26th July 2001

AR/CAR/04

Submission to the Commission for Aviation Regulation

on

Proposed Maximum Level of Airport Charges Draft Determination and Explanatory Memorandum CP6/2001

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EXECUTIVE SUMMARY

This submission is being made by Aer Rianta in response to the Commission's request to interested parties and the public to make written representations in respect of the Draft Determination and Explanatory Memorandum on the Proposed Maximum Levels of Airport Charges (CP6/2001) and in the context of consultation as set out in Section 32 of the Aviation Regulation Act, 2001. The key points raised in the submission are as follows

It is critical that the regulation of maximum levels of airport charges is based on economic principles from the outset as this will be a key factor underpinning the company's ability to invest in airport infrastructure in the future and the sustainability and value of the company itself.

Aer Rianta welcomes some elements of the approach to regulation as set out in CP6/2001 which has been adopted by the Commission in order to achieve the maximization of economic welfare on the basis of the ten statutory factors set out in Section 33 of the Aviation Regulation Act 2001. The framework adopted is similar to that used for regulation of airport charges in the UK. This is appropriate in the context of similarities in market conditions with the Irish airports.

Aer Rianta does not agree with the bases underlying some elements of the Draft Determination and the company's proposals on the key matters which are discussed in detail in the sections that follow are:

- Aer Rianta should be regulated as a single entity, not on an individual airport basis, in order to ensure that maximum benefits from economies of scope are maintained, the efficient and effective use of resources by the airport authority as set out in Section 33 (c) of the 2001 Act is achieved, the regulatory burden is minimised and the role of airports as engines of growth at a regional level is preserved.

- Aer Rianta agrees with the use of an incentive regulatory price cap of the form CPI+X, applied to the average aeronautical yield per work load unit (WLU). In this instance, a +X factor is required due to the heavy investment in capacity which is required over the period of the determination. This model will provide Aer Rianta with appropriate commercial incentives, ensure that economic welfare is optimised and will provide for the sharing of ongoing efficiency benefits between the airport authority and users. It is the appropriate basis to enable the company to carry out its statutory mandate for the proper operation, development and maintenance of the airports and permits the company the flexibility required through the pricing structure to effectively manage the efficiency and effectiveness of its operations.

- A tariff basket approach to setting airport charges would be an inappropriate option to apply as it would limit the company's

flexibility to react to market dynamics and would be almost impossible to implement given the company's stated intention to restructure its pricing.

- Aer Rianta does not consider the use of sub caps to be appropriate. Their use is inconsistent with the objective of imposing the minimum restrictions on the airport authority consistent with the functions of the Commission and with the statutory requirement set out in Section 33 of the Act, where the Commission is obliged to have due regard to the efficient and effective use of all resources by the airport authority.

- It is essential that a correction factor be incorporated into the regulatory formula to account for prior year errors and cost pass through mechanisms should be applied to take account of externally imposed risks and uncontrollable circumstances including sudden and unforeseen increases in security costs, corporate tax charges and the cost associated with economic regulation.

- Aer Rianta believes that dual till regulation is the most appropriate form of economic regulation for airport charges. We welcome the Commission's consideration of a dual till approach to regulation in line with international precedent. Consistency in application of approach to the three airports would be important to delivering a stable regulatory environment for all airport users. The application of the dual till to airports should not be predicated on capacity constraints. The single till approach extends the scope of economic regulation, distorts investment incentives within the till and provides inappropriate incentives to develop activities outside of the till as these factors apply equally at congested and uncongested airports.

- CP6/2001 refers to excluding income and costs from "new commercial investments" at Dublin airport from the regulatory till. It is unclear how the Commission might implement this proposal. A practical way of implementing this approach might be to cap the single till contribution from commercial revenues at Dublin airport to a set level obtaining at an agreed point in time, whilst retaining the associated assets in the regulated asset base. The treatment of operating and maintenance costs related to future investment must also be considered.

- Aer Rianta is strongly opposed to the Commission's proposed reduction in the value of its asset base in relation to Pier C and the Shannon Airport Terminal Development. Apart from this adjustment being unwarranted, these developments were also approved by the regulator of the time. Any attempt at this stage by the Commission to disallow already incurred costs would be a retrospective exercise of regulatory power under the Aviation Regulation Act, 2001. Regulatory risk of this kind could also be seen as setting a precedent which could

potentially have serious negative consequences for future investment.

- Aer Rianta strongly disagrees with the use of historic cost net book value for the valuation of the regulated asset base (RAB) as it has no economic justification. The application of a replacement cost methodology best fulfils the requirement of the 2001 Act.

- In order to ensure that Aer Rianta is capable of delivering facilities to meet customer demand and requirements in the future, the appropriate methodology for the valuation of assets within the regulatory till would be replacement cost and the asset values should be rolled forward in a manner designed to ensure that development can be sustained. Aer Rianta has assessed the replacement net book value of assets at 31st December 2000 as being IR£660m.

- The application of an indexed historic cost approach is superior to the historic cost methodology in terms of its ability to maximise welfare, however, it may send inadequate price signals to the market about the cost of capacity maintenance or expansion and may not generate sufficient revenue to fund capital programmes. Aer Rianta has also calculated the valuation of its asset base on an indexed historic cost basis and this amounts to £510m at 31 December 2000.

- An appropriate approach to calculating the RAB at future price reviews consistent with the approach to the valuation of the RAB is necessary. A financial capital maintenance (FCM) approach to the rolling forward of the asset base would be a superior method when assets are valued on the basis of replacement cost in order to ensure that shareholder and debtor value is maintained. The only appropriate option available to the Commission at this stage is to state that at the next price review, the RAB will be rolled forward on the basis of Aer Rianta's actual capital expenditure.

- The Commission in CP6/2001 formulated its estimate of capital investment for the three airports over the ten year period. Aer Rianta does not have enough information from the Commission to understand how it arrived at this estimate in the context of its regard to the factors set out in Section 33 of the 2001 Act. The Commission must recognise and take account of the statutory responsibilities on the company as set out in legislation, regulations and directives and in the company's Memorandum and Articles of Association in making its determination. In particular the Commission must be cognisant of the statutory mandate on the company as set out in Section 16 of the 1998 Act whereby it must ensure the provision of such services and facilities as are in the opinion of the company necessary for the operation, maintenance and development of the airports.

- The capital investment plan 2001-2010 included in this submission includes the projects which the company considers, with the assistance of extensive expert advice, to be necessary for the proper operation, maintenance and development of the airports. Aer Rianta believes that the plan is required to facilitate the development and operation of cost effective airports which meet the requirements of users and expects the Commission to adopt the capital expenditure plan in full.

- It is critical that the determination on the maximum levels of airport charges allows for the quantum of the necessary investment projects put forward by the company. The consequences of not being allowed sufficient quantum for investment will include capacity constraints, congestion, inadequate service levels, safety risks and will inhibit the growth and development of new routes and services and the entry of new airlines into Dublin, Shannon and Cork airports.

- It is necessary to ensure that all capital and operating costs are recovered, from the time that they are incurred, to ensure sustainability of operations.

- Aer Rianta's ability to fund ongoing investment in the future is dependent on achieving a reasonable rate of return on assets. The rate of return permitted should be equivalent to the cost of capital, which must be derived in the light of the specific market conditions within which Aer Rianta operates. Aer Rianta proposes a real pre-tax dual till rate of return of 9.8 % and on a single till basis this should be 10.8%. The Commission's inference that the cost of capital for Aer Rianta has been estimated with reference to other regulatory decisions introduces the possibility of significant biases. There is no objective and theoretically rigorous method to adjust cost of capital estimates for such factors.

- Benchmarking can provide useful information for the Commission where appropriate comparisons are made, although there are many difficulties in obtaining accurate comparative data. In particular, comparisons must be made on the basis of similar investment and operating profiles. Aer Rianta considers that the methodology used and the conclusions drawn from the Commission's benchmarking exercise were seriously flawed and do not provide a basis for determining efficiency factors.

- Aer Rianta has factored challenging operating efficiency targets into its airport charges proposal for the forthcoming regulatory review period. Aer Rianta considers that its projections in relation to operating efficiency provide the best available information in order to set targets. These projections are firmly set in an understanding of Aer Rianta's actual cost base and scope for efficiencies (rather than a high level and unreliable efficiency comparison with other

airports), and they assume that Aer Rianta will continue to achieve significant gains in operating performance.

Overall, Aer Rianta is committed to assisting the Commission in its task of ensuring that the requirements of current and prospective users are met in an economically efficient manner, while retaining for itself the commercial and operational mandate conferred in the Air Navigation and Transport (Amendment) Act, 1998 and other legal and regulatory mandates under which it must operate.

Following careful consideration of the Commission's determination Aer Rianta has developed a proposal for a maximum level of airport charges which incorporates elements of the Commission's draft proposals and some essential elements of Aer Rianta's original submission to the Commission. In this context Aer Rianta proposes:

- The determination of maximum levels of airport charges in the form of a price cap based on average yield per work load unit on a group basis of £6.52
- A single till composition which excludes ARI, Great Southern Hotels and joint venture property companies
- The valuation of the asset base at 31 December 2000 on an indexed historic cost basis at a value of £510m
- A capital investment plan for the three airports over the period 2002-2006 of circa £950m
- A real pre-tax rate of return of 10.8%

Following the Commission's determination on the maximum level of airport charges, Aer Rianta will develop a pricing structure for airport charges at Dublin, Shannon and Cork airports which takes account of the market conditions in which it and its customers operate.

PREAMBLE

The three Aer Rianta airports are among the fastest growing in Europe. Dublin Airport has doubled in size over the past seven years. Cork and Shannon airports have added almost a million passengers each to their total throughput in the same period. 18.3 million passengers passed through the airports in 2000 and this is forecast to grow to 29 million passengers per annum by 2010 and to almost 40 million by 2020.

The Commission for Aviation Regulation was established under the Aviation Regulation Act, 2001(2001 Act) on 27th February 2001. The Act requires the Commission, no later than 6 months from its establishment, to make a determination specifying the maximum levels of airport charges that may be levied by an airport authority at any Irish airport with more than one million passengers in the previous year.

Aer Rianta is the airport authority which owns Dublin, Cork and Shannon airports. All of its airports meet the threshold set in the legislation and airport charges levied by Aer Rianta at the Irish airports are therefore subject to the Commission's determination.

Aer Rianta is a public company limited by shares, operating under the Companies Acts 1963-2000. Its statutory mandate derives principally from the Air Navigation and Transport (Amendment) Act,1998 (1998 Act). This legislation sets out the duties and responsibilities of the airport authority. The provisions of the 1998 Act are also enshrined in the Company's Memorandum and Articles of Association.

Section 16 of the 1998 Act provides the company with the powers to manage, develop and establish airports

> *(1) The company shall manage and develop the airports vested in it by section 14 and any other airport that may from time to time be established or owned by the company pursuant to subsection (3).*
>
> *(2) The company shall ensure the provision of such services and facilities are, in the opinion of the company, necessary for the operation, maintenance and development of State airport, including roads, bridges, tunnels, approaches, water supply works and watermains, gasworks and gas pipelines, sewers and sewage disposal works, electric lines, telecommunications facilities, lights and signs, apparatus, equipment, buildings and accommodation of whatever kind.*

Section 23 of the Act determines that the principal objects of the company shall be:

> *a) to own, either in whole or in part, or manage, alone or jointly with another person, airports whether within the State or not,*
>
> *b) to take all proper measures for the safety, security, management, control, regulation, operation, marketing and development of its airports,*

c) to provide such facilities, services, accommodation and lands at airports owned or managed by the company for aircraft, passengers, cargo and mail as it considers necessary,
d) to promote investment at its airports,
e) to engage in any business activity, either alone or in conjunction with other persons and either within or outside the State, that it considers to be advantageous to the development of the company, and
f) to utilise, manage and develop the human and material resources available to it in a manner consistent with the objects aforesaid.

Section 24 of the Act provides that the general duties of the Company shall be:

a) to conduct its affairs so as to ensure that the revenues of the company are not less than sufficient taking one year with another to-
i. meet all charges which are properly chargeable to its revenue account,
ii. generate a reasonable proportion of the capital it requires, and
iii. remunerate its capital and pay interest on and repay its borrowings,
b) to take such steps either alone or in conjunction with other persons as are necessary for the efficient operation, safety, management and development of its airports,
c) to conduct its business at all times in a cost-effective manner, and
d) *to regulate operations within its airports.*

In carrying out its functions, the Commission should consider Aer Rianta's statutory obligations in respect of operation and development of the airports.

This submission is being made by Aer Rianta in response to the Commission's request to interested parties and the public to make written representations in respect of the Draft Determination and Explanatory Memorandum on the Proposed Maximum Level of Airport Charges in Ireland (CP6/2001) in the context of consultation as set out in Section 32 of the Aviation Regulation Act 2001. One of the main purposes of CP6/2001 was "*to allow interested parties to ascertain in general terms the impact or effect of the proposed determination and to inform interested parties of the Commission's degree of reliance on the statutory factors*".

Section 33 of the Aviation Regulation Act 2001 sets out the statutory factors which the Commission must have regard to in making a determination in respect of airport charges. It states that the Commission shall aim to facilitate the development and operation of cost effective airports which meet the requirements of users. In carrying out this statutory objective, the Commission must have due regard to

- The level of investment in airport facilities at an airport to which the determination relates, in line with safety requirements and commercial operations in order to meet the current and prospective needs of those on whom the airport charges may be levied

- A reasonable rate of return on capital employed in that investment, in the context of the sustainable and profitable operation of the airport
- The efficient and effective use of all resources by the airport authority
- The contribution of the airport to the region in which it is located
- The level of income of the airport authority from airport charges at the airport and other revenue earned by the authority at the regulated airports and elsewhere
- Operating and other costs incurred by the authority at the airport
- The level and quality of services offered at the airport by the airport authority and the reasonable interests of the users of these services
- The cost competitiveness and operational efficiency of airport services at the airport with respect to international practice
- Imposing the minimum restrictions on the airport authority consistent with the functions of the Commission
- Such national and international obligations as are relevant to its functions.

The Commission has indicated that it will apply a test of economic efficiency in selecting the option which best meets the statutory requirements.

This paper is Aer Rianta's response to the Commission's invitation under the statutory consultation process. In replying to the Draft Determination it requests that the Commission have due regard to its previous formal submission dated 27th March 2001, and its response to submissions by other entities dated 27th April 2001 and our presentation to the Commission at the public meeting on 17th July 2001.

This paper addresses the issues raised and proposals made in the Draft Determination and is arranged in two sections. Section I discusses the Commission's Draft Determination in terms of each of the building block component and attempts to indicate the areas which in our opinion are contrary to the obligations of the Commission under the Aviation Regulation Act, 2001. This section also outlines our views on the appropriate methodologies and approaches which it feels the Commission should adopt in arriving at its final determination with respect to the maximum level of airport charges. Section II comprises our proposal in relation to the maximum level of airport charges and sets out the key components on which our conclusions are based.

It would be impossible to address the issue of airport charges in an Irish context without reference to the heated debate which regularly surrounds this topic, even in the context of a formal submission to the Commission. The level of airport charges has been and remains a very emotive issue in Ireland over the last two years. The provision of airport charges below cost is being promulgated as a measure which will deliver tourism growth, airline profitability, route development etc. These claims are essentially special pleadings for a subsidy usually not supported by any serious economic

analysis. However there is a statutory responsibility on the company under the 1998 Act to ensure the proper operation, management and development of the three airports and to provide such facilities and services as it considers necessary to achieve this objective. It is critical that the determination of maximum airport charges does not contravene this statutory objective for the proper operation and development of the airports.

The consequences of this would be far-reaching and would then have a serious impact on development not just in the regions but in the national economy. In the medium to long term, lack of appropriate infrastructure and services and adequate capacity at airports would constrain growth in access into Ireland far more than any short term reductions in airport charges. Equally, lack of capacity and facilities is the biggest factor which would deter the development of new routes and services in and out of Ireland. Actions which inhibit investment in new capacity and appropriate services levels at airports create a significant barrier to entry for new airlines and services thus generating market power for the incumbent airlines.

It is very clear that Government policy is that the airports must be operated on a commercial basis and there is no recourse to Government funding, grants or guarantees. This was clearly articulated during the Oireachtas debates on the development of the 2001 Act under which the Commission operates. The Minister for Finance indicated to the company's Annual General Meeting that he expects the company to pay dividends to the Minister as shareholder. Aer Rianta fully accepts this commercial mandate.

Confusion is regularly created that airports are in some way inhibiting competition among airlines and therefore impacting on value for the consumers. Airport authorities are the critical players in ensuring that new airline entrants are encouraged to open up new routes and airports thereby encourage competition on all routes and this activity has a greater impact on traffic growth than changes in airport charges.

Aer Rianta is available to discuss this submission in detail with the Commission.

SECTION I: AER RIANTA RESPONSE TO THE DRAFT DETERMINATION

1.1 Introduction

The Commission issued its preliminary determination on the regulation of airport charges in CP6/2001. Aer Rianta agrees with the Commission's assessment that facilitating the development and operation of cost-effective airports and meeting the requirement of all users as required by the Aviation Regulation Act, 2001 is best evaluated by applying the test of increasing economic efficiency. In order to facilitate the statutory requirement for minimising the number of restrictions imposed on the regulated entity the test of economic efficiency should form the basis on which regulation is applied in the case of Irish airports.

Aer Rianta also agrees with the Commission that users should be defined in the widest possible sense to include all users of airport facilities. This would best be achieved by extending the definition of airport users put forward by the Commission in CP6/2001 to include the local communities in which the airports are situated as they are impacted by the development of the airports in their area/region.

Despite general agreement on many issues, Aer Rianta is nonetheless of the view that the preliminary determination was not adequately detailed in some respects so as to allow Aer Rianta to assess fully certain key aspects and therefore the implications of the Draft Determination for the company. Aer Rianta has already sought clarification in respect of a number of key issues without success. The Commission has indicated that it does not believe that any further elaboration of CP6/2001 is required. Consequently, Aer Rianta has been potentially constrained in terms of its ability to deal comprehensively, in this submission or otherwise with the Commission, with all matters relevant to the Commission's draft determination and by extension to its final determination.

This Section presents Aer Rianta's response to the preliminary determination and highlights where there are ambiguities which prevent a clear understanding of the Commission's intentions. The form of the price cap is analysed in Section 1.2. Regulation of the airports as a group is discussed in Section 1.3. Section 1.4 discusses the approach adopted in relation to the regulatory till. Section 1.5 discusses the regulated asset base and the Commission's proposed adjustments to the initial valuation. The Weighted Average Cost of Capital (WACC) is discussed in Section 1.6, followed by a discussion of the proposed capital expenditure in Section 1.7. The Commission's approach to benchmarking is evaluated in Section 1.8. The remaining questions raised by CP6/2001 are discussed in Section 1.8.

1.2 Framework for Regulation

The Aviation Regulation Act 2001 does not prescribe the form of regulation, other than stating that the Commission must determine the maximum level of charges to apply for successive five year periods. Following almost unanimous recommendations from respondents to CP2/2001, we welcome the Commission's indication that it will adopt incentive regulation through the use of a price cap based on a CPI-X formula. In this instance, however, Aer Rianta is of the view that a +X factor is required due to the substantial investment in capacity which is required over the period of the determination.

Incentive regulation puts the onus on the business to achieve efficiency improvements and meet customer requirements. Aer Rianta is of the opinion that the most effective way to do this is to provide the company with appropriate commercial incentives. These can be achieved by the Commission through the adoption of standardised economic asset valuation processes, allowing a rate of return that is commensurate with risk and the implementation of appropriate processes to facilitate the sharing of out performance.

The Commission's approach as set out in the Draft Determination indicates that it will take a "building block" approach to determining the price cap from which Aer Rianta will develop a pricing structure for airport charges at Dublin, Shannon and Cork airports in the context of the market conditions in which it operates. In its most basic form, this revenue requirement is normally assessed as the sum of the return on capital, the return of capital and operating costs. Each of these elements will be discussed in detail in subsequent sections.

Form of Price Cap

The Commission's stated intention is to implement regulation on the basis of the average aeronautical yield per work load unit. The precise composition of the Commission's work load unit is not clear to Aer Rianta at this point. Aer Rianta would welcome clarification on the elements included in the Commission's final determination e.g. Aer Rianta has been unable to determine whether transit passengers have been included for the purpose of calculating the Commission's WLUs. This is an important point – though transit passengers are not levied with a passenger charge at present they utilise the runways, taxiways, apron etc. Aer Rianta believes that the most appropriate WLU formulation would be to include all air traffic.

Aer Rianta agrees that regulation of average aeronautical yield is the best approach for the following main reasons

- It is simple to apply, especially in situations where customers often require a complex range of inter-related services.

- It facilitates changes to the structure of charges, the introduction of new services and charges within the regulated till, or the withdrawal of old charges that are no longer appropriate, as market conditions and customer requirements change over time.

- The revenue yield approach gives Aer Rianta the incentive to stimulate growth of new routes and services from the three airports. This would allow Aer Rianta to comply with the requirement under Section 24 (3) of the Air Navigation and Transport (Amendment) Act, 1998 i.e. that it should have due regard to the development of air transport in carrying out its functions and the policy objectives set by the Minister.

- By allowing the airport operator the flexibility to set its own pricing structure in response to market imperatives, the revenue yield approach facilitates the minimisation of restrictions imposed on the airport operator in accordance with Section 33 of the Act and encourages more effective and efficient use of resources.

- Mainly for these reasons, it is commonly applied in the case of airports, most notably in the UK and in Australia. It has been applied consistently by the CAA in the regulation of the designated UK Airports since the enactment of the Airports Act 1986

Tariff Basket Approach

In CP6/2001, the Commission has invited consideration of the "*feasibility of a tariff basket of revenues given Aer Rianta's stated objective to substantially restructure its charges"*. The tariff basket approach involves the application of a price cap to the weighted average charge, as developed from weighting individual charges in a 'basket' of charges with their share of the revenue in the previous period – for example, a weighted average of airport charges with weights based on revenue from terminal, runway and parking charges in the previous period.

Aer Rianta considers that the application of a tariff basket approach to setting airport charges would be an unsuitable option to apply in this context for the following reasons:

- Problems arise in applying the tariff basket approach when new products, with no previous revenue weight, are introduced. As indicated in its initial submission to the Commission for Aviation Regulation dated

27th March 2001, Aer Rianta is proposing a new structure for airport charges, which is designed to encourage behaviour modification on the part of users so as to ensure efficient use of facilities in the future. To apply a tariff basket form of the price cap would be inappropriate in such circumstances as it would be inaccurate to base future projections on historic patterns which would no longer be applicable. The existing charges structure was developed pre 1987 and no longer meets the business requirements to ensure the efficient and effective use of all resources at the airports.

- While it allows some flexibility for rebalancing charges between existing services, the tariff basket is much less suited to situations where substantial changes to the structure of charges may be required. If charges are found to have been inappropriately structured over the period of the price determination, the risk of economic failure and damage to the regulated entity or to its customers is high. This is particularly relevant in the case of Aer Rianta as the existing charging structure has pertained for three decades and the company has already indicated to the Commission in previous submissions that significant changes to the charging structure will be required.

- To fully meet the requirements for the introduction of a tariff basket for airport charges would prove a costly and time-consuming exercise, which would not be in keeping with the provisions of Section 33 of the Aviation Regulation Act 2001, relating to the minimisation of costs and restrictions on the regulated entity. This complex approach would also pose a significant challenge to implement given the tight time constraints implicit in the six months allowed to reach the first determination.

- It may be difficult for firms to change price part way through the year under the tariff basket approach. Thus a tariff basket might make it more difficult for Aer Rianta to react appropriately to changing market conditions.

- Since the Commission has not put forward a preliminary assessment of the appropriate values in applying a tariff basket to Aer Rianta's airport charges structure as part of its Draft Determination, it has not afforded the airport authority, the airport users or the public the opportunity for adequate consultation on this matter. Therefore it would not be appropriate for the Commission to introduce a tariff basket structure in its final determination on the maximum level of airport charges.

- The tariff basket is more appropriate to the regulation of industries such as telecommunications, where there is a series of distinct and independent activities and services to which the basket can be related. However, the use of the tariff basket is less appropriate in the case of airport operations where a number of charges have inter-related cost drivers.

- The tariff basket approach is not widely supported. According to MMC4[1], following extensive experience of regulation, neither the airlines, the CAA or the BAA in the UK expressed any support for a tariff basket approach.

Aer Rianta considers that the determination specifying the maximum level of airport charges should provide for an overall limit on the level of airport charges as set out in Section 32 Subsection 6(a) (i) rather than individual charges or to a basket of charges. The company recommends a revenue yield price cap on the basis that capping the charge based on revenue per WLU would be the most appropriate way of expressing the determination for maximum airport charges for Dublin, Cork and Shannon Airports. In addition this approach allows for greater simplicity of administration, pricing flexibility in the context of changing market conditions and resulting advantages in terms of increasing economic welfare.

Sub Caps

The Commission has made a number of different statements with respect to its intentions regarding the application of price caps. Under point 9 ("imposing the minimum restrictions on the airport authority consistent with the functions of the Commission") it suggests the possibility of one other sub cap in addition to the revenue cap per workload unit. In the explanatory memorandum this sub cap is mentioned in the context of off peak use of the runway at Dublin Airport. However, under point 7 there is also a mention of consideration of sub caps on particular services/facilities at Dublin Airport in the context of addressing lower cost facilities.

Aer Rianta is opposed to the application of any sub caps, as they will severely restrict the ability of the airports to use the structure of airport charges to maximise economic efficiency. The application of sub caps would also conflict with the Commission's stated intention to afford Aer Rianta discretion in structuring its airport charges thereby enabling it to comply with Section 33(i) of the 2001 Act. The ability to adjust pricing structures in response to market dynamics is an essential requirement for any business, and is also fundamental to the principles of competition and the desire of the Commission as expressed in CP2/2001 to reflect as closely as possible through its function a competitive market environment.

Sub Caps on Service

Aer Rianta believes that sub-caps for different levels of service quality are inappropriate as, in CP6/2001, the Commission accepted Aer Rianta's submission that the basic standards for passenger terminal buildings should be set with reference to IATA service standard B and ICAO and other industry standards for other facilities. Under the proposals put forward by Aer Rianta, and agreed with the Commission, this basic standard will apply

[1] MMC4, A Report on the Economic Regulation of the London Airports Companies, June 1996

to all passenger groups. Airport users willing to pay for additional service elements above this basic minimum will then be able to purchase additional services. For example, air bridges are charged on a separate and independent basis allowing user groups to choose a higher quality of service than the agreed minimum. Similarly, Aer Rianta proposes to offer rebates to carriers which use remote stands as opposed to building served stands.

It is not easy, in practice, to differentiate the service provided within most of the passenger handling facilities at an airport. Many facilities (access roads, kerb, landside concourse, departures concourse, security, immigration and customs) are common to all passengers and differentiated lower services levels are difficult, if not impossible to justify, particularly given the stringent regulatory requirements with respect to safety and security which must be upheld. Some, facilities such as check-in and baggage reclaim have been designed as common systems and a reduction in service level to one airline would have an adverse impact on other adjacent facilities. (For example, increasing check-in times would increase queue lengths and these queues could then extend across the circulation routes used by passengers of other airlines).

When low cost carriers request low cost facilities they usually mean efficient facilities at less than cost. It does not necessarily follow that these are cheap to provide. For example, low cost carriers preference for contact stands to facilitate quick turnaround of aircraft requires extensive expenditure on the part of the airport operator. Furthermore, there is no evidence to suggest that the airport facilities required by passengers travelling with low cost carriers are materially different to those of other passengers. The CAA noted this when it stated that[2]

> Even where multi-lateral contracting is feasible, there will be services which are not valued strongly by airlines but would be valued by passengers. In these cases leaving standards to be determined by direct contracting runs the risk that these preferences will not be met.

The use of sub caps in this manner could give rise to a number of potential distortions, particularly if the differential were set at too high a level vis

- inaccurate price signals, leading to overuse of the designated "lower cost" facilities and under use of other parts of the airport, even though these facilities were provided in response to airlines' demands in the absence of market distorting differentials;
- penalisation of those airlines still choosing to use Aer Rianta's normal facilities. Within an overall price cap, the impact of offering too high a discount for "lower cost" facilities is that other airport users will be left to fund a disproportionate share of Aer Rianta's costs.

[2] CAA, *Direct Contracting Between Airports and Users: A Default Price Cap Consultation Paper*, February 2001

Given the Commission's stated commitment to IATA standard B, the potential for distortions in pricing signals and the implications for other airport users, Aer Rianta is of the view that sub caps for facilities of a standard lower than the agreed default level is not appropriate.

With respect to sub-caps for off-peak use of the runway at Dublin airport, the Commission would need to ensure that any sub cap applying to off peak runway charges at Dublin still allowed Aer Rianta to recover the full cost (taking account of all demands made on airport services) of providing airport services at off-peak times. Moreover, in order to set up such a sub cap, the Commission would need to take full account of the likely demand response by airlines to differential pricing, both to ensure that Aer Rianta would still be able to finance its activities and also to take account of "shifting peak" phenomenon, whereby the introduction of peak pricing leads to significant and sometimes undesirable shifts in the pattern of demand.

If the Commission were to set any such sub cap at too low a level, giving an inappropriate incentive for airlines to switch services to off-peak times, this could result in many passengers being forced to travel at inconvenient times, simply because of the pricing distortions caused by the price cap. At the same time the Commission would need to be able to model such shifts accurately in order to avoid serious under-recovery of costs and financial damage to the company over the course of a quinquennium.

Sub Cap for Cargo

At the Commission's public hearings, concerns were expressed that cargo charges would increase substantially under the present Draft Determination, and therefore the Commission should set a sub cap for this particular user group. However, the perception that cargo charges would increase under the present proposals appeared to be based on the misconception that the yield per WLU implied a relative pricing structure between passengers and cargo. As the Commission already stated at the hearings, the proposed price cap does not set relative prices; the ability to set prices for different services is being retained by Aer Rianta subject to a constraint on maximum yield. Aer Rianta would like to reiterate that the structure of prices, as set out in its initial submission to the Commission, will be cost-reflective, and thus a sub cap for cargo services is not required.

In conclusion, notwithstanding the overwhelming case against sub-caps, were the Commission to determine that any sub caps be introduced they must be based on robust evidence about Aer Rianta's current and future cost structures. Any proposed sub cap reflecting supposed lower cost facilities, for example, would need to be based on reliable estimates of the current and future costs of such facilities, as compared with the current and future costs of Aer Rianta's normal service.

Aer Rianta does not consider the use of sub caps to be appropriate. Their use is inconsistent with the objective of imposing the minimum restrictions

on the airport authority consistent with the functions of the Commission. If sub caps were set at too low a level, for example because the Commission had not been able accurately to estimate the relative variable costs necessary to set such caps, this could result in significant distortions and a substantial loss of economic efficiency. The use of sub-caps is inconsistent with the statutory requirement set out in Section 33 of the Act, where the Commission is obliged to have due regard to the efficient and effective use of all resources by the airport authority.

Other Elements of the Price Formula

CP6/2001 does not provide details of the proposed pricing formula which will be used to derive the maximum level of airport charges. The important components of the formula are set out below

With a revenue yield approach to a price cap, it is essential that there is a correction factor for prior year errors in the regulatory formula. This need arises from forecasting uncertainty. When airport charges are set, Aer Rianta is basing its revenue projections on forecast data, and the actual outcome may show differences for a number of reasons including the contribution from the various revenues streams diverging from the forecast, the number of workload units and the number of aircraft movements may differ from forecast. This will distort the revenue yield per passenger from the projected value in either case. Hence there should be a provision for adjustment (upwards and downwards) of the revenue yield allowed in later years. Such adjustment mechanisms are widely used in other regulatory regimes where prices caps are set on a revenue yield basis.

One of the most important aspects in the design of a robust regulatory system is the striking of a proper balance between risk and reward. Unanticipated cost changes can come from exogenous factors which are not within the control of the company. The size of these effects should be measured and the company should be insured against them by passing the impact through to customers by way of price adjustment. Cost pass-through mechanisms exist to take account of these effects. This is entirely consistent with the workings of a competitive market, whereby exogenous cost changes affecting all firms will be entirely passed on to consumers.

One of the key externally imposed risks and uncontrollable circumstances, which impact on aeronautical revenue is the additional security costs which may be exogenously imposed in accordance with new directives /legislation at national or international (e.g. ICAO or EU) level. Airports must implement these regulations regardless of the cost implications. For example, recent decisions by the UK Government in respect of greater segregation of arriving and departing passengers has resulted in the BAA increasing planned spend by 10% over the next ten years to fund the resultant required changes to infrastructure in its forthcoming capital investment programme.

The UK airports regulator allows the BAA and Manchester airport to pass through sudden and unforeseen increases in security costs at a level of 95 per cent (the S factor in the UK pricing formula). Partial pass through ensures that the airport authority has an incentive to find the least cost method of implementing the new security arrangements while the requirement that the cost be passed through one year in arrears affords the regulator an opportunity to verify the additional costs. It is debatable, however, whether there should be any reduction in the allowance against costs imposed by mandatory security requirements.

Aer Rianta is proposing that its corporate tax charge be treated on a cost-pass through basis and that tax costs are directly included in allowed revenue as an operating cost. This relates to the fact that the cost of capital is proposed to be set on a post-tax basis. This approach has the advantage that is more likely to give a more accurate estimate of Aer Rianta's tax liability over the regulatory period than the application of a simple tax-wedge to a post-tax Weighted Average Cost of Capital formula given the substantial uncertainty surrounding Aer Rianta's future tax liability in the context of recent changes to corporate tax rates. This approach also requires the agreement of an appropriate correction mechanism to correct for deviations of forecast tax liabilities from outturn.

The cost associated with economic regulation is also a legitimate externally imposed expense over which the airport authority has no discretion and should constitute part of the overall airport cost base which is taken account of through the pricing formula.

Incentive Mechanism

Implicit in the concept of independent economic regulation is the principle that the regulated company should be incentivised to improve productivity and efficiency. By making a cost saving, the company demonstrates to the regulator that a saving is possible. In some early applications of incentive regulation, regulators have immediately confiscated the benefits of such savings, by insisting they are reflected in lower prices at all future reviews. Over the long term, this "ratchet effect" significantly weakens the incentive for the company to make the cost saving in the first place. Particularly towards the end of each price control period, companies will have incentives to delay making cost savings until after the next price review has been completed, in order to retain the benefits of such savings for a longer period of time.

In the medium and long term, the interests of the consumer, the users, the regulated company and the shareholder are best served by a charging regime which allows for the sharing of both operating efficiencies and capital efficiencies on an ongoing basis. Best practice regulation now involves rolling efficiency allowances under which the regulated entity keeps the benefits of operating expenditure reductions for a fixed period of

time e.g. five years, regardless of when gains occur in relation to price reviews. This approach is the one best geared to drive continuous innovation, efficiency and service improvements to the benefit of both consumer and regulated company.

Aer Rianta appreciates that the implementation of this approach is primarily a matter for future price reviews and would invite the Commission to clarify its intentions at an early stage to provide regulatory certainty during the current review period and in order to ensure the maximum effectiveness of incentive regulation. Aer Rianta would welcome the opportunity to discuss the concept in detail with the Commission.

1.3 Regulation as a Group

Section 32 subsection 4 of the Aviation Regulation Act, 2001 states that

> *Where it appears to the Commission that two or more airports are either-*
> *a) managed by the same airport authority, or*
> *b) that they are owned by the same person and operate as a group of airports whose activities are co-ordinated by that person,*
> *any determination in relation to any one of those airports may be made by reference to the aggregate of amounts levied by way of airport charges at that airport and amounts so levied at the other airports.*

The Commission is thus granted the discretion to choose to apply a single price cap to a group of airports or to set individual price caps at each airport. In its Draft Determination and Explanatory Memorandum CP6/2001, the Commission proposes the application of individual caps at the three Aer Rianta airports.

Aer Rianta is strongly of the opinion that Dublin, Cork and Shannon airports should be regulated as a group. This is consistent with company strategy as discussed and submitted to Government in 1999. This allows the company to best achieve its statutory obligations set out in the Air Navigation and Transport (Amendment) Act, 1998 and meets the statutory objective and the ten statutory factors set out in Section 33 of the Aviation Regulation Act, 2001.

Economies of Scope and Cost Efficiencies

The nature of the airport business is such that it is characterised by

- a high level of fixed and sunk costs
- a ratio of fixed to variable cost which is extremely high
- investment which is subject to lumpiness and indivisibility
- economies of scale and economies of scope.

If the three Aer Rianta airports are regulated as a single unit this would present opportunities for maintaining benefits derived from economies of scale, scope and density. This is essential to the continuing long-term development of cost effective airports at Dublin, Cork and Shannon.

Economies of scope and scale occur in the airport industry where airports can spread corporate functions, compliance and regulatory costs, research and development, maintenance and engineering and other specialist skills across a number of aeronautical and non-aeronautical related functions. The operation of the three Aer Rianta airports as a group gives rise to cost efficiency gains through the pooling of resources in areas such as human

resources, retailing, property, finance, compliance/regulation, information technology marketing, procurement and technical/engineering.

The introduction of separate price caps across the three airports at Dublin, Cork and Shannon will increase the regulatory burden experienced by each individual airport. Additional management and administrative requirements will be placed on the airports in meeting the demands of regulation. In addition the marketing strategy of the company to utilise effectively capacity at all three airports would be affected. The cost efficiency gains derived through economies of scale from the operation of the airports as one unit would be diminished. Such an approach would be contrary to the requirement in Section 33 of the Aviation Regulation Act, 2001 whereby the Commission is obliged to have regard to the efficient and effective use of all resources by the airport authority. In order for the benefits of effective networking and economies of scope to be realised in the aviation sector, it is essential that a single price cap be introduced across the three regulated airports.

Implications for Capital Investment

The regulation of Aer Rianta as a unit is necessary to ensure a balanced and effective approach to the capital investment programmes. The regulation of the three airports under individual price caps would have serious negative implications for the extent, financiability and timing of the capital investment programmes at the individual airports.

The aeronautical sector is characterised by the lumpiness of its investment. There are exceptionally high costs associated with the development of new aeronautical capacity. If the capital expenditure requirement at each airport is compared with the revenue derived from each airport under individual price caps, investment incentives will be constrained at certain times at the individual airports.

Dublin, Cork and Shannon airports are currently at different stages in their development cycles, therefore the investment requirement at each airport differs considerably. Dublin airport is presently in the midst of a major development programme while a significant investment project was completed at Shannon airport in early 2000. Aer Rianta will need to undertake significant capital expenditure to provide greatly expanded capacity at Cork airport in the forthcoming regulatory period.

Regulation of the airports on an individual basis will restrict capital investment at the individual airports leading to losses in dynamic efficiency. This would call into question the ability of the individual airports to meet the long-term requirements of users in terms of capacity provision and the prospects for future development of the Irish airports. This is contrary to the stated statutory objective of the Commission to facilitate the

development and operation of cost effective airports which meet the requirements of users.

Individual airport caps based on the Draft Determination will not meet the users needs at Cork and Shannon airports as it will divert the development of routes and services to Dublin airport. Because Ireland is such a small country the impact of such a price cap strategy will be very significant in terms of market and demand distortion.

Regulation as a unit would allow Aer Rianta to balance the capital expenditure requirements across the three airports with respect to the investment cycles of the individual airports. This would lead to improved dynamic efficiency.

Regional Policy

The requirement of a single price cap in relation to the three airports is important not only for market stability but also in the interests of regional policy. In its Draft Determination and Explanatory Memorandum document CP6/2001 the Commission acknowledges the important economic contribution of all three Aer Rianta airports to their respective regions.

While it is clear that all three Aer Rianta airports make a valuable contribution to their respective regions, the relative economic contribution of Cork and Shannon as regional airports is proportionally more significant to those regions. Dublin is in fact a national gateway but has less relative significance in the regional context than Cork or Shannon in their regions. The airports are strategically placed to serve the transport infrastructural needs of their regions. They play a critical role in providing the necessary accessibility to maintain regional competitiveness.

The Irish Government has placed the development of the regional and international airport capacity as a core objective in its National Development Plan.

