



Economic Regulation
of Aviation Terminal Services Charges in Ireland

Commission Paper CP5/2001

Consultation Paper on the Maximum Levels of Aviation Terminal Services Charges to be levied by the Irish Aviation Authority under the Aviation Regulation Act, 2001

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1 Introduction

The Commission for Aviation Regulation (‘the Commission’) was established under the Aviation Regulation Act, 2001 on 27th February 2001. The Act requires the Commission, not more than 12 months from its day of establishment, to make a determination specifying the maximum levels of aviation terminal services (ATS) charges that may be imposed by the Irish Aviation Authority (‘the Authority’). The Authority is the body with responsibility for air traffic management in Irish-controlled airspace.[\[1\]](#)

This consultation paper sets out the issues that the Commission considers pertinent in making its determination on ATS charges. It is arranged in 5 sections. This section proceeds with the statutory background to and purpose of the paper and invites responses to the questions posed herein. Section 2 considers the economics of regulation and proposes some approaches to the regulation of ATS charges. It also considers issues concerning the relevant cost base as well as efficient charging structures. Section 3 considers more detailed issues that the Commission considers are likely to arise in the process of making its determination. Such issues include the scope of ATS charges, the form of maximum to be specified with respect to ATS charges, alternative price cap mechanisms and the Authority’s rate of return. Section 3 also considers the statutory objective and the statutory factors to which the Commission must have due regard in making its determination. Conclusions are drawn in section 4.

1.1 Statutory Background

In making its determination, the Commission is required by law to “aim to facilitate the development and operation of safe, cost-effective terminal services which meet international standards” (section 36 of the Aviation Regulation Act, 2001). In aiming to facilitate the statutory objective, the Commission is required to have due regard to each of the following:

- (a) The relevant charging principles of the International Civil Aviation Organisation and of Eurocontrol;
- (b) The level of investment in aviation terminal services by the Authority, in line with safety requirements and commercial operations, in order to meet current and prospective needs of the airline industry;
- (c) The efficient and effective use of all resources by the Authority;
- (d) The level of the Authority’s income from aviation terminal services and other revenue earned by the Authority generally;
- (e) Operating and other costs incurred by the Authority in providing aviation terminal services;
- (f) The level and quality of aviation terminal services, and the reasonable interests of the users of these services; and

- (g) The cost competitiveness of aviation terminal services with respect to international practice.

The Commission will decide the extent to which reliance on each of these factors will assist in achieving its statutory objective of facilitating the development and operation of safe, cost-effective terminal services that meet international standards.

1.2 Purpose of the Consultation Paper

The purpose of this paper is to outline the possible regulatory approaches that the Commission may adopt in its determination of maximum aviation terminal services charges, to lay out the issues that the Commission considers pertinent to the regulation of aviation terminal services, and to invite interested parties to submit their views on those issues, as well as other issues that may be relevant to the Commission's regulation of ATS.

1.3 Call for Submissions and Submission Guidelines

The Commission for Aviation Regulation invites interested parties to submit responses to the questions posed in this consultation paper by 3rd July 2001. Submissions should be addressed to:

Cathal Guiomard,
Head of Economic Affairs,
Commission for Aviation Regulation,
36 Upper Mount Street,
Dublin 2.

Submissions should be sent to the Commission either on floppy disk or by email to info@aviationreg.ie and should be either in Microsoft Word (".doc") or portable document format (".pdf").

2 The Economics of Regulation

This section reviews some of the theory of economic regulation by way of background to the Commission's task of regulating aviation terminal services charges.

2.1 The Economic Efficiency of Competitive Markets

Competitive markets are generally characterised by three types of economic efficiency: allocative, productive and dynamic. Each is explained in turn.

Allocative efficiency describes a situation where no person can be made better off without somebody else being made worse off. It occurs when total output is such that there is equality between the marginal social cost and the marginal social benefit associated with consuming the service.^[2] ^[3] Marginal social benefit can be measured by society's willingness to pay for the additional unit of output. Allocative efficiency, therefore, describes a situation where all consumers who are willing to pay the marginal social cost are able to obtain the product or service at that price. A competitive market is characterised by this outcome because, if the price exceeds that level, firms can continue to expand output and profitably undercut that price until the marginal condition above is reached. On the other hand, a price below that level would render the sale of the marginal units (beyond the output that satisfies the marginal condition) unprofitable.

