Review of the IMG Benchmarking Exercise undertaken on behalf of the Commission for Aviation Regulation for the purposes of its Determination on the Maximum Levels of Airport Charges

AerRianta

in conjunction with

n/e/r/a

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1. EXECUTIVE SUMMARY

IMG, consultants to the Commission for Aviation Regulation ("The Commission"), carried out a benchmarking exercise comparing Aer Rianta airports to a range of European airports. IMG's report is contained in Appendix VII to CP8/2001 "*Report on the Determination of Maximum Levels of Airport Charges*".

The report is used by the Commission to support its conclusion that there is scope for improving operating efficiencies at Dublin and Shannon airports and is the basis for incorporating extremely challenging operating efficiency factors into the price cap. Aer Rianta carried out a similar benchmarking exercise, using the same "peer" airports, data sources and methodology as IMG. The analysis identified serious inaccuracies in IMG's benchmarking methodology and results , which mean that it is a fundamentally flawed basis for estimating the scope for future operating efficiencies for Aer Rianta.

Aer Rianta's analysis has been reviewed and confirmed by National Economic Research Associates (NERA). NERA is a leading international economic consultancy with offices in London, Brussels, Madrid, Sydney and across the United States. It specialises in the application of microeconomics to regulation and competition issues, policy evaluation and business strategy. It is now a leading adviser on regulation, helping many companies, governments and regulatory bodies throughout the world. It is currently advising the UK Competition Commission in the context of determining airport price caps in the UK and has recently advised the UK Civil Aviation Authority, the body responsible for the economic regulation of airports in the UK, on the applicability of benchmarking in setting airport price caps.

Deficiencies in the IMG Report

IMG based its entire analysis on simple partial productivity comparisons, usually dividing a type of cost or input (e.g. operating expenditure) by a type of output (e.g. work load units) or vice versa. Due to the problems associated with partial productivity measures, they cannot be relied on as a valid measure of airport efficiency. Benchmarking work in other regulated sectors has generally employed much more sophisticated statistical approaches than the simple comparisons used by IMG.

A critical flaw in IMG's approach is that they did not compare like with like. They failed to adjust for the differences in the degree of outsourcing of non-core activities between airports. For example, Aer Rianta operates a number of activities (notably car parking and retailing) itself, whereas these are outsourced at many of the comparator airports. Similarily, Aer Rianta does not engage in groundhandling to the same extent as many of the comparator airports do. If Aer Rianta operates a non-core activity (e.g. car parking) in-house, then both the associated costs and revenues will appear in its accounts. If a comparator airport outsources the non-aeronautical activity, then the comparator airport's accounts will

only include the revenues from the concession fee. Unless these differences are adjusted for, any comparison of the cost accounts of the two airports will be meaningless.

The IMG analysis also contains a number of serious calculation errors.

- Group Head Office costs for Aer Rianta have been included in the analysis for Dublin Airport, but related employee numbers have been excluded.
- Cargo throughput figures for Dublin airport are not included in the number of Work Load Units for Dublin.

The impact of these errors is that Aer Rianta has been incorrectly portrayed as not performing as well as peers.

Result of Adjusted Analysis

Aer Rianta made adjustments to ensure that its airports analysis compared like with like, in terms of the range of activities undertaken and the costs / revenues associated with same, viz

- Adjustments were made for those activities not performed directly by the majority of the "peer" airports i.e. direct retailing, and where applicable, catering, fuel and the operation of car parks
- The errors made by IMG in relation to employee numbers and cargo throughput figures were corrected.

As a result, the performance of the Irish airports is substantially better than suggested by IMG's report.

In the adjusted outcome, the main indicator that was relied upon by IMG in analysing Aer Rianta's efficiency levels i.e. ***Operating Expense per Work Load Unit*** changes dramatically, as follows:

	Operating Expense per WLU- Dublin	**Operating Expense per WLU- Cork**	**Operating Expense per WLU- Shannon**
Aer Rianta's Results	€5.1	€4.8	€9.8
IMG's Results	€10.5	€8.2	€20.6
Average of "Peer" Airports (per Aer Rianta)[1]	€6.80	€13.3	€13.3

- When compared to the average of €6.80 per Work Load Unit for IMG's defined "Best of Peers" (as calculated by Aer Rianta), Dublin's operating expenditure per Work Load

[1] In the case of Dublin, the comparative average used is the "Best of Peers" as defined by IMG

Unit at €5.1 is **almost 20% lower**. This contrasts sharply with IMG's assertion that Dublin's operating expenditure per Work Load Unit is 29% **higher** than the average of its "best of peers", or 35% if Oslo were excluded from this group.

- Shannon and Cork compare very favourably to the average of the "peer" airports, which is €13.3 per Work Load Unit. Shannon's operating expense per Work Load Unit at €9.8 is 25% **below** the average of the "peers"; Cork's operating expense per work load unit at €4.8 is no less than 60% **below** the peer group average. This shows that IMG's conclusions in regard to Shannon and Cork's operating costs were based on a completely inaccurate analysis.

- The adjusted ***employee related measures*** also demonstrate the inaccuracies in the IMG report. For example, the adjusted labour cost per employee at €35,876 for Dublin Airport is **17% lower** than the IMG figure of €41,869. Work load units per employee are significantly higher at all Aer Rianta airports than was portrayed by the IMG analysis and IMG's operating expenses per employee indicator was also found to be inaccurate see below:

	Dublin	**Shannon**	**Cork**
Aer Rianta's Results			
WLU's per Employee	11,571	8,308	12,797
Operating Expenses per Employee	59,102	81,134	61,963
IMG's Results			
WLU's per Employee	10,248	3,591	10,452
Operating Expenses per Employee	106,086	74,026	86,196

It is clear that the conclusions drawn by IMG (and the Commission) were based on data which was inaccurate/incomplete and/or incomparable across the selected airports. The IMG report is an unfit basis on which to estimate the scope for future operating efficiencies for Aer Rianta.

