities charge between 5 and 10 SDRs per passenger;
- 12 airports/entities charge between 1 and 5 SDRs per passenger.

European Dataset

In terms of the 25 European airports/groups, during 2002, total 'core' costs per passenger range from approximately 4 to 12 SDRs per passenger. Dublin airport's core costs per passenger stood second from the bottom of the sample at about 6 SDRS per passenger.

Table 2 shows that Dublin Airport's **total core per-passenger costs** were lower than the average of all the airports in the 7-airport group in 2002, at some 6 SDRs per passenger compared to the average of nearly 10 SDRs per passenger. This give core **costs** per passenger in 2002 at Dublin Airport of about 60% of the 7-airport average.

For total Non-pay Opex and total Staff Costs per passenger, Dublin Airport spends about 3 SDRs and 2 SDRs, respectively, per passenger compared to a 7-airport spend of some 4 and 3 SDRs, respectively. There is a larger differential between Dublin Airport's expenditure on total Other Costs (such as depreciation) per passenger at 1 SDRs in Dublin Airport compared to the 7-airport average of 3 SDRs.

In the European dataset, the lowest operating cost airport spent some 4.04 SDRs per passenger in 2002.

Table 2: 2002 Cost per Passenger³

	2002				
	Dublin	TRL 7 Average	TRL European Average	TRL Total Average	Best European Performer
Total Costs per Pax	5.77	9.69	9.36	8.62	4.04
Total Non-pay Opex per Pax	2.68	3.92	3.71	3.61	1.55
Total Staff Costs per Pax	2.11	2.77	3.01	2.36	1.09
Total Other Costs per Pax	0.98	3.00	2.64	2.65	1.4

NB: All prices are in SDRs.

During 2001, total 'core' costs per passenger range from approximately 3 to 15 SDRs per passenger for the 25 European airports/groups. Dublin Airport with about 5 SDRs per passenger ranks third from the bottom of the sample.

In Table 3, it is seen that Dublin Airport's total core per-passenger costs were lower than the average of all the airports in the 7-airport group in 2001, at around 5 SDRs per passenger compared to the average of almost 9 SDRs per passenger.

In terms of total Non-pay Opex Costs per passenger, Dublin Airport spends 2.6 SDRs per passenger compared to the 7-airport group average of 3.41 SDRs per passenger. For total Staff Costs per Pax, Dublin Airport spends 1.89 SDRs per passenger compared to the 7-airport average of 2.58 SDRs per passenger. However, Dublin Airport spends 0.73 SDRs per passenger on total Other Costs per Pax, which is much lower than the 7-airport group average of 2.74 SDRs.

In the European dataset, the lowest operating cost airport spent some 3.32 SDRs per passenger in 2001.

³ 'Best European Performer' is used to describe the airport that performs the best in terms of Total Costs, in the European dataset.

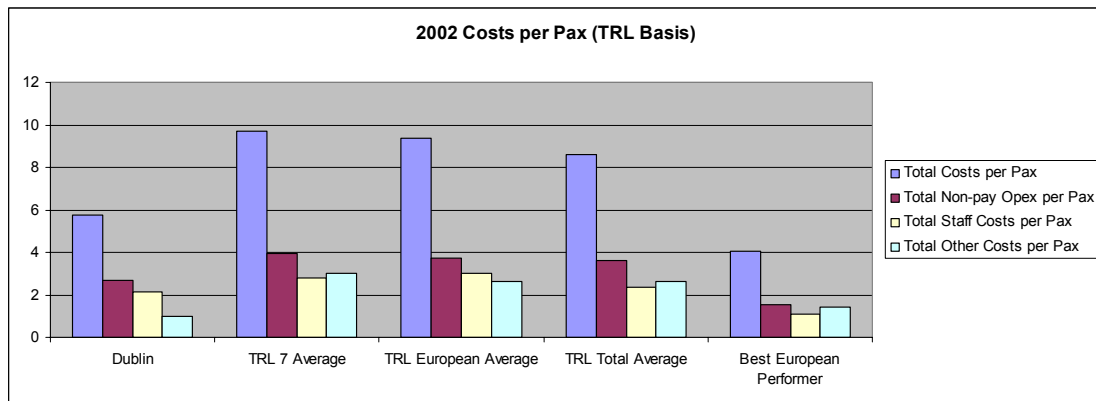
Table 3: 2001 Cost per Passenger

2001					
	Dublin	TRL 7 Average	TRL European Average	TRL Total Average	Best European Performer
Total Costs per Pax	5.22	8.73	8.6	8.18	3.32
Total Non-pay Opex per Pax	2.6	3.41	3.62	3.59	1.3
Total Staff Costs per Pax	1.89	2.58	2.79	2.25	0.79
Total Other Costs per Pax	0.73	2.74	2.19	2.34	1.23

NB: All prices are in SDRs.