The draft NSS (National Spatial Strategy) recognised this in its recommendations and analysis.

- The airports act as economic hubs for both physically manufacturing goods and interactive goods (i.e. people) in a mature economy.

- The demands or demographics and road/rail infrastructure set the backdrop for the airport catchment area. The airport as an intermodal facility is recognised.

- That airports, in themselves, act as distorting magnets for development and demographics (like the cities they serve).

- That the requirements of the NSS will drive increasing development and spend in all the airports.

By setting maximum airport charges on an individual basis, Aer Rianta believes that the Commission is not having adequate regard to its statutory objective under Section 33(d) in relation to the contribution of the airport to the region in which it is located.

The Commission states in section 3.4 of CP6/2001 that it believes that by raising the maximum level of airport charges permitted at airport B in order to provide a regional subsidy to airport A, this will benefit region A at the expense of region B and therefore is not an appropriate option. The analysis fails to take account of the proportional effect of a subsidy of airport A by airport B and amounts to a very narrow interpretation of the statutory requirement under the Aviation Regulation Act, 2001 and does not reflect the views expressed by the Legislature during the Oireachtas debates on the Act.

The Commission indicated at its public meeting that it has not seen any evidence pointing to the net economic welfare effect of the use of a subsidy to promote the development of a regional airport. In the case of Dublin airport the proportionately small increase in airport charges necessary to provide further support for traffic development at Cork or Shannon airport will have a negligible effect on the economic contribution of Dublin airport due to the scale of operations at the airport.

However the corresponding support to Cork and Shannon airports may be sufficient to attract additional airline services which will benefit the airports' economic contributions to their regions. This is due to the fact that Cork and Shannon airports have a higher proportion of marginal traffic due to the comparative scale of their operations and therefore the price elasticity of traffic demand is believed to be relatively higher at these airports. The overall effect of such an approach is a net economic benefit to the country as a whole.

In its Draft Determination and Explanatory Memorandum the Commission has introduced higher maximum levels of airport charges at Cork and Shannon airports compared to Dublin airport. This will have the effect of increasing the relative competitiveness of Dublin airport at the expense of Cork and Shannon airports. This will potentially divert traffic away from Cork and Shannon airports towards Dublin airport, thereby reducing their collective contribution to economic welfare.

The Commission has suggested that Aer Rianta or Aer Rianta under the direction of the Government as shareholder could address the needs of the regional airports by the introduction of pricing below the maxima, however this would require that the company earn a rate of return below the cost of capital. The long term adoption of such a strategy could seriously damage the financial position and credit standing of the company. It would clearly render Aer Rianta unable to fufill its mandate under Section 24 of the 1998

Act. It is inconsistent to determine the cost of capital and then to suggest that the fundamental principles of economics should be somehow suspended so that a non existent surplus can be used to subsidise investment in the airports.

Aer Rianta believes that the Commission will best serve the interests of the development and operation of cost effective airports which meet the requirements of all users by regulating the airports at Dublin, Cork and Shannon as a unit. The introduction of a single price cap for the three airports will permit a structure of relative charges that will promote overall economic efficiency. Regulation as a single entity will allow Aer Rianta to continue its successful strategic approach to balanced airport management and development. The Commission, in adopting this approach, will comply with its requirement under Section 33 of the 2001 Act to have due regard to the contribution of the regions in which airports are located and to the requirement that it place the minimum restrictions on the airport authority.

1.4 Regulatory Till

The consideration of the composition of the regulatory till is an extremely complex area and it is currently generating much debate in other jurisdictions. Before assessing the proposals put forward by the Commission it is necessary to examine the economic implications of a single or dual till approach to the regulatory till.

The Single Till

The single till principle has been widely applied in the airport industry since the Chicago Convention of 1944. The underlying premise is that due to the complementary relationship that exists between aeronautical and some other selected airport activities, revenue from the latter should be used to supplement aeronautical revenue thereby allowing for the subsidy of aeronautical activities by non-aeronautical activities.

Under the single till airport charges are derived from an asset base composed of aeronautical and non-aeronautical assets, although there has never been a consensus on which activities should actually comprise an appropriate single till. Revenues generated from non-aeronautical activities are used to cover a proportion of the common costs incurred in the operation of an airport facility. Thus aeronautical pricing proposals are formulated by combining net revenue from the aeronautical activities and net revenue from some selected airport activities. Airport charges under the single till may be lower than if they were based on the stand-alone costs of aeronautical assets.

A trend away from the single till has been observed in a number of jurisdictions. For example in Sydney, Schiphol, South Africa, Germany and the UK, the single till approach has been abandoned or is under review.

There are a number of implications arising from the application of the single till principle.

- The single till fails to provide cost reflective price signalling in the market. Under the single till prices for aeronautical services are supplemented by revenue from non-aeronautical activities therefore prices do not signal the stand-alone cost of provision of aeronautical services.

- The single till may give rise to under-priced aeronautical services, inflated demand, and the possibility of congestion. The price of aeronautical service derived from the single till may be artificially low and may in certain circumstances prohibit the market from clearing.

- The single till mechanism may distort future investment incentives in both aeronautical and non-aeronautical activities. Since the return on aeronautical assets through airport charges is not required to cover the full stand-alone costs incurred in the provision of aeronautical services, this dampens the incentive for investment in aeronautical capacity going forward.

- The fact that non-aeronautical revenue streams are used to supplement aeronautical revenue through the single till may act as a deterrent to investment incentives in non-aeronautical airport activities included in the single till. This approach creates additional incentives for investment in activities outside the single till. The combined effect of this is reduced dynamic efficiency in the airport sector as investment is discouraged in single till activities.[3] This is an important factor as airport congestion and insufficient infrastructural investment reflects a lack of dynamic efficiency over time.

- The single–till mechanism extends the remit of regulation beyond the confines of aeronautical charges where the airport authority may have some market power into commercial non-aeronautical activities which are subject to vigorous competition. An airport regulator is permitted to extend the scope of ex-ante regulation into commercial and retailing activities in a manner in which there is no legal precedent.

Airports concerns with respect to the application of a single till framework were set out in an ACI-Europe working paper for the ICAO Conference of the Economics of Airports and Air Navigation Services (ANSConf) in June 2000. The paper states that while the single till helps to reduce airline operating costs in the short term through lower airport charges, in the longer term it distorts the market and gives rise to many of the problems listed above.

There is no regulatory precedent to support the introduction of the single till principle in the economic regulation of Irish Airports. All other regulated sectors which comprise businesses combining regulated and non-regulated activities apply a dual till.[4]

The debate on the single/dual till approach to airports regulation is best illustrated by reference to the UK, one of the most evolved regulatory environments for this sector. During its last review of BAA, the MMC[5] found that:

> there are, in our view, evident problems with the single till approach. Charges are lower than the overall cost of supplying the airport

[3] Starkie, D. & Yarrow, G. *The Single Till Approach to the Price Regulation of Airports,* July, 2000
[4] With the exception of rail networks
[5] MMC4, BAA plc -*A Report on the Economic Regulation of the London Airports Companies* , Monopolies and Mergers Commission, 1996

> services to airlines which is not in principle an economically efficient way of pricing.

The UK airports regulatory authority the CAA acknowledges the cross-subsidisation effect of the single till[6],

> Depending on the level of commercial profits, the single till may result in the commercial activities bearing a substantial share of an airport's common costs. It may even result in cross-subsidisation of the aeronautical activities if these fail to cover their incremental cost.

The CAA published an important consultation paper last December entitled *"The 'Single Till' and 'Dual Till' Approach to the Price Regulation of Airports"*. [7] The CAA concludes that the single till mechanism extends the parameters of airport regulation into non-aeronautical activities,

> The most basic argument against the single till approach is that it is aeronautical charges relating to services provided by a firm with substantial market power which should be subject to economic regulation, not the commercial side of the business. To incorporate the commercial costs and revenues into the equation therefore widens the scope of the regulatory framework beyond the basket of services for which a robust diagnosis of market dominance is possible and for which price controls have therefore been deemed appropriate.

To conclude the application of the single till principle does not facilitate the statutory objective of facilitating the development of cost effective airports under Section 33 of the Act.

The Dual Till

The dual till system separates aeronautical and non-aeronautical activities of an airport enterprise as they are treated as separate and independent segments of the business. Airport charges are levied to cover the costs directly attributable to aeronautical activities plus the aeronautical share of common costs incurred by the airport facility. Application of a dual till would, in practice, result in an increase in airport charges, above single till levels. The introduction of a dual till offers substantial economic benefits over the single till approach as it provides for the possibility of enhanced economic efficiency.

- The dual till methodology offers benefits in terms of dynamic efficiency as it increases the incentive to invest in both the aeronautical and non-aeronautical sectors of the business. The incentives for investment in aeronautical assets are increased as the airport authority can earn a full return on aeronautical assets. The incentives for investment in non-aeronautical activities are also

[6] CAA, *Issues for the Airports Review, Consultation Paper*, June 2000
[7] CAA, *The 'Single Till' and the 'Dual Till' Approach to the Price Regulation of Airports Consultation Paper*, 2000

enhanced as the entity is entitled to a proper competitive return on these activities also.

- In the adjustment from a single till to a dual till mechanism the prices of under-valued aeronautical services increase, this ensures an improvement in allocative efficiency as prices become more cost reflective.

- The dual till approach also ensures efficient signals in the market regarding new investment in capacity. This eases congestion and allows the market for aeronautical services to clear. It also enables a more equitable distribution of scarcity rents between the airport and airline industry.

- The dual-till approach focuses regulation exclusively on the natural monopoly elements of the airport business, which is the only area where economic regulation is justified. There is a consequently lower level of uncertainty in forecasting a return on aeronautical investment as the risk factor involved relates solely to aeronautical activity.

- The dual till approach is increasingly gaining currency amongst experts in the area of airport regulation as the most rational approach from an objective economic viewpoint.

There are some concerns about the transition from single to dual till. They principally relate to the fact that the airport authority could achieve a windfall profit gain.

The CAA discusses the potential benefits to be gained in the move to a dual till. It recognises that windfall gains may occur through the removal of the single till where earnings are redistributed from airlines to airports. However, this redistribution is seen as a by-product of the improvement in economic efficiency associated with a dual till approach[8],

> a dual till would increase an airport's incentives to invest appropriately in new facilities, the scarcity rents would in the long run decrease (subject to exogenous constraints, such as restrictions on planning permission).
>
> Even if planning restrictions constrained new investment, a move to a dual till would probably also increase pricing efficiency at congested airports because the difference between the prevailing and the market-clearing level of airport charges would become smaller. This would then be accompanied by a non-transitory transfer of scarcity rents from the airlines to the airports. This redistribution would be a by-product of an increase in economic efficiency….

In examining the Sydney Airports Corporation Ltd pricing proposal for Sydney airport, the ACCC concluded in its draft decision of February 2001

[8] CAA, 2000, *op cit*

that the preferred approach was that of a modified dual till where certain non-aeronautical activities are considered when pricing aeronautical services.[9]

> The model is applied as follows. Services defined as 'aeronautical' under Declaration 89 are incorporated into the cost base from which a 'dual till' estimate of aeronautical revenues is determined. The contribution from aeronautical-related services is then subtracted from this figure to generate the total allowable revenue from aeronautical services

The ACCC in its final decision of May 2001 on the aeronautical charges proposal for Sydney Airport concluded that the adoption of a dual till was the appropriate methodology.[10]

> In general, it is the Commission's view that the dual till approach to pricing aeronautical services has considerable merit, as it focuses regulation on areas where the airport has market power and is more likely to promote efficient pricing outcomes than the single till.

In conclusion the dual till approach offers superior benefits in terms of overall economic welfare. It facilitates the development of a pricing structure for airport charges that allows for the effective and efficient use of all resources by the airport authority consistent with the statutory requirement under Section 33 of the Act.

Commission's Proposal For The Regulatory Till

In formulating the regulatory till, the Commission is determining the appropriate revenue streams that must be taken into account when deriving the maximum level of airport charges under Section 32 of the Aviation Regulation Act, 2001. The Commission states in its draft Determination and Explanatory Memorandum CP6/2001 that it "*must assess what are the appropriate revenues to be taken into account in determining maximum levels of airport charges so that economic welfare is enhanced*". The Commission also refers to the need to ensure that the airport authority is given the "*correct incentives in relation to the future development of the airport and (that) users should benefit from economic activity which they, in part, generate at the airports*".

In its draft determination on airport charges it appears that the Commission considers that a single till should initially be applied at Dublin, Cork and Shannon Airports as it suggests, "*the regulatory tills will include all airport charges revenues and all commercial revenues*". The Commission acknowledges the disadvantages associated with applying the single till principle to the regulatory till. Aer Rianta concurs with the Commission's view that a single till approach to the regulatory till will diminish economic

[9] ACCC, *Sydney Airports Corporation Ltd Aeronautical Pricing Proposal, Draft Decision*, February 2001
[10] ACCC, *Sydney Airports Corporation Ltd Aeronautical Pricing Proposal*, *Decision*, May 2001

efficiency, and has already discussed in detail the reasons why it considers the dual till a superior option. The potential adverse consequences associated with a single till approach include

- an aeronautical pricing structure which introduces or accentuates allocative inefficiency
- inefficient use of airport infrastructure
- reduced incentives for investment in both aeronautical and non-aeronautical activity by the airport authority resulting in a loss in dynamic efficiency

Aer Rianta welcomes the exclusion of Aer Rianta International and Great Southern Hotel from the regulatory till, as these activities occur in competitive markets. Thus inclusion of such incomes streams which do not have a sufficient nexus to the regulated activities would introduce a significant market distortion which would be totally contrary to the purpose of market regulation. Directly analogous considerations apply in relation to a further series of activities undertaken by Aer Rianta adjacent to its Irish airports, e.g. joint venture business parks. It is appropriate that these should also be excluded from the regulatory till.

The Commission's draft determination appears to indicate that while aeronautical and commercial revenues have been included in the regulatory till, the capital expenditure associated with the commercial revenues has been excluded. This is inconsistent, as without provision being made for the capital investment to deliver a revenue stream, the income will not materialise. If a single till is applied then the underlying costs associated with the activities within the regulatory till must be taken into account as well as revenues.

The Commission mentions that it is considering the possibility of excluding from the regulatory till the income and costs associated with new commercial investments at Dublin Airport in the future. This may be interpreted as allowing for the introduction of a dual till approach to the regulatory till at Dublin Airport. This is consistent with trends in aviation regulation in other jurisdictions and with Aer Rianta's submitted position in relation to the regulatory till.

CP6/2001 refers to excluding income and costs from "new commercial investments" at Dublin airport from the regulatory till, Aer Rianta has considered how this specific approach could be implemented in practice. The strict interpretation of the Commission's suggested approach would require separate identification and recording of all revenues and costs associated with new commercial investments, and would raise definitional problems (for example, in terms of defining whether extensive refurbishment of existing commercial facilities constitutes "new" investment). More importantly, it would create undesirable incentives for Aer Rianta to seek to transfer costs and revenues from existing commercial activities to "new" commercial activities.

Instead, Aer Rianta suggests that the most practical way of implementing this approach would be to cap the single till contribution from commercial revenues at Dublin airport to a set level obtaining at an agreed point in time, whilst retaining the associated assets in the regulated asset base. This measure will go part of the way, but will certainly not remove, the distortions created by single till regulation.

Aer Rianta continues to be firmly of the view that dual till regulation is the most appropriate form of economic regulation for airports. It is important to recognise that this argument is not limited to airports subject to capacity constraints. The fact that the single till approach unjustifiably extends the scope of economic regulation, that it distorts investment incentives within the till and that it provides inappropriate incentives to develop activities outside of the till, apply equally at congested and uncongested airports.

It appears, form the Draft Determination that the Commission's primary justification for a transition from single till to dual till is based on the level of available capacity at a facility, although it does not suggest its application at Cork. In practice, this would result in significant uncertainty as a reversal to a single till environment could be envisaged when capacity constraints are removed. This would provide a perverse incentive to the airport operator to ensure that capacity increases trailed increases in demand. In addition this approach would also translate into sharp price discontinuities for customers.

A dual till approach to the regulatory till is entirely justifiable on economic grounds and consistency in approach across the airports would be key to delivering a stable regulatory environment for all airport users. Aer Rianta strongly believes that the dual till approach should be adopted in formulating the regulatory tills for the three Aer Rianta airports as this will provide a superior welfare outcome when applying a test of economic efficiency. The company takes the view that the costs of the provision of aeronautical services must be recovered through airport charges, so as to ensure better allocative efficiency and price signalling. The use of the dual till principle in determining the regulatory till will enhance dynamic efficiency and therefore will best serve the long-term development of the airports sector.

1.5 Regulated Asset Base

One of the key decisions in arriving at the maximum level of airport charges is the appropriate scope and valuation of the regulated asset base (RAB). There are three aspects to be considered – the definition of the regulated asset base, the valuation of the assets themselves and the manner in which they are rolled forward.

Definition of the Regulated Asset Base (RAB)

This report has already set out Aer Rianta's view on the composition of the regulatory till. The regulated asset base in turn should derive from this composition. Thus the exclusion or inclusion of specific assets must be clearly mirrored by the treatment of related revenues, capital expenditure and operating costs.

In CP6/2001, the Commission has suggested that it should define the RAB on the basis of existing assets, excluding those assets, the replacement of which, in its opinion, "*is not critical to the sustainable operation of Aer Rianta's airports in the future*". Specifically the Commission has adjusted downwards the value of Pier C at Dublin Airport by IR£20,968,000 and the value of the terminal building at Shannon Airport by IR£7,242,000.

Despite a number of requests to clarify its methodology, the Commission has not clarified the criteria used for this adjustment to the RAB other than stating that the proposed new valuations reflect the value of "hypothetically efficient equivalents" for both facilities. Aer Rianta disagrees with the Commission's proposal to reduce the valuation of these facilities and believes that this adjustment is totally unwarranted in the context of efficient equivalent facilities and the sustainable and commercial operation of the airports.

Pier C and Shannon Terminal Development

Pier C was constructed in line with good practice, in accordance with the specific requirements of the regulatory authorities at the time and following extensive consultation with users. Costs were benchmarked against peers at the time of construction, the development took place following competitive tendering procedures under EU public procurement requirements and was delivered in a cost effective manner within sanction. The development of Pier C was approved by the regulator at the time the Minister for Transport, following recommendations from independent consultants engaged by the Department of Transport.

Pier C and Terminal West Key Facts	
Designed to IATA service standard B requirements	
Total Area 18,704 sq.m	
Total Cost IR£50.4m	
Construction Cost of IR£2,262 per sq.m compares very well against prevailing market levels and similar airport developments in the UK	
Pier C	Provides bus lounge with six departure gates serving remote aircraft stands
	Provides 6 airbridge served gates including gate lounge areas, café, travellators and toilets
	Complies with all customs and immigration requirements and is the only Pier at Dublin Airport which now fully meets these requirements
Terminal West	Provides enlarged security friskem area, baggage hall, customs facilities and Immigration Hall
	Includes expanded shopping area and additional airside circulation space

Aer Rianta considers that the total cost of this facility including all the elements was very cost effective when assessed against other such projects and should be recoverable in full. The company would be pleased to meet with the Commission to ascertain what specific concerns that it has (which appear to be the basis for its draft determination valuation adjustment) and to allow the company the opportunity to fully address these.

Similarly, the Shannon terminal was recommended as the appropriate course of action by successive master planning documents prepared for Aer Rianta as the original terminal, which was developed in the 1940s, was inappropriate to meet the demands of modern aviation. These documents have been made available to the Commission in response to various statutory requests for information. The then Minister for Transport also approved the investment in this development and this development also took place following competitive tendering procedures under EU public procurement requirements

Shannon Airport Terminal Key Facts
Designed to IATA service standard B requirements
Total Area 10,800 sq.m
Total Cost IR£28.35m
Construction Cost IR£2000 per sq.m
Provides 40 check in desks, 7 airline desks, friskem area, circulation area and baggage hall
Project costs included road realignment and provision of 2025 public car parking spaces

The Commission's Draft Determination agrees that IATA standard B and ICAO standards are the standards and regulations for delivery of facilities at the airport. Consequently it is inconsistent and inequitable to disallow a

proportion of the cost or valuation of two of the projects which are clearly consistent with this standard. In the case of the Pier C development this difficulty is further compounded as the pier capacity constraints at Dublin Airport are widely acknowledged. Clearly both projects are critical to the sustainable and commercial operation of Aer Rianta's airports and it is thus wholly appropriate that their full valuation be retained within the regulatory asset base.

These investments were implemented on the understanding that over time a full recovery of all costs would be made. This is an absolutely defensible approach and one adopted following the approval of the regulatory authorities at the time. Any attempt at this stage by the Commission to disallow already incurred costs would be a retrospective exercise of regulatory power under the Aviation Regulation Act, 2001 which took effect on February 27th 2001. This would be questionable, as the legislation does not expressly or unambiguously permit such a retrospective effect.

Such retrospective withdrawal of approval for some capital investment projects could be seen as setting a precedent and could potentially have serious negative consequences for future investment. Investment might be deterred by the possibility of a regulator's decision at a future date reducing the likelihood of earning a reasonable return on the investment within the expected timeframe. Regulatory risk of this kind would undermine the ability of Aer Rianta to continue to put in place airport facilities "*in line with safety requirements and commercial operations in order to meet the current and prospective needs of users.*"

Appendix 1 gives comprehensive details of the development of Pier C and a full analysis of the Shannon terminal development is provided in Appendix 2. It is clear from the documentation that these developments were necessary, cost efficient and appropriately managed and the Commission should not disallow a portion of the cost or value associated with the same.

Valuation of the RAB

Among the factors that the Commission is directed to consider in setting prices is "*the efficient and effective use of resources by the airport authority*". The elements of efficiency described in the Commission's consultation paper CP2/2001 tend to support the view that asset values should reflect some measure of their current cost. Aer Rianta will need to undertake capital expenditure to provide significantly expanded capacity at Dublin and Cork airports in order to meet the current and prospective needs of airport users. In order to fund this expenditure and repay existing debt, the company will require strong cashflow. It is therefore critical that the asset valuation methodology agreed by the Commission in determining the maximum level of charges is consistent with the need to provide expanded capacity for airport users. International precedent would support the need

to set asset values at a level that allows for the funding of capital expenditure.

Determination of the value of the RAB is central to the determination of two key components of the overall regulatory revenue requirement - the return of capital (i.e. depreciation) and the return on capital (i.e. the cost of capital). These components typically represent a significant proportion of allowable revenues[11].

After the RAB composition has been defined, therefore, it is important that the appropriate values are attached to the included assets. This is particularly relevant in the context of a capital-intensive industry such as airports where many assets are relatively long-lived and expensive. Under-valuation of assets and inadequate depreciation provisions will not allow enough cash for expansion or replacement capital projects. The decisions on the valuation and depreciation policies of the RAB are therefore of long-term strategic importance.

The regulatory criteria set down in the Aviation Regulation Act, 2001 determine to a large extent the appropriate valuation methodology for the regulatory asset base (RAB). A number of factors outlined in Section 33 of the Act may be categorised in terms of allocative, productive and dynamic efficiency. Specifically the following are identified as falling into this category

a) the level of investment in airport facilities at an airport to which the determination relates, in line with safety requirements and commercial operations in order to meet current and prospective needs of those on whom the airport charges are levied
b) a reasonable rate of return on capital employed in that investment, in the context of the sustainable and profitable operation of the airport
c) the efficient and effective use of all resources by the airport authority
f) operating and other costs incurred by the airport authority at the airport

Different approaches to setting the value of the RAB and providing a return of that value provide different incentives in relation to the provision of new capacity, the timing of such provision and the quality of the capacity and services made available.

The Commission accepts the principle of economic efficiency, specifically in terms of maximising economic welfare. The three dimensions of economic efficiency - allocative, productive and dynamic efficiency, must be balanced and maintained within the regulatory framework. This has been considered by the CAA[12]

[11] For example, in the case of the recent transmission price control review of the National Grid Company in the UK, the depreciation allowance and the return on the capital each represented approximately a third of allowable revenues.
[12] CAA, Issues for Airport Reviews: Consultation Paper, July 2000,p.6

> While efficient operation of airports could, for example, require the CAA to put heavy weight on an airport's achievement of cost efficiency and to transfer any cost savings into lower airport charges, such a regulatory policy could limit the airport's incentive to take risks and invest in new facilities. Once such a trade-off is accepted, it may be a superior long-term strategy to sacrifice the immediate transfer of some short-run efficiency gains to users in order to incentivise the appropriate enhancement of capacity.

Thus in considering the various valuation methodologies, economic efficiency, and specifically the balance of the various elements must be a key consideration.

The Commission in its Draft Determination used the historic cost net book value of assets on the basis that it was the best available information capable of verification by the Commission at that point in time. However, it recognised that alternative approaches are available the use of which might be preferred. The Commission signalled that this was an area warranting full consideration following the Draft Determination. Aer Rianta strongly disagrees with the use of historic cost net book value for the valuation of the RAB as it has no economic justification. The application of a replacement cost methodology best fulfils the requirement of the Act.

Historic Cost (HC)

Historic cost valuation is an accounting-based approach, where the current book values are used. Historic costs are generally reported in an organisation's annual accounts and for this reason are easily obtainable and verifiable. The key issue in relation to the use of a HC approach to the RAB is that the determination of an allowable return will require the use of a nominal cost of capital since the assets are valued in nominal terms.

The main shortcoming of the historic cost approach is that, in times of rapidly changing prices or technological changes, the historic value of assets will cease to bear much relationship to the cost of a new and efficiently constructed airport with the same capability as the existing facilities. Even in times of low inflation, historic costs can diverge considerably from current costs for those assets over long periods. Prices based on a historic cost asset valuation will not achieve an economically efficient allocation of resources. Such prices will not allow for the future replacement of the existing airport facilities as required for the sustainable operation of the business.

This implies the application of inflation forecasts in the setting of prices and the need to develop a mechanism that allows for the recovery of forecasting errors. On the assumption that all such errors can be recovered this is not a significant risk but it does introduce the possibility of timing differences as well as issues associated with transparency and intergenerational equity. The cost of capital, prepared for Aer Rianta by NERA is discussed in detail in Appendix 5.

By valuing the RAB using historic costs, the resulting level of depreciation will understate the required level of investment to replace the assets when it comes to the end of their useful lives. This would prevent Aer Rianta from replacing the existing fabric of the airports. This valuation approach would not provide Aer Rianta with adequate cashflow to fund its capital programme going forward. Taking these two factors together, the use of historic cost is contrary to the requirement under Section 33 of the Act that the Commission should have due regard to

a) the level of investment in airport facilities at an airport to which the determination relates, in line with safety requirements and commercial operations in order to meet current and prospective needs of those on whom the airport charges are levied
b) a reasonable rate of return on capital employed in that investment, in the context of the sustainable and profitable operation of the airport
g) the level and quality of services offered at the airport by the airport authority and the reasonable interests of the users of these services

The an extremely low valuation for the RAB, such as would be the outcome of a HC approach, would result in Aer Rianta's cashflow being inadequate to allow it to invest in the capital projects necessary for full efficiency and would thereby conflict with the statutory requirement for the Commission to have regard to the efficient and effective use of all resources by the airport authority.

The assets that comprise Aer Rianta's RAB were acquired or constructed over the period from the 1920s, when operations commenced at Dublin Airport, up to the present day. Over this time there have been enormous changes in: the general level of prices; technology; safety standards and other applicable legislation and requirements; passenger and airline expectations and requirements as well as the cost of performing construction work and acquiring land. There is no reason to suppose that the net book value historic cost valuation of these assets has any relationship to the cost of assembling or replacing a set of assets with the same functionality today. For example the land on which Dublin Airport is built has a commercial value that would have little relationship to the cost of acquiring the original airport land in what was then an agricultural area.

In order to earn a reasonable return on its actual investment in its business, an issue which the Commission is obliged to have regard to in accordance with the Aviation Regulation Act 2001, Aer Rianta's RAB must be valued at some measure of its current worth. If Aer Rianta is not allowed to earn a return that reflects the market value of its assets, it will have insufficient incentive to plan for the long-term development of the airports. For example, there would be no incentive to pursue the land acquisition necessary to enable the expansion of airport capacity.

A net book value HC approach to asset valuation has been heavily criticised in the UK and elsewhere as understating the real economic amount of

capital employed in a business, providing poor economic signals to users and airports, and being a poor base on which to make decisions on real allocations that depend on regulated prices. As a result of this criticism, the BAA and British Telecom both revalued their assets using a replacement cost approach in the late 1980s and 1990s.

Even when regulated companies prepare their main published accounts using the HC convention, economic regulation is generally carried out on a replacement (or current) cost basis. Regulators have opted for valuation methodologies that most accurately reflect the economic measurement of costs and profits, rather than those that are favoured for statutory accounting purposes. Separate regulatory accounts are generally prepared and either included as an annex to the company's published accounts or submitted to the regulator (and made available to the public) as a stand-alone document. Aer Rianta understands that Eircom's accounts are presented in this way. Section 28 of the Aviation Regulation Act 2001 facilitates this by providing for the preparation of separate audited regulatory accounts if required.

The choice of the historic cost net book value basis for valuing Aer Rianta's RAB is totally contrary to the statutory objective of the Commission and with the Commission's stated aim of promoting economic welfare and efficiency.

Replacement Cost (RC)

The most appropriate valuation methodology for the RAB and price setting is replacement cost. This approach determines asset values by identifying the current market cost of purchasing new assets, which provide the same services and capacity as the existing asset. The use of replacement costs would ensure that prices more accurately reflect the economic cost of the underlying assets and is thus consistent with the assessment criteria concerning allocative efficiency. This valuation basis is the only one which is consistent with the requirements under Section 33 of the Aviation Regulation Act 2001 and the maximisation of economic welfare.

In order to earn a reasonable return on its actual investment in its business, Aer Rianta's RAB must be valued at some measure of its current worth. A replacement cost methodology provides the best estimate of this value. In addition, the adoption of a replacement cost valuation will support Aer Rianta's profile on the capital markets, which will facilitate the cost efficient funding of investment.

As a forward looking measure, using replacement costs will ensure that assets can be replaced as they reach the end of their useful lives. It also provides appropriate signals to the marketplace by ensuring that prices more accurately reflect the economic cost of the underlying assets than the historic cost methodology. It is thus consistent with the Commission's assessment criteria in terms of both allocative and dynamic efficiency.

The use of replacement cost to value RAB is well supported by regulators in other jurisdictions and by Irish regulators for other industries. The most common valuation base now used in the UK for regulated industries (i.e. water, electricity, gas and telecommunications) is current replacement cost. As mentioned previously, the BAA revalued its assets using replacement cost methodology in 1991 and has rolled this value forward by the Retail Price Index each year since that date.

In Australia the Australian Commerce and Competition Commission accepts the use of optimised depreciated replacement cost for the valuation of specialised airport assets.

The New Zealand Commerce Commission's review of charges at Auckland, Wellington and Christchurch International Airports is ongoing. The Commission aims to complete its work by November 2001. However its draft report issued earlier this month favours the use of opportunity cost to value land as this sends out the appropriate signals as to whether the land should continue in its existing use as an airport or whether it should be put to an alternative use.

In Ireland the ODTR favours the use of current cost valuations for assets. The Commission for Electricity Regulation (CER) has issued a consultation paper that discusses this issue[13]. In this paper the CER concludes that optimised replacement cost is the ideal approach as it gives the correct incentives to optimise investment decisions.

Finally, the Commission itself has recognised the superiority of replacement cost valuations and used a historic cost net book value valuation for the purpose of its Draft Determination on the basis that it was "the best available information capable of verification" at that point in time.

Aer Rianta with the assistance of Arthur Andersen undertook a comprehensive exercise to arrive at a replacement cost valuation as at 31 December 1999. A structured and detailed approach was developed for the replacement cost valuation exercise. The approach required the input and involvement of a large number of people in Aer Rianta over a number of months. Full details are enclosed in Appendix 3.

Indexed Historic Cost (IHC)

Indexing the historic costs to present them in current terms may not be as correct as using replacement cost in determining the economic costs to society of the assets employed in airport operations, however, the application of an indexed historic cost approach is superior to the historic cost methodology in terms of its ability to maximise welfare. Valuation on an indexed historic cost basis will enable the asset base to keep pace with

[13] CER/99/04 Draft Principles for the Regulation of Distribution and Transmission Revenues

inflation and technological changes to some extent and the resulting valuation typically avoids much of the harm done by using historic net book value as the basis for valuing the RAB.

In the Irish context, current replacement costs are higher than indexed historical costs because Irish tender price inflation greatly exceeds CPI on all but short life assets. The use of indexed historic cost will therefore send inadequate price signals to the market about the cost of capacity maintenance or expansion and may not generate sufficient revenue to fund capital programmes, thus reducing dynamic efficiency. Although indexed historic cost cannot take account of changes in the cost of airport assets that diverge from general increases in prices, it will result in prices which are closer to opportunity costs than a simple historic cost approach.

Development of an indexed historic valuation requires little independently verifiable data other than an appropriate index. The Australian airport regulator favours valuation of land at historic cost inflated by the CPI, mainly on the basis that it is well documented and easy to apply. In Ireland the transmission assets of Bord Gais are currently valued using indexed historic cost.

The simplest approach is to index the historical cost to current values either using an inflation index or an industry/asset specific index. This approach has the advantage of being a relatively transparent calculation, which may be easily verified by reference to the historic cost reported in the company accounts and publicly available information on indices.

Using an inflation index has an advantage in that it ensures that the value of capital held in the company is maintained in real terms. The disadvantage of using an inflation index is that it may result in values, which do not precisely reflect asset replacement costs if actual costs have not moved in line with general prices. Consequently, inaccurate signals may be sent about the efficient allocation of resources. This would be the case, for example, if the cost of rebuilding an airport increased in real terms due to tender price inflation being faster than CPI inflation. However, on balance, if an indexed historic cost valuation approach is used the appropriate index is CPI over the longer term.

As discussed earlier, the valuation of the RAB is a key driver of the price cap set by the Commission and hence on the return on capital earned by Aer Rianta. Given the rise in general prices since many of Aer Rianta assets were purchased or constructed, a historic cost net book value RAB is clearly insufficient to give a reasonable return on shareholders' current investment. Indexing historic costs implies using a lower "real" rate of return so the return allowed to Aer Rianta will still be low. However indexed historic cost will result in returns approaching a more necessary and realistic level.

In the context of the request by the Commission for the best available information capable of verification and the short timeframe afforded to the

Commission, Aer Rianta is enclosing as Appendix 4 a report prepared on the indexed historic cost of assets.

Aer Rianta suggests that the replacement cost valuation submitted provides the Commission with a robust, verifiable approach and urges that the Commission adopt its recommendations. Aer Rianta has included an IHC valuation to facilitate the Commission in its assessment as between the differing valuation approaches and to demonstrate how replacement cost more accurately reflects the economic cost and therefore the most appropriate basis for valuation of the RAB in order to maximise economic welfare.

Rolling Forward the RAB

In the Draft Determination, the Commission is silent on the way in which the RAB will be "rolled forward" at the time of the next price review, presumably because it only addresses Historic Cost. An appropriate approach to calculating the RAB at future price reviews consistent with the approach to the valuation of the RAB is necessary. The Commission's approach to this issue will have profound implications for the investment incentives placed on Aer Rianta, and it is absolutely essential that this be clarified in the final determination.

In order to ensure that the asset book value continues to provide appropriate signals about the costs of equivalent assets to provide the same level of service, the RAB would need to be rolled forward at an appropriate measure of the trend in the replacement cost of assets i.e. an Operating Capital Maintenance (OCM) approach. It is nonetheless recognised that the inflation index used may result in values which do not adequately reflect asset prices. This approach does not guarantee that shareholders' funds are conserved in real terms, and is likely to have implications for the Weighted Average Cost of Capital WACC.

A financial capital maintenance (FCM) approach to the rolling forward of the asset base would be a superior method when assets are valued on the basis of replacement cost in order to ensure that shareholder and debtor value is maintained. This is a key issue for equity or debt holders who will provide capital funds on the basis that charges will be set so as to allow a return on the real value of their investment. If there is a risk of holding gains or losses due to changes in asset prices relative to inflation, then investors will require a higher cost of capital to compensate for this risk.

Rolling forward the value of the RAB ensures that the RAB more closely represents the shareholders' investment in the company, but implies a very high pre-commitment from the regulator not to act opportunistically. If credible this should reduce the cost of capital and encourage appropriate and efficient investment. The regulatory treatment of future capital investment is discussed under the capital investment section below.

1.6 Rate of Return and Cost of Capital

In the regulation of airports the required return on investment and the implications for the financing of the capital programme are critical matters. This arises because the investment at airports is both long-lived, expensive and occurs in large tranches. According to the Aviation Regulation Act, 2001 the Commission must aim to facilitate the development and operation of cost effective airports which meet the requirements of users with due regard to allowing the airport *"a reasonable rate of return on capital employed in that investment, in the context of the sustainable and profitable operation of the airport".* This requires that the allowed rate of return is sufficient to attract new capital investment for future service obligations and to ensure that the regulated activities of Aer Rianta are financially viable.

Expert consultancy group NERA has prepared a detailed report for Aer Rianta on the most appropriate cost of capital in the context of the market conditions specific to the company. This report was previously submitted to the Commission in response to a statutory request for information and is also attached to this document as Appendix 5.

Commission's Approach

The Commission makes the following statement in the Draft Determination in relation to Aer Rianta's cost of capital

> the Commission has reviewed recent decisions concerning the cost of capital by Irish economic regulators and also decisions of a similar nature elsewhere. A careful examination of these decisions, and the extent to which the circumstances of Aer Rianta's business corresponds to those of other regulated companies and other regulated airport operators, has led the Commission to a preliminary view that Aer Rianta's cost of capital lies somewhere in the range of 8% and 9% (exclusive).

It can be inferred from this statement that the Commission has based its estimate of Aer Rianta's cost of capital on previous regulatory decisions. No details are given about the other companies and/or regulatory jurisdictions that have been considered. No more information is provided in the draft decision about the precise methodology that was used to arrive at an estimate of between 8% and 9%, though the Commission specifically invited submissions in CP2/2001 on the question of how the cost of capital should be calculated. The majority of respondents to this request replied that the Capital Asset Pricing Model would be the most appropriate methodology to adopt.

Specific questions that are raised about the Commission's approach and conclusions include:

- Is the estimate of the cost of capital of Aer Rianta of between 8% and 9% pre- or post- tax?
- Is the estimate of the cost of capital of Aer Rianta of between 8% and 9% on a nominal or real basis?
- What other regulatory decisions have been considered by the Commission as appropriate benchmarks for estimating a cost of capital for Aer Rianta?
- What account has been taken of the differences in regulatory risk across regulatory systems, and the maturity of the regulatory system, and the affect of this on the cost of capital?
- What "circumstances" of Aer Rianta's business did the Commission consider distinguished Aer Rianta from other regulated utilities?
- What process has been used to adjust the other regulatory decisions concerning the cost of capital for the specific business characteristics of Aer Rianta?
- Has the Commission used formal models (e.g. the CAPM) to verify its estimate of between 8% and 9%?
- Has the Commission taken account of the fact that the cost of capital of a company changes over time?

Overall, the level of detail provided by the Commission on the methodology that was used to determine an appropriate rate of return on capital is minimal. Detailed comments on the approach that is taken are therefore difficult to make. The next sections of this chapter set out some of the key regulatory principles in setting a rate of return based on international best practice which the Commission should consider in formulating its determination. It also considers whether or not the proposals in the Draft Determination satisfy both the statutory obligations imposed on the Commission (as set out in Section 33 of the Aviation Regulation Act 2001) and also the underlying economic objective of maximisation of economic welfare.

The Regulatory Principle of Capital Adequacy

The principles of regulation have been expressed in a variety of formats by various authors but are well summarised in Bonbright (1988).[14] A key principle identified by Bonbright for setting a rate of return is that of capital attraction, which states that tariffs must provide revenue sufficient to meet a "*fair return standard with respect to private utility companies*". This principle encapsulates the need for regulators to offer a reasonable prospect of cost recovery, so that regulated companies can attract capital for investment.