Conclusion

Even when regulators have tried to estimate airport efficiency using sophisticated statistical benchmarking techniques, they have generally been unable to derive sufficiently robust results, due to the differences that exist between airports. In its recent review of regulated airport charges in the UK, the Civil Aviation Authority commissioned NERA and TRL to carry out a detailed benchmarking study. NERA was not able to derive results that were sufficiently robust to provide a reliable assessment of relative efficiency. The CAA subsequently employed the Department of Spatial Economics, Free University of Amsterdam to expand NERA and TRL's dataset and attempt to derive useable results, but it also failed to generate results that were sufficiently reliable to be useful to CAA. In addition, where regulators in other sectors have used benchmarking results, they have always used

them together with other indicators on the scope for efficiency improvements. The Commission's reliance on one measure *(Operating Expenditure per Work Load Unit)* to determine the scope for efficiency improvements at the Aer Rianta airports is therefore entirely inappropriate.

2. INTRODUCTION

As consultants to the Commission for Aviation Regulation (the Commission), IMG have carried out a benchmarking exercise comparing the Aer Rianta airports with other European "peer" airports. The report produced by IMG, setting out the methodology and results of this exercise, is contained in Appendix VII to CP8/2001, Report on the Determination of Maximum Levels of Airport Charges. In the original Determination this analysis formed the basis for very challenging operating efficiency targets of 3.5% per annum at Dublin and 4% per annum at Shannon for the five year period of the Determination. These targets were subsequently made even more rigorous in the Revised Determination published on 9th February 2002 – cumulative efficiency improvements of 18.76% and 21.66%[2] respectively for Dublin and Shannon, spread over 3 rather than 5 years. These efficiency factors in turn lead to an X factor of 7.8 for Dublin for the regulatory years 2002/03, 2003/04 and an overall Aer Rianta X factor of 6.2 for the same period. Such X factors are far higher than those imposed by virtually any other regulatory body that we are aware of.

In its response to the Draft Determination (CP6/2001, Section 1.8), Aer Rianta pointed out the flaws in IMG's analysis viz:

- IMG's analysis failed to take account of the differences between the activities that airports undertake directly.

- The use of the partial performance measures selected by IMG was subjective and non-robust.

- IMG has ignored a number of potential other comparator airports and the inclusion of these airports would significantly change the results.

Aer Rianta subsequently carried out a review of IMG's benchmarking exercise, using the same basic methodology and data sources as IMG, and has corrected the main errors in IMG's analysis. IMG's analysis for Dublin, Shannon and Cork airports has been reproduced. However, IMG's comparisons between Aer Rianta as a group and the major European airports has not been reproduced, as it was not relied on by the Commission in its Determination.

[2] Aer Rianta has found that these cumulative percentages have been incorrectly calculated.

This report comments on IMG's methodology and presents the results of a revised benchmarking exercise. The remainder of this report is structured as follows:-

- Section 3 sets out IMG's methodology and the problems associated with it;
- Section 4 discusses Aer Rianta's approach to revising the benchmarking exercise;
- Section 5 presents the results

3. IMG'S METHODOLOGY AND ANALYSIS

3.1. IMG's Methodology

The IMG benchmarking study was undertaken by calculating a range of simple partial productivity measures for a number of comparator airports to both Dublin and Cork / Shannon. Initially, a number of comparator airports with similar characteristics to the Irish airports were identified and after a first selection, most of these airports were contacted by IMG with a request to supply data. The airports that responded were included in the final sample. The final sample consisted of 13 comparator airports to Dublin[3] and 6 comparator airports to Shannon and Cork[4]. Of the Dublin comparator group, three airports were US airports. Due to the large differences between US and European airports, the US airports were included for reference only. Figures were based as far as possible on calendar year 1999.

IMG selected a total of 11 partial performance indicators, divided into three main groups. The indicators that IMG used are shown below.

Main category	**Indicator**
Cost Efficiency	*Operating Expense per Work Load Unit*
	Maintenance Expense per Work Load Unit
	Operating Expense per Employee
	Labour Expense per Employee
Revenue effectiveness	*Operating Revenue per Work Load Unit*
	Aeronautical Revenue per Work Load Unit
	Percentage of Revenue from Non-Aeronautical Revenue Sources
	Concession Revenue per Enplaned Passenger
	Operating Income (Revenue minus Expenditure) per Work Load Unit
Service efficiency	*Average Work Load Unit per Employee*
	Average Work Load Unit per Aircraft Movement

Note: A Work Load Unit is equivalent to one passenger or 100 kgs (0.1 tonnes) of cargo
Note: The Commission has relied on only one indicator in formulating its conclusions i.e. the Operating Expense per Work Load Unit measure

[3] Birmingham, Glasgow, Manchester, Stansted, Brussels, Copenhagen, Dusseldorf, Munich, Oslo, Vienna, Baltimore / Washington, Fort Lauderdale, Honolulu

[4] Basel, Bristol, Cardiff, London Luton, Southampton, Leeds Bradford

3.2. Comments on IMG's Methodology

There are four key issues regarding the approach adopted by IMG:

- they did not properly adjust for the differences in the degree of outsourcing at airports;
- they examined an insufficient number of airports for their results to be robust;
- they made a number of other errors; and
- their overall approach, based on simple partial productivity indicators, is inappropriate.

Each of these problems is discussed in turn.

3.2.1. IMG did not properly "normalise" the data

Benchmarking the performance of airports can only be valid if like is compared with like. An important issue with benchmarking airport costs is that there are significant differences in activities between the airports and in the degree of outsourcing of activities between airports. In particular, Aer Rianta operates a number of activities (notably car parking and retailing) itself, whereas these are outsourced at many of the comparator airports. If Aer Rianta operates a non-aeronautical activity (e.g. retailing), then both the associated costs and revenues will appear in its accounts. If a comparator airport outsources the non-core activity, then the associated costs and revenues will appear in the accounts of the subcontractor. The comparator airport accounts will only show the concession fee under revenues and nothing under operating costs (except possibly depreciation, if the airport retains ownership of the facility). Unless these differences are adjusted for, any comparison of the costs per unit of output incurred by the two airports will be meaningless.