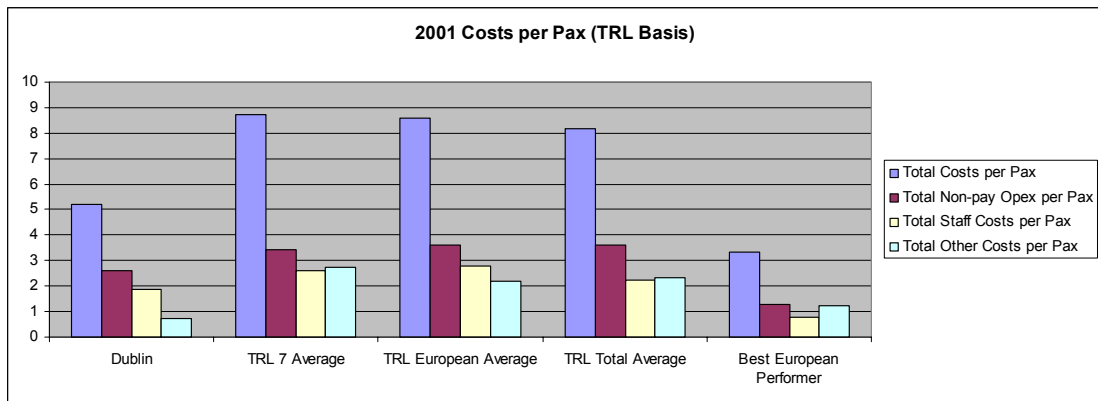
2001 and 2002 Costs per passenger are illustrated in Charts 1 and 2.

Chart 1:



NB: All prices are in SDRs.

Chart 2:



NB: All prices are in SDRs.

3. MAIN ATRS FINDINGS ON THE RELATIVE PERFORMANCE OF DUBLIN AIRPORT

The ATRS sample for European airports includes a total of 33 airports and 9 airport groups. Data are not available for all variables at all airports; in particular, for some of the more interesting productivity measures, the statistics are often available for only about half a dozen of the airports that are comparable in size to Dublin Airport.

The ATRS data relate to the year 2003 and are thus slightly more recent than those at present available from the TRL.

3.1 Airport Sub-Samples

For 2003, the 33 entities of the European airport sample could be grouped by passenger size into:

- The 3 largest hubs – Heathrow, Frankfurt and Charles de Gaulle – which each processed 48-65 million pax per annum;
- A second tier of 3 large airports – Amsterdam, Gatwick, Madrid – which handled 30-40 million pax per annum;
- A third tier of 4 airports - Rome, Munich, Orly and Barcelona – with between 22 - 26 million pax per annum;
- A group of 5 airports - Manchester, Copenhagen, Zurich, Brussels and Stockholm that, with Dublin Airport, have 15-19 million pax per annum, followed by Oslo and Vienna on 12-13 million pax per annum; and finally
- 10 smaller airports with 10 million pax per annum.

These 28 airports out of the 33-airport European sample are common to the TRL and the ATRS reports. For the purposes of the present note, Dublin Airport is compared to the following averages:

- The 5 airports in the 15-19m. passenger range;

- The 7 airports in the 12-19m. passenger range; and
- The 9 airports in the 15-25m. passenger range.

Dublin Airport is also compared to whichever is the best-performing European airport (although this varies across the different measures and it is not generally necessarily to be expected that any one airport could match the performance of the best performers across the full spectrum of measures).

3.2 Airport Characteristics

In terms of **passenger** levels, Dublin Airport is at the upper end of the range of second-tier European airports. Given the speed of its traffic growth, it may continue to move up the rankings, in part because traffic growth has been modest at some of the continental airports in recent years, thereby accelerating Dublin Airport's 'catch up'.

Dublin Airport in 2003 had about two-thirds of the average **cargo** tonnages of the 7 airports with similar passenger numbers.