Productive efficiency describes the situation where a given level of service is produced at minimum cost to the firm. It stems from the production of the maximum possible output from a given quantity of inputs as well as using different types of inputs (such as labour and machinery) in their cost-minimising proportions. Cost reductions allow scope for price reductions and the consequent ability to undercut rivals. Therefore, a competitive market will achieve productive efficiency because firms are under pressure to keep costs as low as possible.

Dynamic efficiency refers to the achievement of allocative and productive efficiency over time. For example, by producing more or better products or services or by reducing production costs, investment and innovation can yield long-term gains to society. The tendency of a competitive market towards allocative and productive efficiency was illustrated in a static sense above. Such a market will also tend towards an efficient outcome over time as a result of continual pressure to reduce costs (thus allowing scope for price reductions) and to bring new and better services to market, thus yielding dynamic efficiency.

2.2 The Purpose of Regulation

The existence of market power may prevent the market from achieving the economic efficiency of competitive markets. A firm with market power has the ability to restrict output in order to charge prices that exceed the marginal social cost of production and so earn excess profits. Allocative inefficiency results because society would be better off if output was expanded. Some buyers, who were willing to pay a price equal to the marginal social cost, are excluded by the higher price. There may also be productive inefficiency because a firm with market power does not face as much pressure from rivals to reduce prices by minimising costs. Therefore, such a market, when left to its own devices, produces an outcome that could be improved upon.

A statutory monopoly, as currently held by the Irish Aviation Authority in the provision of ATS, is one polar case of the existence of market power. Economic regulation of such a firm is typically concerned with emulating the market outcome that would otherwise be provided by competition. However, it is worth noting that weak or non-existent competition may not, in itself, be a sufficient reason to introduce regulation.

2.3 Possible Frameworks for the Economic Regulation of ATS Charges

In situations of statutory monopoly, regulation is typically concerned with the conduct of the firm in the pursuit of economic efficiency. There are a number of approaches to this form of regulation. One possibility is the regulation of the firm's profits. This has been popular in the US and is termed "rate-of-return regulation." A second is to attempt to align the incentives of the regulated firm with the incentives for efficiency that a firm operating in a competitive market possesses. This is known as incentive regulation and its most common application is the regulation of prices through the CPI-X price cap formulation. Such price regulation may be linked to performance targets.

2.3.1 Rate-of-return Regulation

Rate-of-return regulation places a limit on the returns that a regulated firm can earn. While it may be effective in preventing excessive profits, there may be very weak or no incentives to minimise operating costs, since the regulated return is calculated on the basis of capital employed. Moreover, there may be a risk of overinvestment ('gold-plating') as the firm attempts to boost the asset base, which is used to calculate its allowed return.

The informational asymmetry between regulator and regulated firm, combined with the above incentives, has meant that regulators, employing the rate-of-return method, have often been forced to expend significant resources on experts that can advise on whether or not certain investment projects generate a value for users that would make them worthwhile and, consequently, whether or not they should be allowed for regulatory purposes.

2.3.2 Incentive Regulation

There is a fundamental trade-off for a regulator between passing on price reductions to consumers and giving the regulated firm incentives to reduce costs (in a static and dynamic sense) by allowing profit retention. The aim of incentive regulation is to simulate the incentives faced by a firm in a competitive market place, such that the firm, through its own actions, strives towards allocative, productive and dynamic efficiency.

The most common application of incentive regulation is the CPI-X price cap formulation. In general, the requirement is for the regulated firm's average real prices to change annually by a factor of CPI-X. In other words, prices must fall in real terms by X, which reflects the rate of productivity improvement of the firm and its consequent ability to reduce prices without threatening its financial integrity. By way of example, assume that the change in the CPI (inflation) was 5% in the previous year, and the regulator decides to set X at 8%. This requires the firm to reduce prices in nominal terms by 3% in the current year. This is an 8% reduction in real terms because inflation was at 5%.