IMG suggest that they have carried out normalisation of the data on the comparator airports. However, we were actually able to reproduce many of IMG's results on the comparator airports without adjusting (or "normalising") the data to take account of the different activities carried out by individual airports. This suggests that IMG's claimed normalisation was very inadequate, if indeed it was carried out at all. IMG certainly did not adjust the Aer Rianta data to take account of the different activities that Aer Rianta undertakes (with the exception of netting fuel cost of sales against revenue for Shannon).

We note that we have raised this point in our response to the Draft Determination, CP6/2001, and that the Commission claims in the Report, which accompanied its Determination (CP9/2001) to have subjected the IMG benchmarking analysis to "intensive review". In view of the problems with IMG's analysis, we would question the nature of this "intensive review".

3.2.2. IMG used an insufficient sample size

The IMG analysis has been carried out on the basis of an insufficient sample size, notably in the case of Shannon and Cork. When basing comparisons on averages across just six airports, it is clear that the addition of a seventh airport or a replacement of one airport by another could substantially alter the results. The same problem applies, to a slightly lesser extent, to the Dublin comparator group.

3.2.3. IMG made a number of other errors

The IMG analysis also contains a number of other errors.

As stated earlier, the sample size used by IMG was insufficient. This deficiency was compounded by the fact that IMG did not calculate all of the performance measures for all of the "Peers". The result is that the "average" numbers are based on even more limited data than would otherwise be the case and makes them very unsuitable bases for projecting efficiencies. It is unclear why the full range of indicators were not prepared for all comparators as with the exception of the *Maintenance cost per Work Load Unit* and the *Concession Revenue per Enplaned Passenger* measures, Aer Rianta was able to calculate the remaining performance measures for almost all airports using annual reports, Airport Council International (ACI) and website data, the sources used by IMG.

It appears that IMG have included all Group Head Office costs for Aer Rianta in their analysis for Dublin Airport, but excluded the related employee numbers. The effect of this is that all measures based on employee numbers report a less favourable result for Dublin than is actually the case (with the exception of *Work Load Unit per Employee*).

IMG has omitted the cargo throughput figures when calculating the number of Work Load Units for Dublin. This has an adverse effect on the results of all measures based on work load units for that airport, including the operating expense per work load unit indicator that was the basis for the challenging efficiency factor set by the Commission for Dublin Airport as part of its Determination.

3.2.4. IMG's approach based on simple partial productivity indicators is flawed

IMG's overall approach is also seriously flawed and entirely different from the approach in regard to benchmarking commonly adopted by regulators. IMG has based its entire analysis on simple partial productivity comparisons, usually dividing a type of cost or input (e.g. operating expenditure) by a type of output (e.g. work load units) or vice versa. Due to the problems associated with partial productivity measures, they cannot be relied on as a valid measure of airport efficiency. In particular:

- they use a single measure of inputs, and therefore fail to take account of differences in the quantity and quality of other inputs;

When two airports that may be equally efficient and with the same level of total costs are compared, simple partial productivity analysis results may indicate that one airport is significantly less efficient than the other. This is due to the fact that such a comparison would fail to take account of the different mixture of resources used by the different airports in their production process. Airport A may be using a higher level of capital and a lower level of labour compared to Airport B which if comparing the airports on a labour cost basis alone would show Airport A to be more efficient, the opposite would be true if the measure was based on capital expenditure indicators – Airport B would then appear to be more efficient.

- they use a single measure of outputs, and therefore fail to take account differences in the range (and quality) of outputs provided by different airports; and

  Airports often provide different standards of products and services. For example Airports A and B could have the same level of passenger numbers but Airport A provides a higher level of service quality. In this scenario Airport A would appear to be less efficient due to the higher cost associated with providing the higher level of service quality.

- they fail to take account of external factors that may lead to unavoidable cost differences between equally efficient airports.

  Variations in the quality of service delivered, the peakiness of traffic, lumpiness of investment or different input prices for labour etc. are widely acknowledged to impact on airport costs. However these factors will not be identified in the type of simple partial productivity comparisons carried out by IMG.

Benchmarking work in other regulated sectors has generally also employed much more sophisticated statistical approaches than the simple comparisons used by IMG. Even in these cases, regulators have used benchmarking results in conjunction with a range of other potential indicators on the scope for efficiency improvements, instead of just relying on the benchmarking results.

3.3. Summary

In this section, we have reviewed the main problems with IMG's analysis. IMG's analysis is flawed, both in terms of its overall approach and in terms of the detailed application of its methodology.

In the remainder of this paper, we show what IMG's results would have been if they had appropriately adjusted for the differences in the activities that Aer Rianta and the comparator airports undertake.

4. ADJUSTMENTS TO IMG'S ANALYSIS

4.1. Introduction

The review of IMG's benchmarking study has used the same overall approach as IMG, i.e. is based on the same simple partial performance indicators as IMG has used. It has also used the same sources as IMG. However, adjustments have been made for the differences in activities that airports undertake by removing the costs and revenues associated with activities that Aer Rianta airports undertake directly, but their comparator airports do not.

4.2. Comparator Airports

In the case of Dublin, the analysis focuses on the airports that IMG identified as "Best of Peers": Brussels, Copenhagen, Glasgow, Oslo and Stansted. The reason why the other airports have not been included is that many of these were engaged in activities not undertaken directly by Aer Rianta (e.g. as of 1999, the year for which the analysis was undertaken, Manchester and Vienna were directly engaged in groundhandling). The associated costs appear in the accounts of these airports. It is not possible to adjust for these differences since data at activity level for the comparator airports was not available.

In the case of Shannon and Cork, the same comparator airports as in the IMG analysis have been used.

4.3. Adjustments

4.3.1. Dublin

In order to "normalise" data for Dublin airport, the revenues, costs and employees relating to the direct retailing and car parking activities at Dublin have been excluded from the underlying data and replaced with net contribution estimates on the basis of Aer Rianta's accounts. This has the effect of reporting these activities as if concession arrangements were in place, similar to comparator airports, with a concession fee equal to the contribution.