The aircraft using Dublin Airport carried on average 89 passengers; this is high compared to the comparator airports. Correspondingly, Dublin Airport has fewer runway **movements** (about 177,000) per annum than airports processing similar levels of passenger traffic.

Dublin Airport has a large number of **runways** (3), relative to its traffic, but many fewer departure **gates** (39) than equivalent airports; similar-sized airports often have upwards of 100 gates.

The gross number of **employees** at Dublin Airport – at just below 1500 – is almost double that of the 5-airport average, well above the 7 airport average (1100) though below the 9-airport average (1700), all for 2003. Excluding staff employed on direct retailing leaves Dublin Airport's head count (at 1250) still above the 5-airport and 7-airport averages.

3.3 Input and output measures

The ATRS report uses data on airport inputs and outputs to assess the productivity of an airport's operations. On its methodology, the exercise involves tabulating each airport's inputs as follows:

- Labour (number of employees);
- Soft costs (deflated money value of materials and services, measured relative to Copenhagen, which is set equal to 1); and
- Capital inputs (number of runways and gates, and terminal size).

Capital inputs are measured in physical terms in the absence of consistently measured cost estimates of the assets used to produce airport services. **Productivity** is then assessed as 'inputs consumed in the production of outputs'.

The output measures used by the ATRS are

- Passenger numbers;
- Cargo tonnages;
- Aircraft movement numbers; and
- An index of non-aeronautical output (again measured relative to Copenhagen, which is set equal to 1).

The main input and output data are reported in Table 4 alongside, drawn from the ATRS airport database.

Table 4: ATRS airport inputs and outputs – basic data for 2003.

Variables	Dublin	Dublin *	Manchester	Copenhagen	Brussels	Zurich	Stockholm	Oslo	Vienna	Rome	Munich	Orly	Barcelona
Employees	1,497	1,257	0	1,375	786	1,425	700	583	2,918	2,200	4,891	3,710	501
Runways	3		2	3	3	3	3	2	2	4	2	3	2
Terminal (m2)	109,294		136,400	90,300	190,804	138,614	108,700	144,000	55,700	285,000	458,000	371,500	103,123
Counters													
Gates	39		103	106	109	67	61	86	57	107	210	78	54
Soft Cost Input Index	3.3		5.55	1	3.87	2.58	n/a	1.56	2.35	n/a	12.27	n/a	n/a
Passengers	15,856,084		19,699,256	17,714,007	15,192,952	17,024,937	15,100,000	13,646,890	12,784,504	26,284,759	24,193,304	22,390,000	22,541,653
Cargo(tonnes)	133,871		122,639	335,731	607,136	389,843	155,000	72,000	173,296	127,686	178,132	92,650	76,172
Aircraft Movements	177,781		207,118	259,002	244,633	269,392	228,000	175,878	197,089	300,831	343,027	206,767	278,853
Non-Aero Output	1.336		2.117	1	n/a	1.224	n/a	0.887	1.927	n/a	3.747	n/a	n/a

Dublin* treats direct retailing as a concession.

Variables	Dublin	Dublin *	5-Airport Average			7-Airport Average		
			5- Aver.	Dublin (% aver.)	Dublin* (% aver.)	7-Aver.	Dublin (% aver.)	Dublin* (%aver.)
Employees	1,497	1,257	857.20	1.75	1.47	1,112.43	1.35	1.13
Runways	3		2.80	1.07		2.57	1.17	
Terminal (m2)	109,294		132,963.60	0.82		123,502.57	0.88	
Counters								
Gates	39		89.20	0.44		84.14	0.46	
Soft Cost Input Index	3		3.25	1.02		2.82	1.17	
Passengers	15,856,084		16,946,230.40	0.94		15,880,363.71	1.00	
Cargo(tonnes)	133,871		322,069.80	0.42		265,092.14	0.50	
Aircraft Movements	177,781		241,629.00	0.74		225,873.14	0.79	
Non-Aero Output	1		1.45	0.92		1.43	0.93	

Variables	Dublin	Dublin *	9-Airport Average			European	European
			9-Aver.	Dublin (% aver.)	Dublin* (%aver.)	Airports Average	Authorities Average
Employees	1,497	1,257	1,732.00	0.86	0.73	2,099	6,774
Runways	3		2.78	1.08		2	n/a
Terminal (m2)	109,294		209,160.11	0.52		195,910	n/a
Counters							
Gates	39		99.44	0.39		71	n/a
Soft Cost Input Index	3		5.05	0.65		4	10
Passengers	15,856,084		20,015,652.00	0.79		19,417,332	54,440,536
Cargo(tonnes)	133,871		231,665.44	0.58		323,539	702,490
Aircraft Movements	177,781		259,735.89	0.68		224,034	634,441
Non-Aero Output	1		2.02	0.66		2	5

Dublin* treats direct retailing as a concession.