By setting maximum prices, the firm can retain any cost reductions (in excess of X) that it succeeds in making during the period of the cap, thus encouraging cost minimisation. When the cap is fixed in advance for a number of years (as is usually the case), the operator has an incentive to seek *additional* longer-term cost savings through investment and innovation, thereby encouraging dynamic efficiency.

A potential shortcoming of this type of price regulation is that of regulatory commitment. In particular, if the monopolist were to achieve cost reductions far in excess of X, the regulator may be tempted to increase X. Without guarantees of commitment for the period of the cap, the incentives to achieve such efficiency levels may be dampened. The regulator must also be aware that price regulation may, in the absence of explicit flanking measures in respect of quality, give the regulated firm an incentive to reduce quality in order to achieve cost reductions and boost retained earnings.

An important consideration in setting the level of X in a price cap is the power of the incentives that the regulator wishes to give to the regulated firm. A tight price cap (a large X) would bring immediate benefits to users of the service (allocative efficiency), but would leave less scope for future investment from retained earnings (dynamic efficiency). A loose price cap (a small X), on the other hand, would involve reduced user benefits in the short term to allow the firm to earn profits that would be sufficient to engage in cost-saving investments that would (if made), in the longer term, yield greater benefits to users.

Question 1: Are there other approaches that you consider relevant to the task of the Commission?

Question 2: What regulatory approach do you advocate for the economic regulation of ATS charges?

2.4 The Cost Base and Structure of ATS Charges

An optimal system of charging should encourage both the efficient use and provision of the necessary infrastructure. The last section outlined alternative regulatory models and how they can be used to align the incentives of the regulated firm with the incentives for efficiency that a firm operating in a competitive market possesses. Therefore, optimal price regulation should contribute substantially to incentivising the efficient use and provision of infrastructure. However, another vital consideration is the cost base and charging structure upon which that system of regulation relies.

2.4.1 The Cost Base

2.4.1.1 SRMC, LRMC and Average Costs

In order to encourage the efficient use of infrastructure, charges should reflect costs. As outlined in section 2.1, allocative efficiency is achieved when prices are equal to the marginal social costs associated with the use of infrastructure. A charging system based on marginal social costs could be based on either short-run or long-run marginal costs.

Short-run marginal cost (SRMC)-based pricing relates charges to short-run costs associated with the use of existing infrastructure, thus encouraging efficient use of that infrastructure. It would include:

- direct financial incremental costs imposed by users on the Authority; and
- external social costs imposed by users on other parties (such as other users, residents etc.), for example, congestion and pollution.

By directly relating charges to the costs of congestion, SRMC-based charging could incentivise the operation of flights at less congested times and to less congested airports. This would minimise the costs imposed by their operations on other parties, thus ensuring lower charges. In effect, only those users that were willing to pay for the additional costs imposed on society would use the service.

Long-run marginal cost (LRMC)-based pricing would be based on the Authority's long-run costs of expanding infrastructure. It is based on the principle that the costs of expansion should be paid for by those users who require the additional infrastructure. Rather than basing charges directly on the costs of congestion, they are based on the investment costs of addressing the capacity constraints that caused the congestion. However, it is flights that operate at congested times that drive the expansion of infrastructure, so charges would be higher for these flights. Users operating during uncongested times would not be expected to pay for the capacity expansion.

It is worth noting that efficient investment programmes and capacity expansion ensures that SRMC and LRMC converge over time because capacity should be expanded to a point where further expansions cost the same as the social costs imposed by users in using existing capacity.^[4] A pricing system that reflected either would essentially amount to a system of peak-load pricing where congestion was present. SRMC- and LRMC-based pricing should ultimately deliver on similar objectives, that is, an efficient level of capacity and delay. However, it could have perverse effects if, instead, it incentivised the Authority to limit capacity (see footnote 6).