As already indicated, IMG also appear to have omitted the cargo throughput figures when calculating the number of Work Load Units for Dublin. In the revised analysis, this has been corrected.

In addition, IMG appear to have excluded Aer Rianta Group Head Office employees from their analysis, even though the related costs have been included. Aer Rianta's analysis adjusts for this by including Head Office employees.

4.3.2. Shannon and Cork

Shannon's "peer" airports do not operate fuel sales or catering activities directly. In order to make Shannon and Cork airports comparable to the majority of the "peers" the revenues, costs and employees relating to the fuel sales and direct catering (both ground and inflight) at Shannon, and direct retailing at Shannon and Cork have been removed from the data, and then the contributions from these activities have been included as concession revenue. This has the effect of reporting these activities as if concession arrangements were in place, with a concession fee equal to the contribution. None of the "peers" carry out retailing directly. With the exception of Cardiff and Southampton, Shannon and Cork's peer airports did carry out car parking directly in 1999, therefore Aer Rianta has not removed the car parking costs and revenues from the Shannon and Cork accounts since the majority of Shannon and Cork's peer airports did carry out car parking directly as of 1999.

5. A COMPARISON BETWEEN THE ADJUSTED RESULTS AND IMG'S RESULTS

5.1. Introduction

In this Section, we report the adjusted results and compare them with IMG's figures. We also provide some detailed comments on the problems associated with the individual performance indicators.

We note that the *Operating Expense per Work Load Unit* indicator can be regarded as the most important one, since the selection of "best of peers" (in the case of Dublin) and the Commission's assessment of the scope for efficiency improvement were based on this indicator. We therefore analyse this measure separately in Section 5.2. Section 5.3 deals with the other indicators, under a number of broad headings.

5.2. Operating Expense per Work Load Unit

Operating Expense per Work Load Unit was the most important indicator in IMG's analysis. It was on the basis of this indicator that IMG selected the "best of peers" group for Dublin, without taking other indicators into account. It was also on the basis of this indicator that the Commission based its assessment on the scope for efficiency improvement at the Aer Rianta airports.

IMG's results were flawed, as they failed to adjust for the fact that the Aer Rianta airports undertake more activities directly than their comparator airports do. After properly adjusting for this, the Irish airports in fact perform significantly better than the average of the comparator airports.

However, it is important to note that the use of this single indicator for the purpose of assessing the scope for efficiency improvement is problematic in general. As already pointed out, the indicator measures Aer Rianta's productivity only in a partial way. It ignores the fact that airports produce many different products and services, and that they can produce these in different ways (e.g. by providing different levels of quality). It also does not take into account the fact that airports produce these outputs not just using operating expenditure but also using capital expenditure.

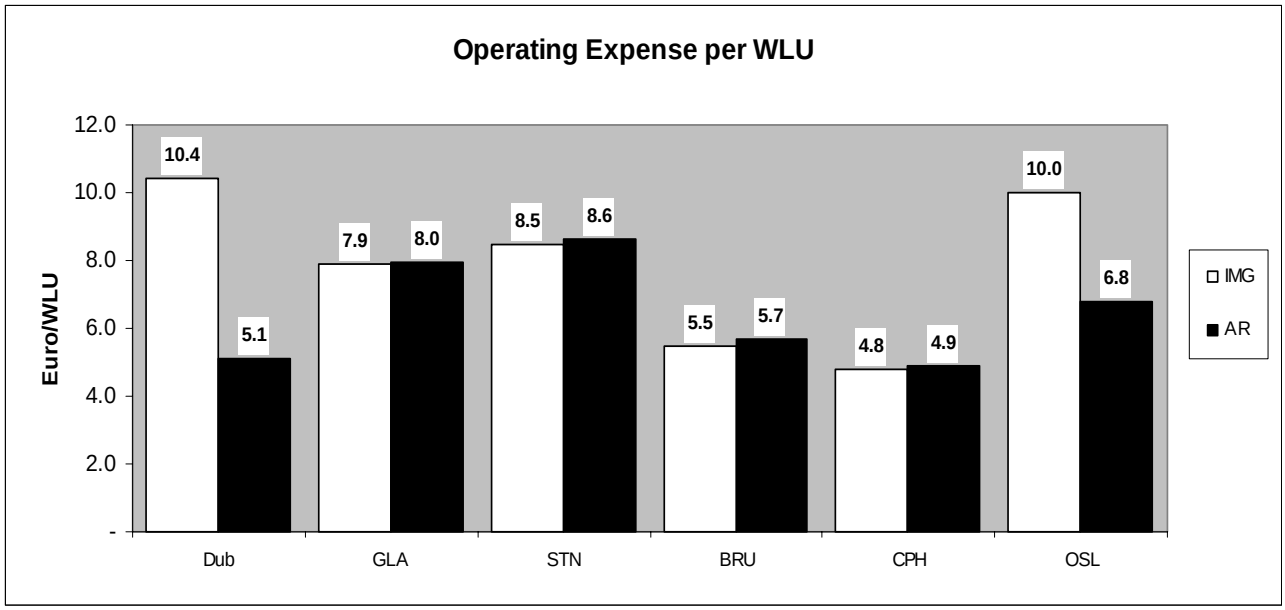
The *Operating Expense per Work Load Unit* measure ignores differences that may exist in the operating environment, including the impact of economies of scale, the degree of peakiness in demand, the airport's position in the investment cycle, local labour market costs, etc.

Another shortcoming is that in IMG's analysis, Aer Rianta performed well in measures relating to generation of non-aeronautical revenues. However, IMG do not appear to have taken into account the fact that there are costs associated with the generation of high non-

aeronautical revenues. Compared to airports that have lower non-aeronautical revenues, this will lead to a higher measured operating expense per Work Load Unit.