3.3.1 Partial productivity measures: labour

The interpretation of partial measures of productivity – such as passenger per employee – is made more difficult by two considerations. First, the measures are partial, and therefore may not capture the way in which a company chooses to substitute one input for another. Second, airports with different managerial arrangements, in particular with regard to outsourcing versus direct service provision, may give different performance measures. These points need to be kept in mind in evaluating the ATRS results.

Measured against the labour input, Dublin Airport's **passengers per (gross) employee**, (at some 10,592) is well below the 5-, 7- and 9-airport averages, which have some 14,500 – 15,500 passenger/employee. On an adjusted basis (excluding direct retail staff which for Dublin Airport gives 12,614 passengers per adjusted-employee) Dublin Airport still remains below the average. With relatively little cargo business, Dublin Airports' performance on **WLUs⁴ per employee** is also considerably less than the average of the European airports. Similarly, **aircraft movements per employee** (119) are well below the three averages (at around 217). All in all, treated on a partial productivity basis, Dublin Airport's staffing looks to be relatively on the high side.

Passenger movements are not, of course, the only output of an airport. Output may be measured more broadly by an aggregate of passenger, plus Air Transport Movements (ATMs), plus non-aero output⁵ and then compared to the labour input in order to give an **overall labour productivity** measure. Of the total of 11 airports to which Dublin Airport has been compared in this section of the note (the 5, plus the smaller 2,

⁴ Work Load Units

⁵ Which are then aggregated according to the methodology of the translog multilateral index method, as described in "Multilateral Comparisons of Output, Input, and Productivity Using Superlative Index Numbers" by Douglas W Caves, Laurits R Christensen, W Erwin Diewert, *The Economic Journal*, 92 (1982), pages 73 - 86.

plus the larger 4), the labour productivity statistics is available for just six. The values are reported in Table 5.

Table 5: Labour Productivity

Airports	Labour Productivity
Best Performer	1.885
7 Airport Average	1.0378‡
European Airports Average	1.033
Dublin	0.955
Dublin *	0.946
5 Airport Average	0.911†
9 Airport Average	0.8495^
European Authorities Average	0.817

Dublin* treats direct retailing as a concession.

^ Sample Size = 4

† Sample Size = 3

‡ Sample Size = 5

It may be seen that Dublin Airport’s labour productivity – which is similar when assessed on a gross and an adjusted basis – is scored at around 0.96, that is to say, close to, but a little behind, the efficiency of the 7 Airport Average and the European Airports Average.

Dublin Airport’s partial labour productivity is approximately one-half of that of the airport with the highest measured labour productivity in the ATRS European dataset.

3.3.2 Partial productivity measures: capital

In the absence of cost-based measures of the capital input, the ATRS report measures capital productivity on three partial measures: passengers per gate, passenger per square-metre of terminal, and ATMs per runway. In terms of the 11 airports, that Dublin Airport is compared to, all 11 airports have statistics available. The values for the capital productivity measures are shown in Table 6.

Table 6: Capital Productivity

	Airports	Pax/gate	Pax/Terminal (m2)	Aircraft Movements/Runway
Best Performer		616,895	409	234,248
Dublin		406,566	145	177,781 [^]
Euro Airports Average		302,642	137	100,635
9 Airport Average		234,185	125	99,145
5 Airport Average		199,880	136	87,447
7 Airport Average		197,482	144	89,101
Euro Authorities Average		n/a	n/a	n/a

Dublin* treats direct retailing as a concession.

[^] 1 Runway⁶

With many fewer gates than comparable airports, Dublin Airport, at some 406,566 **passengers per gate**, has about twice the passenger/gate rate of the other airports. **Passenger/square metre** of terminal is similar to or a little above that of the three airport averages. Dublin Airport's performance on **aircraft movements per runway** is very dependent on the number of runways attributed to Dublin Airport; with three runways, Dublin Airport is bettered by all averages of the 5-, 7- and 9-airport samples. In contrast, measured against a single (effective) runway, Dublin Airport's productivity surpasses that of every other airport in the 33-airport sample bar the largest two UK airports.