In both the short and long run, it has been found that a high proportion of the costs of ATS provision are fixed.^[5] That implies that the marginal cost of ATS provision in an uncongested system would be very low. A pricing system based on those costs would fail to recover fixed costs and leave the ATS provider financially insolvent. Therefore, in the presence of a high proportion of fixed costs and an uncongested system, the appropriate cost base for charging would be average costs. In regulating a monopoly such as the Authority, this will generally involve charges that are based on projected demand, operating costs and capital expenditure (taking account of efficiency), and that allow the regulated firm a return on its assets that reflects its cost of capital. (However, encouraging the efficient use of infrastructure might require deviation from a flat charging structure based on average costs. This is addressed in section 2.4.2 below.)

Therefore, in deciding the appropriate cost base, it is important to establish whether or not there are capacity constraints in the provision of ATS in Ireland. Both short-run and long-run marginal costs are likely to exceed average costs in a congested system, so regulating prices on the basis of average costs could result in the inefficient use of infrastructure and the distortion of the Authority's incentives to meet demand efficiently over time through capacity expansion.

Question 3: Is there evidence of capacity constraints in the provision of ATS in Ireland?

Question 4: If there are capacity constraints, are they sufficiently severe, in your view, to warrant an examination of the Authority's short-run and long-run incremental costs relative to its average costs associated with the provision of ATS?

2.4.1.2 Eurocontrol and International Civil Aviation Organisation (ICAO) Rules and the European Commission Review

While Eurocontrol provides a harmonised system of charging for en route services, there is no equivalent system for ATS or its equivalent in other Member States. Concerns have been raised amongst users of ATS arising from the current system of charging within the EU. Such concerns relate to and include, among others, inconsistency of charging methodologies across Member States, which has resulted in perceived unfair discrimination between airlines, lack of transparency in cost information including attribution methodologies and instances of explicit price discrimination. As a result of these concerns,

the European Commission contracted PricewaterhouseCoopers (PwC) to consider the existing framework of charges and to propose a new and harmonised system for terminal air navigation services charges (see footnote 5).

The European Commission's policy on pricing transport infrastructure favours SRMC as the costing principle. With this in mind, PwC's report investigates the practicality and acceptability of implementing a charging regime that was based on either SRMC or LRMC. However, their findings reveal that

1. most of the data that would be required in order to calculate marginal costs are not available; and
2. congestion-related pricing is strongly opposed by airlines, as well as the majority of governments and air navigation service providers.[\[6\]](#)

Consequently, PwC has recommended that the European Commission adopt a two-stage process to reform the system of charging for ATS. The first stage would focus on developing a non-discriminatory and harmonised charging system for ATS throughout the Community. The second stage would involve a move towards a charging regime based on marginal costs once there are improvements in the data that would be necessary for the implementation of such a regime.

Question 5: Is there sufficient data available to allow calculation of the marginal costs associated with the provision and use of ATS? This question refers in particular to the external social costs associated with a congested system or the investment costs of addressing the capacity constraints that caused this congestion.

Question 6: Do you favour the use of marginal cost (either short-run or long-run) as the cost basis for the Authority's ATS charges in the presence of capacity constraints in their provision?

Any form of social cost-pricing could conflict with both Eurocontrol pricing principles[\[7\]](#) and the recommendations of the Council of the International Civil Aviation Organisation (ICAO)[\[8\]](#), which are based on the principle of 100% financial cost recovery. As a result of Ireland's membership and participation in these organisations, the Authority currently applies these principles. However, the PwC report (footnote 5) states: "we note that these principles are not binding on European terminal ANS providers, and in any case, ICAO's principles in this area are currently under review."

Question 7: Given the PwC view that neither the Eurocontrol nor the ICAO principles are binding on terminal ANS providers, in your view, to what extent should the Commission have regard to these principles in making its determination specifying the maximum levels of ATS charges?