Bonbright derives this principle from two important cases of the US Supreme Court during the first half of the twentieth century: the *Bluefield* and *Hope*

[14] Bonbright, J C, Danielsen, A L, and Kamerschen D R (1988) *Principles of Public Utility Rates* Arlington, Virginia: Public Utilities Reports Inc.

Gas cases. The 1923 Bluefield decision[15] established that regulated companies needed to earn the same rate of return as other companies, after allowing for differences in risk and other circumstances, so that they could attract capital from potential investors. The 1944 Hope Gas decision[16] established that regulatory revenues have to offer a reasonable rate of return on capital after recovery of operating expenses and depreciation (otherwise known as "the return of capital"). The implication of these cases are neatly summarised by Bonbright:[17]

> … investors by making the decision to invest in the debt or equity of a utility forego the opportunity to invest elsewhere. Accordingly, investors should be compensated such that their expected return on a utility's equity is equal to the returns they could expect on an investment of comparable risk elsewhere in the economy.

In other words, to attract investment, the regulator will set the allowed rate of return equal to (and the term is often used synonymously with) the "cost of capital", i.e. the minimum rate of return demanded by investors if they are to invest in the relevant firm. Although there is normally no guarantee that regulated companies will earn this rate of return, they must be offered the same opportunity to do so as other companies, after covering operating expenditures and depreciation, or else investors will not invest in them. Although these principles emerged from the US legal system, they are not specific to the US and should be applied in an Irish context also.

Appraisal Criteria for Cost of Capital Estimation Methods

The cost of capital is the return on an investment that is required to attract capital, i.e. to persuade investors to invest. Unfortunately, it cannot be directly observed, even in hindsight, and must be estimated.

Regulators and companies can reduce the scope for disagreement by first laying down criteria for assessing whether any particular approach is practical in the context of regulation. These criteria can help to identify both the best method and – just as importantly – where to find and how to use the necessary data. This kind of agreement can subsequently reduce the time and effort spent debating estimates of the cost of capital.

Because the cost of capital cannot be observed, "accuracy" is not a relevant criterion, since it is impossible to say how accurately any method reflects the "true" cost of capital. Instead, methods of estimating the cost of capital can only be appraised from a methodological point of view. The

[15] Bluefield Water Works & Improvement Co. v. Public Service Commission of West Virginia (262 U.S. 679, 1923)
[16] Federal Power Commission v. Hope Natural Gas Company (320 U.S. 391, 1944)
[17] Bonbright et al., p 316.

following criteria provide an objective assessment of estimation methods for the cost of capital

- Theoretical support: is the method economically sound?
- Clarity: can regulators and regulatees easily understand the method
- Empirical objectivity: is all the required data available on an objective and reliable basis?
- Stability: Does the estimate produced by the method remain stable between time periods?

The last three criteria amount to a practical definition of a transparent regulatory method.

There is no single methodology that is always used by regulators to estimate the cost of capital. The most widely used methodology (outside the US) is the Capital Asset Pricing Model. CAPM has been the dominant method for calculating the cost of capital in the UK since regulation was introduced following the privatisation programme of the 1980s and early 1990s. With very few exceptions, every UK regulatory estimate of the cost of capital has been justified with reference to the CAPM parameters.

In Aer Rianta's case, the absence of a share price means that the CAPM must be applied using data from comparable companies. NERA's report on Aer Rianta's Cost of Capital of June 2001 (see Appendix 5) sets out an appropriate procedure for doing this.

The Commission's Draft Determination provides no details on whether the cost of capital of Aer Rianta of between 8% and 9% has been estimated (or cross-checked) using an objective, generally accepted and theoretical rigorous technique such as the CAPM.

The Importance of Regulatory Precedent

The Commission appears to have placed primary importance on previous regulatory decisions on the cost of capital in Ireland and elsewhere in reaching its views on the appropriate cost of capital for Aer Rianta.

There are several problems with reaching a cost of capital decision in this way

- First, both the market cost of capital and a company's cost of capital changes over time as a result of changes in market conditions, macro-economic factors, changes in investor attitudes to risk, and investment opportunities. Unless appropriate account is taken of the time-sensitivity of cost of capital estimates then biases can result.
- Second, no two regulated companies are identical. There are significant differences in the cost of capital across different industry sectors and

different regulatory regimes that may mean the relevance of other regulatory decisions is very low.

- Third, there is a risk that if the cost of capital is mis-estimated for one company that its damaging effect will be much greater if such decisions are used as precedents for future decisions.

The importance of the first and second of these issues is discussed below.

Time Sensitivity

The weighed average cost of capital parameters are time-sensitive and therefore their estimation should be based on the latest available financial data. However, a reliance on a survey of past regulatory decisions fails to take into account the time-specific nature of a company's cost of capital.

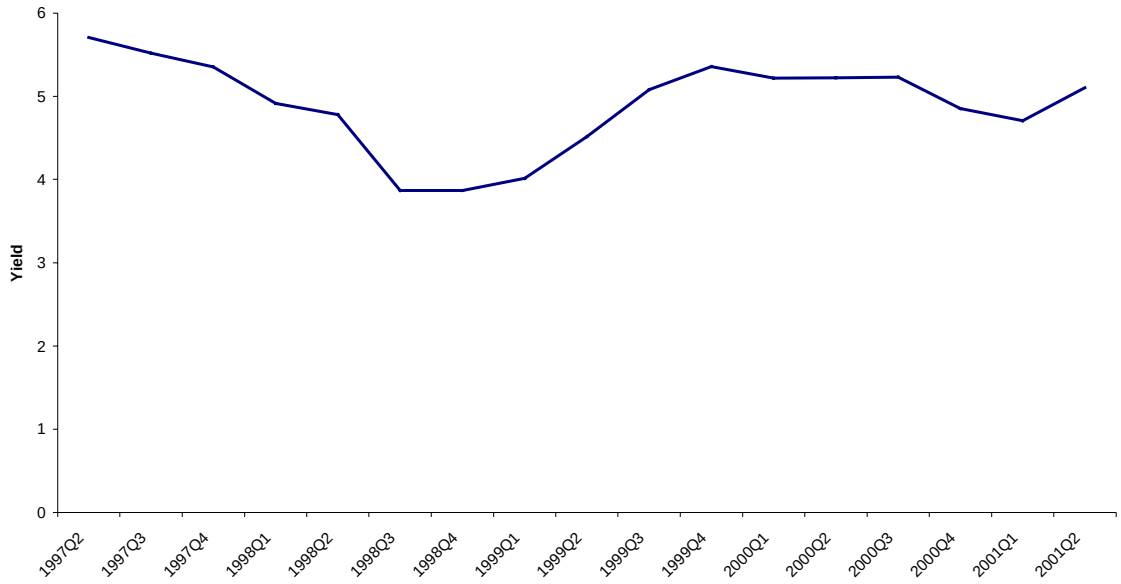
There is powerful empirical evidence, for example, that the market cost of capital is correlated to changes in interest rates, changes in inflation and changes in the business cycle.

An indication of how the cost of capital changes over time can be gauged by looking at changes in base interest rates.

As Figure 1 shows, 10-year German government bonds, NERA's proxy for the nominal risk-free rate, has displayed significant variation over the period shown, 1997 to 2001. The yield-to-maturity has varied from a low of 3.9 to a high of 5.7 over this period. This time-series demonstrates that over reliance on regulatory precedent based on historical data to compute Aer Rianta's present WACC could result in significant mis-calculation of Aer Rianta's present cost of capital.

Figure 1

Time-Series of 10-year German Government Bond[18]



In conclusion, a company's cost of capital is time specific and therefore it is necessary to complement a review of past regulatory decisions with own-calculations using up-to-date financial data. However, it is unclear whether the Commission has done this.

Choice of Comparators and Adjustments for Risk Differentials

A detailed appraisal of the theoretical basis on which the Commission has reached its conclusions on the cost of capital for Aer Rianta is not possible given the lack of detail provided in the Draft Determination. However, the Commission appears to base its estimate on previous regulatory decisions. This section sets out important concerns about basing a cost of capital estimate purely on previous regulatory cost of capital estimates in Ireland and elsewhere.

Significant differences exist in the cost of capital of different regulated sectors. Differences in the cost of capital will result from different exposures of regulated companies' returns to variations in market returns. There are a number of fundamental reasons, related to the product and business environment, why the costs of capital for regulated companies will differ such as different product income elasticities, different cost structures, different levels of competition, etc.

[18] NERA calculations using Bloomberg data. The YTM refers to a generic 10 year German government bond, which is a synthetic yield history created by piecing together observed closing yields for benchmark bonds of 10 year maturity.

There is also substantial empirical and theoretical evidence that the form of regulatory regime influences a company's cost of capital. Research for the World Bank has suggested that companies operating under a price-cap regime rather than a cost-plus have to pay about an extra percentage point for their capital to reflect their greater risk exposure[19].

For these reasons, a regulatory approach that estimates a cost of capital for a company based on cost of capital estimates for other companies must be heavily scrutinised. The choice of comparator set, and the process that is used to adjust for risk differentials across the comparator set, is crucial for the robustness of the results.

The report on Aer Rianta's Cost of Capital of June 2001 sets out NERA's views on the appropriate comparator set for Aer Rianta that share similar operating and regulatory environments. In this report NERA advocated that the most appropriate benchmark for estimating Aer Rianta's cost of capital is BAA. NERA do not consider that other regulated industry sectors provide an appropriate benchmark for Aer Rianta.

There is useful regulatory precedent to support the approach adopted by NERA in its report of June 2001 for a non-quoted airport. In the UK, the Monopolies and Mergers Commission (MMC) conducted a price review of Manchester airport. Like Aer Rianta, Manchester is an unquoted operator, and therefore the methodological approach of the MMC is of particular relevance.

In this instance the MMC set the cost of capital using BAA as a benchmark, which could be observed directly from stock market data. The MMC then adjusted this value for the perceived greater riskiness of Manchester's operations. The factors contributing to Manchester's greater riskiness were, according to MMC, MA's greater dependence on charter traffic, the weaker demand of scheduled airlines, particularly compared to BAA, and the lower profitability of scheduled operators.

The Australian Consumer and Competition Commission (ACCC) adopted a similar approach towards airport regulation in Australia. ACCC has recently undertaken price reviews for Adelaide, Brisbane, Perth, Canberra, Melbourne and Sydney airports, all of which are unquoted.

The most relevant price review process is the first, Adelaide, that contains the original analysis for selecting an appropriate comparator set. Subsequent price reviews then set their respective airport's WACC relative to the Adelaide decision. Adelaide's WACC was set according to four quoted benchmarks, Copenhagen, BAA, Vienna and Auckland, and, again, relative operating characteristics (such as Adelaide's non-hub status) were considered.

[19] Alexander and Irwin, Price Caps, Rate of Return Regulation and Cost of Capital, World Bank, 1996.

There are two important conclusions to draw from UK and Australian price reviews:

- The comparator set is restrictive, consisting of only BAA in the case of MMC Determination, and a composite set of four airports under ACCC price reviews.
- MMC and ACCC make adjustments to the results of the comparative analysis on the basis of qualitative analysis of their relative riskiness.

Although there might be a number of WACC parameters that are common across some utilities, by relying on regulatory precedent for a range of other utilities in Ireland and elsewhere, the Commission's approach introduces the possibility of important and significant biases in the cost of capital estimate and a degree of unnecessary arbitrariness that increases investor uncertainty.

Internal Consistency

The returns that investors demand will be affected by the projected financial profile of the company. There needs to be consistency between the rate of return that is allowed and the Weighted Average Cost of Capital for that company as established in the market.

A particular test that should be applied by the Commission in checking that its decision is internally consistent is to check whether the regulatory package implies financial ratios that are consistent with an "optimal capital structure". "Optimal capital structure" exists where the proportion of debt and equity in a company is such that the post tax WACC is minimised and hence the present value of a company's expected future cash flows is maximised.

In assessing "optimal" capital structure it is necessary to focus not only on central case scenarios but also on downside scenarios. The possibility, for example, that capital expenditure may be substantially above central case projections may mean that an "optimal" capital structure will allow for unused borrowing capacity to increase debt in adverse circumstances. Some trade-off is likely to exist between minimising the average cost of new finance and minimising the *possibility* of financial distress and bankruptcy.

NERA's Report on Aer Rianta's Cost of Capital of June 2001 suggests that an optimal capital structure for Aer Rianta would be consistent with at least a single A credit rating. NERA estimate that this is consistent with a proportion of debt of around 30%.

Recent UK regulatory decisions highlight the regulatory attention that is given to ensuring that the regulatory package is internally consistent. In ORR's 2000 price review of Railtrack, the proposed range of the permissible rate-of-return was based on regulatory precedent and Railtrack specific characteristics, and then an additional allowance was made to ensure the allowed return was consistent with an ability to finance its capital

expenditure programme[20]. The MMC review of BAA and Manchester also allows for a check for financial sustainability against the permissible rate-of-return[21].

The Commission's draft price determination presents only a "headline" WACC figure, and does not explicitly set out the different financial components, i.e. the cost of equity, cost of debt, gearing, credit rating, and assumed financial ratios to maintain the credit rating. These components need to be set out clearly and tested to substantiate (or refute) the bankability of the Commission's proposals.

Overall, the Commission's Draft Determination provides no evidence to suggest that necessary financial modelling has been undertaken to test whether the regulatory package is internally consistent.

In relation to the rate of return that is used in the Draft Determination it is stated that

> …a regulator should allow a rate of return slightly greater, over the medium term, than a company's cost of capital…the Commission proposes that the allowable rate of return on capital employed be set at approximately 9%.

The reason given by the Commission for setting a rate of return higher than the cost of capital is to encourage competition into the industry and provide incentives for the firm to grow the business into the future. Aer Rianta supports this and notes this and notes that there is regulatory precedent for the approach in other jurisdictions e.g. the MMC's treatment of Manchester Airport. No justification is given by the Commission for how the level of 9% is determined to be appropriate in fulfilling its objective. Aer Rianta considers that the rate needs to be revised upwards in accordance with the WACC calculations prepared for it by expert consultants NERA (see Appendix 5).

Conclusions

The level of detail provided by the Commission in the Draft Determination on the approach that is used to determine the allowed rate of return is extremely limited. A full appraisal of the Commission's approach cannot therefore be made. This section emphasises some key concerns

- There is a lack of clarity on fundamental factors such as the definition of the cost of capital that is estimated (pre/post tax, nominal/real), the financial methodology (if any) that is used, the regulatory decisions that have been considered, and the distinguishing risk characteristics of Aer Rianta.

[20] ORR, The Periodic Review of Railtrack's Access Charges, Final Conclusions, Vol I, p39.
[21] MMC, BAA plc, 1996; MMC, Manchester Airport plc, 1996.

- The Commission's inference that the cost of capital for Aer Rianta has been estimated with reference to other regulatory decisions at different times and across different sectors, with adjustments for Aer Rianta's risk characteristics, introduces the possibility of significant biases. There is no objective and theoretically rigorous method to adjust cost of capital estimates for such factors.

- The Commission's failure to state that its estimates of the cost of capital have been determined using rigorous financial techniques such as the CAPM is a major concern, and questions the theoretical rigour of the Commission's approach.

- The Commission's failure to demonstrate that the regulatory package is "internally consistent", and that the rate of return that is allowed will enable Aer Rianta to finance its future investment programme in an optimal manner, is also a key concern.

The Commission has a statutory obligation under the Aviation Regulation Act, 2001 to have due regard to a reasonable return on capital employed. It is generally accepted that the rate of return allowed to a regulated company should be at least equivalent to its cost of capital. The cost of capital should be calculated by use of the Weighted Average Cost of Capital (WACC) methodology and the cost of equity component should be estimated by use of the Capital Asset Pricing Model (CAPM). Aer Rianta considers that the Commission should follow this approach in arriving at its estimate of the cost of capital in its final determination.

1.7 Capital Investment

Dublin, Cork and Shannon airport operate in a highly regulated industry in a number of respects. The 1998 Act as set out previously places a clear statutory duty on the company to manage and develop the airports including the provision of services and facilities as are in the company's opinion necessary for the operation, maintenance and development of the airports.

Since 1999, the Irish Aviation Authority licenses the three aerodromes annually. The airports operate in the context of EU and national legislation and directives on ground handling, health and safety, labour laws, planning permissions and associated environmental impact requirements for all new developments etc. All facilities are delivered in the context of ICAO regulations, ECAC requirements, National Civil Aviation Security Council requirements, FAA, CAA, Immigrations and Customs requirements etc. The airports are also key intermodal hubs and the airport system must integrate effectively with other transport modes.

The magnitude of capital spend in an airport context has profound effects on the cashflow and capital structure of the group. Its timing affects the operational throughput of the airport and the cost effectiveness of the capital programme will affect the airport's self-financing capability and impact on user charges.

Section 33 of the Aviation Regulation Act, 2001 stipulates that in making its determination the Commission must aim to facilitate the development and operation of cost-effective airports which meet the requirements of users. In so doing it must also have regard to, inter alia, the level of investment in airport facilities, in line with safety requirements and commercial operations, in order to meet current and prospective user needs. These factors must be applied in the context of the business and industry parameters in which the airports operate as summarily set out above.

The appropriate level of investment is that which delivers the required level of service performance most cost effectively. "Gold-plating" on capital expenditure projects may deliver an acceptable service level but at substantially higher cost than is necessary. Too little investment will result in reduced standards in the long term and potentially heavy costs and considerable delay before required service levels can be restored. Alternatives to capital expenditure are somewhat limited in an airport context but may include increased maintenance expenditure or demand management options in some instances. It is important to recognise and weigh trade-offs between capital expenditure, operating expenditure, service standards and regulatory requirements.

Thus, a key area for consideration by the regulator is the capital investment programme for the period 2001-2010 submitted by Aer Rianta as Appendix

6.[22] It is important to distinguish between the role of the Commission in reviewing the cost associated with an appropriate capital investment programme (for inclusion in the base for calculation of airport charges), and a more active role as an evaluator of the capital investment programme presented by Aer Rianta. The former may be a necessary and reasonable function of the Commission, while the latter would not be appropriate as

- the company's statutory responsibility under the Air Navigation and Transport (Amendment) Act 1998 to promote the efficient operation, safety, management and development of its airports would be compromised
- the Commission would be attempting to second-guess airport management decisions which would be contrary to the requirements under Section 33(i) of the Act
- imposing a formal monitoring structure on airports could reduce flexibility to adjust capital spend to react to new information on technology, costs and user demand
- the Commission in a limited timeframe would be second guessing a very complex investment programme which is underpinned by significant expert advice on master planning and development, consultation with users, local authorities, regulatory authorities and other statutory bodies and is grounded in the regulation and standards governing delivery of infrastructure and facilities at airports
- the accountability of airports for investment planned and undertaken and for service levels will be diluted

Recoverable Capital Programme

In CP6/2001, the Commission presented its own estimation of a Recoverable Capital Programme which it proposes to allow Aer Rianta to recover through airport charges. The Commission's proposal differs substantially from the plan presented by Aer Rianta and the company has, without success, requested clarification from the Commission on a number of issues in relation to it.

In determining its recoverable capital programme the Commission has not clearly identified which specific projects it has excluded from Aer Rianta's proposed capital investment programme. Furthermore, the rationale applied to reduce the capital investment plans submitted by Aer Rianta has not been sufficiently articulated to allow Aer Rianta to identify the projects and the basis for their removal. This makes it difficult to clarify whether or not the recoverable capital investment programme retains the ability to meet the company's statutory and regulatory objectives and meets the current and prospective needs of users. This has been made more difficult since the traffic forecasts the Commission has used in coming to its conclusions about

[22] This document differs in one respect from that submitted to the Commission in May 2001. The proposed capital spend at Cork Airport has been increased following recent consultation with users on their requirements and a detailed engineering exercise.

the appropriate level of capital investment have not been set out at this point.

It is not immediately evident that the extraction of capital investment has led to the removal of any related revenue streams in the Commission projections. It is clearly inappropriate to include some or all of the revenues deriving from a specific project in arriving at a determination on the maximum level of airport charges if the capital investment required to deliver the revenue has been wholly or partially disallowed. For example, in the draft determination the Commission appears to have included car park activities in the regulatory till definition but excluded car park capital expenditures from the Recoverable Capex Programme.

Aer Rianta does not accept the Commission's suggestion that it has not adequately justified its planned capital investment programme as requested by the Commission. Aer Rianta has complied fully with all of the Statutory Requests for Information, including those pertaining to capital investment. Furthermore, to attempt to ensure that the Commission fully understood the information supplied and its implications, Aer Rianta offered on a number of occasions to meet with the Commission to discuss the capital investment programme in detail, but the Commission has to date declined this offer.

Aer Rianta welcomes the statement by the Commission in CP6/2001 that all safety/regulatory projects have been included in the Recoverable Capital Programme. In the Appendix 6, Aer Rianta has provided comprehensive information on its capital investment plans, including full details on project justification. In this report, the projects are classified in terms of the primary drivers for development – new capacity, safety/ regulatory/environmental and refurbishment/upgrade of existing assets.

Aer Rianta believes that the capital investment plan which it has prepared and submitted to the Commission is required to facilitate the development and operation of cost effective airports which meet the requirements of users and expects that the Commission, having re-examined the proposals, will adopt Aer Rianta's capital expenditure plans in full.

It should be noted that failure to deliver the projects set out in the plan which is grounded in expert advice on the proper development of the airports to meet forecast demand could result in severe capacity and operational constraints in the future. This has already been the experience of the company at the airports over the last three years as a result of the delay by the previous regulatory authority to approve investment plans and due to differing positions by its(the then regulator) consultants on forecast demand and cost of development. The challenge for Aer Rianta and the Commission is to ensure the proper, long-term development of the airports to meet current and prospective needs. Airline users and ground handlers because of their particular market focus tend to take a short-term perspective which will not necessarily correlate with the long-term proper

development of the airports in the interests of all users including passengers.

Treatment of Capital Expenditure by the Commission

The treatment of capital expenditure is a difficult and potentially contentious area of regulation since

- capital expenditure tends to be lumpy so history provides a poor guide to future needs. Aeronautical investment is not linear but 'chunked' into target threshold conditions i.e. 2 million additional passengers, 10 megawatts of additional electrical supply, a railway or light-rail interchange etc.
- airports require significant capital front loading into business before incremental growth justifies these works. Each investment project has a lead in time. Usually amounting to 3/5 years in the case of major projects.
- it is difficult to categorise an efficient capital programme in terms of both the value of outputs delivered and the efficiency of capital inputs
- it is difficult to judge *ex post* whether variations between planned and actual capital expenditure are due to changing circumstances, efficiency gains in delivering agreed outputs, or failure to deliver outputs (perhaps over the longer term)

If the Commission underestimates the amount of capital expenditure that Aer Rianta will need to undertake to meet safety requirements and the current and prospective needs of users, Aer Rianta may have difficulties in financing such investment. Beyond a single price control period, however, the implications of underestimating Aer Rianta's investment programme will depend on the way in which the Commission "rolls forward" the RAB at the next price review:

- if the Commission uses Aer Rianta's actual capital expenditure, then the adverse impact of the original underestimate will be limited to the amount of depreciation charged and the return on capital not allowed during the first price control period;
- however, if the Commission uses its original (under) estimate of Aer Rianta's capital expenditure, the impact will be that Aer Rianta will be permanently deprived of a return on that investment (in addition to the impact during the first price control period described above).

Some utility regulators have adopted the second approach, mainly in order to provide incentives for companies to carry out investment efficiently. In such cases, however, it is essential to have a robust method to determine

whether lower than expected capital expenditure is the result of the efficient delivery of investment, or simply under-investment. Equally, if capital expenditure is higher than expected, the regulator must be able to distinguish between simple inefficiency in carrying out the investment and the case where additional investment has been carried out in order to meet customer needs and changing business requirements. There is scope for companies to justify capital expenditure in excess of the original projection and for this to be included in the company's RAB.

The CAA (UK Airports Regulator) has expressed a clear preference for using actual capital expenditure when rolling forward the RAB. In part, this is because CAA does not choose to involve itself in the detailed investment planning and monitoring that is necessary to identify efficiencies in capital expenditure. The main reasons for this are that

- it would result in the CAA becoming involved in approving and disapproving elements of the plans, according to its own views;
- this would involve a much greater degree of regulatory involvement, and signal a more intrusive type of regulation than currently applied;
- specifically, it would require the CAA to "second guess" management decisions, with less information and responsibility than airport management mirroring what happened in the early 90s;
- it would substantially dilute the accountability of airports for the investments planned and undertaken and regulatory compliance
- the formal monitoring that would be required might reduce airport operators' flexibility to adjust capital expenditure to react to changing circumstances

The CAA also notes the role that airport users themselves can play in scrutinising investment plans. Airline user groups currently play a significant informal role in reviewing and influencing capital expenditure plans, and CAA suggests that this role could be enhanced, in particular by requiring full disclosure of information, probably in the form of a fully specified business plan, on demand projections, capacity projections, the capital expenditure plans, operating cost projections and associated charging profiles. The CAA acknowledges that airlines may not properly reflect the views of passengers. But this approach may nevertheless be superior to alternatives.

Conclusions

In its Draft Determination, the Commission has disallowed a significant element of the capital expenditure plans proposed by Aer Rianta, on the basis that Aer Rianta has not provided adequate justification for this expenditure. There is no suggestion that the Commission actually believes this investment is not required, but rather that Aer Rianta has simply not

provided sufficient justification for its proposals. Aer Rianta has no details from the Commission as to the particular projects it feels are not sufficiently justified and therefore is finding it difficult to understand exactly what the Commission requires as significant justification so that it can assure the Commission of the necessity for the investment and the consequences of non-delivery of certain plans.

As with all plans, they are based on the best available information at this time including forecast data and cost estimates and there is a danger that the Commission and its consultants, without having sufficient interaction with the company on its capital investment plans, could be incorrectly interpreting data submitted under statutory requests for information. All companies analyse and present information based on their own understanding and customised formats.

In this situation, it is essential that the Commission provides clarification, in its final determination, of how it intends to deal with capital expenditure at the next price review. In particular, it needs to clarify how it will deal with the situation where Aer Rianta needs to carry out some or all of any of the disallowed projects, in order to meet the current and prospective needs of airport users.

The only appropriate option available to the Commission at this stage is to state that, at the next price review, the RAB will be rolled forward on the basis of Aer Rianta's actual capital expenditure. The Commission could require Aer Rianta to carry out more extensive consultation with users, and indeed could attend such consultation fora itself, to satisfy itself that Aer Rianta's capital expenditure plans are necessary and are carried out efficiently. But we see no alternative, at least for the next price review, to rolling forward the RAB on the basis of actual (rather than expected) capital expenditure.

If it is demonstrated that Aer Rianta does need to carry out any of the projects disallowed by the Commission, it should be able to earn a return on this investment, at the earliest possible juncture. In addition, it is necessary that the financing cost of the investment during the current price control period should also be added to the RAB, to compensate for the impact of that investment (and associated depreciation) being excluded from the Commission's projections for the current price review.

The Commission has not carried out the very detailed work required to analyse Aer Rianta's investment proposals and reach an agreed investment programme based on specifically identified projects and deliverables. There is not time to carry out the analysis that would be required to implement this approach within the period remaining before the final determination. This approach is simply not an option for the Commission, at least for the current price review.

If, despite this, the Commission were to decide that the RAB would be rolled forward on the basis of Aer Rianta's projected (rather than actual) capital

expenditure, this would have a very damaging impact on Aer Rianta's investment incentives. Aer Rianta might be unable to raise finance for new investments, because of the apparently arbitrary basis on which it was denied a reasonable return on its investment. Aer Rianta itself would also have strong incentives to undertake as little investment as possible during the price review period, and wherever possible to delay investment in the hope that it will be included in the allowed investment programme for the subsequent price review period.

1.8 Benchmarking and Operating Costs

The assessment of potential efficiency improvements has been one of the most important and challenging issues to be faced by regulators. It is one of the main determinants of "X" factors within RPI+/-X regulation, and is a key component of any regulatory framework based on future estimates of revenues and costs.

Under or over-estimating the scope for efficiency gains or setting targets on a basis that might be considered unreliable, could make it difficult for the regulated firm to raise finance for new investment. Potential investors may be concerned by the risk that the regulator will over-estimate the scope for efficiency gains at future price reviews, and therefore set a price cap that makes it very difficult or even impossible for the firm to earn a reasonable return on past investment.

In CP6/2001 the Commission assumptions for efficiency gains for the duration of the determination appear to be primarily based on a benchmarking exercise for each of the three Aer Rianta airports. Although Commission states that its targets have been based on this analysis "among other things", the targets correspond exactly to those suggested in the Commission's analysis, and there is no evidence in Commission's document to demonstrate what these "other things" were or how they influenced the Commission's thinking. The Commission's provisional efficiency targets have been set at a 15% improvement in operating expenditure per work load unit (WLU) at Dublin Airport and a 25% improvement at Shannon Airport, both to be achieved over five years. In contrast, the Commission analysis suggests that Cork Airport is operating efficiently and therefore it has not set any target for efficiency improvements.

Aer Rianta considers that the methodology used and the conclusions drawn from this exercise were seriously flawed and do not provide a basis for determining efficiency factors. In this chapter Aer Rianta will discuss the deficiencies in the approach adopted by the Commission.

Analysis of the Commission's Methodology

In its Draft Determination of maximum airport charges, the Commission for Aviation Regulation appears to have based its efficiency targets for Aer Rianta almost entirely on a simple set of partial productivity comparisons. Partial productivity measures consist of a simple ratio, typically between a single measure of outputs and a single measure of inputs. For example, the Commission's benchmarking analysis focuses on work load units (WLUs) as a measure of output and operating expenditure as a measure of input. Such measures have the advantage that they can be calculated with relatively little data, and the results are easy to understand (if not to interpret and draw conclusions from). They are often used in cases where firms simply

want to gain a general impression of how their performance compares with similar firms elsewhere. They may also be useful in helping to interpret the results of more sophisticated efficiency analysis of the type described below.

There are a number of reasons, however, why such simple comparisons may be misleading, and why they are not appropriate for assessing differences in firms' efficiency and setting its price cap:

- since they use only a single measure of input, partial productivity comparisons often fail to take account of substitution possibilities between different inputs, or they fail to take account of significant differences in the quality and quantity of other, unmeasured inputs;
- similarly, these simple indicators often measure output very imperfectly, missing out important dimensions of output (including, but not limited to, service quality) and therefore further reducing the usefulness of such comparisons;
- finally, such measures usually fail to take account of important external factors that give rise to legitimate cost differences between firms, even if they are equally efficient.

Applying these criticisms to the Commission's comparisons of operating expenditure per WLU, we find that this measure ignores potentially important differences in the quantity and quality of fixed assets and other capital costs at airports. It also ignores potentially important aspects of output, such as the number and nature of aircraft movements, the proportion of transit passengers, the peakiness of demand and the quality of service delivered, all of which could lead to significant cost differences between apparently similar airports.

Perhaps more importantly, these measures fail to take account of the many external factors that could lead apparently similar and equally efficient airports to have significantly different costs. Such factors include

- economies of scale – larger airports might be expected (unless they are suffering from capacity constraints) to have lower average costs than smaller airports;
- the lumpiness of investment – as some airport facilities (such as runways, roads, rail and to a lesser extent, terminals) can only be provided in relatively large increments, airports may have different costs simply because they are at different positions in the investment cycle;
- differences in input prices – higher wage rates, for example, will be reflected in a higher operating cost per WLU. Where these reflect national wage differentials, however, this higher cost does not

indicate inefficiency on the part of the airport operating in the high wage country.

In addition, such measures could be subject to measurement problems and data inconsistencies. An inappropriate choice of exchange rates can lead to misleading results, and it is important to ensure that data are being compared on a like-for-like basis. Taking the measure of operating cost per WLU, for example, it is important to ensure that comparisons are not distorted by different accounting practices (for example, governing the division between operating expenditure and capital expenditure) or because operating costs are included for activities that are provided at some airports but not others.

For these reasons, we believe that simple partial productivity comparisons of the type used by the Commission are very unreliable indicators of efficiency differences between airports, and are unsuitable as a basis for setting price caps. These indicators fail to measure inputs or outputs adequately, and they do not allow for differences in operating environments that may lead to genuine cost differences between airports, even if they are equally efficient. Further analysis of these measures is contained in the next section.

Analysis of the Commission's Specific Conclusions in CP6/2001

In this section the benchmarking analysis on which the Commission's efficiency targets for Aer Rianta are based is discussed and shown to be seriously flawed. The activities undertaken at peer airports are discussed first of all in comparison with Aer Rianta; then the Commission's methodology in applying partial performance measures (operating costs per WLU) is shown to be subjective and inappropriate. Thirdly, it is shown that the outcome of the Commission's analysis is highly sensitive to the specific choice of comparator airports used.

Finally, it is shown that the Commission has ignored a number of other potential comparator airports and importantly, that the inclusion of these airports significantly changes the results. As a result, a benchmarking study of this sort becomes a rather random exercise: every cost efficiency target could be justified by including or not including certain airports in the analysis. We conclude that the results are not robust, and cannot be used as a basis for the setting of efficiency targets.

Do Costs Cover Different Activities?

A crucial issue in benchmarking the performance of airports is to ensure that the costs of non-core activities are included in a similar way, if like is to be compared with like. If airport A operates a non-core activity (e.g. car parking) in-house, then both the associated costs and revenues will appear

in the accounts. If airport B outsources the non-core activity, then the associated costs and revenues will appear in the accounts of the subcontractor. The airport B accounts will only show the concession fee under revenues and nothing[23] under operating costs. Unless these differences are adjusted for, any comparison of the cost accounts of the two airports will be meaningless. The fact that airport A's costs appear lower represents a form of spurious efficiency caused by transferring costs from one company's account to another's. For a meaningful comparison of these airports, it is essential that for airports that operate these facilities themselves, either the additional costs be excluded or the additional outputs are included.[24]

In the presentation to the Commission for Aviation Regulation of 6 March 2001, Aer Rianta has presented its activity profile. For the activities that generate revenue, the following profile was indicated

Aer Rianta Activity Profile

	Retailing	Car parking	Ground handling	Catering	Fuel
Dublin	Aer Rianta and concessions	Aer Rianta	Concessions	Concessions	Concessions
Shannon	Aer Rianta and concessions	Aer Rianta	Aer Rianta [25]	Aer Rianta	Aer Rianta and concessions
Cork	Aer Rianta and concessions	Aer Rianta	Concessions	Concessions	Concessions

It can be seen in the table above that Aer Rianta is heavily involved in the operation of the retail facilities at its airports, in the entire car parking operation and, in the case of Shannon, in catering and in a significant part of the fuel supply business to the airlines. The Dublin, Cork and Shannon airports accounts include the associated operating costs. Any comparisons with airports that do not include the costs associated with these activities in their accounts will be meaningless unless appropriate adjustments are made.

In the table below, a comparison is made between the activity profile of Dublin Airport and its apparently "better performing" peers. The following table contains a similar comparison for Shannon and Cork. Both tables indicate that the Aer Rianta airports, notably Shannon, undertake significantly more activities in-house than the "peer" airports. As a result,

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[23] Possibly apart from the costs associated with managing the concession. The airport may retain ownership of the facility, in which case its depreciation costs will also include costs associated with the non-core activity.

[24] The distinction is only relevant in the case of activities that generate revenue. Whether for example an airport outsources its cleaning activities is not relevant for the purpose of a benchmarking exercise, since the associated costs will appear in the airport's accounts in either case.

[25] Inflight catering & fuel supply only.

the Aer Rianta accounts include the full costs of these activities, as opposed to just the difference between costs and revenues (which, as revenues usually exceed costs, this will appear under revenues with nothing under costs at all).

Dublin Airport Activity Profile Compared with Peers

	Retailing	Car parking	Ground handling	Catering
Dublin	Airport operator and concessions	Airport operator	Concessions	Concessions
Brussels	Concessions	Concessions	Concessions	Concessions
Copenhagen	Concessions	Concessions	Concessions	Concessions
Glasgow	Airport operator and concessions	Concessions	Concessions	Concessions
Oslo	Concessions	Concessions	Concessions	Concessions
Stansted	Airport operator and concessions	Concessions	Concessions	Concessions

Shannon and Cork Activity Profile Compared with Peers

	Retailing	Car parking	Ground handling	Catering
Shannon	Airport operator and concessions	Airport operator	Aer Rianta[26]	Airport operator
Cork	Airport operator and concessions	Airport operator	Concessions	Concessions
Leeds-Bradford	Concessions	Airport Operator	Concessions	Concessions
Cardiff	Concessions	Concessions	Concessions	Concessions
Bristol	Concessions	Airport operator	Concessions	Concessions
Southampton	Airport operator and concessions	Concessions	Concessions	Concessions
London Luton	Concessions	Airport operator	Airport operator (in part)	Concessions
Basel-Mulhouse	Concessions	Airport operator	Concessions	Concessions

These are not trivial adjustments, as can be illustrated by the fact that some 50% of Shannon's workforce and 14.1 % of its revenues were attributable to catering in 2000, an activity undertaken by none of its peers.

The conclusion is that the Commission's study fails to take account of the different activities included in the "peer group" airports' costs. Consequently, the results are not comparable and any benchmarking analysis on this basis will not be robust.

[26] Inflight catering and fuel supply only

The Impact of Different Measures

In general, the use of partial performance measures in benchmarking studies is problematic. It only measures one isolated aspect of relative efficiency, and fails to take into account many important factors, including differences in operating characteristics and environments between airports. Another difficulty is that partial performance measures can deal with one output only, whereas airports in fact produce multiple outputs that cannot easily be compared with each other. Using partial performance indicators may also provide perverse incentives for airports if they focus their attention just on the measures that are being used, without this necessarily implying a better overall performance. For these reasons, many regulators have not relied on them. To illustrate the difficulties and to show why a more sophisticated approach is needed, this section shows how the efficiency scores change when using just a few other measures.

In the context of comparative analysis even if the peer airports were engaged in the same set of activities, the partial performance indicator "operating costs per Work Load Unit" that has been used by the Commission would not give robust results. There is nothing to suggest that the costs to an airport of processing one passenger are in general equal to the costs of processing 100 kg of cargo.

Moreover, Work Load Units do not take account of the number of aircraft movements at an airport. An airport that would mainly be served by small aircraft or aircraft with low load factors can be expected to have higher costs than an airport mainly served by large aircraft or high load factors. Only to a limited extent can airports influence the mix of aircraft they receive, and they cannot influence average load factors in the planes that serve them. This point has been made, for example, by the UK CAA in its December 2000 consultation paper "The use of benchmarking in the airport reviews".

For this reason, the Transport Research Laboratory (TRL) in conjunction with the French Ecole National des Travaux Publics de l'Etat, developed the concept of Airport Throughput Units. This measure incorporates the relative efficiency of aircraft movements at an airport, as well as the carriage of freight, and is defined as follows

$$ATU = WLU * \frac{WLU}{ATM} = \frac{WLU^2}{ATM}$$

None of these measures is perfect for benchmarking purposes. Taking the example of two airports A and B which have similar passenger numbers and costs, but airport A having higher numbers of ATMs than airport B

- Measures using ATUs would suggest that the airport A was actually less efficient than B

- Measures using WLUs (or passenger numbers) would suggest that both airports were equally efficient.

Without further information (for example about the reason why airport A has a lower ratio of passengers per ATM) it is not possible to conclude that either of these measures is "correct". However, the mere fact that these approaches produce different results highlights the need for any comparative efficiency analysis to be based on more sophisticated methods that are capable of dealing with the multi-dimensional nature of airport outputs.

In addition to the problems with the output measure, it is not clear what has been included in the Commission's cost figures. For example, it appears as though the Commission has included the cost of sales in its analysis. This is a fundamental weakness and creates an immediate source of bias when comparing Aer Rianta airports with other of the Commission's suggested peer airports as these costs will be much lower for those that outsource commercial activities. This is highlighted by the fact that some 50% of Aer Rianta's turnover in 2000 was derived from retailing, catering and fuel sales, resulting in a significant cost of sales element in its base. At an airport level, some two thirds of Shannon's total revenue in 2000 was derived from fuel sales and catering. The inclusion of cost of sales in the benchmarking also raises the incongruity that if retailing was to proportionately increase at the Aer Rianta airports it would have the effect of making the airports appear more inefficient rather than reflecting a more successful commercial outcome.