Dublin Airport's pax/gate rate is some two-thirds of that of the best performer; its pax/square metre of terminal is about one-third of that of the best performer; and its ATMs per runway are about three-quarters of the best performing airport in the ATRS European dataset.

⁶ When all 3 runways are considered, Dublin Airport's performance on Aircraft Movements/Runway is 59,260.

3.3.3 Partial productivity measures: soft costs

The ATRS report computes a 'soft cost' input index to measure the non-capital non-pay inputs such as materials and services. Dublin Airport's index takes a value of 3.3, compared to Copenhagen's reference value of 1. On that basis, Dublin Airport's materials-and-services inputs are almost identical to the 5-airport average (3.25), greater than the 7-airport average (2.82) and quite a lot less than the 9-airport average (5.05). The airport with the lowest soft cost input index scores 0.68.

Measured against the soft cost input, Dublin Airport's productivity - defined as **passengers/soft cost input** - is relatively weak (0.27) compared to the comparator airports which range between 0.38 - 0.45. When direct retail is treated as a concession, Dublin Airport's performance moves up to 0.38, similar to, or just a little behind, these comparator airports. The productivity of Dublin's soft costs is therefore about 40% of that of Copenhagen Airport.

Widening the scope of airport production to cover the aggregate of passenger, ATMs and non-aero output, gives an overall soft input productivity measure (**overall output/soft cost input**) for Dublin Airport of 0.312, some 20-33% below the comparator averages (scoring 0.47 - 0.56). The overall productivity of Dublin's soft costs is about one-third of that of Copenhagen Airport.

The values for the soft cost measures of productivity are shown in Table 7.

Table 7: Soft Cost Productivity

Airports	Soft Cost Input Index	Pax/Soft Cost Input	Soft Cost Input Productivity
Best Performer	0.68	1.00	1.000
7 Airport Average	2.82	0.43	0.541
5 Airport Average	3.25	0.45	0.559
Dublin	3.3	0.27	0.312
European Airports Average	3.92	0.36	0.382
9 Airport Average	5.05	0.38	0.468
European Authorities Average	9.8	0.28	0.348
Dublin*	n/a	0.38	0.367

Dublin* treats direct retailing as a concession.

3.4 Variable factor productivity measures

In order to make a more robust assessment of productivity (than is possible from purely partial efficiency measures), the ATRS report computes a measure that it calls variable factor productivity (VFP). This is calculated by aggregating the labour and the soft costs productivity measures, weighted by the variable cost shares. By assumption, capital input is held constant. In other words, the VFP statistic measures the efficiency with which the airport utilises its variable inputs for a given level of capital infrastructure. The airport's productivity is assessed with reference to the sum of three aspects of output: passenger, ATMs, and non-aero services. The statistic is normalised with reference to Copenhagen (whose VFP value is therefore set equal to 1). The VFP estimate is reported gross, or unadjusted, as well as net, after excluding the *estimated* contribution to productivity of factors outside the airport's control.

In addition to Dublin Airport, the VFP statistic is available for only six other airports. Dublin Airport is compared against the 5, 7, 9, airports and authorities⁷ average in Table 8.

⁷ By European 'Authorities', the ATRS means the nine airport groups/companies that operate several airports.

Table 8: Variable Factor Productivity - Gross and Residual

	Variables	Gross VFP	Residual VFP
Best Performer		1.00	1.00
7 Airports Average‡		0.73	0.72
5 Airports Average†		0.71	0.74
European Airports Average		0.62	0.59
9 Airports Average^		0.62	0.66
Dublin *		0.61	0.63
Dublin		0.55	0.57
European Authorities Average		0.54	0.47

Dublin* treats direct retailing as a concession.

^ Sample Size = 6

† Sample Size = 3

‡ Sample Size = 5

Dublin Airport's **gross VFP** is estimated to have been 0.55 in 2003, very similar to the European Airports Authorities mean (0.54), but not as good as the 9-airport average (0.62) and the 7-airport average (0.73). On an adjusted basis (treating direct retail as a concession), Dublin Airport's VFP score rises to 0.61.