Dublin

Figure 5.1
Operating Expenses per Work Load Unit: Dublin



Note: A glossary of airport codes is provided at the end of the document

The Aer Rianta results reflect replacing the costs and revenues associated with car parking and retailing at Dublin (including the costs of sales) by the net contribution of these activities, similar to concession income in the accounts of the comparator airports. The Aer Rianta analysis also includes the correct Work Load Units by including cargo throughput as for other airports.

The adjustments made for Dublin airport are set out in Table 5.1~~Table 5.1~~~~Table 5.1~~ below.

Table 5.1
Reconciliation of IMG's Underlying Data to Aer Rianta's: Dublin Airport

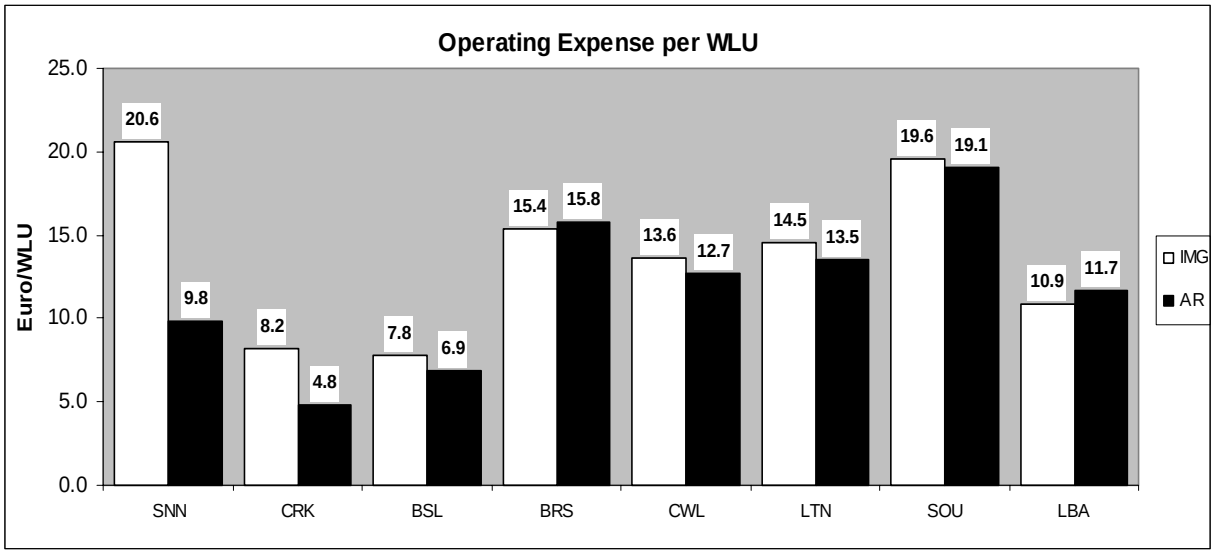
	Per IMG €'000	Adjustments €'000	Per AR €'000
Aeronautical	(49,036)		(49,036)
Non Aeronautical revenue	(134,104)	65,526	(68,578)
Cost of sales	46,370	(46,370)	0
Staff costs	55,008	(10,809)	44,199
Operating costs	33,227	(4,613)	28,614
Operating Income	**(48,534)**	**3,734**	**(44,800)**
Depreciation	16,610	(3,734)	12,876
Operating Profit	**(31,924)**	**-**	**(31,924)**
WLU	12,802,031	1,453,910	14,255,941
Operating Expenses per WLU	**10.5**		**5.1**

On the comparator airports, Aer Rianta was able to approximately reproduce IMG's results for each of the comparator airports, with the exception of Oslo. It is not clear how IMG derived their results for Oslo.

After applying the adjustments, the *Operating Expense per Work Load Unit* is €5.10 for Dublin airport not €10.50 as stated by IMG. When compared to the average of €6.8 per Work Load Unit for IMG's defined "Best of Peers" (as calculated by Aer Rianta), Dublin's operating expenditure per Work Load Unit is almost 20% lower. This contrasts sharply with IMG's assertion that Dublin's operating expenditure per Work Load Unit is 29% higher than the average of its "best of peers", or 35% if Oslo were excluded from this group.

Shannon / Cork

Figure 5.2
Operating Expenses per Work Load Unit: Shannon/Cork



The Aer Rianta adjustments to the data for Cork and Shannon involved removing the costs for some specific activities carried out at Shannon from the Shannon cost data as at the comparator airports, these activities are outsourced and only the net contribution appears in their accounts. Similarly, the costs and revenues associated with retailing were removed from the cost data for both Cork and Shannon airports and the net contribution included as concession income reflecting the manner in which this activity would be reported in the accounts of the comparator airports.

The full adjustments for Shannon and Cork can be found in Table 5.2.

Table 5.2
Reconciliation of IMG's Underlying Data to Aer Rianta's: Shannon and Cork Airports

	Shannon			Cork		
	Per IMG €'000	**Adjustments €'000**	**Per AR €'000**	**Per IMG €'000**	**Adjustments €'000**	**Per AR €'000**
Aeronautical	(10,589)		(10,589)	(5,923)		(5,923)
Non Aeronautical revenue	(49,357)	27,516	(21,841)	(12,415)	5,299	(7,116)
Cost of sales	10,379	(10,379)	(0)	4,358	(4,358)	(0)
Staff costs	25,881	(11,371)	14,510	6,452	(754)	5,698
Operating costs	15,590	(5,354)	10,236	2,268	(159)	2,109
Operating Income	**(8,096)**	**412**	**(7,684)**	**(5,260)**	**28**	**(5,232)**
Depreciation	2,294	(412)	1,882	1,676	(28)	1,648
Operating Profit	**(5,802)**	**-**	**(5,802)**	**(3,584)**	**-**	**(3,584)**
WLU	2,533,972		2,533,972	1,612,416		1,612,416
Operating Expenses per WLU	**20.5**		**9.8**	**8.1**		**4.8**

It should be noted that IMG appear to have netted the cost of sales of fuel (at Shannon) against revenues in the Shannon accounts. This can be regarded as a first step towards normalisation and shows that IMG did have some basic understanding of the need for this. However, they failed to adjust for differences in the non-aeronautical activities carried out at comparator airports.