It is also unclear whether the cost figures include or exclude depreciation, or whether the use has been consistent. The Commission acknowledges that there will be some differences in accounting definitions but the present analysis makes no explicit allowance for these differences.

To show the impacts of these factors, an alternative analysis has been produced using alternative measures, looking at cost figures both including and excluding depreciation.

The key assumptions and data for these and all following analyses are contained in Appendix 6. All figures are denominated in euros.

The table below contains the results of our analysis of the Dublin peers using alternative measures. Since the Commission's cost efficiency target was based on the five best performing peers, we focus on this group as well. It is important to note that this comparison demonstrates the variance in results arising from different measures. The analysis do not, nor do they purport to, suggest that any of these comparisons provide a basis for conclusion – the comparisons suffer from the same fundamental inaccuracy

caused by the non-comparability of the airports activity profiles referred to above.

Benchmarking Dublin Using Alternative Measures

	Dublin	Brussels	Copenhagen	Glasgow	Stansted	Oslo
Operating costs (incl. depr) per WLU	10.40	7.49	7.13	9.24	10.05	10.22
Operating costs (excl. depr) per WLU	9.30	5.67	4.88	7.37	7.95	6.56
Operating costs (incl. depr) per 100 ATU	11.43	8.25	9.87	11.50	11.98	14.42
Operating costs (excl. depr) per 100 ATU	10.23	6.24	6.76	9.18	9.48	9.26
Operating costs (incl. depr) per passenger	11.31	9.95	8.73	9.40	12.12	10.82
Operating costs (excl. depr) per passenger	10.12	7.53	5.98	7.50	9.59	6.95

The table below summarises the results by calculating the difference between the Dublin cost level and the (unweighted) average cost level of the best of its peers as identified by the Commission.

Summary of Dublin Cost Differences Using Different Measures

Measure	Difference between Dublin and peer average (% of peer average)
Operating costs (incl. depr) per WLU	17.8
Operating costs (excl. depr) per WLU	43.4
Operating costs (incl. depr) per 100 ATU	2.0
Operating costs (excl. depr) per 100 ATU	25.0
Operating costs (incl. depr) per passenger	10.8
Operating costs (excl. depr) per passenger	34.8

It can be seen that the differences that result from using alternative output measures are very significant. This applies in particular to using Airport Throughput Units as an output measure, which when including depreciation almost removes the efficiency differences between Dublin and its peers, even when abstracting from the differences in activities the airports undertake. But using passenger numbers too results in material differences, compared to using Work Load Units as an output measure. The differences between analysing the airport costs including and excluding depreciation are striking as well. When including depreciation, the efficiency differences between Dublin and the peers appear much lower than when excluding depreciation. It should again be noted that it is not clear whether Commission have used figures including or excluding depreciation, nor whether they have done so consistently.

It should be stressed that this analysis has made no attempt to adjust for the different activities undertaken by individual airports, as described in the previous section. These variations arising from differences in unit of output are of course material and additional to the serious problems posed by variations in the range of activities undertaken.

In the table below we present the results of the analysis using alternative measures in the case of the Shannon and Cork comparators.

Benchmarking Shannon Using Alternative Measures

	Shannon	Cork	Basel-Mulhouse	Bristol	Cardiff	Luton	Southampton	Leeds-Bradford
Operating costs (incl. depr) per WLU	21.00	10.55	14.15	15.75	12.84	11.06	20.80	13.02
Operating costs (excl. depr) per WLU	20.18	9.63	8.20	14.57	11.76	10.00	17.68	10.87
Operating costs (incl. depr) per 100 ATU	20.92	12.61	32.10	26.63	16.70	10.98	68.55	23.36
Operating costs (excl. depr) per 100 ATU	20.10	11.51	18.60	24.65	15.30	9.92	58.27	19.49
Operating costs (incl. depr) per passenger	24.33	11.33	17.04	16.39	13.11	11.63	20.99	13.04
Operating costs (excl. depr) per passenger	23.38	10.34	9.87	15.17	12.02	10.50	17.84	10.88

The results of this analysis are summarised in the following table

Summary of Shannon Cost Differences Using Different Measures

Measure	Difference between Shannon and peer average (%)
Operating costs (incl. depr) per WLU	49.7
Operating costs (excl. depr) per WLU	70.7
Operating costs (incl. depr) per 100 ATU	-23.3
Operating costs (excl. depr) per 100 ATU	-10.8
Operating costs (incl. depr) per passenger	64.5
Operating costs (excl. depr) per passenger	88.9

It can be seen that using alternative measures here changes the results altogether. Shannon suddenly appears more efficient than its peers when using Airport Throughput Units. The differences between including and excluding depreciation are significant here too.

The Impact of Additional Airports

The Commission analysis has used a number of airports as comparators for Dublin, Cork and Shannon. Whereas it is acknowledged that in a number of cases, differences between these airports may question the possibility of making direct comparisons between airports, such comparisons are still made. Only Brussels is excluded from one of the analyses, but not from the one on which the final cost efficiency target is based.

However, given the fact that most of the peer airports are only imperfect comparators, the question arises why other potential comparators have been excluded. This has not been explained in the Commission's report. In a number of cases, it is not possible to use airports in a benchmarking study, since some belong to larger airport groups that do not publish cost data for the individual airports. In other cases, however, cost data for other airports are available and there is no obvious reason why these should not be used. The fact that the Commission have only looked at a few comparators may bias the results, especially when –as the Commission acknowledge- there are some significant differences between the comparators.

Below, this is illustrated by the extension of the analysis to include four more airports

- Stuttgart
- Geneva
- Hamburg
- Zurich

The results of the analysis using alternative airports are contained in the table below.

Benchmarking Dublin Using Alternative Airports

	Dublin	Stuttgart	Geneva	Hamburg	Zurich
Operating costs (incl. depr) per WLU	10.40	19.90	11.42	14.19	8.64
Operating costs (excl. depr) per WLU	9.30	13.43	8.86	12.06	6.36
Operating costs (incl. depr) per 100 ATU	11.43	26.72	16.85	18.39	9.47
Operating costs (excl. depr) per 100 ATU	10.23	18.04	13.08	15.63	6.97
Operating costs (incl. depr) per passenger	11.31	20.84	12.26	14.98	10.21
Operating costs (excl. depr) per passenger	10.12	14.07	9.52	12.73	7.51

Of these, only Zurich scores better than Dublin, although Geneva is also more efficient in two of the cases excluding depreciation.

Summary of Dublin Cost Differences Using Different Airports

Measure	Difference between Dublin and peer average (% of peer average)	Difference between Dublin and peer average plus Zurich (% of peer average plus Zurich)	Difference between Dublin and peer average plus Zurich plus Geneva (% of peer average plus Zurich plus Geneva)
Operating costs (incl. depr) per WLU	17.8	18.2	13.4
Operating costs (excl. depr) per WLU	43.4	43.9	36.7
Operating costs (incl. depr) per 100 ATU	2.0	4.7	-2.8
Operating costs (excl. depr) per 100 ATU	25.0	28.2	17.5
Operating costs (incl. depr) per passenger	10.8	10.8	7.7
Operating costs (excl. depr) per passenger	34.8	34.8	29.8

It can be seen that the inclusion of Zurich makes little difference, as Zurich happens to be close to the peer group average. Adding Geneva however does significantly change the results and makes Dublin even more efficient

than the peer group on one measure. The fact that the inclusion of just one additional airport can make the difference between being classified as relatively efficient or inefficient again illustrates the lack of robustness of the CAR benchmarking analysis.

For Cork and Shannon, the analysis is extended to consider Aberdeen and Billund. The results of the benchmarking analysis for these alternative airports are contained in the table below.

Benchmarking Shannon and Cork Using Alternative Airports

	Shannon	Cork	Aberdeen	Billund
Operating costs (incl. depr) per WLU	21.00	10.55	10.22	20.11
Operating costs (excl. depr) per WLU	20.18	9.63	9.15	17.82
Operating costs (incl. depr) per 100 ATU	20.92	12.61	33.01	31.29
Operating costs (excl. depr) per 100 ATU	20.10	11.51	29.56	27.71
Operating costs (incl. depr) per passenger	24.33	11.33	10.46	21.03
Operating costs (excl. depr) per passenger	23.38	10.34	9.37	18.63

The results of this analysis in the case of Shannon are summarised in the following table.

Summary of Shannon Cost Differences Using Different Measures

Measure	Difference between Shannon and peer average (% of peer average)	Difference between Shannon and peer average plus Aberdeen and Billund (% of peer average plus Aberdeen and Billund)
Operating costs (incl. depr) per WLU	49.7	47.1
Operating costs (excl. depr) per WLU	70.7	65.5
Operating costs (incl. depr) per 100 ATU	-23.3	-26.2
Operating costs (excl. depr) per 100 ATU	-10.8	-15.9
Operating costs (incl. depr) per passenger	64.5	62.2
Operating costs (excl. depr) per passenger	88.9	83.5

Here, too, it can be seen that the inclusion of additional airports materially changes the results. The differences remain high due to the wide range of activities that Shannon undertakes itself.

Alternative Perspectives on the Aer Rianta Cost Base

The Warburg Dillon Read, SH&E, AIB Corporate Finance *"Review of the Strategic Options for Aer Rianta",* which was Commissioned by the Ministers for Public Enterprise and Finance, also reviewed the issue of Aer Rianta's operating costs. The report concluded, *"Aer Rianta's comparative operating cost performance is in line with airport operators undertaking a similar range of activities"*. The report concluded in broad terms that *"Aer Rianta's lower profit margins are a result of lower than average aeronautical revenue, rather than an excessive cost base".*

It is clear that there is little evidence of inefficient or ineffective use of resources by Aer Rianta but that the efficiency of its operations is borne out by various inter-airport comparisons in these analyses.

Conclusions

The evidence apparently used by the Commission for the purpose of establishing efficiency targets for Aer Rianta is unreliable and therefore unsuitable for tariff setting purposes. There are three specific areas of concern

- Comparisons between airports first require a very careful evaluation of the range of activities carried out by each airport, and how these activities impact on specific comparators. This does not appear to have been undertaken in the Commission exercise.

- Alternative, equally plausible, partial productivity measures can lead to very different results.

- The specific choice of peers can significantly affect the results. Alternative peers, with arguably equally valid reasons for inclusion, yield very different efficiency scores. This raises very serious concerns about the robustness of Commission's current analysis.

Thus not only does Aer Rianta consider that the specific kind of analysis undertaken by Commission may produce misleading results, but we are strongly of the view that no form of partial productivity comparison should be used by regulators for tariff setting purposes. We have also drawn attention to the fact that cost differences identified by such exercises cannot simply be assumed to represent efficiency differences. These are difficulties that cannot be addressed by refining or improving the Commission's benchmarking analysis. The methodology is simply unsuitable for the purpose of setting regulated charges.

The Commission has a statutory requirement under Section 33 to have due regard to the cost competitiveness and operational efficiency of airport services at the airport with respect to international practice. It is therefore appropriate that the Commission adopts best international regulatory practice in relation to its benchmarking analysis. Appendix 7b attached to this document summarises the efficiency reviews adopted by regulators in other jurisdictions.

Where utility regulators in Europe have used benchmarking analysis

- This is usually based on statistical or linear programming techniques that allow for a variety of inputs and outputs to be measured and also seek to adjust for exogenous differences between companies;
- It has always been used in conjunction with other indicators of the scope for efficiency gains, such as detailed bottom up analyses or time series comparisons with productivity gains in similar industries.

It would be extremely risky for the Commission to attempt to set regulated charges on the basis of such unreliable indicators as the benchmarking analysis contained in Annex V of the Draft Determination. If, in reality, Aer Rianta has less scope to improve its efficiency than assumed by the Commission, then prices based on such targets could create significant financial difficulties for Aer Rianta, making it difficult to finance new investment and perhaps even the operation of existing facilities. In addition, the use of such unreliable indicators for price setting purposes is likely to lead to a very significant increase in the regulatory risk associated with all operators regulated by the Commission.

In view of the very serious shortcomings in Commission's own benchmarking analysis, it is important to establish an alternative basis for setting operating efficiency targets going forward.

Aer Rianta considers that the projections presented in Appendix 8 and summarized in Section II provide the best available information in order to set efficiency targets. These projections are firmly set in an understanding of Aer Rianta's actual cost base and scope for efficiencies (rather than a high level and unreliable efficiency comparison with other airports), and they assume that Aer Rianta will continue to achieve significant gains in operating performance.

Aer Rianta believes that it would be highly inappropriate for the Commission to impose more stringent efficiency targets without having robust evidence to demonstrate that these are feasible, that they are achievable in the next control period, and that they can be achieved without jeopardising national and international standards on safety and security, as well as minimum quality service standards.

SECTION II: AER RIANTA PROPOSAL ON MAXIMUM LEVEL OF AIRPORT CHARGES

In Section I Aer Rianta discussed the Commission's Draft Determination in terms of each of the building block component and outlined the company's views on the most appropriate methodologies the Commission should adopt in arriving at its final determination with respect to the maximum level of airport charges.

Aer Rianta's recommendations with respect to the key regulatory building blocks are as follows

- The airports should be regulated as a single entity in order to ensure that maximum benefits from economies of scope are maintained, the efficiency and effectiveness in the use of all resources by the airport authority to minimise the regulatory burden and to ensure that the role of airports as engines of growth at a regional level is preserved.

- An incentive regulatory price cap of the form CPI+X, should be applied to the average aeronautical yield per work load unit. In this instance, a +X factor is required due to the heavy investment in capacity which is required over the period of the determination.

- The dual till approach is the most appropriate framework for regulation of airport charges, as it efficiently signals the economic costs of the provision of infrastructure both to airport users and the airport authority.

- In order to ensure that Aer Rianta is capable of delivering facilities to meet customer demand and requirements in the future, it is appropriate that the valuation of assets within the regulatory till be based on a replacement cost methodology and that asset values be rolled forward in a manner designed to ensure that development can be sustained. Aer Rianta has made a detailed assessment, with the assistance of Arthur Andersen, of the replacement cost of its assets. The net book value of these assets at replacement cost as at 31st December 2000 was IR£660m of which IR£435m relates to aeronautical assets within the Dual Till. This is detailed in Appendix 4.

- Aer Rianta's capital programme has been carefully formulated in order to ensure that the necessary facilities are delivered in order to meet the current and prospective needs of airport users. This requires an average capital spend per WLU for the period 2001-2006 of IR£7.24 (expressed in constant 2000 terms). This programme is detailed in Appendix 6.

- Aer Rianta's ability to fund ongoing investment in the future is dependent on achieving a reasonable rate of return on assets. The rate of return permitted should be equivalent to the cost of capital, which must be derived in the light of the specific market conditions within which Aer Rianta operates. A real pre-tax dual till rate of return of 9.8 % should be applied. This is set out in Appendix 5.

- Aer Rianta has factored challenging operating efficiency targets into its airport charges proposal for the forthcoming regulatory review period. This is further referred to below and detailed in Appendix 8. In view of the very serious shortcomings in the Commission's benchmarking analysis, it is important for the Commission to establish an appropriate alternative basis in the context of any assessment of Aer Rianta's operating efficiency targets going forward.

Aer Rianta submitted its airport charges proposal to the Commission based on the above building blocks[27] in response to a statutory request for information on 19th June 2001.

Aer Rianta believes that the approach outlined in Section I provides the optimum economic basis for the implementation of regulation at Irish airports. Aer Rianta is conscious of the possible implications in terms of discontinuities in pricing which would arise from the full implementation of all elements of its proposal at this point in time. In particular, Aer Rianta is conscious of the combined impact on charges that a dual till, replacement valuation of the RAB and the substantial capital programme might have.

In this context, as an interim measure and following careful consideration of the Commission's draft determination, Aer Rianta has developed an adjusted proposal which incorporates some of the Commission's draft proposals and retains some of the essential elements of Aer Rianta's original submission.

Aer Rianta feels that it is vital that the following key elements be incorporated in the regulatory framework if the final determination is to facilitate the development and operation of cost effective airports which meet the requirements of all users

- The three airports should be regulated as an entity rather than on an individual price cap basis
- The recoverable capital expenditure programme should fully reflect Aer Rianta's capital investment plan 2001-2006
- The appropriate revaluation of asset base from historic cost

[27] The capital expenditure element of the building blocks now differs in one respect from that submitted to the Commission in May 2001. The proposed capital spend at Cork Airport has been increased following recent consultation with users on their requirements and a detailed engineering exercise.

- A rate of return at least equivalent to Aer Rianta's estimated cost of capital which will ensure the sustainable and profitable operation of the airports

Aer Rianta's revised proposal for the maximum level of airport charges for the regulatory period is presented below. Those elements proposed but not reflected in the initial determination should be incorporated into the Commission's next review.

2.1 Regulation of the Three Airports as a Group

In Section 1 Aer Rianta set out its position in relation to the regulation of Cork, Dublin and Shannon Airports as a single unit. By treating the airports as a group, a balance between demand for additional capacity and capital expenditure at the three airports will be maintained while achieving an economically efficient outcome. The role of airports as engines of growth at national and regional levels can also be maintained. In its proposal Aer Rianta has assumed that the airports would be regulated as a unit through the application of a single price cap over the three airports.

2.2 Application of a CPI+X Price Cap

Aer Rianta has assumed the use of a modified price cap based on the formula CPI+X, applied to the average aeronautical yield per WLU. A +X factor is required due to the heavy investment in capacity which is required over the period of the determination.

The CPI index used for this purpose is tabulated below.

Inflation Rate	2002	2003	2004	2005	2006-2010
ESRI rate (%)	2.9	3.0	3.0	2.9	2.6

2.3 Regulatory Till Composition

In Section I of this document Aer Rianta supports the use of a dual till approach for price regulation at Dublin, Cork and Shannon Airports. As airports across the world migrate to the dual till approach to economic regulation, Aer Rianta expects the Irish regulatory approach should follow suit, and carry out future price reviews on the basis of what is becoming international best practice.

Aer Rianta recognises the difficulties with a move to a dual till system in the initial determination. Aer Rianta acknowledges there needs to be an

appropriate "transition path" between the initial determination and the successor determination to reach a full scale dual till approach to price regulation. Its views on the best means of achieving this objective have also been set out in Section I. On this basis Aer Rianta is proposing a single till composition for the initial determination.

Aer Rianta's definition of the activities that should be included within a single till does not differ substantially from the Commission's, except that Aer Rianta believe its joint venture property investments should not be included in the single till. These activities do not have a sufficient nexus to Aer Rianta's regulated activities, and should be excluded for exactly the same reasons that the Commission has already excluded income from Aer Rianta International and Great Southern Hotels. The projected commercial earnings for the regulatory period are attached in Confidential Appendix 9.

2.4 Asset Valuation

Aer Rianta strongly supports the valuation of the regulatory asset base in accordance with replacement costs as set out in Section I. This is consistent with the key criteria of economic efficiency and with meeting the funding requirements of the business. The Commission itself has recognised the superiority of a replacement cost approach to the valuation of the asset base in CP6/2001.

Aer Rianta, with the assistance of Arthur Andersen, has undertaken a comprehensive exercise to arrive at a replacement cost valuation. A substantial revaluation exercise was carried out over a number of months involving expert staff. Using a structured and detailed approach a replacement cost valuation was determined as at 31 December 1999. The results of the valuation exercise are detailed in the report on the regulatory asset valuation prepared by Arthur Andersen on behalf of Aer Rianta and included in Appendix 3.

In its draft determination, the Commission indicated that historic cost was the best available information capable of verification at that point. Aer Rianta disagrees with this and considers that the revaluation report furnished to the Commission provides such as basis. Aer Rianta is also providing the Commission with a revaluation on an indexed historic basis. The development of an indexed historic valuation requires little independently verifiable data other than an appropriate index. Though indexing the historic costs to present them in current terms is not as correct as using replacement cost, such a methodology is superior to the historic net book value methodology in terms of its ability to maximise economic welfare. As an interim measure, up to the next price control review, valuation on an indexed historic cost basis will enable the asset base to keep pace with inflation to some extent and the resulting valuation will avoid some of the harm done by using historic net book value as the basis for valuing the RAB.

The Arthur Andersen report, which has already been made available to the Commission, concludes that:

- Replacement cost valuation methodology should be used as the basis for determining the opening value of the RAB
- The use of the historic cost approach fails to meet any of the economic efficiency objectives and accordingly is not an appropriate basis for valuation of the RAB.
- An indexed historic cost approach is inferior as it is less consistent with the key criteria of economic efficiency and with meeting the funding requirement of the business.

The following table gives the replacement cost valuation (rolled forward to arrive at an estimated valuation as at 31 December 2000) and an indexed historic cost net book value valuations as at 31 December 2000.

Net Book Values IR£(M)[28]	Historic Cost	Indexed historic cost	Replacement Cost
Dublin	273	372	478
Cork	55	81	106
Shannon	28	49	71
Information Technology & Misc.	6	8	5
Total	362	501	660

2.5 Rate of Return Proposal

In order to ensure the sustainable and profitable operation of the airports, the allowed return on the regulated asset base (RAB) must be set in accordance with an estimate of Aer Rianta's cost of capital for the regulatory till.

Aer Rianta commissioned expert consultancy group NERA to estimate the cost of capital for Aer Rianta to be used in setting the allowed returns for both single till and dual till regulatory systems. The component elements of the WACC for Aer Rianta's regulated activities are summarised in the table below. NERA's detailed analysis is presented in Appendix 5.

Aer Rianta has followed NERA's advice that the allowed rate of return should be set on a post tax basis with taxes to be included in the revenue requirement separately in accordance with projected tax costs estimated through financial modelling.

[28] Expressed in real 2000 terms

Based on NERA's analysis Aer Rianta's proposal on airport charges is based on a real post tax "Vanilla" WACC, (calculated as the weighted average of the post tax return on equity and the cost of debt gross of the debt tax shield) of 8.0% under a single till approach.

Parameter	
	Single till
Cost of Equity	
Nominal risk-free rate	5.0%
Expected inflation	1.7%
Real risk-free rate	3.2%
Equity risk premium	6.0%
Asset beta	0.75
Debt	30%
Equity	70%
Equity beta	1.04
Real post-tax return on equity	9.4%
Cost of Debt	
Debt premia (basis points over riskfree)	150
Real cost of debt	4.7%
WACC	
Real post-tax "Vanilla" WACC	**8.0%**
Real post-tax "net of debt tax shield "WACC[29]	7.7%
Effective tax rate	25%
Nominal "net of debt tax shield" WACC	9.5%
Real pre-tax WACC using "Historical" formula	**10.8%**

2.6 Capital Expenditure 2001-2006

Aer Rianta has factored into its calculations the capital expenditure plan 2001-2010 previously submitted to the Commission. Capital development strategies for airports are by necessity framed in long-term horizons, typically 20 years or more. In order to evaluate the capital investment plan that Aer Rianta has used to develop its airport charges proposal, it is necessary to consider the current stage of development of each of the airports. As airport managers, one of the biggest challenges for Aer Rianta is to cater for continuing growth at its airports, to ensure that acceptable service standards are offered to both airline and passenger customers at the three airports and to meet regulatory requirements.

Aer Rianta has estimated the capital plan necessary to deliver appropriate facilities at the three airports to meet customer demand, and to ensure that

[29] Note: post-tax "net of debt tax shield" WACC = post tax cost of equity * E/(E+D) + cost of debt (1-tax rate)* D/(D+E)

the congestion problems of recent years are not repeated and to ensure that it meets its statutory obligations under the Air Navigation and Transport (Amendment) Act 1998. The total capital plan for the three airports for the period 2002 to 2006 is estimated at IR£891 million (uninflated) or IR£1081 million (inflated) in addition to a budgeted capital spend of IR£107 million in 2001. The equivalent in constant 2000 terms is outlined in the table at the end of this section.

Aer Rianta's capital programme represents the output from a comprehensive process which is rooted in

- Robust passenger / ATM forecasting methodology
- Strategic master plan studies which were conducted by Scott Wilson Kirkpatrick
- Formal structured stakeholder consultation

Aer Rianta's Capital Expenditure Programme is based on realistic demand assessment and controlled procurement costs.

Aer Rianta's plan is based on the centerline demand forecast and the company believes that a responsive approach to capital project delivery is essential to avoid periods of major capacity constraint into the future. In this regard, it is Aer Rianta policy to execute outline design and permitting early in the project lifecycle in order to be able to deliver an appropriate response when growth exceeds forecast. This position has been endorsed by a majority of stakeholders during the recent consultation processes at Dublin and Cork airports

Aer Rianta believes that the capital investment plan which it has prepared and submitted to the Commission is required to facilitate the development and operation of cost effective airports which meet the requirements of users and expects that the Commission, having re-examined the proposals, will adopt Aer Rianta's capital expenditure plans in full.

In the Appendix 6, Aer Rianta has provided comprehensive information on its capital investment plans, including full details on the project justification. In this report, the projects are classified in terms of the primary drivers for development – capacity, safety/regulatory/environment or refurbishment/ upgrade.

Capital Expenditure 2001-2006[30]	2001 IR£(m)	2002 IR£(m)	2003 IR£(m)	2004 IR£(m)	2005 IR£(m)	2006 IR£(m)
Dublin	52.6	117.1	116.1	169.0	163.8	148.9
Shannon	23.0	7.9	5.3	17.6	13.5	27.0
Cork	14.3	67.7	31.1	5.1	6.5	8.1
I.T. & Misc.	12.5	5.5	8.9	9.1	9.3	9.4
Total	102.4	198.2	161.4	200.8	193.1	193.4

2.7 Traffic Forecasts

The traffic forecasts which underpin the capital expenditure plan and the other key building blocks in this proposal are set out below.

WLU(m)	2001	2002	2003	2004	2005	2006
Dublin	16.3	17.3	18.2	19.2	20.3	21.2
Shannon	3.0	3.1	3.3	3.4	3.5	3.7
Cork	1.8	1.9	2.0	2.1	2.2	2.3
Total	21.1	22.3	23.5	24.7	26.0	27.2

2.8 Operating Costs

Aer Rianta has undertaken a detailed assessment of its historic operating cost performance over the period 1995-2000 and an analysis of the factors underlying its performance. On the basis of this analysis and taking into account the significant changes in Aer Rianta's operating environment over the next regulatory period, particularly in the context of the significant capacity constraints currently at the airports, the increasing regulatory and compliance cost burden, and forecast traffic growth rates, Aer Rianta has estimated expected future operating costs per Work Load Unit for the regulatory control period 2001-2006. A comprehensive analysis is included as Appendix 8.

Aer Rianta has realised considerable operating cost efficiencies over the period 1995-2000. Operating costs measured in terms of Work Load Units,

[30] Expressed in real 2000 terms

have decreased by approximately 20% over the period of analysis. Operating cost decreases at each of the airports amount to 24% in the case of Shannon, 26% at Cork and 13% at Dublin.

There are a number of factors that explain the historic falls in unit operating costs

- The beneficial impact of increased traffic volumes on unit costs.
  This is particularly true for Shannon and Cork, which are smaller operations and therefore have greater scope to exploit economies.

- Increases in labour productivity.
  Labour productivity increased by over 40 per cent over the period of analysis (as measured by WLU's per FTE).

- Reductions in unit non-payroll costs.
  Reductions in non-payroll costs have been secured through restructuring, competitive tendering for all aspects of its non-pay cost base as well as other cost-saving initiatives.

Future Operating Cost Performance

Aer Rianta is taking further measures that will reduce unit operating costs over for the period of the determination. These measures include

- The restructuring of the cleaning department and the Airport Police Fire Service at Dublin Airport. The restructuring of Aer Rianta's finance division with the transfer of all processing functions to a Shared Services Centre.

- The exploitation of new technologies to secure reductions in operating costs.

- The re-design of certain business processes in order to reduce operating costs.

- The establishment of a specialist corporate procurement function in order to secure the benefit from economies of scale in procurement activities.

These measures should ensure that Aer Rianta continues to reduce operating costs over the period 2001-2006.

However, there are also a significant number of factors that will constrain Aer Rianta's ability to reduce operating costs at a similar rate in the forthcoming regulatory period. These factors include

- Demand for higher levels of service from users, industry standards, and regulatory bodies in both the delivery of services and facilities at the 3 airports.

- A reduction in the beneficial effect of traffic volumes on unit costs. The impact of volume growth on unit costs declines with increasing passenger numbers. Traffic growth over the next five years is forecast to be lower than historic traffic growth.

- The impact of major capacity additions such as the terminal building at Dublin, and the new terminal at Cork will impose additional operating costs on Aer Rianta.

- The extension of "flying hours" at Cork to 24 hours per day.

- The geographical expansion of Dublin Airport, particularly as regards long-term car parking and the consequent need to introduce an extensive bus service will add to non-pay operating costs items.

- Additional compliance requirements, particularly with respect to older facilities in terms of fire safety enhancements and inbound/outbound passenger segregation, and also in terms of new requirements such as EU Ground Handling Directive and licensing of aerodromes.

- The impact of national pay awards, pay increments, and external economic pressures on payroll costs. Aer Rianta is a signatory to the Programme for Prosperity and Fairness that commits Aer Rianta to appropriate remuneration for its staff.

- The imposition of local authority rates. Since 2000 Aer Rianta has been subject to local authority rates. In 2001 this exogenous cost will be equivalent to 14 per cent of total non-pay operating costs.

- New environmental costs, such as noise tracking and monitoring, and waste disposal services.

- Further anticipated increases in externally-imposed costs such as rates and insurance.

These factors suggest that the scope for realising efficiency gains in unit costs over the period of the regulatory review will be below historic levels.

Overall Aer Rianta estimates that unit costs will decline by 9.5% over the regulatory period. At airport level, unit cost efficiency is expected to increase by 6% at Dublin; Shannon by 15%; with an approximately stable unit cost performance at Cork, reflecting the fact that Cork, as acknowledged by the Commission, already operates at high levels of efficiency.

The unit cost performance per Work Load Unit for the airports is set out in Appendix.

2.9 Proposed Maximum level of Airport Charges

The Air Navigation and Transport (Amendment) Act, 1998 defines "airport charges" as

- *charges levied in respect of the landing, parking, or taking off of aircraft at an aerodrome including charges for air-bridge usage but excluding charges in respect of air navigation and aeronautical communications services levied under section 43 of the Act of 1993,*
- *charges levied in respect of the arrival at or departure from an airport by air of passengers, or*
- *charges levied in respect of the transportation by air of cargo, to or from an airport, as may be appropriate*

Based on the assumed framework and key components discussed above and in previous submissions, Aer Rianta's proposed maximum level of airport charges is set out below.

Economic principles have been used to ensure that the new charges encourage the efficient use and management of capital-intensive facilities. Aer Rianta's proposal on airport charges is for a maximum revenue yield per work load unit of IR£6.52, increasing by CPI+X per annum over the regulatory period, where X = 5.

APPENDICES

Appendix 1	Pier C and Terminal West Development at Dublin Airport
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APPENDIX 1

Pier C and Terminal West Development

at

Dublin Airport

1. Summary

In its Draft Determination on the maximum level of airport charges, CP6/2001, the Commission for Aviation Regulation has adjusted downwards the net book value of Pier C at Dublin Airport by £20,968,000. Despite requests to clarify the basis for this adjustment and the calculation of the amount, the Commission has not provided Aer Rianta with the necessary information other than stating that the adjustment reflects the value of "a hypothetically efficient equivalent to Pier C".

Aer Rianta is concerned that it does not have enough information/clarification from the Commission to understand this adjustment and that this paper may therefore not deal effectively with the matter. In the absence of this further information/clarification requested, Aer Rianta is setting out in this paper the case for the Pier C and Terminal West project at Dublin Airport and to demonstrate that the cost of £50.4m for this asset requires no adjustment as it already reflects good value for this very efficient facility delivered to the necessary standards and the requirements of the users and regulatory authorities.

This paper gives comprehensive details of the development of Pier C and the associated terminal west extension. The project evolved from a long term planning process including the master plan for Dublin Airport, successive reviews of this plan, a specific project plan which was first outlined in 1989, extensive consultations with carriers, control authorities, government and other parties leading to a project proposal which was submitted to and approved by the Board of the company in 1995. During the consultation/consultative process 9 options were examined before the project specification was determined. The project and related cost was approved by the regulator at the time, the Minister for Transport, Energy and Communications following his own independent consultants review.

It is clear from the documentation that the development was deemed necessary by customers and the Department of Transport, Energy and Communication and the project was delivered on a cost efficient basis at the total cost of £50.4m and was appropriately managed and that the development of the pier and terminal extension was carefully thought through to deliver a product that satisfied the operational requirement, fire, safety, security and the expressed needs of users. Furthermore the project was only implemented at a stage when the forecasts indicated that it would be required to meet demand. The Commission has no grounds for disallowing £20.968m of the value of this asset on the stated basis of some hypothetically equivalent facility, particularly as the project was approved by the regulator at the time, the Minister for Transport, Energy and Communications and based on independent consultants reports.

Aer Rianta would be delighted if the Commission could share with it how an equivalent facility to Pier C and Terminal West could be constructed for

£25m while meeting all the same regulatory, operational, safety and user requirements.

2. Timeline for Pier C/Terminal West Project

1988	Terminal Review Group formed to discuss traffic and review options for the development of Dublin Airport as forecasts indicated that the terminal would reach full capacity by 1990.
1989	Report by Terminal Review Group
1990	Special project group established
1991	Special project group reported at time of Gulf War. Due to the worldwide decline in traffic the project was temporarily deferred.
1993	Consultative Committee established including all stakeholders - • Carriers • Customs • Immigration • Aer Rianta Initial pier options developed.
1995	Review of capital expenditure plans and forecasting by Department of Transport, Energy and Communications and its consultants, Indecon. Postponement of Phase II of Pier C recommended.
1995	Board approval for terminal west and Pier C to be built in two phases following advice of Department of Transport, Energy and Communications consultants.
1996	Minister for Transport, Energy and Communications announces approval for Terminal West and Pier C Phase I expenditure - £32M. *(See Attachment 1)*
1996	Contract went to tender for Terminal West and Pier C Phase I.
1997	Review of capital expenditure by WS Atkins on behalf of the Department of Transport, Energy and Communications - recommends Aer Rianta should proceed with Phase 2 of Pier C.
1998	Pier C Phase I/Terminal West completed in March. Pier C Phase 2 commenced.
1999	Pier C Phase 2 completed - whole project within budget.

3. The Business Case

The overall capacity of the terminal at the time of project conception in 1995 was 7.5 million passengers, however, by the end of 1995 passenger numbers were expected to reach 8 million passengers. Further pressures on capacity were expected from EU regulations regarding changes in frontier controls in the context of the internal market. Aer Rianta was also forecasting strong passenger growth at 4.5 per cent per annum until 2001, and 4 per cent thereafter. Total passenger volumes were expected to be in excess of 10 million passengers by the year 2000. In the event, passenger outturn reached 13.8 million in 2000 - significantly in excess of forecasts. The development of Pier C/Terminal West was thus predicated on alleviating present and expected capacity constraints at Dublin Airport.

4. Development of the Brief for the project

Aer Rianta Technical Consultants were the Project Managers for the development. At an early stage in the process of reviewing development options a Consultative Committee was formed. Its brief was to bring together all the stakeholders to ensure that all the needs of the various parties using the Terminal were taken account of in the design of the new expanded terminal. The group met on a monthly basis from 28th September 1993 to 15th April 1994. Minutes of these meetings are available and sample minutes are appended. *(See Attachment 2)*

The Consultative Committee meetings included the following stakeholders

- Aer Rianta
- Aer Lingus
- Immigration
- Department of Agriculture
- Airline Operators Council (which represented the majority of airlines operating at the airport at the time) (AOC)
- Airport Medical Department
- Customs and Excise
- Airport Police.

Though all carriers were invited to join the Consultative Committee, not all chose to participate, most notably Ryanair.

The issues discussed at these meeting included the following:

- Size, location and number of airbridges
- Mix of user aircraft
- Transfer times from pier to pier
- Passenger segregation requirements
- Security related problems i.e. size and location of Friskem gates
- Handling passengers with disabilities, inclusion of 'ambilifts'
- 100% hold baggage screening
- Health screening
- Shopping requirements

The requirements of the regulatory authorities, particularly Immigration, were an important driver of the ultimate design of Pier C. At the time it was specified that the new facility would need to allow for complete segregation of EU and non-EU passengers both inbound and outbound to comply with regulations.

Comment [M1]:

During this period ARTC and Dublin Airport Management visited a number of European airports with similar type pier buildings including Rome, Glasgow, Munich, Zurich, Vienna, Manchester and Heathrow to assess best practice and carry out benchmarking.

An optioneering exercise was then carried out for the Pier C/Terminal West development based on best practice at European airports. This exercise formed the basis of the development of the design of Pier C/Terminal West.

5. Benchmarking of Project Costs

The quantity surveyors for the project, Bruce Shaw Partnership prepared a detailed breakdown budget cost for the development. This breakdown included all works that formed the basis of the tender document for Phase 1 Pier C/Terminal West that went out to tender in May 1996. The estimated total budget cost to complete phase 1 of this project was £31,600,000 inclusive of all costs associated with

- Facilitation projects (including relocations)
- Professional fees
- Statutory charges

The actual construction costs for the projects were £2,063 per sq. metre for Pier C, and £2,240 per sq. metre for Terminal West. These construction costs were benchmarked against the prevailing market levels and also against similar Pier developments in the UK. The comparison against the Irish market at that time and against piers of a similar design compared favourably on a cost per square metre basis with the budget costs.

		Cost (£/m²)
Glasgow	Pier and Connector	£2,465/sq.m
Glasgow	Terminal extension	£1,725/sq.m
Stansted	Satellite	£2,387/sq.m
Gatwick	Pier 4	£2,108/sq.m
Heathrow	Pier 4A	£3,881/sq.m
Stansted	Terminal	£2,745/sq.m
Gatwick	West Pier	£2,965/sq.m
Pier C - Phase 1		£2,063/sq.m
Pier C- Phase 2		£2,201/sq.m
Terminal West		£2,240/sq.m

The above figures were all inflated to April '95 and are expressed in punts.

6. Costs

Pier C Phase I and Terminal West

Construction of Pier C Phase I and Terminal West commenced on site in October 1996 and continued to completion in March 1998. This was a very complex contract, particularly the Terminal West element of the contract which involved an extension of the existing terminal to connect to the pier. Notwithstanding this difficulty, the work was completed with minimal impact on the public using the Terminal and the contract was delivered within Ministerial and Board sanction levels.

Phase 1 Pier C/Terminal West	
Total Area (new build)	10,800 sq.m new build
Board Sanction	£31.6m
Ministerial Sanction	£32.0m
Total Cost (Actual)	£31.1m
Construction Costs	£25.0m
Construction Cost/sq.m Pier C	£2,063
Construction Cost/sq.m Terminal West	£2,240

It should be noted that the cost per sq.m of the Terminal West element of the contract can be substantially reduced as an area of approximately 1,300 sq.m on the existing Departures floor was refurbished and included in the contract. There was also a substantial amount of refurbishment in the existing baggage hall. All of this work was carried out outside the boundaries of the 10,800 sq.m new build but was accounted for within the total cost. The approximate cost of this refurbishment work was £1.0m

Construction Cost of Terminal West	£12.5m
Construction Cost of Terminal West exclusive of refurbishment	£11.5m
Benchmark cost/sq.m for new build	£2,061

Pier C Phase 2

Pier C Phase 2 continued after Phase 1 and was completed in December 1999.

Pier C Phase 2	
Total Area	7,904 sq.m
Total Cost (Actual)	£19.3m
Construction Cost	£17.4m
Construction Cost/sq.m	£2,201

The construction costs for Phase 2 are proportionately higher due to inflation and the splitting of Pier C development into 2 elements at the request of the regulator at the time.

Total Costs

The total sanction for all phases (1 and 2) of the Pier C/Terminal West project was £50.6m and the final costs for the project were £50.4m - a tightly managed project. The construction cost of Pier C/Terminal West was £42.4m. This represents a cost of £2,267/sq.m, which compares very well against the benchmarks.