Dublin Airport's VFP score is therefore between one-half and two-thirds of that of Copenhagen airport, which is the airport in the ATRS European dataset with the greatest VFP.

The regression analysis of the ATRS concludes that airport VFP performance declines with:

- the share of international traffic the airport services

but improves with:

- the share of cargo traffic;
- the share of non-aeronautical revenue;
- the level of the capacity constraints; and
- the average aircraft size.

Adjusted for these factors, Dublin Airport's **residual VFP** is higher (0.57 to 0.63 on an unadjusted and retail-adjusted basis), putting it above the

European Airport Authorities mean (0.47) and now closer to the European Airports mean (0.59), though still behind the 5-, 7- and 9- airport averages. Dublin Airport's Residual VFP score is therefore at approximately two-thirds of the residual VFP of the best performer, Copenhagen Airport.

3.5 Cost Measures

The ATRS database contains some analysis of airport costs including labour costs per passenger, per movement and per WLU and variable costs per passenger, per movement and per WLU.

3.5.1 Labour Costs Measures

Dublin Airport's labour costs are approximately US\$4 per passenger, which is 30% lower than the average of the European airports (at US\$6.08). The average labour cost per passenger for the European airport groups/authorities was higher at US\$7.85 in 2003. By treating direct retail as a concession, Dublin* labour cost are approximately US\$3, which is 44% lower than the average of the individual airports.

In terms of labour cost per aircraft movement, Dublin Airport's costs are some US\$400 per aircraft movement. When compared with the average labour cost per aircraft movement, Dublin Airport is about 10% lower than the average of the European airports (of US\$428). If direct retail is treated as a concession, Dublin* has a labour cost per movement approximately equal to US\$300, which is 30% lower than the average of the individual airports.

Dublin Airport's labour costs per WLU are about US\$4, which is 25% lower than the average labour cost per WLU of US\$5.20 for the European airports, and US\$6.89 for the airport groups in 2003. Dublin*'s labour cost per WLU falls when direct retail is treated as a concession, when its labour cost per WLU would be 40% lower than the average of the individual airports.

3.5.2 Variable Costs Measures

Dublin Airport has a variable cost per passenger of about US\$12, which is about 10% lower than the average of the European airports (of US\$13.45). The average for the airport groups in 2003 is US\$16.08. The variable cost per passenger is 35% lower than the average for the European airports, when direct retail is treated as a concession, as Dublin* has an approximate variable cost of US\$9.

In terms of variable cost per aircraft movement, Dublin airport was about US\$1100. This is 10% higher than the average of the European airports of US\$983. The average variable cost per aircraft movement was US\$1,306 for the airport groups. When direct retail is treated as a concession, Dublin*, has a variable cost per movement of some US\$800, which is 22% lower than the average of the individual airports.

Dublin Airport has a variable cost per WLU of about US\$11, which is very close to (2% lower than) the average of the European airports of US\$11.49. The airport groups/authorities averaged US\$14.28. By treating direct retail as a concession, Dublin* Airport has a variable cost per WLU of some US\$8. This is about 30% lower than the average of the individual airports.

The Unit Variable Cost Index is calculated to enable an understanding of the cost competitiveness of the airports on a per unit basis. The Unit Variable Cost Index is calculated by dividing the aggregate output index by the total variable costs of the airport. Dublin Airport has an index of 1.48. This is about 4% lower than the average of the European airports of 1.61. However, its index value is about 18% lower than the average of the individual airports when direct retail is treated as a concession.

3.6 Input costs and unit input costs

Since input costs affect unit costs, it is helpful to analyse Dublin Airport's results in terms of Average Employee Compensation and also in terms of an index of Variable Input Prices.

According to the ATRS database, Dublin Airport in 2003 has an **average employee compensation** level of US\$43,831. When direct retail is included as a concession, Dublin Airport's average is US\$41,700. This is lower than the average employee compensation across the European airport sample at US\$58,942 and the European groups/authorities average of US\$56,908.

A **Variable Input Price Index** is calculated by dividing the total variable costs by the aggregate input index, and normalised with respect to Copenhagen Airport, which is set equal to 1. Dublin Airport has a variable input price index of 0.82, which falls to 0.77 when direct retail is included as a concession. Reflecting the lower compensation rates, Dublin Airport is distributed towards the lower part of the sample whose average variable input price index value was 0.88 in 2003.