On the basis of the adjusted data, the *Operating Expense per Work Load Unit* for Shannon and Cork is €9.8 and €4.8 respectively, compared with IMG's stated numbers of €20.6 and €8.2. Shannon and Cork compare very favourably to the average of the "peer" airports, which is €13.3 per Work Load Unit. In fact, Shannon's operating expense per Work Load Unit is 25% below the average of the "peers"; Cork's operating expense per work load unit is no less than 60% below the peer group average. This shows that IMG's conclusions in regard to Shannon and Cork's operating costs were based on a completely inaccurate analysis.

5.3. Other Indicators

5.3.1. Introduction

After the discussion of the most important indicator *Operating Expense per Work Load Unit* in Section 5.2, we report the results on the other indicators in this section. The indicators are grouped under the following main headings:

- Employee-related measures;
- Revenue and income related measures; and
- Work Load Units per Movement.

5.3.2. Employee-related measures

In this section, we report the following three measures:

- *Work Load Units per Employee;*
- *Operating Expense per Employee; and*
- *Labour Expense per Employee.*

These measures are all heavily affected by the degree of contracting out (as opposed to the use of own labour) for certain activities. In addition, they may be influenced by other specific factors affecting the size of the workforce for example local legislative requirements in relation to staffing ratios etc.

The *Work Load Units per Employee* measure is a very partial measure of productivity that does not take account of the fact that airports produce more outputs than just Work Load Units. For example, if an efficient airport employs a relatively large number of employees and uses them to provide a high level of service quality, the airport will appear to perform poorly on this indicator without this being a result of cost inefficiency. The indicator also fails to take account of the trade-offs between employee numbers and capital expenditure.

The *Labour Expense per Employee* measure largely reflects relative labour costs in the various countries in which the airports are located and can only to a limited extent be influenced by airports. These differences will also impact on the *Operating Expense per Employee* measure.

<u>Dublin Airport</u>

In our analysis, we have adjusted for the employees associated with retailing and car parking in Dublin, as these are also not included in the employee numbers for the comparator airports. We have added the Group Head Office employees to the total, as IMG has included the related Head Office costs. The net effect of this is that the *Work Load Units*

per Employee measure is higher than in IMG's analysis, though still lower than at the comparator airports.

There are a number of factors which impact upon the results related to this measure including:

- Economies of scale – some airports have significantly higher passenger throughputs than Dublin. There is not necessarily a direct correlation between an increase in passenger numbers and the number of employees required

- Level of outsourcing of operational functions – For example, all of the "best of peer" airports outsource either cleaning or security, which improves their performance in the employee based measures whereas Dublin Airport performs both of these activities directly. In this context it should be noted that Dublin's cleaning and security employees make up approximately 40% of the adjusted employee figure.

We have also adjusted for the costs associated with retailing and car parking in Dublin, including the cost of sales. Both the *Operating Expense per Employee* and the *Labour Cost per Employee* measures are thus lower than in IMG's analysis, this is in spite of the lower number of employees in Aer Rianta's analysis. As a result, Dublin now performs better than its "best of peers" on both measures.

Table 5.3
Results for Employee related measures: Dublin Airport

	DUB	GLA	STN	BRU	CPH	OSL
Aer Rianta's results						
WLU's per Employee	11,571	14,612	17,367	37,461	14,698	25,552
Operating Expense per employee	59,102	116,322	149,605	212,219	71,684	173,075
Labour Cost per employee	35,876	47,442	52,553	64,284	43,627	61,039
IMG's results						
WLU's per Employee	10,248	14,349	17,367	37,158	14,697	n/a
Operating Expense per employee	106,086	113,449	148,175	205,440	71,145	n/a
Labour Cost per employee	41,869	46,212	52,162	48,683	43,299	n/a

Shannon and Cork Airports

After adjusting for retailing, catering and fuel activities at Shannon, a number of other activities are carried out in-house (unlike at the comparator airports), the number of employees used in Aer Rianta's analysis was considerably lower than in IMG's analysis. As a result, the Aer Rianta result for *Work Load Units per Employee* is substantially higher than in IMG's analysis.

The difference on the other two indicators is lower as the removal of non-core activities causes both the costs and the employee numbers to fall. The net impact is that both the *Operating Expense per Employee* and the *Labour Cost per Employee* are higher in Aer Rianta's analysis than in IMG's analysis.

On the basis of the adjusted data, Cork now performs better on the *Work Load Units per Employee* measure than the average of the comparator airports, whereas Shannon is only slightly below the average. It should be noted that the average itself has fallen by around 10 per cent following the inclusion of Southampton. IMG did not appear to have employee data for Southampton and therefore did not report any Southampton values for these three indicators. The fact that the inclusion of a single airport causes the average result for the comparator airports to fall by around 10 per cent is another example of the non-robustness of IMG's approach.

Even after the adjustments, the Aer Rianta airports still perform significantly better than the average of the comparator airports on the *Operating Expense per Employee* measure (although, as we pointed out, it is unclear what the significance of this indicator is). On the *Labour Cost per Employee* measure, Cork and Shannon now perform broadly in line with the average across the comparator airports.