7. Capacities and Facilitation Delivered by this Project

The Pier C/Terminal West project delivered the following levels of capacity and facilitation *(See Attachment 3)*.

Pier C **Area: 13,104 sq.m**

The Pier is single loaded, 250m long by 13m wide built in three interconnecting modules.

Modules 1	
Level 1 (Apron)	Bus Lounge with six departure gates serving remote aircraft stands Airline ramp accommodation,
Level 2 (Departures)	Four airbridge served gates, including gate lounge areas, café, travellators and toilets,
Level 3 (Arrivals)	Arrivals passenger walkway to terminal,
Module 2	
Sub Level	Medical room and associated facilities for pilgrimage flights,
Level 1	Airline offices.
Level 2 (Departures)	Two airbridge served gates, including gate lounge areas
Level 3 (Arrivals)	Arrivals passenger walkway to terminal.

Terminal West Area: 5,600 sq m

The Terminal West Extension consists of 3 levels:

Level 1 (Arrivals) - Baggage Make-up Hall
Customs Facilities and offices
Baggage belts

Level 2 - (Departures) - Enlarged Security friskem area
Airside central circulation
Shopping mall
Facilities for Transfer pax.

Level 3 - (Immigration)- Immigration Hall and associated office accommodation
Cash Office

The specification also catered for

- Ramp facilities requirements
- Requirements of Immigration, Customs, Health, Agriculture, Security, Commercial
- User recommendations with regard to furniture and fittings.
- Detailed requirements with regard to energy usage.

Conclusion

The entire process with respect to definition of requirements, consultation with users and all other key bodies, specification of design, competitive tendering and control of delivery, satisfied industry best practice criteria. The project was delivered within budget. There is no basis which supports any reduction in the valuation of Pier C/Terminal West by £20.968m i.e. a reduction of 46% in the net book value in the Annual Accounts of Aer Rianta at 31st December 2000 of £45.8m.

Attachment 1

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ON BEHALF OF	THAR CEANN
Department of Transport, Energy and Communications Kildare Street, Dublin 2. (01) 6707444 Fax: 6709633 Telex: 90035	An Roinn Iompair, Fuinnimh agus Cumarsáide Sráid Chill Dara Baile Átha Cliath 2 Tel: (01) 6707444 Fax: 6709633

LOWRY ANNOUNCES £120 MILLION INVESTMENT PROGRAMME IN DUBLIN AND SHANNON AIRPORTS

£97M TO BE SPENT AT DUBLIN AIRPORT TO CATER FOR TRAFFIC GROWTH

£23.5M FOR EXPANSION OF FACILITIES AT SHANNON

Mr Michael Lowry TD, Minister for Transport, Energy and Communications, today unveiled an investment package in Dublin and Shannon airports totalling in excess of £120 million.

This major investment by Aer Rianta, financed from the company's own resources, is directed at ensuring both airports are well positioned to cater for increased traffic growth. The investment will result in major expansion of existing terminal buildings in Dublin and Shannon to cater for growth in passenger numbers into the next Millennium.

DUBLIN

In Dublin, the Minister has approved in principle a carefully modulated plan for the development of the airport over the next five years to the year 2001.

It includes:
* £32M to be spent on a new passenger handling pier and an airside extension to the Terminal Building to be built over the next two years.

* £65M to be spent on a major extension of the Terminal. Construction will commence towards the end of 1997. The extension will increase the size of the building by 60%.

The Minister said the Aer Rianta investment was required because the existing Terminal facilities, built in 1972, were designed to cater for an annual passenger throughput of 5 million people. Alterations over the years had increased the capacity to 7 million people but last year over 8 million passengers passed through the airport. Passenger traffic is expected to reach 11 million by 2001.

Included in the expansion are plans for new departure lounges, extra baggage handling, customs and immigration, new airbridge check-in desks and commercial and other operational outlets.

The Minister said an important element of Aer Rianta's mission was to continue to provide cost effective airport services so that there would be a minimum cost imposition on the movement of passengers and goods.

The Minister stressed that at his request, Aer Rianta was already implementing measures for new facilities at Dublin Airport designed on a low cost "no frills" basis in consultation with low cost operators. These facilities will be extended in 1997 and can be extended even further should the need arise.

The charge per passenger for the low cost facilities will be cut by 26%, from £7.23 to £5.73 from the beginning of 1997. Current Aer Rianta discounts will be available on this reduced figure. "The average charge per passenger for growth traffic under the overall charges scheme is 96p per return journey," the Minister stated.

The Minister stressed flexibility is a keynote element in the plans. "My Department will be keeping the programme under close continuous review in consultation with Aer Rianta so that plans can be accelerated, decelerated or modified as needs be in the light of traffic and other developments."

"This will provide the opportunity for taking account of traffic trends and of any developments at Dublin Airport which may affect traffic distribution or growth. Possible developments include the Huntstown Airpark proposal which is at present being examined in depth by Fingal County Council, the Irish Aviation Authority and my Department," the Minister stated.

SHANNON

The Minister announced major expansion of the Shannon Passenger Terminal at a total cost of £23.5 million.

The main element is the refurbishment of the existing Arrivals Concourse and a major extension to the Arrivals Building which will house Departures and outgoing baggage and provide an enlarged Arrivals Concourse. A new roadway system will be built in front of the Terminal Building.

The Minister said the Aer Rianta Task Force for Shannon has recommended that the current programme should comprise the first phase of a long term £50 million strategic plan for Shannon.

"I am fully confident that traffic growth at Shannon will justify the second phase of the development programme during the 2001-2006 planning cycle. Traffic growth at Shannon is running well ahead of projections - up by 18% on 1995 for the first half of this year," the Minister said.

The Minister added:"The development programme which I have announced today is no mere sop from the Government to the Mid-West. It is a definite acknowledgement by the Government of the importance of the Airport to the economy of the Mid-West region."

ENDS
2/8/1996

Attachment 2

NOTES ON PIER C CONSULTATIVE COMMITTEE MEETING
11TH MARCH 1994

Notes by P Redmond

Present

J. McGuinne, Aer Rianta
D. Treacy, Aer Rianta
E. Travers, Aer Rianta
B. Wall, Aer Rianta
J. Kelly, Aer Rianta
B. Dornan, Aer Rianta
P. Redmond, Aer Rianta
F. Flood, Customs & Excise
P. Prendeville, Immigration
Dr. O'Donnell, Port Medical Officer
M. O'Connor, Aer Lingus
B. McEnerney, Aer Lingus
S. Forsyth, AOC
E. Scott, AOC

The meeting was introduced by Brendan Wall who revisited the main aspects of the terminal extension and pier development. It was noted since the last meeting that approvals had been got from the Board and Senior Management.

Barry Dornan reviewed the design process in terms of arriving at this point and where it would go next

- The drawings are a guidline only - planning documents which have allowed us to set the broadstrokes of the design.
- They have been very useful for the overall cost estimation of the project, providing us with basis for fairly detailed costs.
- They have also been used to successfully move forward the approvals process.

The next stage would be detailed design which would involve

- Putting "clothes" on the project although this would involve alot more design resolution and not merely elevating the design as is.
- While the larger forum was useful smaller groups would be required to develop the detailed design aspects of the project.
- It was noted there would be many planning issues and details to be resolved.
- At this point J. McGuinne would need to put structures in place to forward the process.

Don Treacy spoke about the approvals process. He noted that the Minister had seen the proposal and seemed happy with it, this should help the process along. Given the size and scope of the project he suggested putting a project management group in place with full time personnel allocated to this project

- The steering group should stay in place
- Smaller groups be set up for 1 to 1 discussions.
- The existing maintenance complex and its relocation was now a major issue.

Barry Dornan agreed and suggested that ARTC set up a schedule of meetings to work with the various groups on an individual basis and pull together the information required.

Bill McEnerney asked with the falloff in funding whether there was any possibility of the project not going ahead. Don Treacy said that given the precentages involved that the project should not be affected.

Sandy Forsyth asked about the timescales involved, what the process would be and who would use what in the new development. How did Dublin Airport see the pier being used because otherwise it would be difficult for the airlines to say what they required.

Don Treacy said that the first module would serve the existing remote stands through the proposed bus lounge facility and the first two airbridges. The existing volume of traffic would be served by Pier B, the new pier would cater for extra traffic only.

Michael O'Connor asked how Aer Rianta see pier operating, then the airline could comment.

Barry Dornan suggested that in drawing up a schedule and topics that we be clear what we were saying to the airlines.

Joe McGuinne stated that the facility would be providing six prime stands and bus lounge which should prove very popular. Don Treacy said that it should help to avoid rows over prime stands at peak.

Brendan Wall stated that the terminal extension and the first module should be ready for midsummer 1996 with the remaining two modules being available in midsummer 1997.

Bill McEnerney asked whether ther would be provision for invalid facilities in the new pier. Brendan Wall said the the new development would be handicap accessible with a possibility for special invalid facilities in the last module.

Sandy Forsyth asked again about the phasing and who would use it. Joe McGuinne replied that there would be a mixture of carriers and it would be played on a schedule basis. He noted that the Department still had to give its approval.

There followed a general discussion on design aspects of the development. Sandy Forsyh asked about the location of Inskem and Pier A and what would happen during the building process. Barry Dornan said that we would filter queries, that it was not yet clear how the phasing would occour particularly with the terminal extension and perhaps there should be a seperate presentation for phasing. The main thing was to keep the operation going. J. McGuinne stated that Pier A would continue to operate normally.

Michael O'Connor asked how other facilities would impact on the operations of the airlines. J. McGuinne said that we were operating in a vacuum with regard to

segregation etc.. Don Treacy said that Shengen appeared to have been overtaken by Mastricht - physical border, asked how big customs & immigration need to be. Frank Flood stated that there should be full integration from day one when new regs come into being. J. McGuinne spoke about mixing of passengers, immigration control being required at departures and as EU becomes more open there would be a corresponding tightening of its borders with more segregation of non EU passengers.

Don Treacy suggested that if gate checkin was required that we would need a much bigger fiskem facility and gate facilities because more and bigger bags going through. Both Sandy and Michael said airlines prefer gate checkin.

A review of health aspects emphasised checking aliens. Heathrow has four fulltime doctors. Major diseases are the main concern. Immigration stated that health could be used as grounds of refusal.

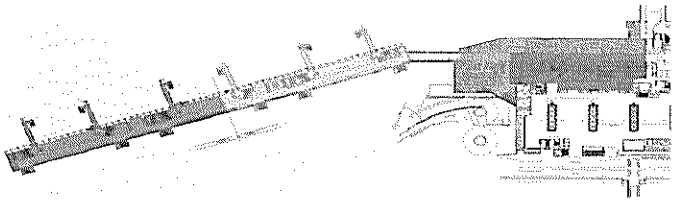
Frank Flood was asked about next step from departments point of view. Suggested formal application and drawings to agree points of principle. Those present felt this was still premature.

Don Treacy said Aer Rianta would paint a pictue up to 96/97. Need agreement on CUTE etc. IT departments of airlines would need to be involved in the process. J. McGuinne said the next four years would see huge development including the proposed 4 / 6 bay extension to the terminal with alot of areas being affected. This group would have a similar steering role to play.

Jim Kelly discussed centralised shopping and the interplay of the various elements. Don Treacy spoke about the change in emphasis from taxfree to taxpaid. Sandy Forsyth - don't have shops near fiskem!! Don Treacy said there seemed to be a move away from centralised catering.

The date for the next meeting was set for 15th April 1994

Attachment 3



APPENDIX 2

Shannon Airport Terminal Development

1. Summary

In its Draft Determination on the maximum level of airport charges, CP6/2001, the Commission for Aviation Regulation adjusted downwards the value of the recent Shannon Airport Terminal Development by IR£7,242,000. No basis whatever is set out in CP6/2001 for this adjustment.

Aer Rianta is concerned that it does not have enough information/clarification from the Commission to understand this adjustment and that this paper may therefore not deal effectively with the matter. In the absence of this further information/clarification requested, Aer Rianta is setting out in this paper the case for the Shannon Airport terminal development project, associated improvements to the road infrastructure and expansion of car parks and to demonstrate that the cost of £28.35m for these assets requires no adjustment as it already reflects good value for this very efficient facility delivered to the necessary standards and the requirements of the users, immigration, customs, IATA standard B, fire and safety and other regulatory authorities.

It is clear from the documentation that the development evolved from a long-term planning process set out in the master plan for Shannon airport and successive reviews of this plan. The development was approved by the Regulator of the time, the Minster for Transport, Energy and Communications, was delivered on a cost efficient basis and within budget. The terminal extension was carefully devised to deliver a product that satisfied the operational requirements and the needs of all users, regulatory and other bodies.

Aer Rianta cannot see any basis for the downward adjustment of £7.242 million i.e. a 26% reduction on the net book value of this asset at 31st December 2000 of £27.5m.

2. Timeline for the Shannon Terminal Project

Late '60,s Early'70's	The Introduction of wide-body aircraft i.e. Boeing 747's, put terminal capacity under stress. Due to a worldwide economic recession during the 70's passenger figures fluctuated resulting in large-scale capital investment being put on hold.
December 1993	Publication of Shannon Airport Master Plan Update 1993 - 2000. Traffic growth forecast to reach 1.79 million. Report advised the construction of a new departures /check-in area to the west of the existing arrivals area.
Jan/Mar 1995	Outline design issued to consultant Quantity Surveyors for development of budget costs.
September 1995	Minister for Transport, Energy and Communications announced approval for expansion of facilities at Shannon at a total cost of £23.5m *(See Attachment 1)*
October 1996	Consultative Group formed
November 1996	Briefing document issued by Shannon Airport
July 1997	Design team appointed
June 1998	Contract tendered for
August 1998	Works commenced on site
March 2000	Contract completed

3. Stakeholders Consultation and Final Brief Delivery

A consultative group was formed in October 1996 and met every three weeks. (Sample minutes are provided in Attachment 2). This group included the various stakeholders

- Aer Rianta
- Aer Lingus (who accounted for 62% of terminal traffic at the airport at the time)
- Security
- Immigration
- Customs
- Airport Police

Lansdowne Market Research were appointed in 1996 to carry out a comprehensive survey of facility utilization including queuing times at check-in desks and number of check-in desks manned. This information formed the basis of the spatial design for the project which was carried out by expert consultants Halcrow.

The Design Team following its appointment in July 1997 developed the final design. The lead consultants were architects Murray O'Laoire. Design team meetings were held on a fortnightly basis from July 1997 through to the completion of construction in March 2000. Separate meetings were held with various airlines to agree the final design of airline tickets desks, check-in desks and airline offices. Similarly the project team liaised with the car hire companies etc with regard to their specific requirements.

The final briefing document for the project was issued by Shannon Airport in November 1996.

4. Costs

The quantity surveyors and cost control consultants Patterson Kempster and Shorthall developed a full breakdown of the costs of the project following sign off of the final design by Shannon Airport.

The original estimated cost of the project was £23.4m. An additional £5.1m was subsequently attributed towards the inflation increases associated with project costs. Aer Rianta informed the Department of Public Enterprise of this increase in a letter dated 11th June 1998. Therefore the total projected costs of the development amounted to £28.5m, made up of its constituent elements as follows:

Shannon Terminal Project	£IR
Terminal redevelopment	21,944,850
Facilitation/Infrastructural Works	567,220
Roads/car parks	3,953,000
Fees	2,034,930
Total Project Budget	**28,500,000**

Financial Out-turnout	£IR
Terminal Extension	21,607,666
Roads Infrastructure	3,589,789
Facilitation projects /Fees/ Other	3,154,258
Total Out-turn on Estimate	**28,351,713**
Cost/sq. m. for terminal construction	2,000

5. Deliverables

Terminal

Total area of new build 10,800 sq.m

New departures terminal consists of a three level structure

- Ground Floor
  - 40 check-in desks
  - 7 airline desks
  - 12 airline offices
  - 6 concession outlets
  - Vertical circulation area
  - Baggage hall
- Mezzanine Floor
  - Restaurant/ kitchens
  - 12 airline offices
  - Bar
  - Staff rooms and toilets
  - New security 'friskem' gate to Transfer Lounge
- Viewing Lounge
  - Located over the general roof area of the new building with a glass corridor linking to the lifts
- Plant rooms are generally situated on the roof of the new building

Arrivals Extension

The existing Arrivals hall was extended towards the front (landside). This allowed the 8 car hire desks to be relocated opposite the customs exit doors. The increase in circulation was required to meet the severe congestion being experienced at peak times. The existing baggage make-up area was reconfigured to accommodate both outgoing and incoming baggage A tourist bus set-down park with canopy was also provided as part of this element of the project.

Roads Infrastructure

The project included a complete redesign of the existing roads infrastructure. The need was clearly demonstrated by the severe shortage of car parking and a road system which resulted in traffic arriving into a cul de sac at the terminal. The new design doubles the number of car spaces and allows traffic free flow past the Terminal without congestion. The project also delivered

- 2025 public car park spaces
- 30 set down car spaces
- 15 taxi spaces
- 11 spaces for tourist buses

The importance of additional tourist bus and taxi parking spaces was high given the importance of tourism to the west of Ireland.

6. Conclusion

The terminal development and associated road realignment and car parking developments were all necessary, were provided to a specification agreed with all relevant users and in a cost effective manner based on transparent public tendering processes. Aer Rianta's then Regulator - the Minister for Transport, Energy and Communications approved the project and related cost at the time.

Attachment 1

ISSUED BY THE GOVERNMENT INFORMATION SERVICES O SHEIRBHÍSÍ EOLAIS RIALTAIS Tel: (01) 6687855 Telex: 93909

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LOWRY ANNOUNCES £120 MILLION INVESTMENT PROGRAMME IN DUBLIN AND SHANNON AIRPORTS

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£23M FOR EXPANSION OF FACILITIES AT SHANNON

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In Dublin, the Minister has approved in principle a carefully modulated plan for the development of the airport over the next five years to the year 2001.

It includes:
* £32M to be spent on a new passenger handling pier and an airside extension to the Terminal Building to be built over the next two years.

* £65M to be spent on a major extension of the Terminal. Construction will commence towards the end of 1997. The extension will increase the size of the building by 60%.

The Minister said the Aer Rianta investment was required because the existing Terminal facilities, built in 1972, were designed to cater for an annual passenger throughput of 5 million people. Alterations over the years had increased the capacity to 7 million people but last year over 8 million passengers passed through the airport. Passenger traffic is expected to reach 11 million by 2001.

Included in the expansion are plans for new departure lounges, extra baggage handling, customs and immigration, new airbridge check-in desks and commercial and other operational outlets.

The Minister said an important element of Aer Rianta's mission was to continue to provide cost effective airport services so that there would be a minimum cost imposition on the movement of passengers and goods.

The Minister stressed that at his request, Aer Rianta was already implementing measures for new facilities at Dublin Airport designed on a low cost "no frills" basis in consultation with low cost operators. These facilities will be extended in 1997 and can be extended even further should the need arise.

The charge per passenger for the low cost facilities will be cut by 26%, from £7.23 to £5.73 from the beginning of 1997. Current Aer Rianta discounts will be available on this reduced figure. "The average charge per passenger for growth traffic under the overall charges scheme is 96p per return journey," the Minister stated.

The Minister stressed flexibility is a keynote element in the plans. "My Department will be keeping the programme under close continuous review in consultation with Aer Rianta so that plans can be accelerated, decelerated or modified as needs be in the light of traffic and other developments."

"This will provide the opportunity for taking account of traffic trends and of any developments at Dublin Airport which may affect traffic distribution or growth. Possible developments include the Huntstown Airpark proposal which is at present being examined in depth by Fingal County Council, the Irish Aviation Authority and my Department," the Minister stated.

SHANNON

The Minister announced major expansion of the Shannon Passenger Terminal at a total cost of £23.5 million.

The main element is the refurbishment of the existing Arrivals Concourse and a major extension to the Arrivals Building which will house Departures and outgoing baggage and provide an enlarged Arrivals Concourse. A new roadway system will be built in front of the Terminal Building.

The Minister said the Aer Rianta Task Force for Shannon has recommended that the current programme should comprise the first phase of a long term £50 million strategic plan for Shannon.

"I am fully confident that traffic growth at Shannon will justify the second phase of the development programme during the 2001-2006 planning cycle. Traffic growth at Shannon is running well ahead of projections - up by 18% on 1995 for the first half of this year," the Minister said.

The Minister added:"The development programme which I have announced today is no mere sop from the Government to the Mid-West. It is a definite acknowledgement by the Government of the importance of the Airport to the economy of the Mid-West region."

ENDS
2/8/1996

Attachment 2

Shannon Terminal Development
ADAS 9301/2.1/001
Minutes to Consultation Meeting No. 1.1
with Aer Lingus
Held at Board Room, Shannon Airport on
Thursday 10th October 1996 at 10 am

Attendance:	Garry McCormack	Manager Passenger Services, Aer Lingus
	John Lawlor	Duty Manager, Aer Lingus
	Paddy Givan	Manager Line Services, Aer Lingus
	Sheelagh Graham	Manager Personnel Admin., Aer Lingus
	Chris Nash	Station Manager, Aer Lingus
	Conor Sheehan	SRS Ops
	Harry Hewes	SRS Aviation
	Tom Lyddy	Co-ordinator, Aer Rianta, Shannon
	John Kenny	Ops. Manager, Aer Rianta Shannon
	[illegible]	Aer Rianta Technical Consultants

Item	Description	Action
[illegible]	The purpose of the meeting [illegible]	
	1. To explain the [illegible]	
	2. To explain consultation process	
	3. To take initial comments on proposals to date	
	4. To issue drawings for comment by agreed date within next 10 days	
[illegible]	Scheme to date summarised with Drawings ADAS 9301.23.1, Extract from ADAS 9301 [illegible] ADAS 9301 [illegible] ADAS 9301 24.1, ADAS 9301 [illegible]	
[illegible]	Consultation process to be completed within [illegible] months with 3 opportunities to comment [illegible] and comments within [illegible] days [illegible] time	
	The following [illegible] were made:	
	Departures Hall	
	[illegible] ARTC [illegible] the same number [illegible] additional [illegible]	[illegible]

Item	Description	Action
2	Comparison between present and proposed queue lengths requested	AR[illegible]
[illegible]	In order to avoid backtracking along queues after check in, it is suggested that a barrier system is put in place between end of queue and check-in desk allowing checked in persons to continue towards departures gate without encountering congestion, i.e. clear "return aisles" designated.	[illegible]
4	Route for passengers from check-in to departures gate should be clearly designated [illegible]	[illegible]
[illegible]	Lifts: To be large enough to take electronically propelled wheelchair	AR[illegible]
[illegible]	Access to [illegible] from West end of Terminal to be considered	AR[illegible]
6	Check-in desks and offices	
6.1	Larger scale details of check-in desks requested	[illegible]
6.2	Access for personnel from desks preferably from [illegible]	[illegible]
6.3	Access between back offices and desks to be confirmed	
6.4	Confirmed that all design will comply with all Health & Safety at work regulations, i.e. no walking over conveyor belts for access	[illegible]
6.5	Number of access points between departures hall and baggage hall will be limited and will be swipe card access type.	
6.6	Airside/landside boundary location to be decided [illegible] baggage hall may be landside	[illegible]
6.7	All aspects of project will meet with fire requirements	[illegible]
6.8	View out of offices [illegible] required	
6.9	Aer Lingus to provide their requirements for [illegible]	AL
6.10	Staff [illegible] access to baggage hall [illegible] baggage hall or [illegible] departures hall	[illegible]
[illegible]	Size of offices required by AL [illegible] to be confirmed	AL

	Description	Action
	to March 2000 (Civil Contract will commence March 1997).	
	The following drawings were issued: ADAS 9301/023/1 Extract from ADAS 9301/019/1, ADAS 9301 018/0. ADAS 9301/024/1. ADAS 9301/025/1.	
14.	Consultation Process. Agreed that all Aer Lingus comments should be returned to Tom Liddy within 10 days. These will be considered and revised proposals presented for further comment approx. 10 days later (date dependent on consultation with other groups).	AL ARTC
15.	Next Consultation Meeting to be arranged for approx. 3 weeks time.	ARTC/ SNN/AL

Circulation:
All present.
Chris [illegible]kan (ARTC Eng.)
Liam Gaffney (ARTC Eng.)
David Hepburn (ARTC D.G.)
Tony Kelly (ARTC)

Signed: Angela Tunney

Date: 16.10.96
16th October, 1996

APPENDIX 3

Arthur Andersen Report on Replacement Cost Valuation of Assets at 31st December 1999 and details of the rollforward of this valuation at 31st December 2000

Fixed Asset Replacement Cost – Roll forward to 31 December 2000

IR£(M)	Replacement Cost		Replacement NBV	
	as at 31/12/99 Per Arthur Andersen report[3]	as at 31/12/00 Per Aer Rianta	as at 31/12/99 Per Arthur Andersen report[3]	as at 31/12/00 Per Aer Rianta[1]
Dublin	760	806	454	478
Shannon	301	314	101	106
Cork	101	104	71	71
Information Technology & Misc.	6	8	4	5
Total	**1,168**	**1,232**	**630**	**660**
Dual Till element				435[2]

Notes

1 *Detailed listing of assets by category (Aeronautical, Car Park, Commercial, Common Services) provided to Commission on 20th July 2001*

2 *As per Tangible Fixed Assets statement provided to Commission on 20th July 2001*

3 *The Arthur Andersen report has been reproduced in this Appendix*

Roll forward methodology

The valuation of the regulated asset base at 31st December 1999 conducted for Aer Rianta by Arthur Andersen has been rolled forward to present the valuation as at 31st December 2000 as presented in the tables above. These values have been derived by taking the replacement net book value as at 31st December 1999, adding to this capital additions for 2000, less depreciation for the year and applying an inflation factor to roll forward to a replacement net book value estimate at 31st December 2000.

Reconciliation of movement from 31/12/99 to 31/12/2000	IR£(M)
NBV on replacement Cost at 31/12/99 *Arthur Andersen report page 23*	630.0
Write Offs/Disposals in 2000	(0.2)
Additions 2000	45.6
Depreciation year 2000	(26.4)
Roll forward adjustment	11.0
NBV on replacement Cost at 31/12/00 *Submission on 21/6/2000*	660.0

APPENDIX 4

Indexed Historic Cost Valuation of Assets at 31st December 1999 and details of the roll forward of this valuation to 31st December2000

Asset base – Indexed Historic Cost

IR£(M)	Historic Cost as at 31/12/00	Historic NBV as at 31/12/00	Indexed Historic Cost as at 31/12/00	Indexed Historic NBV as at 31/12/00
Dublin	360	273	664	372
Shannon	87	55	275	81
Cork	39	28	91	49
Information Technology & Misc.	10	6	13	8
Total	**496**	**362**	**1,043**	**501**

Methodology
Historic fixed assets have been indexed in the above table using the Consumer Price Index (CPI) as sourced from the Central Statistics Office. Each asset has been indexed by reference to the increase in the CPI from the date of acquisition.

A variety of approaches exist for revaluing assets to current costs and hence ensuring that reported values keep pace with inflation and technological changes.

The simplest approach is to index the historical cost to current values using either a general inflation index or an industry/asset specific index. This approach has the advantage of being a relatively transparent calculation, which may be verified easily by reference to the historical cost reported in the company accounts, and publicly available information on indices.

For the purpose of assessing initial valuation results under the indexed historical cost valuation approach, a number of applicable indices were identified and sourced from the Central Statistics Office. The asset specific indices most appropriate to the various asset categories were applied.

- Consumer Price Index (CPI)
- Building and Construction Price Index (all materials)
- Capital/Building and Construction Price Index (material and wages)
- All Capital Goods Price Index; and
- Earnings Index.

Indexed historical costs were calculated using the CPI and asset specific indices and produced broadly similar results, both in terms of cost and net book value. Aer Rianta proposes using a CPI indexed approach.

The increase in the net book value over that recorded in the books of account under the indexed historical cost and replacement cost methodologies is significantly lower than the increase in gross cost. This reflects the relatively old age profile of certain categories of assets.

A detailed listing of assets by category (Aeronautical, Car Park, Commercial, Common Service) can be provided to the Commission, if required, in the format in which replacement cost valuation details were provided on 20th July 2001.

APPENDIX 5

NERA REPORT ON COST OF CAPITAL

AER RIANTA'S COST OF CAPITAL

A Final Report for Aer Rianta

Prepared by NERA

June 2001
London

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An MMC Company

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EXECUTIVE SUMMARY

NERA was commissioned by Aer Rianta to estimate the cost of capital for Aer Rianta's regulated activities, and to consider the appropriate allowed rate of return to be used in the forthcoming regulatory review for setting tariffs. This report sets out NERA's methodology and conclusions.

WACC Methodology

A company's cost of capital must be estimated with reference to the rate of return investors could expect to earn on investments of equivalent risk.

The Weighted Average Cost of Capital (WACC) methodology is now widely accepted as a suitable method for calculating the cost of capital. The WACC methodology states that the cost of capital is calculated as the weighted average of the cost of debt and the cost of equity, weighted by the market values of debt and equity of an efficiently financed business. In applying the WACC methodology it is necessary to estimate the cost of debt, the cost of equity, and the "efficient" market-based weights separately with respect to investments of equivalent risk.

The WACC should be calculated on a post tax basis first to reflect the returns that investors require after corporation tax. Allowance for corporate taxes can then be made by either adjusting the post tax WACC to a pre tax WACC or by allowing for taxes separately in the revenue formula.

Our calculation of the WACC is also consistent with the valuation of the capital base in real replacement cost terms, and is an integral component of the regulatory building block approach to setting Aer Rianta's permitted tariff levels.

Single and Dual till estimates

In this report NERA estimates a WACC for Aer Rianta's under a single till and dual till regulatory regime. The single till considers all of Aer Rianta's operations in setting an allowable rate of return, namely:

- The core domestic airport business, i.e the ownership and operation of Dublin, Shannon and Cork airports; and,
- Aer Rianta's non- aeronautical businesses, such as retail airport management and property businesses.

The single till approach takes account of the contribution of Aer Rianta's aeronautical and non-aeronautical activities to overall company profits in setting the appropriate tariff level, and in this instance the appropriate cost of capital relates to the riskiness of aeronautical and commercial cash-flows. To the extent that profits from the non-aeronautical services display

different systematic risk than the core airport business, the single till cost of capital will differ from the dual till cost of capital. This report considers evidence on the differences in the cost of capital for Aer Rianta under single and dual till regulation based on differences in the riskiness of Aer Rianta's aeronautical and non-aeronautical businesses.

Although this report presents a WACC estimate to be applied in both a dual till and single till regime, NERA broadly supports the arguments put forward in Aer Rianta's recent submissions to CAR in favour if a dual till approach to regulation.[1]

Aer Rianta's "State Owned Enterprise (SOE)" Status

Since Aer Rianta is currently a State Owned Enterprise, market based measures of the cost of equity and the cost of debt and hence the riskiness of its cashflows cannot be directly observed. The procedure that is used in this paper for estimating the WACC of Aer Rianta is to examine market-based data for a set of comparator airport companies that share similar risk characteristics, with an appropriate adjustment for the particular operating conditions of Aer Rianta. In this way the WACC that is estimated will be consistent with the "market required" rate of return for Aer Rianta in the event that Aer Rianta was privatised.

It is not appropriate to assume that the WACC for Aer Rianta should be based on either the government borrowing rate or the embedded debt costs to Aer Rianta which reflect an implicit sovereign guarantee. The lower interest rate paid by a government simply reflects the guarantee provided by taxpayers to lenders. If Aer Rianta's allowed rate of return does not adequately reflect the nature of Aer Rianta's risks, then it would be implicitly assumed that the government and hence the tax payer would have to bear the shortfall in the event that cash flows were unexpectedly low.

Application of the Capital Asset Pricing Model (CAPM)

In estimating the cost of equity for Aer Rianta, NERA has applied the Capital Asset Pricing Model (CAPM), widely established as an appropriate model to use to estimate the post tax cost of equity of a regulated company. NERA considers that alternative cost of equity models such as the Dividend Growth Model (DGM) are not appropriate for estimating the cost of equity for Aer Rianta given the lack of availability of robust data.

The CAPM is based on the theory that the required return on an asset is related to the asset's *systematic risk*, that is, the degree of co-movement between the company's returns and the market returns. This measure of systematic risk is known as the beta factor and can only be directly observed for quoted companies.

[1] Submission to the Commission for Aviation Regulation on The Economic Regulation of Airport Charges in Ireland CP2/ 2001, March 27th 2001.

Since Aer Rianta is not quoted, it is necessary to estimate the beta factor of Aer Rianta's regulated activities by reference to observed equity beta factors of quoted "comparator companies". The estimated equity beta coefficients are then adjusted for differences in the financial riskiness of these comparator companies by a process of "unlevering" to calculate an asset beta which reflects the fundamental business riskiness of the airport industries. An adjustment is then made to the estimated asset beta factors to reflect the relative riskiness of Aer Rianta.

In estimating a beta factor for Aer Rianta, NERA has relied heavily on long run market based beta estimates of Aer Rianta's most appropriate comparator company, BAA. BAA has a similar, but not identical, balance of aeronautical and non-aeronautical activities in its revenue base, and is subject to a price cap regime. However, we would still expect their respective betas to diverge because of key differentiating factors, such as:

- composition of revenue (aeronautical/ non-aeronautical);
- the traffic mix (domestic/international/business/ leisure);
- the cost structure (operating/capital cost mix).

We have also taken into account regulatory precedent on airport beta estimation in both the UK (for a single till regime) and Australia (to inform our dual till estimate).

Cost of Debt and Optimal Gearing Methodologies

NERA's estimates of the cost of debt and optimal gearing for Aer Rianta are calculated with reference to private sector companies that have similar risk characteristics. Specifically, NERA considers both the actual observed costs of debt of the comparators and the relationship between the cost of debt finance and a company's capital structure.

NERA's estimates of the cost of debt and optimal gearing for Aer Rianta are based on the assumption that Aer Rianta must maintain at least a single A credit rating status. Given Aer Rianta's large capital investment programme over the next quinquennium, NERA consider that a single A credit rating is necssary to ensure that Aer Rianta is able to raise finance even in weaker capital market conditions. It has been recently observed that during periods of market turbulence, access to debt markets can be restricted for companies with weak investment grade credit ratings.

Post Tax WACC Estimates

Table 1 below presents NERA's estimate of the post tax WACC of Aer Rianta under a single and dual till regulatory regime. Estimates of equity and debt costs are both based on the assumption that the relevant investor market is the Eurozone market. This reflects the fact that investor diversification opportunities extend more widely than the Irish domestic

capital markets, and that there is free movement of capital within the Eurozone currency area.

This table shows that NERA's best estimate of the post tax "Vanilla" WACC, calculated as the weighted average of the post tax return on equity and the cost of debt gross of the debt tax shield, for a single till approach is 8.0% and 7.8% for a dual till approach.

Table 1
Cost of Capital for Aer Rianta's Regulated Activities

Parameter	Regulatory Regime	
	Single till	Dual till
Cost of Equity		
Nominal return on risk-free	5.0%	5.0%
Expected inflation	1.7%	1.7%
Risk-free rate	3.2%	3.2%
ERP	6.0%	6.0%
Asset beta	0.75	0.7
Debt	30%	30%
Equity	70%	70%
Equity beta	1.04	0.97
Post-tax return on equity	9.4%	9.1%
Cost of Debt		
Debt premia (basis points over riskfree)	150	150
Cost of debt	4.7%	4.7%
WACC	150	150
Real post-tax "Vanilla" WACC	**8.0%**	**7.8%**

Comments on Parameter Values

The parameter values represent NERA's best estimate of the appropriate values for Aer Rianta, based on a wide-ranging examination of existing evidence, as well as by NERA's own research. The key supporting arguments for each parameter value are set out below.

- ***Risk Free Rate***: Current data on yields on German government bonds, our proxy for the eurozone riskfree asset, suggests an estimate of the nominal risk free rate of around 5.0%. We calculate a real risk free rate of 3.2% based on the estimates of the nominal risk free rate adjusted for 1.7% expected inflation, where inflation estimates are based on consensus analyst forecasts.
- ***Equity Risk Premium (ERP)***: NERA's best estimate of the ERP for the eurozone market is 6.0%. In reaching this estimate, NERA have taken into consideration long run historic data on equity returns (for the UK, US and Euro markets), forward looking evidence (P/E ratios) and recent academic studies.
    - NERA strongly reject the basis of recent UK estimates of the equity risk premium by Ofwat (1999), Ofgem (2000) and the Competition Commission

(2000). These estimates relied heavily on interpretations of small sample survey results and non-published interviews with fund managers. This report notes a number of problems with the surveys that were conducted and the interpretation of the results. NERA note that other forward looking evidence from rigorously structured surveys used in US rate cases suggest an equity risk premium in the range of 6-7%.

- ***Beta:*** NERA estímate a beta coefficient for Aer Rianta under a single till and a dual till regulation system:

  - NERA's estimate of the beta coefficient for Aer Rianta under single till regulation is 0.75. This estimate relies heavily on market based evidence on the beta for BAA, which shows a long run beta for BAA since privatization of 0.67. NERA considers a beta for Aer Rianta would be higher than for BAA for the following reasons: (i) Aer Rianta has a higher proportion of non-aeronautical operations than BAA; (ii) Aer Rianta has a higher proportion of international and leisure traffic relative to BAA; (iii) Aer Rianta faces higher regulatory risk relative to BAA owing to a newer and more uncertain regulatory regime.

  - In deriving a beta estimate for a dual till business, NERA has taken account of evidence showing that variations in revenues from Aer Rianta's directly operated retail activities are very closely correlated with variations in traffic levels and so experience similar risk levels to aeronautical volume related revenues. NERA has also taken into account the higher operational leverage of the aeronautical business which, other things equal, leads to great profit volatility. Overall, NERA believes that only a small adjustment is appropriate when moving from a single till to a dual till beta estimate for Aer Rianta. NERA's best estimate of the asset beta for Aer Rianta under dual till regulation is 0.7, compared to 0.75 if it was subject to a single till regulatory framework.

- ***Cost of Debt:*** Our estimate for Aer Rianta's current debt premia (spread over government gilt of equivalent maturity) is based on evidence from private sector comparators that enjoy a similar single A credit rating. Recent medium term debt issues by a range of European utilities suggests a debt premium of 150 bps is consistent with a single A credit rating, and this is taken as our best estimate.

- ***Gearing***: NERA's analysis of quoted airports shows that their gearing (D/ D+E) ranges from 22 to 33% debt. We base our estimate for Aer Rianta's optimal gearing on an average of our quoted set of comparator companies of 30% debt. This is also consistent with regulatory precedent in the UK where in 1997 the MMC concluded that a gearing level of 30% was appropriate for BAA.

Taxation

There is no simple scaling formula for converting a post tax rate of return to a pre tax rate of return that can adequately capture the complexities of the interaction between a (nominal) tax system and a RPI-linked regulatory system. NERA also notes that Aer Rianta derives income from different sources and there is a degree of uncertainty whether some of these income sources will attract the passive corporation tax level of 25% or the reducing standard rate. Given this uncertainty a 25% tax rate is assumed.

For these reasons it may be more appropriate to set revenues on the basis of a post tax rate of return with separate allowance for forecast tax costs determined through financial modelling.

An indicative estimate of the Real Pre tax WACC for Aer Rianta can be reached by applying the following formula, which takes into account the fact that taxes are paid on nominal profits.

Real Pre Tax WACC=(Nominal Post Tax "Net of Debt Tax Shield" WACC/(1-t)-I)/(1+I)

Where: I is the expected inflation rate, t is the tax rate.

In the table below NERA has estimated a real pre tax WACC for Aer Rianta based on current effective tax rates of 25% and 20% respectively for single till and dual till operations. This table shows that NERA's estimate of the pre tax WACC for a single till approach is 10.8% and 9.8% for a dual till approach.