A further statistic prepared by the ATRS concerns the unit variable cost index, the report's measure of '**competitiveness**'. This is calculated by summing the effects of variable input price and the effects of efficiency in using these variable inputs (i.e., Residual VFP). Apart from Dublin Airport, this measure is available only for five airports. Dublin Airport is compared against the average figures in Table 9.

Table 9: Cost Competitiveness - % difference from Copenhagen

Variables	Cost Competitiveness %Above or below CPH
Best Performer	0.000
Dublin *	-0.132
5 Airports Average	-0.166
7 Airports Average	-0.241
Dublin	-0.245
9 Airports Average	-0.256
European Airports Average	-0.275
European Authorities Average	-0.435

Dublin* treats direct retailing as a concession.

On this basis, Dublin Airport in 2003 was performing, relative to Copenhagen, at levels of efficiency

- similar to the 7- and 9-airport averages (-24% to -26% behind Copenhagen);
- a little better than the average of the European airports (-28%);
- considerably better than the average of the European airport authorities (-44%);
- but not as well as the 5-airport average performance (-17%); however, when direct retailing is excluded, Dublin* performs better than the 5-airport average (-13%).

The ATRS statistics suggest that, in terms of unit input costs in 2003, there remained scope for an improvement in the efficiency of Dublin Airport.

4 CONCLUSIONS

This note has reported the relative performance of Dublin Airport in terms of the international comparative information prepared for the Commission by its consultants, TRL and IITL.

In terms of the TRL dataset and methodology for 2001 and 2002, compared to the 25 European airports/groups, total 'core' costs per passenger were the third and second lowest, respectively, of the sample, at about 5 and 6 SDRs, respectively, per passenger.

In terms of the ATRS dataset and methodology, Dublin Airport's labour productivity – which is similar when assessed on a gross and an adjusted (excluding direct retailing) basis – is scored at around 0.96, that is to say, close to, but a little behind, the efficiency of the 7 Airport Average and the European Airports average. Dublin Airport's partial labour productivity is approximately one-half of that of the airport with the highest measured labour productivity in the ATRS European dataset.

In the absence of cost-based measures of the capital input, the ATRS report measures capital productivity on three partial measures: passengers per gate, passenger per square-metre of terminal, and ATMs per runway. With many fewer gates than comparable airports, Dublin Airport, at some 406,566 passengers per gate, has about twice the passenger/gate rate of the other airports. Passenger/square metre of terminal is similar to or a little above that of the three airport averages. Dublin Airport's aircraft movements per runway (measured against its single effective runway) surpass that of all other airport in the sample bar the largest two UK airports. Dublin Airport's pax/gate rate is some two-thirds of that of the best performer; its pax/square metre of terminal is about one-third of that of the best performer; and its ATMs per runway are about three-quarters of the best performing airport in the ATRS European dataset.

On soft cost inputs (non-pay non-capital costs such as materials and services) Dublin Airport's index equals 3.3 in comparison to Copenhagen's value of 1. Soft cost productivity (overall output/soft cost input) equals 0.312 for Dublin Airport, some 20-33% lower than the comparator averages. The overall productivity of Dublin's soft costs is about one-third of that of Copenhagen Airport.

ATRS computes a Variable Factor Productivity (VFP) measure, which assesses the efficiency with which the airport utilises its *variable* inputs for a given level of capital infrastructure. In 2003, Dublin Airport's gross VFP is given a value of 0.55, which is lower than the 9-airport average and the 7-airport average of 0.62 and 0.73, respectively. By treating direct retail as a concession, Dublin's VFP value improves to 0.61. Dublin Airport's VFP score is therefore between one-half and two-thirds of that of Copenhagen airport, which is the airport in the ATRS European dataset with the greatest VFP.

When factors deemed to be outside the control of airport management are excluded (to give residual VFP) Dublin Airport has a value of 0.57, which rises to 0.63 when direct retail is included as a concession. Both values are lower than the 5-, 7- and 9- airport averages which stand at 0.74, 0.72 and 0.66 respectively. Dublin Airport's residual VFP score is therefore about two-thirds of that of Copenhagen airport, which is the airport in the ATRS European dataset with the greatest residual VFP.

Overall, for the purpose of its draft determination, the Commission considers that there remains scope for efficiency improvements in Dublin Airport.