2.4.2 Charging Structures

2.4.2.1 Ramsey Pricing, MTOW-Based Pricing and Two-part Pricing

As outlined in section 2.4.4.1, a high proportion of the costs of provision of aviation terminal services are fixed in both the short and the long run. The size of these fixed costs can be such that average costs are declining at current levels of demand, such as would occur in an uncongested system, in which case pricing based on marginal costs will fail to cover the total costs of the ATS provider. It is widely accepted that a pricing structure known as Ramsey pricing minimises the welfare losses associated with pricing above marginal cost. Ramsey pricing involves raising prices inversely in proportion to the elasticity of demand. Those users with low price sensitivity would pay higher prices, which reflects their greater willingness to pay, as illustrated by the fact that a price increase produces only a small reduction in their demand for the service.

In practice, the Authority relates charges to the Maximum Take-off-Weight (MTOW) of the aircraft in question. This is a proxy for the ability (or willingness) to pay in that, for example, a larger aircraft seats more passengers, which generates greater revenues for the airline. Consequently, they are able to contribute more to the costs of the ATS provider. An important issue is to ensure that there is a reasonable reflection of users' relative ability to pay in the relationship between charges and MTOW. The recommendations of the Council of ICAO states that "where charges for approach and aerodrome control are levied...the charge...could take aircraft weight into account but less than in direct proportion." MTOW used in direct proportion could lead to the overcharging of larger aircraft and, consequently, wasteful underuse of capacity. The Authority, at present, uses the average MTOW of each airline's fleet for the purposes of charging those airlines for ATS.

There may be more accurate approximations to Ramsey pricing than MTOW. For example, the charging structure could reflect the demand patterns of the passengers on board the flights that require ATS. For example, business travellers may have relatively inelastic demand for airline services, which translates into a greater willingness to pay to get to where they wish to go. This could, in turn, be reflected in the airlines' willingness to pay for ATS in order to get these passengers to their destination. Therefore, ATS charges could be set according to the different types of passenger on board or according to the value of that flight to the airline. However, there could be difficult practical obstacles to implementing such an approach, in particular, the information that would be required from the airlines with operations to and from Dublin, Shannon and Cork airports.

Two-part pricing could also be useful in encouraging the efficient use of infrastructure while recovering the fixed costs associated with the provision of ATS. The payment of a relatively high fixed fee per flight in order to use ATS could encourage airlines to operate larger aircraft with more passengers or cargo, such that the value of the flight exceeds by greater amounts the ATS charge. Such a charging structure would align charges more closely to the cost of providing the service.

Question 8: Do you believe that the Authority's current charging structure based on MTOW is an adequate approximation to an efficient charging structure when the recovery of fixed costs associated with the provision of ATS preclude marginal cost-pricing? If not, please indicate the charging structure that you believe would contribute most to the efficient use of infrastructure and the attainment of overall efficiency.

2.4.2.2 ATS and Airport Charging Structures

All flights require the provision of both airport and aviation terminal services and the demand for both is a derived demand from the market for airline services. Therefore, given their complementarity as inputs in the provision of airline services, it may be important to consider their charging structures in parallel. In other words, there may be a necessity to have coincidence between the incentives that are designed to encourage use of certain aspects of both airport and air navigation infrastructure efficiently. For example, the capacity to provide aerodrome control services may be influenced or even dictated by the capacity of the airport to land planes on its runway(s).

Question 9: Having regard to the statutory factors to which the Commission must have due regard, is it necessary, in your view, to align the structure of ATS charges with the structure of charges for any airport services? If so, for what services?

2.5 Conclusion

This section has reviewed the motivations for and objectives of economic regulation in the context of the Irish Aviation Authority's provision of aviation terminal services. It has outlined some of the possible approaches that could be adopted in regulating the level of the charges for those services and, finally, it has raised issues concerning the charging base and structure.

Question 10: Please indicate your overall view on ATS charges, including the cost base, the structure and their level. Please support your answer by appropriate quantitative analysis.

Question 11: In the context of any knowledge or experience that you may have in terms of the successes or failures of economic regulation of ATS charges abroad, are there lessons to be applied in Ireland drawing on such international experience?

3 Issues for Discussion in setting the Regulated Charges

This section discusses the issues that are likely to arise during the Commission’s process of making a determination specifying the maximum levels of aviation terminal services charges.