Table 2
Pre Tax WACC

WACC	**Regulatory Regime**	
	Single till	**Dual till**
Real post-tax "Vanilla" WACC	**8.0%**	**7.8%**
Real post tax "Net of Debt Tax Shield" WACC[1]	7.7%	7.5%
Effective tax rate	25%	20%
Nominal "Net of Debt Tax Shield" WACC	9.5%	9.3%
Real Pre-Tax WACC using "Historical" Formula.	**10.8%**	**9.8%**

[1] Note: Post tax "Net of Debt Tax Shield" WACC = Post tax cost of equity*E/(E+D) + Cost of debt (1- tax rate)* D/(D+E)

We recommend, however, that this formulaic estimate of the tax wedge should be confirmed as accurate through the use of financial modelling of actual tax liabilities given the other regulatory assumptions.

Appropriate Rate of Return

The appropriate allowed rate of return must ensure that investors' average expected post tax returns are equal to the estimated post tax WACC. Differences can arise between the appropriate allowed rate of return and the estimated post tax WACC in the event of asymmetric risks, that may arise in particular from other regulatory price setting assumptions such as operating expenditure and capital forecast projections.[2] This report does not consider all the regulatory assumptions of tariff setting.

[2] In other words, if investors expect higher outturn costs that the regulator assumes then the expected rate of return will be lower than the allowed rate of return. Conversely if the allowance for tax is higher than investors' expected tax costs then the expected rate of return will be higher than the allowed rate of return.

1. INTRODUCTION

NERA was asked by Aer Rianta to estimate its cost of capital as part of its present price review process.

The structure of the report is as follows:

- Section 2 discusses a number of key issues central to the calculation of Aer Rianta's cost of capital, including the nature of the regulatory regime (e.g. single or dual till), and sets out our rationale for calculating its cost of capital in the context of a European market.
- Section 3 briefly discusses the economic and financial theory underpinning this study, in particular, it outlines the Capital Asset Pricing Model (CAPM), which is the basis for our calculation of Aer Rianta's equity costs.
- Section 4 sets out our estimates of the constituents of the CAPM, and calculates the cost of Aer Rianta's equity with reference to the eurozone area;
- Section 5 discusses the linked issues of Aer Rianta's cost of debt and gearing
- Section 6 examines the expected effective corporation tax rate.
- Finally, Section 7 draws upon these results to calculate the likely range of Aer Rianta's pre-and post-tax real and nominal cost of capital.

2. KEY ISSUES

This section discusses a number of key issues that affect our approach to estimating a cost of capital for Aer Rianta.

- The nature of Aer Rianta's regulated activities and the form of regulation.
- Aer Rianta's status.
- The relevant investor market.

2.1. The Nature of Aer Rianta's Regulated Activities and the Form of Regulation

Aer Rianta's main activities are:-

- The core domestic airport operations, i.e the ownership and operation of Dublin, Shannon and Cork airports, which together handle about 97 per cent of all air passenger traffic to and from Ireland
- International airport management, undertaken through a wholly owned subsidiary, Aer Rianta International.
- Non-aeronautical services, such as airport retail management, property services and its hotel business.

This report considers Aer Rianta's cost of capital under both single and dual till regimes. Although there is no clear cut distinction between activities that fall within each regulatory regime, we broadly interpret Aer Rianta's regulated activities under a dual till framework as consisting of the services provided to airlines at its core domestic airports, for which airlines pay through airport charges, primarily in the form of landing, parking and passenger service charges. By contrast, under a single till approach, the regulator must set airport charges to airlines taking account of the contribution to Aer Rianta's common costs from a wider set of commercial activities.

To the extent to which these two "businesses" display different levels of systematic risk, the two forms of economic regulation will be associated with different costs of capital. Typically, it is assumed that the commercial activities of an airport operator's business display higher levels of systematic risk, and therefore a single till regime is associated with a higher cost of capital to compensate investors. The core airport business is assumed to be less cyclical, and therefore a less risky proposition.

The key differentiating factor is our measure of beta for the single and dual till businesses. We present a beta estimate for the single till business first, and then derive a beta estimate for a dual till regime from this single till estimate. Our single till estimate is directly

observed from BAA's equity beta calculated over a long timeframe, with adjustments for differentiating factors, to derive Aer Rianta's single till beta. Our dual till beta then takes into account largely qualitative evidence regarding the relative systematic risk of commercial activities vis-à-vis the aeronautical business, as well as regulatory precedent from Australia, which operates a form of dual till regime for its primary airports.

2.2. Aer Rianta's Status

Since Aer Rianta is currently a State Owned Enterprise, market based measures of the cost of equity and the cost of debt and hence the riskiness of its cashflows cannot be directly observed. The procedure that is used in this paper for estimating the WACC of Aer Rianta is to examine market-based data for a set of comparator airport companies that share similar risk characteristics, with an appropriate adjustment for the particular operating conditions of Aer Rianta. In this way the WACC that is estimated will be consistent with the "market required" rate of return for Aer Rianta in the event that Aer Rianta was privatised.

It is not appropriate to assume that the WACC for Aer Rianta should be based on either the government borrowing rate or the embedded debt costs to Aer Rianta which reflect an implicit sovereign guarantee. The lower interest rate paid by a government simply reflects the guarantee provided by taxpayers to lenders. If Aer Rianta's allowed rate of return does not adequately reflect the nature of Aer Rianta's risks, then it would be implicitly assumed that the government and hence the tax payer would have to bear the shortfall in the event that cash flows were unexpectedly low.

2.3. The Relevant Investor Market

It is common regulatory practice to estimate several key parameters in the WACC calculation by reference to the domestic capital market. For example, the risk free rate is estimated using appropriate domestic government debt instruments, possibly in conjunction with the predicted domestic inflation rate.

However, Ireland is now a full member of the Eurozone currency area, with free movement of capital between its members, so that investors in other Eurozone countries may hold Irish Government stock without currency risk. Irish investors in turn, are able to invest in assets quoted on other Eurozone stock markets without currency risk. Under these circumstances, we believe that there is a strong case for assessing WACC parameters on a Eurozone-wide basis.

3. COST OF CAPITAL PRINCIPLES

3.1. Introduction

This section briefly discusses the general principles underlying the calculation of a company's cost of capital. We begin by discussing the weighted average cost of capital (WACC) formula, which determines the required rate of return on a company's total capital base, before discussing the two key components of the WACC, the required return on equity, as determined by the generally accepted financial model, CAPM, and the return on debt.

3.2. WACC

Companies can raise capital through either debt or equity. The relative return required for equity and debt is different because debtholders enjoy a prior claim on a company's earning stream, and therefore face different levels of risk. Thus, the cost of capital for a company is a weighted average of the two instruments, with the weightings determined by the relative levels of debt and equity in the company's asset base, or the company's "gearing".

Formally, the post-tax cost of capital is:

$$\text{Post-tax WACC} = g \times r_d + (1 - g) \times r_e$$

where,

g = gearing = (debt/ debt + equity)

r_d = the post tax cost of debt; and

r_e = the post tax cost of equity

The post-tax WACC is the return required to persuade investors to take on the risks of investing in this company. However, since companies' profits are taxed, this is not the same as the return that a company is required to make in order to provide that post-tax return. In short, interest repayments on debt are not subject to corporate taxation and thus the pre-and post-tax rates of return on debt equate. However, returns on equity are subject to taxation, and this drives a wedge between pre- and post-tax cost of capital.

3.3. Cost of Equity

The post-tax cost of equity is the return on equities (either through dividends or through an increase in the value of shares) that is required to persuade investors to bear the risk associated with the company's equity. There are essentially two ways of calculating the cost

of equity, the Capital Asset Pricing Model (CAPM) and the Dividend Growth Model (DGM). However, in practice DGM is infrequently used by regulators, because one of its key components, the expected growth in company's dividends, is unobserved. Thus, to calculate Aer Riantas cost of equity we follow regulatory precedent and use the more generally accepted financial model, CAPM, to determine equity costs, as described below.

3.3.1. Principles of the CAPM

This section provides a description of the conceptual background of the Capital Asset Pricing Model. The standard Capital Asset Pricing Model determines required returns for investment in the equity capital of a firm as:

$$E[r] = E(r_f) + \beta(E[r_m] - E(r_f))$$

Where $E(r_f)$ is the current risk-free rate of return; beta (equity beta) is the expected covariance between returns on the risky asset and the market portfolio, divided by the variance of the market portfolio; and $E[r_m]$ is the expected rate of return for the market.

A key tenet of the CAPM is that an investor *diversifies* his or her stock holdings by combining risky securities into a portfolio. The effect of this diversification is to eliminate risks known as *specific* risks (also known as non-systematic risks). Specific risks arise from all those events that are unique to a particular share and have nothing to do with general market or economic factors. Because specific risks are not related, an investor holding a diversified portfolio can eliminate this type of risk.

Complete diversification of risk is not possible since securities all move together to a certain extent, a result of the influence of economy wide factors such as interest rates, inflation, and macro economic demand. The risks that cannot be eliminated through diversification are described as "market" risks (or "systematic" risks).

A fundamental notion of the CAPM is that investors are risk-averse and therefore they demand higher returns for assuming additional risk and that higher risks securities are priced to yield higher returns than are lower risk securities. The CAPM quantifies the additional return required for bearing incremental risk, and provides a formal risk-return relationship based on the idea that only market risk matters, as measured by beta.

There are a number of issues to stress about the underlying assumptions of CAPM:

- the standard CAPM (shown above) is a "single period" model that attempts to explain investors required returns assuming that risk free returns and the equity risk premium ($E(r_m) - E(r_f)$) defined over the same period are constant. The CAPM is mute with respect to how long the period is. Over different periods, required returns may change if expectations change or if attitudes to risk aversion change;

- the CAPM is an equilibrium pricing model that describes the risk-return relationship in "efficient" capital markets. By "efficient" it is meant that the capital market utilises all available information in setting the prices of its assets (Ross (1989)). In this situation, there should be no opportunity for traders to earn arbitrage profits on the basis of other "available information";
- the standard CAPM assumes that there are no transaction costs, taxes, or impediments to trading. It assumes that all assets are perfectly marketable and that no one trader is significant enough to influence price;
- the standard CAPM assumes that investors are risk averse and base their portfolio decisions only on the first two moments of the distribution of possible returns, the expected return and the variance of return, implying that returns are normally distributed; and
- the standard CAPM assumes that investors can lend or borrow unlimited amounts at the risk free rate.

In the theoretical literature, a number of variants of CAPM have been proposed to accommodate more realistic assumptions with respect to one or more of these assumptions.

It is also important to stress that the CAPM is an *expectational* model whereas most of the available capital market data to support the theoretical input variables (expected risk free rate, beta, expected market return) are historical. This is an issue that we will continually refer to in the calculation of the components of CAPM in Section 4.

3.4. Principles for Estimating the Cost of Debt

The cost of debt can be expressed as the sum of the risk free rate and the company specific debt premium. The company specific debt premium is driven by the ratings which specialist credit rating agencies, such as Standard & Poor's (S&P's), assign to that company.[3]

In essence, credit ratings are based on a number of financial characteristics such as market capitalisation, earnings volatility, and business risks specific to the company and/or the sector. However, particular regard is paid to the following two financial ratios:

- Funds From Operations (FFO) interest coverage; and
- Interest Coverage defined on earnings basis (EBIT).

Interest cover, defined as the number of times by which a company can meet its interest payments out of operating profits, is essentially a measure of the surety of interest payments

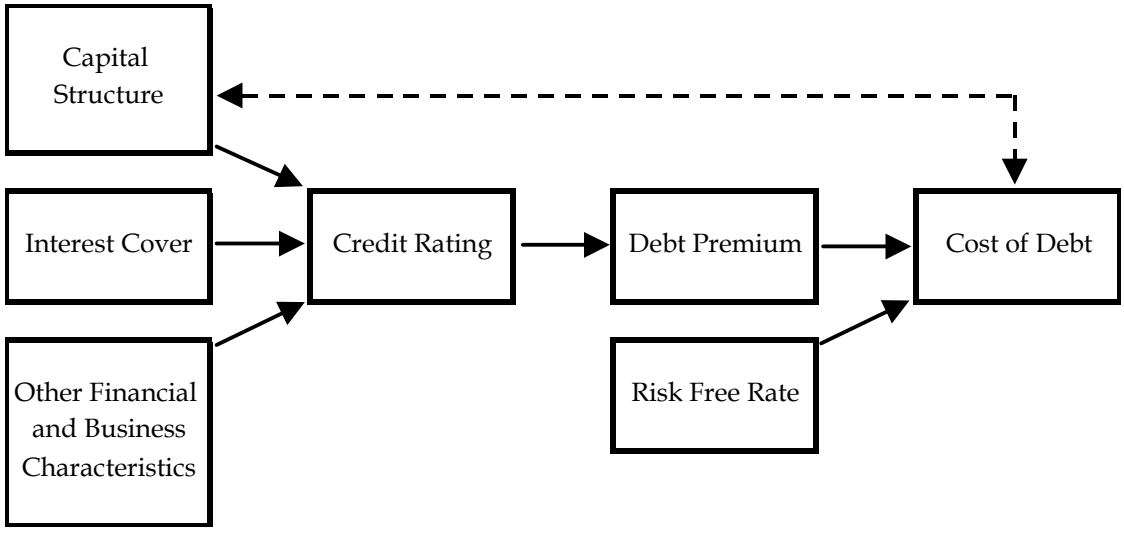
[3] Some companies, particularly large and well known, choose not to be rated but still access the capital markets for debt at appropriate levels.

being met. A company with low interest cover is less likely to maintain a premium credit rating, since the probability of default on interest payments will be relatively high. S&P's particularly emphasises funds flow interest coverage as a rating criterion.

A company with a high gearing ratio is also less likely to maintain a premium credit rating. This reflects the fact that the probability of default on interest payments will be higher if gearing is high. It is clear that credit rating agencies, in determining credit ratings, are concerned primarily not with capital structure per se, but rather with debt service coverage levels, measured on both a cash flow and earnings basis.

Figure 3.1 summarises the relationships between gearing and interest cover, credit ratings, other business and financial characteristics and the debt premium and cost of debt. In Section 5 we estimate the cost of debt for Aer Rianta with reference to comparable utilites. We consider both the actual observed costs of debt of the comparators and the relationship between the cost of debt finance and a company's capital structure, on the basis of these linkages.

Figure 3.1
Relationship Between Capital Structure, Interest Cover, Credit Rating and Cost of Debt



3.5. Principles for Estimating Gearing

Finance theory states that the appropriate discount rate for expected future cash flows is the Weighted Average Cost of Capital (WACC) which represents a weighted average of the expected costs of debt, equity and hybrid financing.

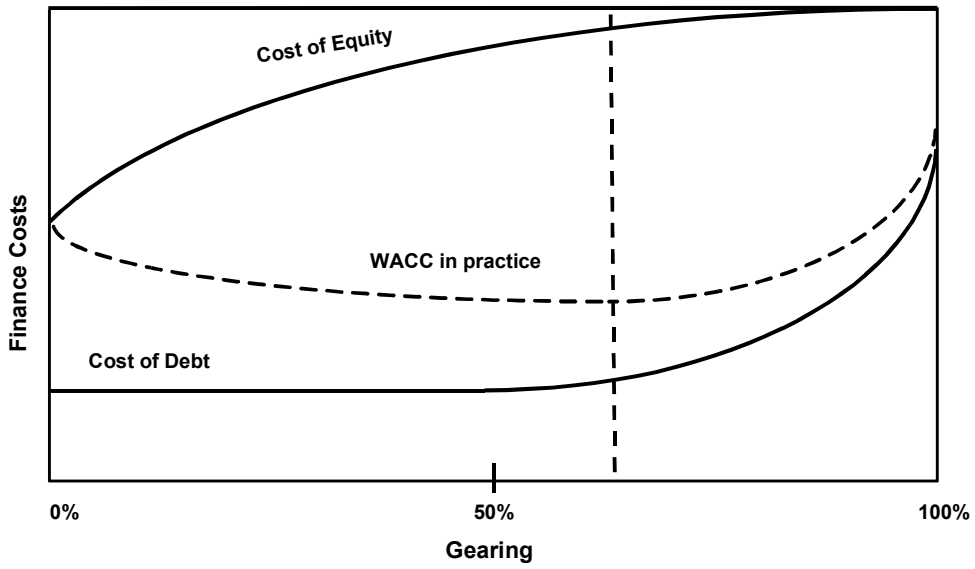
It is now generally accepted that changes in the proportion of debt and equity in the balance sheet can, in practice, have significant implications on a company's overall costs of finance. This is the result of a number of factors that occur when gearing is changed:

- Debt risk and interest rate changes;
- Equity risk changes;
- Probability of future default changes;
- Tax position (personal and corporate) changes;
- Investment strategy may change.

Academic theory cannot predict what proportion of overall finance should be raised through debt or equity. In general terms, debt is advantageous because of its low costs and tax deductibility but can be disadvantageous where personal taxes and bankruptcy costs are concerned. The optimal capital structure of a company will normally consist of a mixture of debt and equity finance.

Companies with stable cash flows and low risk profiles can absorb more debt into their balance sheets than most other types of companies. However, to assess the optimal capital structure of a utility, an empirical analysis is required that examines market evidence on how the perceptions of investors, credit rating agencies and financial markets in general are affected by capital structure changes.

Figure 3.2
Does Capital Structure Matter?



In assessing "optimal" capital structure it is important to focus not only on central case scenarios but also on downside scenarios. The possibility, for example, that capital expenditure may be substantially above central case projections may mean that an "optimal" capital structure will allow for unused borrowing capacity to increase debt in adverse

circumstances. Some trade-off is likely to exist between minimising the average cost of new finance and minimising the *possibility* of financial distress and bankruptcy.

4. ESTIMATING THE COST OF EQUITY

4.1. Introduction

The CAPM model discussed in section 3.3.1 determines the required returns to investment in equity capital as:

$$E(r) = E(r_f) + \beta\,[E(r_m) - E(r_f)]$$

where $E(r_f)$ is the expected risk-free rate of return; beta (equity beta) is the expected covariance between returns on the risky asset and the market portfolio, divided by the variance of the market portfolio; and $E[r_m]$ is the expected rate of return for the market. The term in square brackets, $[E(r_m) - E(r_f)]$, is known as the equity risk premium (ERP).

This chapter applies the CAPM approach to estimate the post-tax cost of Aer Rianta's equity finance.

- Section 4.2 gives estimates of the risk free rate.
- Section 4.3 discusses the equity risk premium.
- Section 4.4 discusses the equity beta.
- Section 4.5 presents conclusions.

4.2. Estimating the Risk-Free Rate

CAPM states that the risk-free asset has zero correlation with the market portfolio, that is, a return on a zero beta asset or portfolio. However, in practice it is difficult to identify an asset that is completely risk-free, since inflation, as well as other factors, has been shown to lead to covariance between notionally risk-free government debt and stock markets.

In the UK there is general agreement that index-linked-gilts (ILGs) provide the closest proxy to the risk-free asset. The reason for this is twofold. First, the yield on index linked gilts is immune from the effects of unanticipated inflation. Second, it has been argued that the returns on index linked gilts are less correlated with the market than the returns on Treasury bills and other government bonds, and are therefore closer to satisfying the theoretical requirement of having a zero beta.[4]

Unfortunately, neither the Irish government nor any other eurozone government issues ILGs. Thus, for our purposes we present government bonds with a return denominated in

[4] This point was made by Stephanie Holmans in Ofwat RP5 (1996) , Section 2.5.

nominal terms as our proxy for the risk-free rate, and then make an adjustment for expected inflation.

There are two key questions regarding the appropriate proxy for the risk-free rate:

- First, are current "spot" yields, or historic average yields a more appropriate measure of the expected return on the riskless asset?
- Second, what is the appropriate bond term or maturity: should it be commensurate with the regulatory period, investment horizon of an investor, or average asset life?

As the CAPM is an expectational model the appropriate yield measure would appear to be the present "spot" rate. The present spot rate embodies expectations of real interest rates over the term of the bond. However, if there is evidence to suggest there are temporary, short-term factors influencing the market, then yields over a longer timeframe might offer a better indicator of yields going-forward. For example, in UK there is evidence to suggest that "institutional factors" have suppressed present yields, which provides an argument for using an historic average.

With regard to the appropriate bond term or maturity, there are three conceptually attractive options.

- the "investment horizon" or security holding period for a representative equity investor, equivalent to the CAPM horizon;
- the "planning horizon", that is the average life of projects that are to be assessed using the estimate of the cost of capital.
- the time-horizon of the periodic review is the appropriate measure, as this offers an opportunity to readjust the ex-ante return on the asset base.

The preferred academic position - since the CAPM is a single period model - is to choose a maturity that is consistent with the investment horizon. However, as Paterson (1995) notes, there is little or no evidence to guide the length of the investment horizon of an equity holder, although cursory evidence in the US suggests one year or more.

A theoretical argument that is sometimes made in regulatory discussions is that "investment horizons" are heavily influenced by the nature of the regulatory regime. The WSA/WCA (1991) argued:

> "*The nature of the regulatory regime is such that each price review process represents an opportunity and indeed a requirement to redetermine the ex ante earnings potential of the assets….(T)o conclude the ten (or five) year time period between Periodic Reviews would seem to provide the most appropriate benchmark for determining the true time horizon to be used in estimating the risk free rate.*"

However, this argument overlooks the fact that in practice regulated companies issue bonds of considerably longer maturity than the periodicity of the price review, typically 5 years, and these bonds have to be serviced over their entire lifetime.

Although the arguments regarding the appropriate term have not been resolved, increasingly the consensus among regulators globally has been to adopt securities with maturities of around 10 years as the appropriate measure of the risk-free rate. The main reason underlying this choice is that the 10-year bond is typically the security that has the closest maturity to the 15 year-plus investment profile of utility assets, while also retaining a certain liquidity and market depth, and therefore price stability.

Thus, there is strong precedent for selecting current yields on long term bonds as the proxy for the risk-free return.

4.2.1. The risk-free rate in practice

Consistent with the view expressed in section 2.1 above, that the relevant investor market is (at least) Europe-wide, our discussion of the risk free rate focuses on conditions in the eurozone area, as proxied by yields on German government debt. We also demonstrate that, as we would expect, the existence of a common currency zone means that yields on comparable Irish government stocks are similar to the benchmark German stocks.

Table 4.1
German Bond Yields

Bond type	Maturity	Current yield to maturity[1]	Average yield to maturity[2]
4% Bundesschatzanweisungen	14/12/01	4.263%	4.784%
4.25% Bundesobligation	18/02/05	4.404%	4.799%
5.375% Bundesrepub. Deutschland	04/01/10	4.979%	5.019%
6% Bundesrepub. Deutschland	20/06/16	5.312%	5.192%

Source: NERA analysis of Bloomberg data. 1: Current yield to maturity is as of 05/06/01. 2: Annual average, from 05/06/00 to 05/06/01

Table 4.1 indicates that the German bond market is characterised by an upward-sloping yield curve, as we would expect. Comparing current yields to the average yield over the previous nine months indicates a very slight movement in the term structure of the bond market, with the yield on short term bonds increasing slightly and yields on medium to long term issues falling. A comparison with yields over the previous six months shows that current yields have fallen by about 0.5%.

Table 4.2 presents the return on Irish government debt for similar maturities to German government issues. The return on Irish bonds shows a similar pattern to German bonds, with an upward sloping yield curve and a recent fall in returns of approximately 0.5%. This is an important observation. The parallel movements in Irish and German bonds suggests

that there are no significant short-term "institutional factors" influencing bond returns in these two markets, and thus we conclude that fundamental economic changes underlie the movements. Indeed, other eurozone countries display similar trends (see 0).

In such circumstances, there is strong theoretical preference for the current yield as a proxy for the expected risk-free rate. Thus, we assume that the appropriate return on the riskless asset in the eurozone market is the *current* yield on German 10-year Treasury bonds, equal to 5.0%.

Table 4.2
Irish Bond Yields

Bond title	Maturity	Current yield to maturity[1]	Average yield to maturity[2]	Yield at 30/6/2000
6.5% Treasury bond 2001[3]	18/10/01	4.512%	4.389%	5.029%
3.5% Treasury bond 2005	18/10/05	4.631%	4.983%	5.278%
4% Treasury bond 2010	18/04/10	4.949%	5.330%	5.487%
4.6% Treasury bond 2016	18/04/16	5.189%	5.554%	5.566%

Source: NTMA, NERA analysis of Bloomberg data. 1: As at 02/02/01. 2: Average over 11/05/99 to 02/02/01. 3: The buyback was limited to 30% of the outstandings by the NTMA for market management purposes.

4.2.2. Inflation expectations

German debt returns are denominated in nominal terms. Thus, we require a long term inflation forecast of similar maturity to calculate the real risk free rate.

Table 4.3 and Table 4.4 presents Consensus Forecasts (CF), a forecast based on a survey of a private sector and research institutions throughout Europe, and the UK's National Institute of Economic and Social Research (NIESR) long term forecasts for Germany, our eurozone proxy. The average inflation rate forecast by CF is approximately 1.7% over the period 2001-2010. The NIESR forecast for Germany is consistent with CF report, at a constant 1.7 per cent, albeit over a shorter timeframe.

Table 4.3
Consensus Forecasts Inflation Forecasts

Year	2001	2002	2003	2004	2005	2006 – 2010
Forecast	1.8	1.6	1.6	1.6	1.7	1.7

Source: Consensus Forecasts Global Outlook 2000 – 2010.

Table 4.4
NIESR Inflation Prospects

Year	2001	2002	2003-2007
Forecast	1.7	1.7	1.7

Source: National Institute Economic Review..

4.2.3. Conclusions on the value of the real risk free rate

On the basis of these forecasts, we assume that the relevant inflation rate is 1.7%. This suggests that, on the basis of the 10 year bond yields presented above, the real risk-free rate is approximately 3.2% in the context of a eurozone estimate of the cost of capital.

4.3. Equity Risk Premium (ERP)

Consistent with prevailing views amongst both academics and finance practitioners, NERA's approach to estimating the ERP relies primarily on the results obtained from the analysis of the average difference over the long term between realised returns on the market portfolio, and those on a risk free asset. NERA also follows mainstream opinion in favouring the use of the arithmetic rather than the geometric mean in deriving an average measure of returns to each type of asset. The arithmetic mean approach is consistent with the hypothesis that financial markets are efficient, with equity returns serially independent.

We begin, in section 4.3.1, by summarising the findings from analyses of historical returns. As we show in section 4.3.2, the historical findings are broadly corroborated by evidence from an alternative approach, based on ex-ante evidence on expected returns, derived either from surveys of informed market participants, or from market data on share prices and expected dividend growth. Section 4.3.3 examines recent regulatory precedent, and section 4.3.4 gives conclusions.

4.3.1. The evidence from historical returns

We have examined the available evidence on the arithmetic returns to equities and to a selection of government securities over the most recent 10 year (1991-2001) and 30 year (1971-2001) periods (Table 4.5), and over the very long term (100 years).

We focus on evidence on returns on the FTSE All Share and the S&P500 indices, both of which are mature and broadly based equity markets, with sufficient historical data to produce reasonable estimates of the risk premium. While there are other European equity markets that may be mature, such as the German DAX index, they tend to be dominated by a few large companies, and therefore are not representative of a well-diversified portfolio.

Table 4.5
10 and 30 year Equity Market Risk Premium Estimates

Sample period	Market used	Average total returns on market[1]	Average risk-free rate[2]	Equity market risk premium
10 years	FTSE all share	11.48%	7.33%	4.15%
10 years	S&P500 index	16.12%	6.23%	9.89%
Average				***7.02%***
30 years	FTSE all share	13.24%	7.33%	5.91%
30 years	S&P500	10.99%	6.23%	4.76%
Average				***5.3%***

Source: NERA analysis of Bloomberg data. 1: Equity returns defined as the average annual return on the indicated stock market. 2: The risk-free rates are calculated using an average 10 year bond yield.

Estimates of the ERP over a very much longer time period are available in the recent LBS / ABN AMRO publication[5] which reports the returns on equity markets around the world over the last 101 years, and compares them against the returns on treasury bills and bonds. The summary results, presented in Table 4.6, indicate a long term global ERP of approximately 7 per cent using arithmetic averaging.

Table 4.6
LBS / ABN AMRO estimates of the equity risk premium

	ERP relative to Bills		ERP relative to Bonds	
	Arithmetic	**Std. dev.**	**Arithmetic**	**Std. dev.**
UK	6.5%	19.4%	5.6%	16.7%
Ireland	6.7%	23.2%	6.0%	20.4%
Germany[1]	10.3%	35.3%	9.9%	28.4%
USA	7.5%	19.8%	6.9%	19.9%
World average[2]	7.5%		6.7%	

Source: LBS / ABN AMRO "Millennium Book II, 101 years of investment returns", 2001. 1: The estimates are based on 99 years of data, with 1922/3 excluded where hyperinflation had a major impact on the risk premia and bills returned –100%. 2: The countries included in this average are: Australia, Belgium, Canada, Denmark (from 1915), France, Germany, Ireland, Italy, Japan, Netherlands, Spain, Sweden, Switzerland (from 1911), UK and USA.

5 E. Dimson, P. Marsh, M. Staunton, "Millennium Book II, 101 years of investment returns", 2001

These results would suggest that whilst the estimated ERP over the past 30 years has been somewhat lower than the ERP estimated over the most recent 10 year period, the 10 year estimate, of around 7%, is remarkably similar to the average for the UK and US over the very long term.

We would interpret the historical evidence as supporting an ERP in the range of 6-7%.

4.3.2. Ex ante approach

An alternative approach described as a "full ex ante" approach, is to consider evidence on current investors' expectations of equity returns instead of evidence on historical long run outturns of equity returns.

4.3.2.1. Survey Evidence

The table below summarises the results of surveys, in both the UK and US, which have been referred to in a regulatory context. We summarise comments made on the robustness of these results.

Table 4.7
Survey Evidence Regarding Equity Risk Premium

Survey	Equity risk premium: findings	Robustness / comment
UK SURVEY EVIDENCE		
UK Strategy Forecasts at Investment banks	range of 2% - 5% reported	Range of market premia from UK strategists from SSSB, Deutsche Bank and Morgan Stanley.
NERA 1998 UK Analysis	3% – 4% mean estimate	Sample size of six analysts only. Answers show wide variation
Credit Lyonnais Securities (CLSE) 1998	2.75% - 7.2%, based on estimates on required returns on water equity	The survey did not ask investors for direct estimates of equity risk premium OFWAT/OFGEM interpreted a range of 2.7-4.2%. The LBS suggested the range could be approx. 3% higher
PriceWaterhouseCoopers (1998)	7 funds reported 2 – 3% 3 funds reported -1 - 1% 2 funds reported 6 – 8%	Polled 12 big pension fund managers in the UK on their expected market premium in the next 15 years.
MMC / Bgas 1993	3.37% - 3.5%, based on reported average 7.0% for expected equity returns.	Sample size of eight fund managers responses considered.
US SURVEY EVIDENCE		
Welch 1998 (US Financial economists)[6]	6% mean estimate	70 financial economists; estimates varied between 4% and 8%
Harvard Business review (1995)	Most corporations used 5%; M&A groups used 7% based estimates on historic rather than forward-looking data.	Best practices study among investment banks, M&A groups and 27 leading North American corporations.
Carleton and Harlow (1993), US, using database of analysts' forecasts	6.5% for period 1982 – 1990; 7.5% for period 1989 – 1993	Methodology approved in US rate setting cases
Harris and Martson (1992), US, using IBES database of analysts' forecasts	6.5% based on expected return for equity market minus long term yields on government bonds	Methodology approved in US rate setting cases

[6] Welch (1998) "Views of financial economists on the equity premium and other issues", Working paper, Anderson Graduate School of Management, UCLA, April

It is clear from Table 4.7 that the estimates of the ERP derived from US surveys are significantly higher than those shown in UK surveys. Such differences are hard to justify given that casual evidence shows stock market returns between the UK and the US to be highly correlated.

NERA would argue that more weight should be put on the US than on UK survey evidence for the following reasons:-

- First, the US data are based on much larger sample sizes;
- Second, the US data have regularly been used as evidence on the appropriate allowed cost of equity in US rate cases, and as such, have been subject to far more demanding scrutiny and testing than UK material.

The US data are broadly supportive of the estimates of an ERP of 6-7% derived from historical data.

4.3.2.2. Evidence from Price-Earnings Ratios

The so-called dividend growth model offers an alternative approach to deriving an ex-ante estimate of the ERP. The model uses market data on actual share prices and earnings per share, in conjunction with forecasts of the growth in earnings, to derive an implied cost of equity, such that:.

> *Share Price = Expected earnings/share next period / (Required return on equity – expected growth rate)*

The model thus implies that the required return on market equity (R_e) is:

> R_e = *(Expected earnings / market price) + expected earnings growth rate*;

Using this model to calculate the required return on the market index, defining the required return on the market portfolio (R_m) as the sum of the market ERP (R_m-R_f) plus the risk free rate, it therefore follows that the market ERP can be expressed as:

> $ERP = (E/P)_{MARKET\ INDEX}$ + *(expected earnings growth rate)* $_{MARKET\ INDEX} - R_f$

The approach is market-driven and uses current data.. Table 4.8 shows the implied equity premiums in the European market based on the current P/E ratios of the index, a real risk-free rate for Europe at 2.94%, and a real earnings growth rate of 4% across Europe, the latter slightly above the growth in EPS in the US since 1945. However, US GDP growth in this period was also less than growth of eurozone GDP, suggesting that the 4% per annum assumption is consistent with historical experience for the eurozone.

Table 4.8
Implied Equity Risk Premium Based on Current P/E Ratios

Index	Country	Current P/E	Implied ERP[1]
Bloomberg European 500	Europe	22.69x	5.47%
FTSE Eurotop 300	Europe	24.37x	5.50%
FTSE Eurotop 100	Europe	22.51x	5.16%

Source: NERA analysis of Bloomberg data May 2001. 1: Based on a long-term real risk-free rate of approximately 3% (based on earlier derivation of riskfree rate) and an annual earnings growth rate of 4%.

Using this methodology, the implied eurozone ERP is in the 5-6% range, slightly less than the estimate from historical returns.

4.3.3. Regulatory precedents on the equity risk premium

Recent UK regulatory estimates by Ofgem, the ORR and Ofwat of the UK equity risk premium are in the range of 3.5-5%. The Competition Commission (2000) used an equity risk premium of 4% in its review of the price limits for Mid Kent Water and Sutton and East Surrey Water. These estimates of the equity risk premium rely heavily on small sample survey evidence of the equity risk premia by CLSE (1999), NERA (1998) and other evidence from Investment Bank analysts.

The basis for the estimates of the ERP derived by UK regulators has come under considerable scrutiny by academics and industry commentators who have questioned the reliability of the survey evidence used by the UK regulators. NERA highlight a number of the main concerns:

- *Small sample biases* – Many of the surveys conducted appeared to use very small samples. The NERA (1998) survey, for example, was of six utility analysts and the answers showed a wide range of results.

- *Questionnaire biases* – it is well known that the results of surveys are sensitive to the design of the questionnaire. No evidence was provided to suggest that the structure of the surveys undertaken were sensitive to these possible biases.

- *Questionable interpretation of results* - the interpretation of the results of the surveys is also questionable. For example, Ofwat's (1998) interpretation of CLSE survey evidence led them to an estimate of the ERP of 2.4% to 4.7%. Cooper and Currie (1999) argue that other interpretations of the CLSE survey data could lead to a post tax cost of equity that is 1.7% to 2.5% higher. [7]

[7] *"(Surveys) tend to generate quite wide ranges of results and are increasingly subject to the problem that their replies have some bearing on the permitted returns in regulated industries"* MMC: Cellnet and Vodaphone p.65 (December 1998).

- *Short time horizons* - it is unclear what methodology is used by these utility analysts (and fund managers) to arrive at estimates of the ERP and, in particular, what time horizon is considered to derive these numbers. NERA would argue that an estimate of the equity risk premium based on a short time horizon is not appropriate for setting prices over a five year period.[8]

The Competition Commission and, most recently, the CAA (2001)[9] concurred that the results of survey evidence on the equity risk premium may be subject to biases that are difficult to quantify and assess. Given these concerns, the basis for the Competition Commission's and the CAA's estimate of the ERP of 4% is hard to understand since it is inconsistent with the historic data on equity returns which both the CAA and the Competition Commission state that they place greater reliance.

In the Netherlands, the electricity regulator DTe has recently published its guidelines for price cap regulation in the period from 2000 to 2003 whereby it "*considers it reasonable to fix the market risk premium between 4% and 7%*[10]". This is derived on the basis of the available data and responses from the sector. This is in line with the decision of OPTA Commission in assessing the telephone tariffs.

In the US, although the CAPM is not widely used to estimate the cost of equity, the most widely quoted source used in the rate of return cases of the equity risk premium is the Ibbotson data. The method recommended by Ibbotson is to compute, for each year, the excess of the stock market return over the long-term treasury bond yield prevailing at the beginning of that year, and then arithmetically average them over the years. The result is an estimate of 8.0%. The final adopted figures are generally in the range of 6-7%. Such estimates are based on detailed survey data from the IBES database, and historical evidence. The Table 4.9 shows an example of the ranges accepted.

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8 Short term estimates of the equity risk premium can be affected by market volatility. A number of academic studies show that the equity risk premium can vary substantially in the short term.

9 "Cost of Capital: Position Paper", CAA, June 2001.

10 "Guidelines for price cap regulation of the Dutch electricity sector in the period from 2000 to 2003", Netherlands Electricity Regulatory Service, February 2000

Table 4.9
Recent decisions regarding the equity risk premium in the US

Decision	ERP estimate	Comments
Connecticut Department of Public Utility Control Decision 98-01-02 (February 1999) for Connecticut Power & Light Company	6.52%, 5.89%	Different witnesses performed the CAPM calculation with different ERPs. These are the ERPs used in the CAPM calculations that the Commission approved of.
Maine Public Utilities Commission, Decision 97-580 (March 1999) for Central Maine Power Company	7.40% - 8.90%	The Commission uses CAPM analysis as a check on the DCF method, and employs this range of ERPS, based on witnesses' recommendations.
Public Service Commission of Utah, Decision 97-035-01 (March 1999) for Pacificorp, dba Utah Power and Light	7.8%	Use CAPM as check to DCF model.
Connecticut Department of Public Utility Control Decision 99-04-18 (January 2000) for Southern Connecticut Gas Company	6.13%	The Commission used a Risk Premium Method to check DCF. The ERP is the arithmetic average from 1974-1998.
Public Utility Commission of Oregon Order 99-697 (November 1999) for Northwest Natural Gas	8.5%	Commission chose the ERP for use in CAPM.

In recent decisions, Australian regulators have concluded that the market risk premium is most likely to lie in the range of 5.0% to 7.0%. The most recent regulatory decision by the ACCC in the price review of Sydney Airports used an equity risk premium of 6%. In the electricity sector, on the other hand, independents experts have used 6.5% in their submissions for electricity distribution pricing. In May 1999, one market practitioner noted that "[it] believes 6 per cent [equity risk premium] to be a reasonable, if not conservative, estimate[11]".

4.3.4. NERA conclusions on the equity risk premium

NERA believes that – compared to the rather weak UK survey evidence - more weight should be attached to estimates of the ERP based on historic data and market based evidence such as that derived by analysis of P/E ratios, and worldwide evidence such as that used in US rate cases.

On this basis our best estimate of the equity risk premium applicable to Aer Rianta is 6 per cent. This is consistent with world estimates of the equity risk premium, and the

[11] Grant Samuel & Associates Pty Ltd, Valuation of Cultus Petroleum NL in relation to the takeover offer by OMV Australia Pty Ltd.

methodology used to derive these estimates is consistent with best international regulatory practice, such as that observed in the US and Australia.

4.4. Estimating Beta

CAPM theory states an investor holds a diversified portfolio of assets, and thus the *specific risk* associated with each company is "diversified away". An asset's return is therefore related only to the asset's *covariant* risk with the market portfolio, that is, the degree of co-movement between the company's returns and the market returns. The degree of co-movement is measured by an asset's beta.