Table 5.4
Results for Employee Related Measures: Shannon/Cork

	SNN	ORK	BSL	BRS	CWL	LTN	SOU	LBA
Per Aer Rianta								
WLU's per Employee	8,308	12,797	16,800	11,203	13,598	7,730	3,805	5,983
Operating Expense per employee (Incl COS)	81,134	61,963	116,625	176,718	173,222	104,665	72,700	70,228
Labour Cost per employee	47,575	45,223	48,151	53,155	38,699	44,851	42,748	41,909
Per IMG								
WLU's per Employee	3,591	10,452	16,800	11,220	13,658	7,472	n / a	6,324
Operating Expense per employee (Incl COS)	74,026	86,196	131,451	173,286	185,350	108,050	n / a	68,864
Labour Cost per employee	37,237	42,348	45,956	52,123	37,947	43,980	n / a	41,095

5.3.3. Revenue and income related measures

In this Section, we report the following four measures:

- *Operating Revenue per Work Load Unit;*
- *Aeronautical Revenue per Work Load Unit;*
- *Non-Aeronautical Revenue as a Percentage of Operating Revenue; and*
- *Operating Income per Work Load Unit.*

Dublin Airport

Table 5.5
Results for Revenue Related Measures: Dublin

	Dub	GLA	STN	BRU	CPH	OSL
Aer Rianta's results						
Operating revenue[5] per WLU	8.3	15.9	13.9	9.5	11.1	15.1
Aeronautical revenue per WLU	3.4	10.1	5.7	5.4	5.9	8.5
Non-aeronautical revenue as % of revenue	58.3%	36.7%	58.8%	43.6%	46.9%	44.1%
Operating Income Per WLU	3.1	8.0	5.3	3.8	6.3	8.4
IMG's results						
Operating revenue per WLU	13.4	15.8	13.8	9.3	11.1	14.0
Aeronautical revenue per WLU	4.3	10.0	5.7	n/a	5.9	n/a
Non-aeronautical revenue as % of revenue	68.1%	63.3%	41.2%	n/a	46.9%	n/a
Operating Income Per WLU	3.1	7.9	5.3	3.8	6.2	4.0

Note: IMG made an error in the calculation of Non-Aeronautical Revenue as % of Revenue *for Glasgow and Stansted airports; the ratios IMG state are in fact Aeronautical (rather than non-Aeronautical) Revenue as % of Revenue. The ratios are corrected under the Aer Rianta results.*

The total revenue from car parking and retailing at Dublin Airport has been replaced with net contribution estimates i.e. concession income as at the comparator airports. As a result of this, both the *Operating Revenue per Work Load Unit* and the *Non-Aeronautical Revenue as % of Revenue* are lower in Aer Rianta's analysis than in IMG's. The *Aeronautical Revenue per Work Load Unit* is also lower in Aer Rianta's results since the correct Work Load Unit figure including cargo throughput at Dublin has been used. The *Operating Income per Work Load Unit* measure is the same in IMG's and in Aer Rianta's analysis, however, since Aer Rianta

[5] Operating Revenue = Total revenue

used a higher Work Load Unit figure (including cargo), it is unclear how IMG obtained its figure for Dublin Airport.

On the basis of the adjusted data, Dublin's result for *Operating revenue per Work Load Unit* is €8.3 per Work Load Unit, which is lower than any of the "peers". This is as a direct consequence of Dublin's *Aeronautical revenue per Work Load Unit* being less than half the "Best of Peers" average.

Aer Rianta's *Non-Aeronautical Revenue as a %* of the normalised *Operating Revenue* is 58.3%, which is higher than all but Stansted. It should be noted that Dublin and Stansted are the only airports whose *Aeronautical Revenue per Work Load Unit* is lower than their *Operating Cost per Work Load Unit.* Dublin's *Aeronautical Revenue per Work Load Unit* barely covers the labour cost per Work Load Unit. Again this is a reflection of the low level of *airport charges* at Dublin airport.

Shannon and Cork Airports

Table 5.6
Results for Revenue Related Measures: Shannon/Cork

	SNN	ORK	BSL	BRS	CWL	LTN	SOU	LBA
Per Aer Rianta								
Operating revenue per WLU	12.8	8.1	13.8	24.9	23.0	15.3	27.3	18.8
Aeronautical revenue per WLU	4.2	3.7	6.6	11.6	17.3	6.9	15.7	13.5
Non-aeronautical revenue as % of revenue	67.3%	54.6%	52.2%	53.5%	25.1%	54.7%	42.4%	27.8%
Operating Income Per WLU (before Deprec)	3.0	3.2	6.8	9.1	10.3	1.7	8.2	7.0
Per IMG								
Operating revenue per WLU	23.7	11.3	12.6	24.3	22.5	15.5	24.0	17.4
Aeronautical revenue per WLU	N/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Non-aeronautical revenue as % of revenue	81.4%	69.1%	56.0%	53.5%	25.1%	54.7%	36.4%	27.8%
Operating Income Per WLU (before Deprec)	3.1	3.0	4.7	8.9	8.9	1.0	4.4	6.5

In the case of Cork and Shannon, non-aeronautical revenue was adjusted downwards in Aer Rianta's analysis by replacing the total retail revenue at the two airports (including the cost of sales) by net contribution estimates. The same was done for some specific activities carried out at Shannon only.

As a result, *Operating Revenue per Work Load Unit* and *Non-Aeronautical Revenue as % of Revenue* are substantially lower in IMG's analysis. Aer Rianta has also calculated the *Aeronautical Revenue per Work Load Unit* for the two airports, something that was not

included in the IMG report. The Aer Rianta adjustments did not impact on the *Operating Income per Work Load Unit measure*, which is broadly similar to IMG's result.