3.1 Scope of ATS Charges

The Aviation Regulation Act, 2001 adopts the meaning assigned to terminal services by the Irish Aviation Authority Act, 1993. It defines terminal services as follows:

“the air navigation services provided for aircraft landing at or taking off from an aerodrome or while in the vicinity of an aerodrome before landing at or taking off from that aerodrome.”

Air navigation services are defined in the Irish Aviation Authority Act, 1993 as including

“services providing, giving or issuing information, directions or instructions, or other facilities, for the purposes of or in connection with the navigation or movement of aircraft.”

Air navigation services are generally provided in three main phases of a flight:

- Movements at and around an aerodrome (aerodrome control);
- Approach and departure of flights including initial climb and descent (approach control);
- En route.

ATS comprises two elements, being, air navigation services provided by the Authority to an aircraft landing at or taking off from an aerodrome, as well as air navigation services provided to aircraft while in the vicinity of the aerodrome. No legislative guidance is given as to the meaning of the term ‘in the vicinity of’ and, accordingly, it falls to the Commission to determine. In doing so, the Commission will have regard to normal principles of interpretation, as well as international practice as represented by the ICAO and Eurocontrol regimes.

3.1.1 ATS versus En Route

In the recommendations of the Council of the International Civil Aviation Organisation (ICAO) on charges for airports and air navigation services ‘approach and aerodrome control charges’ are distinguished from ‘route air navigation services charges.’

The current Eurocontrol en route charging rule exempts the 20 kilometres of flight closest to the airport from en route charges. Therefore, ATS charges must be set to recover the costs associated with aerodrome and approach control of flights entering or leaving a 20km radius from the airport. The Authority currently applies this 20km rule, as with the principle of 100% financial cost recovery (see

subsection 2.4.1.2).

PwC's report recommends that the Eurocontrol rule should be amended to exempt:

1. 80km from en route charges at airports where there is a separate approach control phase; and
2. 40km from en route charges at airports where approach and aerodrome control are provided as a single integrated service.

Their report states that a flight's approach phase is greater than 20km, 20km being a more reasonable proxy for the aerodrome phase when aerodrome and approach are separated. Therefore, taking account of the operational reality (as outlined by PwC), and assuming that ATS charges cover the costs associated with the 20km radius around the airports, the current charging system effectively results in some proportion of the costs associated with the provision of approach control being recovered through en route charges.

Question 12: Do you believe that the Eurocontrol en route charging rule exempting the 20 kilometres of flight closest to the airport from en route charges provides an appropriate definition for ATS? If not, what, in your view, is the appropriate rule or definition?

It may be more appropriate to determine what constitutes the vicinity of an aerodrome (and, hence, en route) using variables other than distance from the airport, for example, altitude.

Question 13: Is there an alternative, more appropriate variable(s) that can be used to determine what constitutes the vicinity of an aerodrome?

3.1.2 Aerodrome versus Approach Services

It may be the case that aerodrome and approach control is provided from different locations in the ATS system. If this is the case, and particularly if one or the other is provided from busier parts of the system, it may be necessary to have separate charges. For example, while aerodrome control may be provided from the tower at each individual airport, approach control for all flights, regardless of where they land may be provided from Dublin or Shannon.

Separate provision of aerodrome and approach control may arise only in the case of contingencies. For example, if approach facilities in Dublin shut down ahead of a flight landing in Dublin, approach control may have to be provided from Shannon at short notice. However, the costs associated with the provision of approach control may differ between Shannon and Dublin, so cost-reflective charging would require separate charges for approach and aerodrome control.

Where the provision of aerodrome and approach control is always integrated (even during emergencies), an integrated charge may be sufficient.

Question 14: In your view, is the provision of aerodrome control and approach control such that cost-reflective charging would require separate charges or a single integrated charge?

3.1.3 Joint and Common Resources and Costs

As well as ATS for Ireland's three state-owned airports (Dublin, Shannon and Cork), the Authority provides en route navigation for movements in Irish-controlled airspace; Shanwick Communications^[9]; safety regulation; air navigation for exempt air traffic^[10]; and commercial and training activities. Some resources that are used in the provision of ATS are also used in the provision of these other services, particularly en route air navigation. In order to have cost-reflective ATS charges, it is necessary to distinguish the proportion of use of these resources in the provision of each service. The Authority has had a set of cost allocations, which were devised by Eurocontrol, for joint and common costs in place since 1993. Given the significant developments that are likely to have taken place since 1993, it may be necessary for the Commission for Aviation Regulation to review these cost allocations for the purposes of making its determination on ATS charges.