AR's beta is dependent on the nature of the regulatory regime. For a single till regime, the appropriate beta relates to the covariance of all of Aer Rianta's activities, both aeronautical and non-aeronautical with market returns. A dual till beta relates to the covariance of cash-flows from aeronautical activities only with market returns. Our approach to estimating Aer Rianta's beta is to first estimate a beta for a single-till regulatory regime, and then base our beta estimate for a dual-till regime on the estimate for a single-till, by considering the relative riskiness of Aer Rianta and comparator companies' non-aeronautical activities. This is the logical way to present the evidence for Aer Rianta's beta, because the primary evidence is BAA's observed equity beta that reflects the riskiness of BAA as a single till business.

4.4.1. Estimating a Single Till beta

The first step in measuring a company's covariant, or beta risk, is to regress the return to a company's shares against the return to an appropriate market index. The resulting estimate of the equity beta is then adjusted to take account of gearing, to derive an estimate of the ungeared or asset beta.

There are three significant practical difficulties in estimating an equity beta for Aer Rianta.

- First, since Aer Rianta is an unquoted company and therefore its equity beta is not observed, which comparator companies should be used as proxies for its equity beta?
- Second, over what timeframe should the equity betas for comparator quoted companies be estimated?
- Third, what adjustments should be made to betas for comparator companies to reflect possible differences in covariant risk between Aer Rianta and the comparators arising from the nature of their activities, and differences in demand and cost conditions?

4.4.2. The choice of comparators

In total, there are only six quoted airport operators, five of which are in Europe (BAA, Copenhagen, Rome, Vienna and Zurich), as well as Auckland in New Zealand. Some of these companies are better comparators than others. Although, we would expect companies in the same economic sector to have broadly similar covariance of returns with the market, there are other factors that influence a company's beta. Among the most important are, the balance of aeronautical to non-aeronautical activities, and the type of regulatory regime. A price cap regulatory regime implies greater systematic risk than a negotiated or cost plus regime that offers greater opportunities to pass costs through to consumers and protect the regulated company's earnings.

To estimate a beta for Aer Rianta, therefore, we restrict our analysis to BAA. This approach acknowledges that BAA has a similar balance of aeronautical to non-aeronautical revenues, and is subject to a price-cap regulatory regime, until now of the single till variety. However, we also recognise that there are still differentiating factors between BAA and Aer Rianta that imply different levels of systematic risk. The main differentiating factors are, the higher proportion of non-aeronautical revenues at Aer Rianta, and the different composition of the passenger base. We discuss the implication of these differences for Aer Rianta's relative equity beta in Section 4.4.4.

4.4.3. The appropriate estimation timeframe

There are two key issues that are relevant to the estimation period.

- the "economic relevance" of the estimation period to the expected operating environment over the next control period; and
- the need for a sufficiently long time period to ensure the regression results are robust.

4.4.3.1. Economic relevance

Figure 4.1 shows beta value for BAA for a rolling period of five years, from 1989 to 2001. This clearly indicates the relatively stable behaviour of BAA's equity beta over time, prior to a sharp fall in its value towards the end of the 1990's. The decline in BAA's beta reflects a general downward trend of utility betas, typified by the experience of companies in the power sector (Figure 4.2).

Figure 4.1
Time Series of BAAs Asset Betas

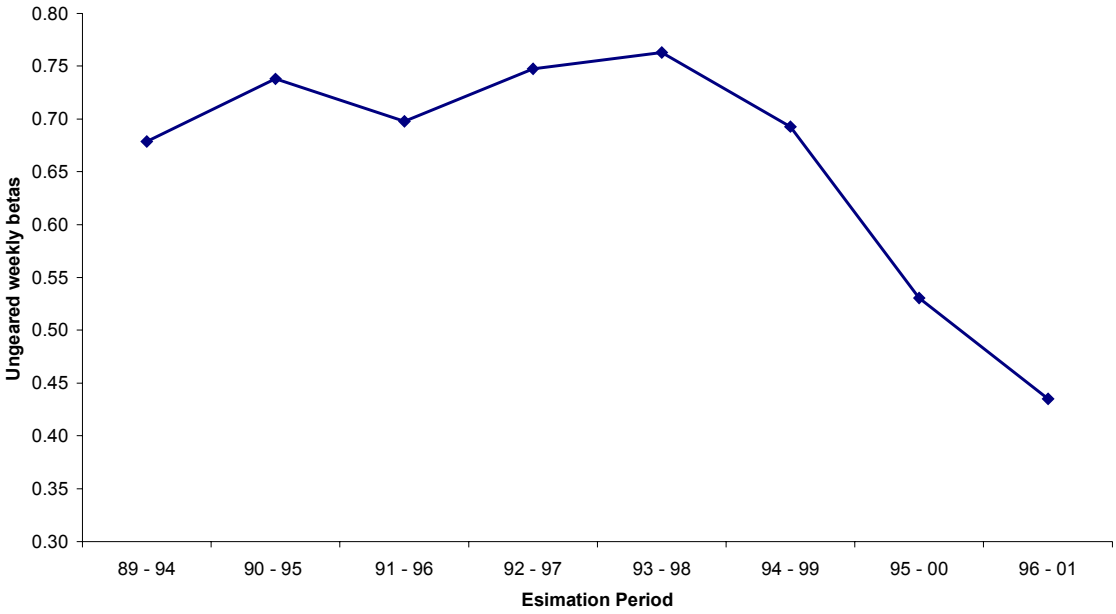
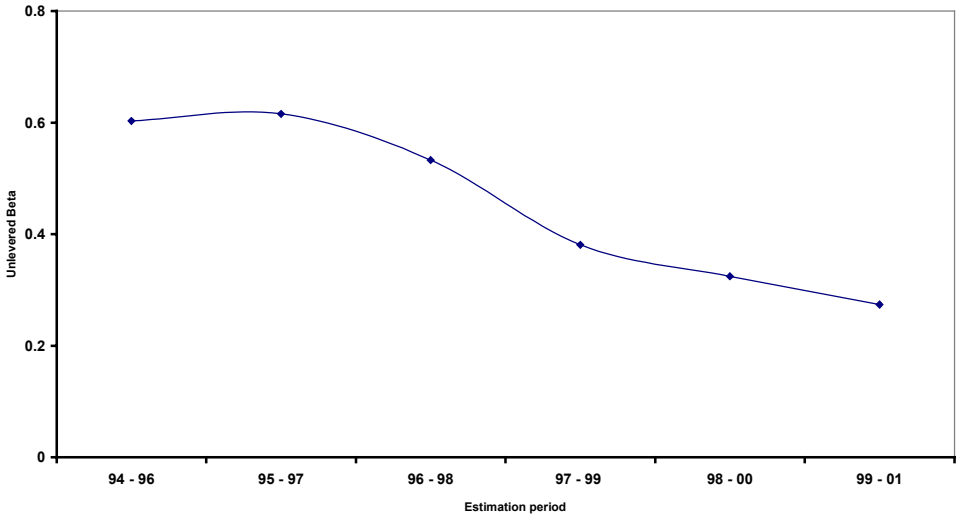


Figure 4.2
Composite Beta Trend for Power Utilities[12]



There are a number of factors that have been put forward to explain the decline in utility betas, including:

[12] The companies represented in the composite beta calculation are: Veridian Group Plc; Sondel - Societa Nordelettrica SpA; Iberdrola SA; Endesa SA; National Grid Plc; Powergen; and, Union Electrica Fenosa SA.

- *A decline in the level of regulatory risk* :- this view was put forward by Ofwat in its 2000 price determination. However, there is no reason to suppose that a change in the regulatory environment should affect non-diversifiable risk and hence the equity beta value.

- *Excess volatility in the market*:- Cooper and Currie (1999), among others, have observed that recent estimates of beta are biased downwards as a result of the high volatility of capital markets in the recent past. As a consequence of this volatility, there is a "flight to quality", including utility stocks, that results in a lower correlation of these stocks with the market portfolio.

- *Changes in the composition of the market portfolio*:- OXERA recently argued that changes in the market portfolio with increased levels of high risk technology stocks has caused the overall level of market risk to increase and the *relative* level of utility risk to decline. However, if this explanation is correct, we would expect the overall market risk premium to increase (to reflect the higher risk associated with the market portfolio). This would potentially offset the fall in beta values.

- *Effect of changes in gearing*: As we discuss below, asset betas are not observed, but are derived from equity betas by applying an adjustment factor, to reflect the effect of gearing, such that equity betas should increase with the level of gearing if the underlying business risk is unchanged. In fact, utility equity betas have been reasonably constant since 1997 despite an increase in the gearing of utility firms. This has led some observers, such as SBC Warburg, to argue that the gearing adjustment suggested by orthodox finance theory might not apply if the starting level of debt was low, as has typically been the case.

It is important to distinguish between those causes that would result in a permanent change in the cost of equity finance, and those that leave the cost of equity unchanged. It appears from the proposed range of possible reasons for the decline that only a reduction in the level of regulatory risk would result in a permanent fall. The other causes either involve what we would expect to be temporary phenomena, or involve compensatory changes in the equity risk premia, and therefore leave the cost of equity finance unchanged.

However, given that Aer Riantas regulatory environment is only now being established, Aer Riantas cost of equity finance would not benefit from the market's perception that regulatory risk has declined, the only explanation that suggests the decline in beta values is permanent. Therefore, we suggest the most "economically relevant" period for beta estimation is the period from privatisation to the end of 1998, prior to the general fall in utility beta values.

4.4.3.2. Ensuring robust estimates

To ensure that our estimates are statistically significant we consider evidence on company and market returns over a long run period using monthly time intervals. We regress each

company's return against a broad-based European index, consistent with our overall approach of calculating Aer Rianta's beta in the context of a European market.[13]

4.4.3.3. Adjusting equity betas

There are two "technical" adjustments that need to be made to the regression (or raw) betas to ensure they are comparable. The first adjustment takes into account the biases in the raw beta. A further adjustment is then required to convert equity betas to asset betas. This adjustment involves calculating the "unlevered" beta of the company, defined as the value of beta for the company on the assumption that the company holds no debt. To estimate Aer Rianta's cost of equity we then have to "re-gear" the unlevered beta to accord with Aer Rianta's expected capital structure.[14]

Finance theory offers two alternative approaches to deriving an asset beta from the observed equity beta, each approach reflecting a different view on the relative value of a company's debt shield. These are:

Modigliani-Miller (MM) equilibrium: $\beta_{equity} = \beta_{asset} (1+(1-T_c)/(1-T_s)*(D/E))$

Miller equilibrium: $\beta_{equity} = \beta_{asset} (1+(D/E))$

where Tc is the corporate tax rate, Ts is the imputation tax credit rate, D represents a company's debt, and E represents a company's equity.

In short, the MM beta-gearing relationship is based on the assumption that debt offers a tax shield, whereas equity is subject to corporation tax. Miller subsequently proposed that personal taxes on debt offset the effect of the corporate tax shield and therefore there is no advantage to debt. In practice, the Miller adjustment implies a higher asset beta than the MM adjustment for any given observed equity beta, although the differences are minimal in a low corporation tax environment such as Ireland's. To derive asset betas from equity betas we use an average of the two formulae.

4.4.3.4. Empirical results

Table 4.10 presents our preferred beta values, estimated from 1991, the start date of our preferred European index, to the end of 1998, prior to the general fall in utility betas.

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[13] The Dow Jones STOXX (Price) Index is a broad capitalisation-weighted index of European stocks that duplicates the Dow Jones Global Indexes European Index, consisting of 600 individual stocks.

[14] As a company issues more debt, the prior claim on a company's earnings, i.e. the fixed interest costs on debt increases, increasing the volatility of the residual profit and increasing a company's beta. This is referred to as "financial risk". Because observed betas reflect both "business risk" and "financial risk", betas of companies with different financial structures are not directly comparable.

Table 4.10
BAA Long Term Asset Beta Value[1]

	Estimation period[1]	Asset beta value
BAA	31/12/91 – 31/12/98	0.67

Source: NERA analysis of Bloomberg monthly data. 1: The Dow Jones European index was created on 31/12/91, and for this reason the BAA estimates can only start from end of 1991.

4.4.4. Differentiating Factors

We would expect Aer Rianta's beta to differ from the observed beta for BAA because of the higher proportion of non-aeronautical activities in Aer Rianta's total revenues, as well as significant differences in the composition of their respective passenger profiles. By comparing Aer Rianta's operating characteristics with BAA, we can assess whether its beta is likely to be higher or lower than the observed quoted betas. We consider the following factors:-

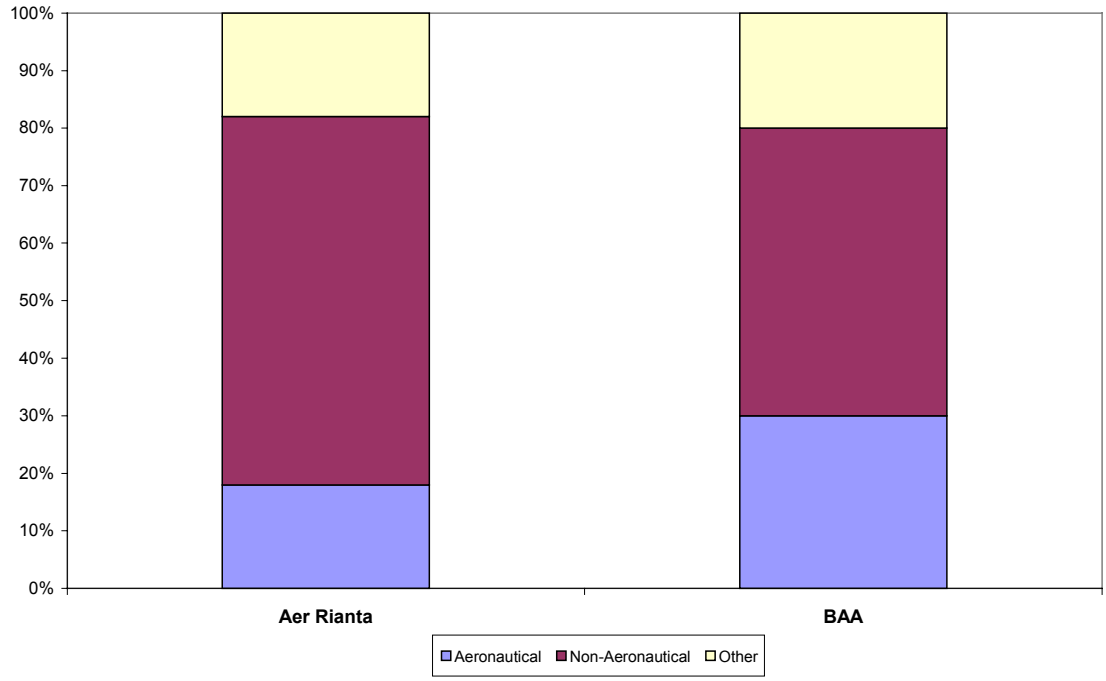
- The composition of revenue.
- Traffic mix
- Cost structure.

4.4.4.1. The composition of revenue

Airport operators' derive revenues from aeronautical and non-aeronautical operations. Aeronautical activities, which cover the provision of airside services, such as aircraft take-off and landing, aircraft parking, passenger processing, and, in some cases, ground handling services, tend to have lower covariant risk than non-aeronautical, or commercial, aspects of an airport's operations. These commercial activities consist largely of terminal retail developments and airport car parking, and exhibit similar risk characteristics to retail companies. Thus, the higher the proportion of non-aeronautical assets in a company's total asset base, the higher the beta, all other things equal.

We have therefore compared the proportion of revenue Aer Rianta derives from its aeronautical business compared to its non-aeronautical side, with the relative balance at BAA. The results of this analysis, shown in Figure 4.3 below show that Aer Rianta derives a higher proportion of its revenues from non-aeronautical revenues than BAA (which, like Aer Rianta has a highly developed airport retailing line of business). This evidence alone would suggest that Aer Rianta's asset beta should be higher than BAA's.

Figure 4.3
Relative Contribution of Activities to Revenue Base[15]



4.4.4.2. Demand risks

The level of covariant demand risk to which an airport operator is exposed vary according to the airport's passenger mix, since some types of traffic are more sensitive than others to changes in GDP. In Australia, the ACCC has made extensive use of the differences in passenger profiles between Australian airports in setting airport betas. The Commission's approach has been to use estimates of the income elasticity of demand for different categories of journey (business, leisure, international, domestic), in conjunction with data on the shares of each category at particular airports, to produce measures of the relative demand risk faced by different airport operators. The higher the weighted income elasticity, the greater the relative demand risk, and hence the higher the asset beta, all other things equal.

The ACCC concludes that:

- International travel is more sensitive than domestic travel;
- Leisure travel is more sensitive than business; and

[15] Source: Warburg Dillon Read, Report to the Minister for Public Enterprise and the Minister for Finance, December 1999.

- Outbound travel (travel by nationals) is more sensitive than inbound (travel by foreigners).

We have data disaggregating Aer Rianta and BAA's passenger base by international and domestic travel, and leisure and business travel. As Table 4.11 shows, Aer Rianta has a higher proportion of both international and leisure passengers, the more "income sensitive" passenger groups. This suggests Aer Rianta's beta is higher than BAAs.

Table 4.11
Passenger Profiles for Aer Rianta and BAA[16]

Airport Operator	Domestic (%)	International (%)	Business (%)	Leisure (%)
Aer Rianta	5	95	25	75
BAA	11	89	35	65

There are other factors than passenger profile that determine a company's demand risk. In particular, airports where there is excess demand, and that are capacity constrained, are less vulnerable to the economic cycle than less busy airports. This factor further suggests that Aer Rianta has higher systematic risk than BAA, whose London airports are severely capacity constrained.

4.4.4.3. Cost risks

Operating leverage is a key determinant of a company's beta. Formally, this is the percentage change in total costs associated with a percentage change in output. Intuitively, it measures the degree to which costs are fixed, and therefore non-variable with revenue. The higher the proportion of fixed costs, the more volatile are earnings, and the higher the asset beta.

Unfortunately, even proxy measures for operating leverage, such as capital costs divided by operating costs, are difficult to compare across countries, because of differences in accounting practices, which we have been unable to resolve in the time available. Analysis of airport cost drivers would suggest that capital inputs per passenger would be higher for international than domestic traffic, and for business passengers than for leisure passengers. As we have seen, compared to the comparators, Aer Rianta has a relatively high proportion of international traffic, but it also has a relatively small proportion of business traffic.

4.4.4.4. Conclusions

Our analysis of the business factors likely to be the source of inter-airport differences in asset betas suggests that Aer Rianta's asset beta should be significantly higher than BAA, on the

[16] World Airports Comparative Data, 1999.

basis that it has a more income sensitive passenger base, and a larger proportion of earnings from more risky non-aeronautical activities.

4.4.5. Regulatory Precedent (Single till)

In the UK, both BAA's south east airports and Manchester Airport are subject to single-till price regulation that can inform our estimate for Aer Rianta's single-till beta.

The most recent reviews of BAA and Manchester Airport were conducted by the Monopolies and Mergers Commission (MMC) in 1996 and 1997. With respect to BAA, the regulator determined that the appropriate level for BAA's *equity* beta was in the range 0.7 to 0.9. The lower bound was set by the beta of US utilities subject to rate of return regulation, and therefore considered less risky, with the upper bound set by the view that utilities were less risky than the market portfolio. It also invoked evidence from BAA's market beta, which varied in value according to the exact timeframe and data set, but was consistent with this range. The MMCs central estimate of the implied asset beta is approximately 0.67[17].

Manchester Airport (MA) is unlisted and therefore the MMC could not use direct beta evidence. Thus, the MMC set the cost of capital using BAA as a benchmark, and then adjusted this value for the perceived greater riskiness of Manchester's operations. The factors contributing to Manchester's greater riskiness were, according to MMC, MA's greater dependence on charter traffic, the weaker demand of scheduled airlines, particularly compared to BAA, and the lower profitability of scheduled operators. However, MMC adjusted the overall cost of capital to account for these risk factors, rather than explicitly revising the beta value upwards.

There are two key conclusions to draw from UK price review:

- MMC set Manchester's systematic risk in the context of a comparable quoted company (BAA);
- MMC then made adjustments to BAA's quoted betas to reflect the different operational characteristics of Manchester airport.

Table 4.12
Recent regulatory decisions on asset beta

Regulator	Company	Asset beta	Comments
MMC (1997)	BAA	0.67	Set partly on basis of BAA market data
MMC (1997)	Manchester Airport	> 0.67	Cost of capital set relative to BAA

Source: MMC Reports

[17] See Cost of Capital, Position Paper, June 2001, CAA.

4.4.6. Conclusions Regarding a "Single- till" beta

As we have set out above, we think that it is most appropriate to estimate Aer Rianta's beta based mainly on evidence of BAA's observed beta estimated over a long timeframe up until the end of 1998, prior to the most recent period where there is widespread evidence that beta estimates have destabilised, mainly, NERA believe because of the internet and technological changes in the stock market compositions.

NERA consider that an adjustment to BAA's beta is appropriate to take account of the different operating characteristics of Aer Rianta. Our analysis suggests:

- Aer Rianta has a higher proportion of non-aeronautical operations than BAA. Activities such as retail tend to have a higher asset beta than aeronautical operations, often close to unity.
- Aer Rianta has a higher proportion of international and leisure traffic relative to BAA. These passenger groups tend to be sensitive to changes in income, which translates into a relatively higher beta. In addition, Aer Rianta is not capacity constrained to the extent of BAA's south east airports. This also increases its relative demand risk.

Thus, Aer Rianta's operating characteristics suggest its beta value is greater than BAA's long term average of 0.67. We also note regulatory precedent. At the last price review MMC set an asset beta of 0.67 for BAA, and implicitly assumed a higher beta for Manchester. On this basis, our best estimate of Aer Rianta's single-till beta is 0.75.

4.4.7. Estimating Aer Rianta's "Dual till" Beta

There are a no quoted "pure" aeronautical companies, and therefore we cannot estimate Aer Rianta's dual-till beta by observing an equity beta for a comparable company. We therefore take two alternative approaches to estimating Aer Rianta's dual till beta. These are:

- "extracting" Aer Rianta's dual till beta from our single-till estimate by examining the systematic risk of its non-aeronautical activities; and,
- by looking at regulatory precedent for dual-till regimes.

We consider each of these below.

4.4.7.1. Extracting a dual-till estimate from Aer Rianta's single-till beta

In theory, Aer Rianta's dual till beta should be equal to its single till estimate, minus the beta risk associated with its non-aeronautical activities, weighted by the expected contribution of each of these activities to overall profits.

AR's predominant non-aeronautical activities are airport retail, property and to a lesser extent, car parking. If we can estimate betas for these activities, then it is simple to calculate Aer Rianta's dual till beta estimate from our single till estimate. However, there are a number of problems with undertaking this approach formally:

- We only have inexact comparators for Aer Rianta's non-aeronautical activities. For example, there are no quoted "airport retail" businesses or quoted property businesses with a similar portfolio. Instead, we can only observe betas for general high-street retailers or general property companies. These companies, because they have a different customer base, can display significantly different levels of systematic risk.

- The actual contribution of each activity to group profits is difficult to calculate because of common costs. Moreover, weightings of each beta should be based on the *expected* contribution of the activity to overall profit rather than the actual contribution.

For these reasons, we believe that to calculate Aer Rianta's dual till formally on the basis of its single till value, would lend spurious accuracy to the figure. Instead, we base our estimate of Aer Rianta's dual till beta value on the following observations:

- We would expect Aer Rianta's non-aeronautical activities to display higher systematic risk than the aeronautical side of its business. In particular, (general) retail activities are often assumed to have a beta close to unity (because retail returns are driven by consumer expenditure which is highly correlated with the market portfolio).

- However, the underlying determinant of demand for the non-aeronautical side of the business is the same as for the aeronautical side, i.e. passenger volumes. Therefore, we would expect the riskiness of Aer Rianta's commercial operations to be relatively close to the riskiness of volume related revenues for the aeronautical business.

- The systematic risk of a business is not only determined by demand conditions, but costs conditions. On the cost side, we would expect the cost fixity of retail services to be lower, leading to lower systematic risk than aeronautical services, all other things being equal.

On the basis of these qualitative arguments, we believe that the non-aeronautical services will display only slightly higher systematic risk than the aeronautical services, and therefore the asset beta for a dual till operation will be very close to the asset beta for a single till business.

4.4.7.2. Regulatory precedent (dual till regimes)

The Australian Consumer and Competition Commission (ACCC) has recently conducted price reviews for Adelaide, Brisbane, Perth, Melbourne, Canberra and Sydney in the context of a dual till operation. All of these companies are unquoted and thus the ACCCs approach is of particular relevance for the process in Ireland.

Adelaide was the first airport to be subject to the ACCCs price review process. The rate of return on its capital base was set according to four quoted benchmarks, Copenhagen, BAA, Vienna and Auckland. Subsequent airport betas were then set according to the relative risk of their operations compared to Adelaide (as discussed in Section 4.4.4.2). Although the ACCC's approach lacks transparency, it appears "relative risk" has been measured exclusively in terms of the passenger profile at each airport. We believe that this approach is seriously incomplete, and would suggest that relative covariant riskiness should be assessed by reference to a wider set of factors, as discussed in section 4.4.3 above.

We also note that the ACCC's final determination does not appear to explicitly adjust its beta estimates for the nature of the regulatory regime in the case for Adelaide, Brisbane, Perth and Melbourne, although the ACCC's final determination for Sydney airport refers to the importance of the regulatory regime[18]

As Table 4.13 sets out, the ACCC has determined that the asset beta under a dual till regime lies in the range of 0.6 to 0.7. As stated above, the differential is largely accounted for by the differences in passenger composition. Unfortunately, we do not have a sufficient break-down of the Australian airports' passenger base to compare their relative risk with respect to Aer Rianta.

Table 4.13
Australian Regulatory Precedent (Dual till Regime)

Regulator	Company	Asset beta	Comments
ACCC (1999)	Adelaide Airport	0.61	Based on Copenhagen, BAA, Vienna and Auckland betas
ACCC (2000)	Brisbane Airport	0.7	Set relative to Adelaide
ACCC (2000)	Perth Airport	0.7	Set relative to Adelaide
ACCC (2000)	Canberra Airport	0.65	Set relative to Adelaide
ACCC (2000)	Melbourne Airport	0.7	Set relative to Adelaide
ACCC (2001)	Sydney Airport	0.6	Set relative to Adelaide

[18] ACCC, Sydney Airport Final Determination, p156, 2000.

4.4.7.3. Conclusions regarding Aer Rianta's dual-till beta

It is possible to determine Aer Rianta's dual till beta on the basis:

- adjusting its single till beta using qualitative evidence regarding the systematic risk of its non-aeronautical activities; and,
- by invoking regulatory precedent.

We do not think that it is possible formally to derive Aer Rianta's dual till beta from its single till estimate, because of the absence of close proxy companies for its non-aeronautical services. We believe that a qualitative assessment of the relative beta risk of these activities, supported by Australian regulatory precedent, suggests that non-aeronautical activities display only marginally more systematic risk than the aeronautical side of the business. NERA's best estimate of Aer Rianta's beta for a dual till regulatory system is 0.70.

4.5. Conclusions on the Cost of Equity for Aer Rianta

Bringing together the discussion in sections 4.2, 4.3 and 4.4, Table 4.14 summarises NERA's recommended values for the three key parameters of the cost of equity for Aer Rianta.

Table 4.14
Cost of Equity Parameters

	Single till	**Dual till**
Real risk free rate	3.2%	3.2%
Equity risk premium	6%	6%
Asset beta	0.75	0.70

5. THE COST OF DEBT AND GEARING

5.1. Introduction

The cost of debt can be expressed as the sum of the risk free rate and the company specific debt premium. As explained in section 3.4, the debt premium will reflect both the level of business riskiness and financial riskiness of a company. As a company's gearing increases, the debt premium will normally increase to reflect an increase in the financial riskiness of the company.

Although the Irish Treasury does not formally extend a sovereign guarantee to Aer Rianta's debt stock, it seems likely that the company's credit rating, and hence its cost of debt, are likely to reflect its SOE status.

NERA's approach to estimating a cost of debt and optimal gearing for Aer Rianta is to consider market based evidence on the costs of debt for Aer Rianta comparator companies. Specifically, NERA consider both the actual observed costs of debt of the comparators and the relationship between the cost of debt finance and a company's capital structure.

NERA's estimate of the cost of debt and optimal gearing for Aer Rianta are based on the assumption that Aer Rianta must maintain at least a single A credit rating status in order to be able to raise finance for its capital investment programme in all economic conditions.

In developing estimates of Aer Rianta's cost of debt and gearing to assess a WACC, we have taken account of the following factors:-

- Capital structure and market based costs of debt of Aer Rianta comparator companies.
- Evidence on the cost of debt for other European utilities with a credit rating of Single A.
- Recent regulatory precedent.

5.2. Market Based Evidence on the Cost of Debt and Gearing for Aer Rianta Comparator Companies

5.2.1. Comparator's Capital Structure

Table 5.1 presents actual market gearing ratios for our comparator set of airport operators. This shows that the gearing decisions of the quoted companies are quite close, ranging from 22% (Auckland) to 33% (BAA). We exclude Rome and Vienna airports that do not have any debt on their balance sheet. Taking an average of these four comparators, suggests an optimal capital structure for Aer Rianta of approximately 30 per cent.

However, we would expect this to be an upper limit. Companies take on debt because interest payments can be offset against their corporate tax liability- the "tax shield" effect. Obviously, a company that operates in a lower tax environment has less incentive to increase debt, because the relative value of the tax shield is lower. Table 5.1 also presents corporation tax rates for our comparator companies. Although, Aer Rianta's corporation tax situation is uncertain, its upper limit is 25 per cent, this is clearly less than the tax liabilities of our comparator set. We therefore suggest that a gearing level of 30 per cent debt represents an upper limit.

Table 5.1
Comparator Gearing Ratios

Company	Gearing (Debt/ Debt + market cap)	Corporate tax rate (%)
BAA	0.33	30
Aeroporti di Roma SPA	0	41.25
Kobenhavns Lufthavne	0.30	25
Flughafen Wien AG	0	34
Unique Zurich Airport	0.31	25.1
Auckland International Airport Ltd	0.22	33

5.2.2. Evidence on the Cost of Debt

We present evidence for Aer Rianta's cost of debt by looking at similarly rated companies, in the range to AA to BBB+. These data are shown in Table 5.2. This shows an average spread of approximately 130 bps for BAA that enjoys a slightly better (AA-) rating than Aer Rianta.

Bond ratings for single A credit ratings are in the range of 105 to 150 bps, although the lower end of this range appears to be dominated by relatively short term debt. We are interested in medium to long term debt issues, consistent with the term of our CAPM assumptions. Scottish Power is a useful comparator. It has a number of debt issues with differing maturities, with an average term of approximately 16 years. Taking an average of these debt issues, which ensures that no single debt issues unduly influences the result, suggests a single A company can raise debt at approximately 150 bps above the risk-free rate.

Table 5.2
Bond issues by utility companies in the European market

Company	Issue date	Matuirty date	Coupon	Gearing (debt / market cap)	Credit rating	Spread over government security	Weighted average
European market							
Vodafone Group Plc	27/10/1999	27/10/2006	5.75	0.03	A	105.3	105.3
Kelda Group Plc	26/07/1999	26/07/2006	5.25	1.37	A /*-	112.1	112.1
AWG Plc	02/07/1999	02/07/2009	5.375	1.31	A-	143.7	143.7
British Telecommunications Plc	15/02/2001	16/02/2004	5.625	0.14	A /*-	127.0	149.8
	15/02/2001	15/02/2006	6.125		A /*-	172.6	
UK market							
BAA Plc	10/02/1997	10/02/2007	7.875	0.49	AA-	84.0	133.2
	28/02/1991	31/03/2016	11.75		AA-	141.9	
	31/01/1996	29/03/2021	8.5		AA-	148.7	
	04/08/1998	04/08/2028	6.375		AA-	157.8	
Scottish Power Plc	12/08/1998	26/11/2004	6.63	0.54	A /*-	83.3	149.8
	13/02/1998	13/02/2008	6.715		A /*-	113.5	
	04/08/1999	14/01/2010	6.625		A /*-	147.1	
	20/02/1997	20/02/2017	8.375		A /*-	174.3	
	29/05/1998	29/05/2023	6.75		A /*-	184.0	
	09/12/1999	09/12/2039	5.75		A /*-	195.4	
British Energy Plc	11/06/1999	25/03/2003	5.949	0.81	BBB+	99.5	152.8
	11/06/1999	25/03/2006	6.077		BBB+	156.5	
	11/06/1999	25/03/2016	6.202		BBB+	202.0	

Source: NERA analysis of Bloomberg data.

We also need to consider how a change in Aer Rianta's credit rating might affect its cost of debt. The data in Table 5.2 suggest that there is no clear relationship between credit ratings and debt spreads across the range of issues that are considered. This is mainly because bond spreads also depend on a number of factors such as coupon, maturity, yield and the presence and type of embedded covenants. For a more accurate comparison of debt spreads, we have compared spreads for specific bonds with similar maturities. As Table 5.3 shows, a decrease in credit rating of one notch from A- to BBB+ might increase debt spreads by approximately 40 basis points.

Table 5.3
Comparison of Holding Company Debt Yields

Rating	Company	Coupon	Maturity	Yield	Spread
A-	Vodafone Group plc	7.625%	2005	6.149%	142
BBB+	United Utilities	6.25%	2005	6.604%	187

Source: NERA analysis of Bloomberg data

A survey by NERA of financial analysts, undertaken in December 1998, asked what average debt spreads were expected over the period 2000 to 2005 for UK utilities, at different S&P's credit ratings. Our survey showed that the average *expected* difference between a single A rated company and a BBB rated company in expected debt spread would be roughly 50 basis points. This expected premia reflected no specific debt maturity. Respondents to the survey also made the point that many investors cannot buy BBB rated corporate bonds since this is outside their investment criteria. This increases the cost of BBB rated debt in adverse market conditions.

5.2.3. Regulatory Precedents

The best estimate of the future cost of raising debt finance changes over time to reflect changing market conditions and economic cycles. For this reason, previous regulatory decisions in Ireland, the UK and Worldwide on the cost of debt for utilities have little relevance to the best estimate of the "market" cost of debt for Aer Rianta.

There are also few direct regulatory precedents relevant to Aer Rianta's optimal gearing. Perhaps the most relevant is the MMCs decision for BAA, as BAA is subject to a single till regulatory framework. In its 1997 price review MMC concluded that a gearing level (D/ D+E) of 30 per cent was appropriate, based on actual observed levels of gearing over the previous control period.

More widely, UK utility regulators have recently considered the issue of optimal gearing level for other types of utility companies:

- In the 1999 Price Review Ofwat estimated an optimal gearing of 50% for UK water companies;

- In the 2000 price review Ofgem estimated an optimal gearing of 50% for REC Distribution companies;
- In the 200 price review for NGC, Ofgem concluded that NGC's "optimal" gearing ratio lay in the range of 60 to 70 per cent.

It can be assumed that the optimal gearing for Aer Rianta is below the optimal gearing for water and electricity companies on the basis that such companies have more stable cash flows and hence are able to raise debt finance, and retain strong credit ratings, more easily at higher levels of indebtedness.

5.2.4. Summary

Overall, NERA consider that an assumed market gearing of 30% seems appropriate for Aer Rianta. This is consistent with available evidence market gearing ratios for comparator companies, as presented in Table 5.1, which shows a range from 22% to 33%, with an average of approximately 30%. An assumed gearing of 30% is also consistent with regulatory precedents, most notably the 1997 MMC on BAA where a gearing ratio of 30% was used.

Our conclusions regarding Aer Rianta's debt costs are based on the assumption that a gearing ratio of 30% will allow Aer Rianta to maintain a single A credit rating. Table 5.2 presents a range of recent debt issues by European utilities. On the basis of this evidence NERA consider that a best estimate of the cost of debt for a single A rated company is approximately 150 bps above the riskfree rate.

6. TAXATION

6.1. Introduction

There has been considerable academic and regulatory debate worldwide surrounding the use of pre- or post-tax formulations of the rate of return, the appropriate conversion formula and the application of statutory or effective tax rates. In principle this stems from:

- A fundamental tension between regulation on the basis of RPI-linked real revenues and a taxation system which operates in nominal terms; and
- Differences in timing between the depreciation allowed for taxation and that allowed for regulatory purposes.

The effects of these two factors means that the use of a simple formula to take account of taxation in converting from a post tax WACC to a pre-tax WACC is only an approximation of the actual effects of inflation. Even if the second effect is ignored the impact of inflation in a RPI-lined revenue regime is sufficiently complex since rising price levels cause real taxable income and regulatory return on equity to diverge in two, potentially offsetting, ways. Essentially, inflation drives a wedge between:

- depreciation allowed for regulatory purposes and depreciation allowed for taxation purposes; and
- nominal interest rates (which are fully deductible for tax purposes) and real interest rates (which is the true cost of debt used in determining regulatory profits).

The level of inflation will determine to what extent these two effects are material.[19]

Three formulas have been used by regulators to convert a nominal post tax WACC into a real pre tax WACC. The nominal post tax WACC is defined as

Nominal post tax WACC = Re(nominal)*E/V + (1-t)*)Rd(nominal)*D/V ***(1)***

This is the post tax cost of capital recognising that nominal debt costs are tax deductible and should therefore be reduced in proportion to corporate tax rate (t). Where Re is the post tax cost of equity; E is equity; V is total value defined as debt plus equity; D is debt; Rd is the pre tax cost of debt. We define the approaches that have been used by regulators to convert a nominal post tax WACC into a real pre tax WACC as follows:

[19] Neither of these effects applies in a regulatory framework based on nominal returns on a historic cost asset base

6.2. Approach 1: The "Macquarie" Approach

Approach 1, known in Australia as the Macquerie approach[20], converts a nominal post tax WACC to a real pre tax WACC as follows:

- **Step 1**: Convert nominal post tax "net of debt tax shield" WACC to real post tax WACC by adjusting for inflation using Fisher equation.
- **Step 2**: Convert real post tax WACC to real pre tax WACC by adjusting for the statutory tax rate.

Note that in this case, the post tax WACC is defined as a weighted average of the cost of debt net of debt shield and the post tax cost of equity.[21] The "Macquarie Approach" defines the real pre tax WACC in terms of the nominal post tax WACC as follows:

$$\textit{Real Pre Tax WACC}_{\textit{Macquarie}} = (\textit{Nominal Post Tax "Vanilla" WACC} - I)/((1+I)*(1-t)) \quad \textbf{(1)}$$

Where I is the inflation rate; t is the corporate tax rate.

6.3. Approach 2: The "MMC" Approach

Approach 2 is known in the UK as the "MMC" Approach.

- **Step 1**: Converts the nominal post tax return on equity and the nominal pre tax return on debt to their real counterparts
- **Step 2**: Convert the real post tax return on equity to real pre tax return on equity by adjusting for the statutory tax rate

The "MMC Approach" defines the real pre tax WACC in terms of the nominal post tax WACC as follows:

$$\textit{Real Pre Tax WACC}_{\textit{MMC}} = (\textit{Nominal Post Return on Equity} - I)/((1+I)*(1-t))* E + (\textit{Nominal Pre tax Return on Debt} - I)/(1+I)* D \quad \textbf{(2)}$$

Where I is the inflation rate; t is the corporate tax rate; E is the proportion of equity; D is the proportion of debt.

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[20] Macquerie Risk Advisory Services (1998) "The Appropriate Level of Taxation to Apply for Gas Distribution Businesses in Conjunction with the CAPM models in the Determination of Regulated Use of System Charges" Submission to the ORG.

[21] This is the post tax cost of capital recognising that nominal debt costs are tax deductible and should therefore be reduced in proportion to corporate tax rate (t).

6.4. Approach 3: The "Historical" (or "CSFB") Approach

Approach 3, known (mainly) in Australia as the CSFB[22] or Historical approach, converts a nominal post tax WACC to a real pre tax WACC as follows:

- **Step 1** Convert nominal post tax "net of debt tax shield" WACC to nominal pre tax WACC by adjusting for the statutory tax rate.
- **Step 2**: Convert nominal pre tax WACC to real pre tax WACC by adjusting for inflation using Fisher equation.

The "The Historical Approach" defines the real pre tax WACC in terms of the nominal post tax WACC as follows:

$$Real\ Pre\ Tax\ WACC_{Historical} = (Nominal\ Post\ Tax\ WACC/(1-t)-I)/(1+I) \quad \textbf{(3)}$$

Where I is the inflation rate; t is the corporate tax rate.