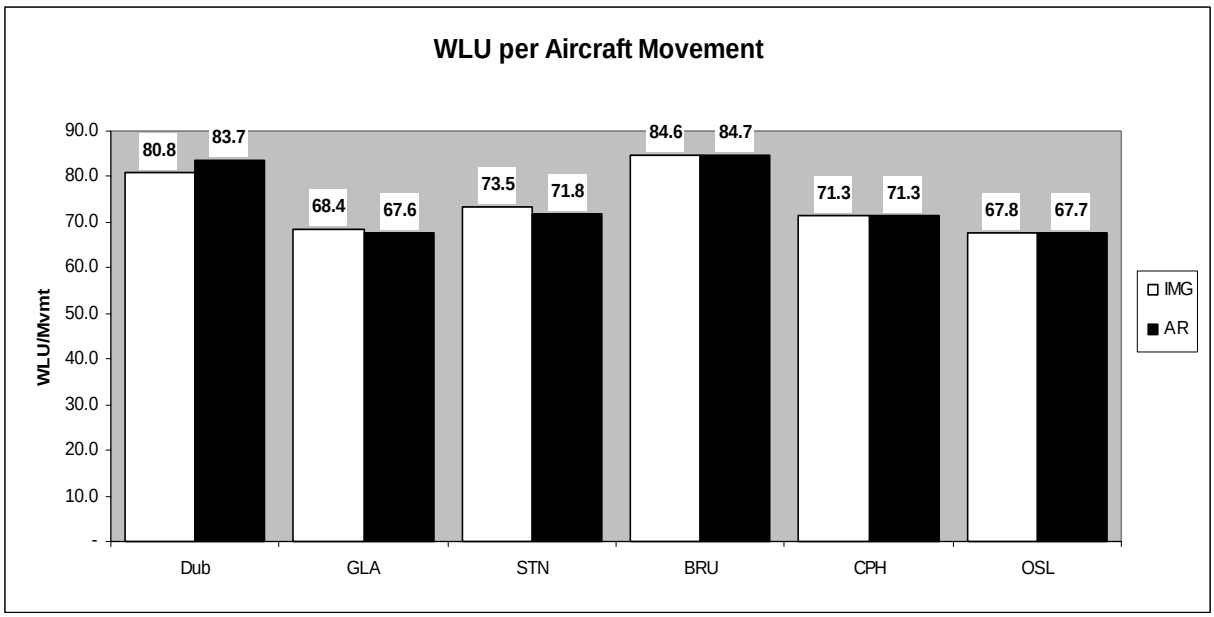
Based on Shannon and Corks *Aeronautical Revenue per Work Load Unit* results, it is reasonable to conclude that Shannon and Cork's higher *Non-Aeronautical Revenue as a % of Operating Revenue* is significantly influenced by the aeronautical revenues being only one third that of their "peers".

5.3.4. Work Load Units per Movement

This section presents the final indicator, *Work Load Units per Movement*. Although we include the indicator for completeness, we note that airlines' profiles in terms of fleet, sectors flown (i.e. short, long haul, domestic, international etc.) and performance, rather than that of airports heavily influences this measure. This includes the long-haul / short-haul split at an airport, the wide-body / narrow-body split and the average aircraft load factors at the airports in question. Average load factors are a function of airline performance and, in addition, of the scheduled / charter mix at an airport and the presence of low-cost airlines. Another factor that impacts on this measure is the level of non-passenger and non-cargo movements at the various airports.

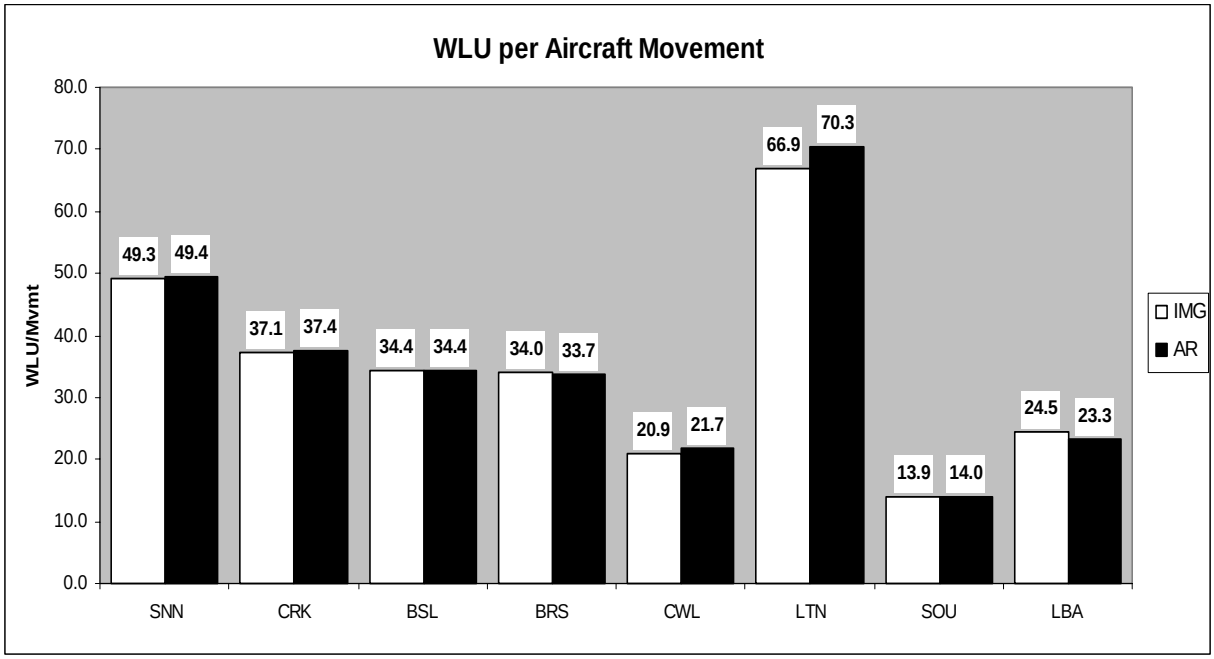
The results for Dublin are shown in the figure below. As can be seen, there is little difference on this indicator between the IMG and Aer Rianta analyses; Dublin remains in the top tier.

Figure 5.3
***Work Load Units per Aircraft Movement*: Dublin**



Finally, the results for Shannon and Cork are shown in the figure below. Again, the IMG and Aer Rianta analyses are broadly similar.

Figure 5.4
***Work Load Units per Aircraft Movement*: Shannon/Cork**



Due to data availability problems, we do not report the following two indicators that IMG have used:

- *Maintenance Expense per Work Load Unit*; and
- *Concession Revenue per Enplaned Passenger*.

GLOSSARY OF AIRPORT CODES

DUB	=	Dublin
SNN	=	Shannon
ORK	=	Cork
GLA	=	Glasgow
STN	=	London Stansted
BRU	=	Brussels
CPH	=	Copenhagen
OSL	=	Oslo
BSL	=	Basel
BRS	=	Bristol
CWL	=	Cardiff
LTN	=	London Luton
SOU	=	Southampton
LBA	=	Leeds Bradford