6.5. NERA Approach

In general (where expected inflation and the expected tax rate are both positive) the MMC approach will give a lowest estimate of the Real Pre Tax WACC and the Historical approach will give the highest estimate of the Real Pre Tax WACC. Intuitively, this is because the MMC approach scales up for tax a (lower) real WACC whereas the Historical approach scales up for tax a (larger) nominal figure. The differences between the three approaches will increase as inflation increases.[23]

Recent academic debate suggests that all simple scaling formula are likely to be a mis-estimation of the true tax liabilities (and hence the correct real pre tax WACC) faced by RPI-linked regulated companies. NERA is not aware of any empirical work that evaluates which of the three formula is likely to be more accurate and in which circumstances.

NERA's conclusion therefore is that it is not possible to say which formula should be preferred in converting a post tax nominal WACC to a pre tax real WACC for the case of Aer Rianta. We note that all formulae also ignore the effect of capital allowances on the true tax liabilities faced by Aer Rianta.

The only way of determining which, if any, of the above formulae is a better approximation to the true tax paying position of companies is to have a prior opinion on what the correct answer is through the use of tax cash flow modelling. We suggest that the regulator may

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[22] Based on the formula proposed by CSFB in relation to the Victoria Gas Access Arrangements

[23] For inflation of around 2% and a tax rate of around 30%, the difference between the three approaches is around 1%.

consider supporting his arguments about the appropriate pre tax WACC using financial modelling of projected tax liabilities.

For the purpose of deriving a pre tax WACC for Aer Rianta we have applied the Historical approach. We have applied a taxation adjustment to the nominal post tax cost of equity to convert to a nominal pre tax cost of equity, assuming an effective corporation tax liability of 25 per cent for a single till operation and an effective tax rate of 20 per cent for a dual till operation. The difference in effective taxation for the two regulatory regimes arises because of the differential tax rates on passive and trading income. This approach has the advantage over the widely criticised MMC approach in that it takes into account the fact that taxation payments are paid on nominal profits.

In the table below NERA have estimated a real pre tax WACC for Aer Rianta based on current effective tax rates of 25% and 20% respectively for single till and dual till operations.

Table 6.1
Pre Tax WACC

WACC	**Regulatory Regime**	
	Single till	**Dual till**
Real post-tax "Vanilla" WACC	**8.0%**	**7.8%**
Real post tax "Net of Debt Tax Shield" WACC[1]	7.7%	7.5%
Effective tax rate	25%	20%
Nominal "Net of Debt Tax Shield" WACC	9.5%	9.3%
Real Pre-Tax WACC using "Historical" Formula.	**10.8%**	**9.8%**

[1] Note: Post tax "Net of Debt Tax Shield" WACC = Post tax cost of equity*E/(E+D) + Cost of debt (1- tax rate)* D/(D+E)

We recommend, however, that this formulaic estimate of the tax wedge should be confirmed as accurate through the use of financial modelling of actual tax liabilities given the other regulatory assumptions.

7. WACC

Table 7.1 presents our overall estimate of Aer Rianta's cost of capital on the basis of a pre-tax WACC and for both a single and dual till regulatory regime. This is equal to 10.8 per cent and 9.8 per cent for a single and dual till respectively, and represents our best estimates of the rate of return required to compensate existing equity and debt holders for bearing risk, as well as ensure that Aer Rianta can raise finance to fund future investments.

Table 7.1
Aer Rianta WACC Estimates

Parameter	**Regulatory Regime**	
	Single till	**Dual till**
Cost of Equity		
Nominal return on risk-free	5.0%	5.0%
Expected inflation	1.7%	1.7%
Risk-free rate	3.2%	3.2%
ERP	6.0%	6.0%
Asset beta	0.75	0.7
Debt	30%	30%
Equity	70%	70%
Equity beta	1.04	0.97
Post-tax return on equity	9.4%	9.1%
Cost of Debt		
Debt premia (over riskfree)	150	150
Cost of debt	4.7%	4.7%
WACC	150	150
Real post-tax "Vanilla" WACC	**8.0%**	**7.8%**
Real post tax "Net of Debt Tax Shield" WACC[1]	7.7%	7.5%
Effective tax rate	25%	20%
Nominal "Net of Debt Tax Shield" WACC	9.5%	9.3%
Real Pre-Tax WACC using "Historical" Formula.	**10.8%**	**9.8%**

[1] Note: Post tax "Net of Debt Tax Shield" WACC = Post tax cost of equity*E/(E+D) + Cost of debt (1- tax rate)* D/(D+E)

Finally, we emphasise that the returns demanded by investors will be affected by the projected financial profile of the company. There needs to be consistency between the allowable rate of return and the WACC as established in the market.

ATTACHMENT A. EUROZONE DEBT YIELDS

Table 0.1
European bond yields

Country	Bond type	Current yield to maturity	Average yield over last year	Yield at 30/6/00
Germany	Bundesschatzanweisungen 4% 14/12/2001	4.519%	4.812%	4.959%
Germany	Bundesobligation 5.25% 18/02/2005	4.494%	4.964%	5.051%
Germany	Bundesrepub. Deutscheland 5.375% 04/01/2010	4.725%	5.165%	5.228%
Germany	Bundesrepub. Deutscheland 6% 20/06/2016	4.982%	5.282%	5.297%
Italy	Buoni Polienniali del Tes 4.5% 15/01/2003	4.562%	5.085%	5.276%
Italy	Buoni Polienniali del Tes 9.5% 01/02/2006	4.842%	5.360%	5.502%
Italy	Buoni Polienniali del Tes 5.5% 01/11/2010	5.174%	5.500%	5.574%
Spain	Bonos y Oblig. del estado 8.4% 30/04/2001	4.6%	4.786%	4.877%
Spain	Bonos y Oblig. del estado 3.25% 31/01/2005	4.671%	5.174%	5.277%
Spain	Bonos y Oblig. del estado 4% 31/01/2010	5.049%	5.439%	5.504%
Spain	Bonos y Oblig. del estado 4.75% 30/07/2014	5.326%	5.608%	5.661%
Portugal	Oblig. do tes medio prazo 5.75% 23/03/2002	4.574%	4.939%	5.134%
Portugal	Oblig. do tes medio prazo 5.25% 14/10/2005	4.75%	5.270%	5.389%
Portugal	Oblig. do tes medio prazo 5.85% 20/05/2010	5.129%	5.525%	5.611%
Portugal	Oblig. do tes medio prazo 5.45% 23/09/2013	5.265%	5.616%	5.691%
Average of short term bonds (< 5 years)		**4.627%**		**5.183%**
Average of long term bonds (> 10 years)		**5.093%**		**5.509%**

Source: NERA analysis of Bloomberg data

ATTACHMENT B. RISK FREE RATE DATA USED TO CALCULATE THE ERP

Table 0.1
Analysis of risk-free rates

Bond type	Issue date	Current yield	Average yield to maturity	
			Arithmetic mean	Geometric mean
Ireland				
Capital 9% 2006	N/a	4.98%	6.62%	6.45%
Capital 8.5% 2010	N/a	5.23%	6.85%	6.72%
Capital 8.75% 2012	N/a	5.32%	6.52%	6.33%
Average		5.18%	6.62%	6.45%
England & Wales				
Treasury 5.5% 2008/12	5/10/1960	5.07%	7.21%	7.05%
Treasury 7.75% 2012/15	26/12/1972	5.32%	7.45%	7.31%
Average		5.20%	7.33%	7.18%
Treasury 6% 2028	21/1/1998	4.34%	4.75%	4.72%
Treasury 4.125% 2032	25/5/2000	4.32%	4.37%	4.37%
Average		4.33%	4.56%	4.55%
Germany				
Bundesrep. Deutschland 8.375% 21/05/2001	19/05/1991	4.60%	5.65%	5.42%
Bundesrep. Deutschland 8.25% 11/10/2001	20/09/2001	4.50%	5.59%%	5.39%
Average		4.55%	5.62%	5.41%
Bundesrep. Deutschland 6% 20/06/2016	20/10/1986	5.02%	6.79%	6.69%
Bundesrep. Deutschland 5.625% 20/09/2016	20/09/1986	5.06%	6.82%	6.74%
Average		5.04%	6.81%	6.72%
US				
Treasury 7.5% 2001	15/11/1991	4.80%	6.19%	6.14%
Treasury 7.75% 2001	15/02/1991	5.10%	6.27%	6.21%
Treasury 7.875% 2001	15/08/1991	4.83%	6.21%	6.16%
Treasury 8% 2001	15/05/1991	4.96%	6.24%	6.19%
Average		4.93%	6.23%	6.17%
Treasury 9.125% 2009	15/05/1979	7.13%	7.78%	7.74%
Treasury 10.375% 2009	15/11/1979	7.52%	8.00%	7.96%
Treasury 10% 2010	15/05/1980	7.18%	7.89%	7.84%
Treasury 11.75% 2010	15/02/1980	7.94%	8.20%	8.16%
Treasury 12.75% 2010	17/11/1980	7.95%	8.26%	8.22%
Treasury 13.875% 2011	15/05/1981	8.05%	8.32%	8.29%
Treasury 14% 2011	16/11/1981	7.87%	8.27%	8.23%
Average		7.66%	8.10%	8.06%

Source: NERA analysis of Bloomberg data.

Table 0.2
Equity market risk premium estimates for European indices

Sample method and period	Market used	Average total returns on market[1]	Average risk-free rate[2]	Equity market risk premium
Arithmetic mean				
10 years	Irish overall index	16.03%	5.18%	10.85%
10 years	FTSE all share	11.48%	7.33%	4.15%
10 years	DAX index	17.41%	5.62%	11.79%
10 years	S&P500 index	16.12%	6.23%	9.89%
30 years	FTSE all share	13.24%	4.56%	8.68%
30 years	DAX index	11.16%	6.81%	4.35%
30 years	S&P500	10.99%	8.10%	2.89%
Geometric mean				
10 years	Irish overall index	14.19%	5.18%	9.01%
10 years	FTSE all share	11.01%	7.18%	3.83%
10 years	DAX index	15.66%	5.41%	10.25%
10 years	S&P500 index	15.56%	6.17%	9.39%
30 years	FTSE all share	10.99%	4.55%	6.44%
30 years	DAX index	9.23%	6.72%	2.51%
30 years	S&P500	9.87%	8.06%	1.81%

Source: NERA analysis of Bloomberg data. 1: Equity returns defined as the average annual return on the indicated stock market. 2: The risk-free rates over the same period are averaged using the same methodology as the average of the market returns.

ATTACHMENT C. EQUITY RISK PREMIUM REGULATORY PRECEDENT

Decision	ERP estimate	Comments
ACCC Final Decision Victorian Gas Distribution (October 1998)	6%	Adopted 6% as this was the mid value of a range from 4.5 to 7.5 per cent estimated by its economic advisor. The Energy Projects Division's advisor CS First Boston proposed 6.5 per cent for the market risk premium given that the conventionally accepted value has been six to seven per cent under the classical tax system.
ACCC Final Decision Adelaide Airport (October 1999)	6%	Adopted 6% with reference to Victorian Gas decision
ACCC Final Decision Perth Airport (April 2000)	6%	Adopted 6% as recent studies suggested that the Australian MRP was unlikely to be in excess of 6% and this was consistent with ACCC's decision on Adelaide and Victorian Gas.
ACCC Final Decision Brisbane Airports (April 2000)	6%	Estimate adopted with reference to consistency with Adelaide decision and electricity transmission decisions.
ACCC Draft Decision Canberra Airport (June 2000)	6%	No reference made
ACCC Final Decision Melbourne Airport MUDT (August 2000)	6%	No reference made
ACCC Draft Decision Sydney Airport (February 2001)	6%	Adopted 6% in spite of recent studies suggesting that MRP is unlikely to be in excess of 6% as the ACCC remains to be convinced that the Australian MRP is decidedly lower than 6%. This figure was supported by the commission's economic advisor.
ORG Victorian Ports Price Review Draft Determination (May 2000)	6%	Adopted 6% with reference to being upper end of recent regulatory decisions and consistent with a range of historical estimates.
ORG Electricity Distribution Price Review (September 2000)	6%	6% adopted as within range provided by historical averages, is at upper end of range in recent regulatory decisions and is above value implied by ex ante model (which gave an average of 4.8% over 8 years).
IPART NSW Electricity Distribution Final Determination (December 1999)	5%-6%	5%-6% decision adopted with regard to suggestion that MRPs are trending down and with reference to discussion of recent studies including estimates based on

Decision	ERP estimate	Comments
		historical measures, ex ante approach, long term averages and US and UK evidence.
OPTA decision on the cost orientation of KPN Telecom's proposed voice telephony tariffs (September 1998)	4%-7%	Decided that a MRP "of between 4%-7%" would be used in assessing telephone tariffs with reference NERA report to recommending that range.
DTE guideline for price cap of Dutch Electricity sector (February 2000)	4%-7%	4%-7% adopted on basis of "available info" and sector responses – the latter included reference to Ibbotson Associates (1997) with arithmetic mean of EMRP of 7.47%; Fase and Van de Poll (1997) with ERP of 6% for 1889-1978; Fase (1997) and Pronk and Hallerbach (1999) with ERP of min. 8% and Opta's adoption of 4%-7% for KPN fixed charges
IPART Report on rates of return for network service providers (June 1999)	5%-6%	5%-6% decision adopted with regard to suggestion that MRPs are trending down and with reference to discussion of recent studies including estimates based on historical measures, ex ante approach, long term averages and US and UK evidence.
2001 Electricity Distribution Review submission by AGL Electricity Ltd	6.5%	Provided results of studies by recognised Australian authorities in estimating the long-term arithmetic means of historically observed market risk premiums. These studies indicate a risk premium of above 6%. Used 6.5% as final estimate based on long-term market evidence, rather than a methodology that seeks to rationalise recent movements in share prices.
Pacific Gas & Electricity Company, Cost of Equity Capital for Gas Distribution. Testimony by James Weide	4.9% - 6.4%	Ibbotson Associates – 7% risk premium on A-rated utility bonds, but 8% over long-term government bonds. (use S&P500 for equity returns) Carried out comparable returns received by bonds and stock investors over 1937 to 1999. S&P500 grew by 12.53%, whilst Moody's A-rated utility bond gave 6.13% yield => 6.40% ERP. S&P utilities grew 11.01% per annum, so ERP is 4.88%.
Pacific Gas & Electricity Company, Cost of Equity Capital for Electricity Distribution. Testimony by Lawrence Kolbe of The Brattle Group – Used for its unbundled electricity distribution business	5% for short-term ERP and 6.5% for long-term ERP	Estimated market risk premium over short and long-term.

Decision	ERP estimate	Comments
Envestra's Angaston to Berri Transmission pipeline, assessed at 31/10/99	6% - 7%, but used 6%	Adopted 6% because it is adopted by ACCC and ORG in Victoria and IPART I respect of the Wagga Wagga gas distribution network. Original estimate based on RR Officer "Rates of return to shares, bonds yields and inflation rates: A historical perspective". Return on equity compared to return on 10-year bonds.

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APPENDIX 7A and B

Benchmarking Assumptions and Data

Approaches to Efficiency Reviews Adopted by Regulators in other Jurisdictions

Appendix 7A

The following are the assumptions underlying the Benchmarking and Operating Cost analysis contained in Part I of Aer Rianta's submission to the Commission for Aviation Regulation on the Proposed Maximum Level of Airport Charges Draft Determination and Explanatory Memorandum CP6/2001.

- Cost data for the Aer Rianta airports have been provided by Aer Rianta to the Commission. They exclude interest costs but include the costs of goods sold. This in itself creates a source of bias when comparing Aer Rianta airports with other airports as these costs will be much lower for other airports that outsource their retail activities. Corporate overhead costs, also excluding interest costs, have been allocated to the airports on the basis of Work Load Units. It should be noted that using this basis of allocation makes (in the case of the Aer Rianta airports) very little difference to using passenger numbers or Air Throughput Units as the basis, but the results do differ from those obtained from using proportionate costs as an allocation basis. The reason why proportionate costs have not been used as the basis for allocation is that they would amplify the differences in costs that exist as a result of differences in activities the Aer Rianta airports undertake, notably Shannon. NERA and Aer Rianta have so far been unable to reproduce the figures used by the Commission.

- The Shannon cost data excludes the costs for inflight catering and Shannon Aviation Fuels.

- Cost data for the comparator airports have been taken from the 1999 or 1999/2000 published accounts. Airports for which no individual cost data were available have not been included. No adjustments were made to the data, even though some of the comparator airports undertake quite different activities to the Aer Rianta airports.

- As with the Aer Rianta airports data, NERA has not been able to reconcile the Commission's figures for the comparator airports with the data in the published accounts. In a number of cases, the implied figures are close if we look at operating expenditure **excluding** depreciation (e.g. Brussels, Copenhagen), whereas for others the results are close if we compare operating expenditure **including** depreciation (e.g. Oslo).

- For those airports in countries outside the Eurozone, average exchange rates for 1999 (based on daily data) have been used. As it is not clear which exchange rates the Commission has used for these airports, there may be differences between their figures and ours even if other assumptions are the same.

Appendix 7 B

Approaches to Efficiency Reviews Adopted by Regulators in other Jurisdictions

Appendix 7 B

1.Water and Sewerage in the UK

At the recent (1999) review of retail prices in the water industry the regulator, Ofwat, used several techniques for assessing the efficiency performance of regulated water companies, as follows

- **Econometric Analysis**. This is an economic and statistical technique that identifies correlations between costs and potential cost drivers. In the water case the econometric approach used was Ordinary Least Squares (OLS) and the cost drivers include length of water main, type of water abstraction, number of properties served, etc. Any costs that are not "explained" by the array of cost drivers are assumed to provide an estimate of inefficiency. Ofwat's approach has been developed over a number of years, beginning in around 1991/2, and uses econometric analysis for a number of detailed assessments of various elements of both operating and capital maintenance expenditures. At the 1999 Periodic Review, separate models for ten different operating cost activities were developed (including, for example, water distribution, water resources and treatment, large sewage treatment works and sewer network). These included both log linear and unit cost models and used more than 20 different cost drivers. In addition Ofwat tested for the statistical significance of a large number of other potential cost drivers.

- **Engineering Assessments**. For new capital expenditure and capital maintenance expenditure only, the regulator compared company unit costs for a range of stylised capital projects. The approach was similar to the approach used by Ofwat at the 1994 Periodic Review and was further developed over a two year period leading to the 1999 Periodic Review in consultation with regulated companies, their Reporters[1] and external engineering consultants. Yardstick unit cost estimates for 112 different cost items were developed and used to judge the cost savings achievable by companies over the price control period. Examples of the cost items show the level of detail in this exercise and include "*sewer laying nominal bore 900mm urban highway*", "*additional secondary treatment population equivalent 5,000*" and "*variable speed pump motors 30 Ml/d*".[2] Engineering expertise was also used to validate some elements of the econometric analysis.
- **Scope for Efficiency Gains Over Time**. The regulator employed economic consultants to undertake an assessment of the experience of productivity gains in similar industries and on this basis to come to

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[1] Engineering consultants used by Ofwat to audit and validate the assumptions and methodologies used by the companies for their price review submissions to Ofwat.

[2] Ofwat "*Capital works unit costs in the water industry*" December 1998.

a view on the scope for future productivity gains in the water industry. The consultant examined evidence for two sets of comparator industries. The first included those industries that undertake similar tasks. These were chosen following an assessment of the nature of the activities undertaken by water and sewerage companies and comprised: the extraction, refining, network, construction, manufacturing, financial/business services and chemicals industries. The second group was other privatised industries. Detailed reviews of the available literature on productivity performance and its drivers were undertaken for the study.[3]

- **Panel of Senior Industrialists**. The regulator took account of the view of a panel of senior industrialists on the scope for efficiency gains by the water companies.

The following passage illustrates Ofwat's view of the important role of techniques, such as econometric analysis, which can take account of more factors that drive costs than a simple unit cost comparison can

> *"Ofwat uses a number of tools to compare the relative efficiency of the water and sewerage companies. Direct comparisons of unit costs across the industry are simple and straightforward. They can be very useful but do not take account of differences in operating environment and service performance. These differences may explain why some companies should have higher or lower expenditure than others. Statistical techniques, such as multiple regression, provide a means to assess the impact of different operating environments. These statistical techniques are called econometrics. Ofwat and Professor Stewart (University of Warwick) developed econometric models for the 1994 Periodic Review.*
>
> *"The econometric models can take into account factors that describe the size and operating environment of different companies. These models require a larger amount of data than simple unit cost comparisons and consistency between companies, to ensure comparisons are fair. There are some factors which are difficult to quantify in terms of expenditure or value to customers, such as the levels of service provided by a company. There are other factors which are company specific or affect the ability of a company to achieve efficiency savings. These are not easy to incorporate into an econometric model.*
> *"Nevertheless, these factors are important and can be taken into account by making adjustments to the results of unit cost analysis or econometric models. In the past, Ofwat has made*

[3] Europe Economics and Professor Nick Crafts, LSE "*Water and Sewerage Industries General Efficiency and Potential for Improvement: Final Report*", October 1998.

such adjustments in producing relative efficiency assessments."[4]

2. Electricity Distribution in the UK

In it's review of electricity distribution prices in 1999, the electricity regulator, Ofgem, used two techniques for comparing the cost performance of the public electricity suppliers (PESs) in Great Britain. Before this Ofgem first employed consultants to make detailed adjustments to the reported costs of the regulated companies in order to ensure that the costs used for benchmarking purposes were directly comparable across the companies. They included adjustments to reflect differences in accounting policies, cost allocations, regional factors such as wage differences and one-off costs.

- **Engineering/Operations Assessment.** Ofgem employed consultants with management consulting expertise and with engineering/operations expertise to provide their view on whether each regulated company could improve the efficiency of its operations and, if so, the extent of cost savings achievable. This process involved separate and detailed assessments of costs and of operational procedures for each of the main activities of the regulated businesses. It included comparisons of costs by activity, comparisons of savings achieved in the past, reviews of organisational structures and operational practices and assessments of company plans for achieving future efficiencies.

- **Econometric Analysis.** An econometric analysis was also undertaken. The explanatory factors were the number of customers, the number of units of electricity distributed and the length of the network. Note that other factors such as differences in wage costs and some other regional factors had already been taken into account in the initial adjustments to the costs described above.

Ofgem's views on the importance of taking account of a range of explanatory factors, including operating environments, and the need to use more than one approach to assessing relative efficiency, is illustrated in the passage below.

> *"Regression analysis provides an insight to relative efficiency by taking into account, as far as practicable, differences in operating environments. The use of a composite size explanatory variable and adjustments for regional differences is an attempt to normalise for differences across PESs. Further, factors which may be outside of the direct control of management, such as network rates, are not included in the level of base*

[4] Ofwat *"Assessing the scope for future improvements in water company efficiency: a technical paper"*, April 1998.

operating costs. The use of this form of analysis is consistent with the principles for making greater use of yardstick comparisons…….Nevertheless, it is important that there is not an undue reliance on a statistical analysis of operating costs. Therefore the regression analysis forms only a part of the overall assessment of operating costs……."[5]

3. Electricity Transmission

The benchmarking relating to operating costs used by Ofgem in its recent review of the Transco price control is based on two main types of assessment.[6]

- **Engineering/Operations Assessment**. Ofgem's consultants undertook a detailed review of a range of cost categories including, for example, staff costs, research and development, insurance, business rates, etc. The analysis involved a detailed assessment of operating practices and policies and, based on the consultant's experience and expertise, a view on the scope for achieving cost savings from specific changes in practices and policies. A large part of the potential savings identified by the consultants were in staff costs. This followed from a detailed assessment of a number of factors that drive staff costs including numbers of staff, the most appropriate profile of staff grades, bonus costs, pay levels, costs of severance payments, rates of pay for each staff grade, etc.
- **Scope for Efficiency Gains Over Time**. Ofgem's consultants also compared the past and predicted cost reduction performance of NGC with the performances of the best performing public electricity supply companies over a range of different time periods. They also compared NGC's annual percentage cost reductions with those of a number of other companies across a range of sectors, including the public electricity suppliers, water, sewerage and Transco.

Ofgem's view of some of the problems associated with benchmarking the performance of the National Grid Company (NGC) is illustrated by the following passage.

"Ofgem considers that the exchange of views between its consultants and NGC has demonstrated that it is possible to derive a variety of answers from benchmarking NG, depending on the period over which the comparison is made and the precise variable compared. The lack of a

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[5] Ofgem "*Distribution Price Control Review: Draft Proposals*" August 1999, paragraph 2.30.

[6] Ofgem "*The Transmission Price Control Review of the National Grid Company from 2001: Final Proposals*" September 2000.

direct comparator for NGC adds to the difficulties in relying on benchmarking."

4. Gas Transmission in the UK

The benchmarking relating to operating costs used by Ofgem in its current (2001) review of the Transco price control is based on two main types of assessment. [7]

Engineering/Operations Assessment

Ofgem's consultants undertook a detailed review of nine cost categories including, for example, staff and related costs, information systems, cost of gas leakage from the distribution network, network operating costs, insurance costs, etc. The analysis involved a detailed assessment of operating practices and policies and, based on the consultant's experience and expertise, a view on the scope for achieving cost savings from specific changes in practices and policies.

Scope for Efficiency Gains Over Time

Ofgem consultants assessed Transco's trend in productivity improvement and compared this with equivalent improvements in comparable sectors and for other privatised companies. Based on this assessment a view was taken on the scope for future annual productivity gains. Further adjustments were also made to reflect the potential for achieving economies of scale as the level of output increased.

5. Telecommunications in the UK

The benchmarking analysis used by Oftel in its current (2001) review of prices was undertaken in July 2000 by external consultants (NERA) and is published by Oftel.[8] A number of different approaches to measuring relative operating cost performance were undertaken. These are set out below.

Simple Unit Cost Analysis

Costs per switched line and costs per call minute were compared for 54 companies, including BT. Since BT's ranking varied considerably between the two measures it was concluded that simple unit cost comparisons were not sufficient to draw conclusions about BT's efficiency.

Econometric Analysis

Cost functions were estimated using three different econometric techniques: Ordinary Least Squares (OLS) estimation, Panel Data and Stochastic Frontier Analysis (SFA). Panel data elaborates on OLS by using

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7 Ofgem *"Review of Transco's price control from 2002: Draft Proposals"* June 2001.

8 NERA *"BT Comparative Efficiency Study"*, July 2000. Available from Oftel.

data across time as well as across different companies, and SFA elaborates on OLS by attempting to breakdown the costs that are unexplained by the model into costs caused by inefficiency and a random element. A number of alternative models were tested, varying the cost drivers used and the definition of the costs being explained. Cost drivers used in the models include the number of access lines in the network, the volume of calls made and the length of both aerial and non-aerial sheath per line.

Data Envelope Analysis (DEA)

The scope for using this mathematical programming technique for comparing the efficiency of BT with that of other operators was examined, but it was decide that for technical reasons this particular dataset was not suitable for the application of DEA.

The following passages illustrate the consultant's view first on the problems of relying on unit cost analysis and second on the benefits of using more than one approach to efficiency assessment.

> *"…….a unit cost approach has severe limitations:*
>
> - *a major weakness of simple unit cost analysis is that it fails to take account of the differences in operating environments that exist between telecoms operators. For example, a company operating in an area which is sparsely populated might be measured as relatively "inefficient", simply because the extra costs of operating in such an environment have not been taken into account;*
> - *if the differences in operating environment have a significant impact on costs, it is important that allowance is made for them. This applies to all such factors that are exogenous to the operator. Examples include differences in customer density, input price differences not reflected in exchange rates, accounting policy differences and so on;*
> - *there are a large number of potential unit cost or other ratio analysis measures (eg employees per line). In isolation, they do not provide a complete picture. For example, a company may have a low level of employees per line but a high level of investment per line. How, in these circumstances, is a decision to be made as to which measure should be used? Even if the use of certain ratios as opposed to others can be informed by, for example, engineering advice, there is no single correct way of specifying the weights to be given to different ratios, so it is not possible to combine them to produce a single meaningful efficiency comparison. It is entirely possible, if not probable, that different*

operators will perform very differently, depending on the ratios that are examined.

"For these reasons, we do not feel that it would be appropriate to base a study of this kind on unit cost analysis alone."
"…….each of the main methods for the measurement of comparative efficiency has its weaknesses as well as its strengths. With this in mind, the approach underlying this study is that a combination of methods is preferable when making an analysis of this type. The outputs for the alternative methods can then be compared. If the results are broadly similar and the differences can be explained, this provides confidence that a reasonably accurate estimation of relative efficiency has been made. If the results are markedly different, it suggests caution is needed in the interpretation of the results."

6. Rail in the UK

Like many other UK utility regulators, the Office of the Rail Regulator (ORR) used a combination of techniques when considering the scope for Railtrack to make efficiency savings as part of its 2000 review of passenger track access charges.

- **Bottom-up expenditure review** – the first piece of work to be commissioned by ORR in this area was a careful and detailed review of Railtrack's stated expenditure plans, conducted by Booz-Allen and Hamilton (BAH).[9] This work built up an estimate of Railtrack's expenditure needs for the forthcoming review period based on a set of detailed assumptions on forecast rates of activity and unit costs for each type of activity/resource. Unit costs were based on benchmarks of international best practice at the specific activity level (it was noted that it would not be possible to benchmark activities at the aggregate level, because of the organisational and operational differences between Railtrack and other companies). BAH also reviewed Railtrack's contracting strategy and the savings that a new round of contracts could bring.

  In his Draft Conclusions (July 2000) the Regulator noted his opinion that bottom-up analysis should not be used on its own to inform on the scope for future efficiency gains due to the fact that it tends to underestimate the scope for future efficiency savings, not least because assumptions are based on information available to date, and the past may not always be a good predictor of future efficiency possibilities.

[9] A copy of the Booz-Allen report: *Railtrack's Expenditure Needs 2001-06* (December 1999) is available on ORR's website (www.rail-reg.gov.uk).

- For the reasons explained above, the Regulator also used "top down" efficiency studies to inform on the scope for efficiency savings. Firstly, ORR commissioned a study examining efficiency gains in other privatised utilities. This study examined the productivity gains observed in comparator industries (for example water and sewerage, electricity transmission and distribution, gas transportation and telecoms). The report examined real unit operating cost reductions in each industry over what was considered to be a comparable period to the forthcoming Railtrack control period.

  The ORR Draft Conclusions emphasise that the report explicitly took into consideration key differences between the comparators that were not applicable to the Railtrack case. For example, gas transportation was removed due to the fact that strong demand growth had played a key part in the strong efficiency gains seen in that industry.

  Furthermore, an explicit adjustment (of one per cent per annum) was made to account for total factor productivity growth in the economy as a whole.[10] Because the report only considered operating costs, the Regulator noted that adjustments were also made for the effects of capital substitution.

  The report also noted that ORR would need to take into account any changes to forecast real input prices for Railtrack. In his final conclusions, the Regulator noted that *"he has adjusted the assumed efficiencies in his draft conclusions to take account of this risk."*

- Secondly, ORR commissioned NERA to examine **rail infrastructure cost efficiency gains in other countries**.[11] NERA carried out both time series and cross sectional efficiency analyses. The NERA report emphasised that the significant differences between the different railways examined made it difficult to draw any meaningful conclusions on Railtrack's relative efficiency in this case. NERA reported that it was not appropriate to examine isolated partial performance indicators (such as costs per unit of output) due to these differences in operating environments. This point was illustrated by comparing the very different results obtained when different partial performance measures were used (for example costs per kilometre versus costs per passenger). The NERA analysis concluded that in this

[10] Where price regulation is based on an RPI-X formula, it is important to make such an adjustment due to the fact that to the extent that there is total factor productivity growth in the economy as a whole, this will be reflected in the retail price index. When setting X, it is therefore important to *exclude* such effects.

[11] Review of Overseas Railway Efficiency NERA, May 2000. A copy of the report is available on ORR's website (www.rail-reg.gov.uk).

case it was more relevant to consider productivity trends over time in overseas railways.

NERA therefore examined productivity trends in the US Class 1 railways, again using econometric techniques. The NERA analysis made explicit adjustments to correct for both scale and traffic density effects (ie two key factors in operating environments that were found to affect costs). The analysis also considered another factor specific to the US that had a significant impact on costs but was not appropriate to the Railtrack case, namely the large-scale rationalisation that took place in the US immediately following deregulation.

In his Draft Determinations, the Regulator notes that BAH also conducted some international comparisons as part of its bottom-up study, but did not attach significant weight to these comparisons when drawing conclusions due to the fact that they were not directly comparable with Railtrack.

- In addition, the Regulator made use of information gathered from interested parties during the consultation process, and was mindful of detailed studies conducted by some of the consultees into best practice in track maintenance and renewal internationally. However, ORR also noted the time that it would take for Railtrack to implement such improvements, and the fact that there were operational differences between different countries.[12]

- Furthermore, ORR also commissioned literature reviews of previous studies into the scope for efficiency savings in regulated utilities and considered their results, and considered the results of other recent regulatory reviews, including the 1999 OFWAT and OFGEM electricity distribution reviews.

- Other important features to note included the specific consideration of which costs were "controllable" by Railtrack, and which were not (eg rates, ORR licence fees and the costs paid for British Transport Police). The Regulator applied his efficiency targets to controllable costs only.

7. Airports in the UK

The UK Civil Aviation Authority (CAA) is currently undertaking its review of the UK regulated airports. For the first time, CAA is conducting what amounts to a full price cap review, whereas previously the bulk of the

[12] See for example ORR Draft Conclusions July 2000, paragraph 4.22.

analysis had been carried out by the Competition Commission (formerly the Monopolies and Mergers Commission).[13]

In December 2000 the CAA published a consultation document *The Use of Benchmarking in the Airport Reviews*. As the CAA review is still ongoing, full information on the methodology adopted is not available. However, CAA has commissioned NERA to conduct an investigation into the applicability of top-down benchmarking to airports, particularly within the context of using the results to inform on the scope for the regulated airports to make efficiency gains. Phase 1 of the NERA report consists of data collection and adjustment, and a consideration of whether it would be possible with the data available to take account of the differences observed in operating environments between airports. CAA has indicated that should the results of this work be favourable, it will commission a second phase involving actual efficiency analysis.

CAA hopes to publish the results of this study, but this information is not yet available. However, key issues raised by both CAA themselves and interested parties during the consultation process so far include the following.

- Consideration of the range of possible techniques available for efficiency analysis. CAA emphasised the need to consider both "catch up" efficiencies and "frontier shift" efficiencies. The CAA consultation document considers both top-down and bottom-up approaches. It also discusses specific techniques available and their advantages and disadvantages, including a range of econometric techniques, data envelopment analysis and partial statistical measures. We note that when considering the use of partial statistical measures (such as unit costs for particular services), CAA states that "*these kinds of measures must be handled with caution since good performance on one partial measure (for example a low number of security staff per passenger) may reflect under performance in another (for example the time taken for security processing of passengers).*"

- Consideration of whether airports are comparable enough for a meaningful analysis to be undertaken, and what factors would need to be adjusted for to allow for this. Examples of issues raised by CAA in their consultation document include airport capacity relative to traffic, overall scale (eg passenger numbers or number of air traffic movements), traffic mix (eg large or small, international or domestic), peakiness of traffic, and ownership and regulatory

[13] This change follows a decision (not yet formally implemented) by the UK Government to bring airport regulation into line with other utility regulation.

characteristics (eg state or privately owned, and the level and type of regulation).

- How to adjust for differences in the activities undertaken by different airports, which will have a significant impact on costs (issues raised by CAA include whether or not an airport undertakes air traffic control, ground handling or security services, and differences in who owns and operates the terminal).

8. Energy sector price regulation in the Netherlands

The electricity regulator for the Netherlands, the DTe, is required to use a CPI-X approach to price regulation. In its "Guidelines for price cap regulation of the Dutch electricity sector", (February 2000) the DTe stated its intention to use benchmarking analysis in the determination of X (there is no legal requirement that requires DTe to use benchmarking).

For the current regulatory period (which runs up to 2003), DTe has employed Data Envelopment Analysis (DEA) to estimate efficient cost levels, against which company performance is benchmarked. The results of the benchmarking analysis are then used in determining the X factor.

The DTe's report "Choice of model and availability of data for the efficiency analysis of Dutch network and supply businesses in the electricity sector" notes that DEA extends simple ratio analysis by allowing multiple inputs and outputs to be considered simultaneously (paragraph 3.2.2). DTe published a detailed paper, setting out their reasons for adopting a DEA approach, describing how issues such as economies of scale had been dealt with, and explaining how the inputs, outputs and variables reflecting differences in operating environments were identified and taken into account. The paper also notes the importance of collecting data on a consistent basis.

This approach has been taken for both electricity distribution and transmission. For the electricity distribution companies, of which there are 20, the companies were benchmarked against each other. For the electricity transmission company, of which there is only one, benchmarking was conducted against comparators from overseas (the US and Europe). For the benchmarking using international comparisons, the DTe study made adjustments for factors such as exchange rates, different wage rates between the Netherlands and the other comparators, and the need to treat depreciation in a consistent way for all companies. Further adjustments were made for other accounting differences between the comparators such as the way overhead costs are allocated (eg to reflect the vertical integration of US companies, that did not exist for companies in other countries included in the benchmarking exercise).

More recently, the DTe has also employed DEA techniques in efficiency benchmarking for the regulatory review of the gas distribution companies ("Price-Cap Regulation: Gas Distribution Companies 2002/03" March 2001). Here, DTe note that "*Uni-dimensional measures of performance (or performance indicators)…are unsatisfactory because… companies are engaged in multi-input, multi-output processes. A firm that performs well on one measure may do badly on another while one firm may do reasonably well on all measures but not be the most efficient of any.*" (page 25). Once again, issues such as the reasoning behind the choice of methodology, the collection and standardisation of data to aid comparability, and the impact of different operating environments were all considered.

9. Electricity Distribution in Victoria, Australia

Electricity distribution in Victoria is price regulated by the Office of the Regulator General (ORG) using a CPI-X approach.

In December 1998 ORG stated that its intention for the 2001 price review was to derive forward-looking revenue benchmarks by applying the "building-block" methodology.[14] During the periodic price review the electricity distributors were invited to put forward their benchmark revenue requirements for the future period based on their proposed costs of operating the distribution licences (including capital and operating expenditures) and allowance to provide them with reasonable rates of return. [15] Throughout the process of the price review ORG organized a series of public forums and workshops as a means of dialogue between the public, the distributors and ORG.

ORG relied on the following sources of information in determining the scope for future efficiency in operating expenditure for each of the distribution companies

- distribution company submissions;
- past trends in efficiency gains;
- the results of "top-down" efficiency benchmarking studies carried out by ORG's consultants;
- submissions made during the consultation process

Section 5.11 of ORG's Draft Decision notes that "*basing the distribution price controls for 2001-05 solely on industry or economy-wide external benchmarks is neither desirable nor currently practical.*"

The top-down benchmarking studies drew on both interstate and overseas comparators, using a panel of cross sectional and time series data. A

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[14] See Office of the Regulator-General: "Consultation Paper No.1" (June 1998) and "Finalising the Framework" (December 1998)

[15] To take effect from 1/1/2001 and carry on for five years

detailed explanation of the exact methodology adopted is not available, but the consultants (UMS Group Australia) made specific adjustments for exchange rates, wage rates, and differences in the operating environment of the comparators that were found to have a significant effect on costs. The impact of differing levels of service on costs was also considered. Statistical testing was used to check the robustness of the model and its results.

ORG adopted a cautious approach to the results of the benchmarking exercises, noting that "*the Office recognises that no benchmarking method can fully reflect the operating environment of a particular firm. As a result the Office initiated detailed consultations between its consultants and the distributors to identify the reasons for differences between its benchmarks and the distributors' forecasts.*" (Draft Decision, Section 5.11). ORG by and large adopted the distributors expenditure forecasts as its benchmarks, with divergences between the two arising from issues such as differences between ORG's and the distributors' assumptions regarding non-network operating expenditures and safety and environmental obligation expenditures.