Question 15: In your view, what set of resources is used in the provision of ATS?

Question 16: In your opinion, which of these resources are exclusive to the provision of ATS and which are used jointly to provide ATS and en route (or other) services?

Question 17: Having regard to questions 15 and 16, how should the joint and common costs be allocated between ATS and the Authority's other services?

3.1.4 Other Costs of the Authority

The Authority bears considerable costs for meteorological (MET) services and membership of Eurocontrol. Such costs are, at present, recovered out of the Authority's total revenues. It may be appropriate for some proportion of these costs to be recovered directly through ATS charges, given that some proportion of these services may be necessary in the provision of ATS.

Question 18: What costs, other than those relating to the core elements of ATS provision, are borne by the Authority in the provision of ATS (whether currently recovered through ATS charges or not)?

Question 19: How, in your view, should the share of these (non-core) costs borne in the provision of ATS be determined?

These (non-core) costs are quite distinct from the core elements of ATS provision and, consequently, could be recovered through separate charges or charging elements imposed on ATS users. This may serve to increase transparency of costs.

Question 20: Should the recovery of these (non-core) costs be through separate charges or through core ATS charges?

3.2 The Form of the Maximum Charge

Section 35(4)(a) of the Aviation Regulation Act, 2001 states that a determination, specifying the maximum level of aviation terminal services charges, may “provide

- (i) for an overall limit on the level of aviation terminal services charges,
- (ii) for limits to apply to particular categories of such charges, or
- (iii) for a combination of any such limits.”

In choosing the form of the maximum, regulators usually face a trade-off between allowing discretion in setting individual charges, to allow scope for re-balancing, and mitigating the potential incentive to cross-subsidise by charging excessive prices for certain services.

In the case of ATS, setting an aggregate maximum would leave the Authority with some discretion, which may be desirable if re-balancing of separate charges for aerodrome and approach control was required. However, it could also give the Authority the incentive to set charges for approach or aerodrome control that did not reflect the associated costs, thereby cross-subsidising from one to the other. Individual maxima would, on the other hand, mitigate such incentives for cross-subsidisation.

Question 21: What form should the maximum for ATS charges take?

3.3 The Mechanism to Operate the Price Determination

Section 35(4)(b) specifies that a determination may “operate to restrict increases in any such charges, or to require reductions in them, whether by reference to any formula or otherwise.” The decision as to

whether the determination operates to restrict increases or require reductions in aviation terminal services charges will depend, amongst other things, on the form of economic regulation to be applied and the current level of those charges.

Price regulations are generally expressed by reference to a formula, in order to allow the regulated firm to compute the impact of such regulations. The Commission's ability to make a determination "whether by reference to a formula or otherwise" affords it some latitude in choosing the mechanism by which its price determination will be operated. There are a number of alternative mechanisms, each giving somewhat different incentives to cut costs, change output and set prices.

3.3.1 A Cap on Individual or a Basket of Charges

This allows for a maximum percentage change in the regulated firm's individual charges or the overall price of a basket of the regulated firm's services. The firm retains the difference between these charges and costs, so the incentive is to minimise the latter in order to boost profits. Moreover, total revenues rise or fall in line with output, so there are strong incentives to increase output in the presence of large fixed costs. However, the firm's revenues will also vary with deviations from the projected demand forecasts that were used in setting the cap.

3.3.2 A Cap on Total Revenue

This allows for a maximum percentage change in the total revenues of the regulated firm. In a similar manner to the cap on charges, the firm retains the difference between total revenues and total costs, so the incentive is to minimise the latter in order to boost profits. There is certainty in the face of deviations from forecasted demand patterns because total revenues are constant. However, there is no incentive to expand output because, in order for total revenue not to exceed the cap, prices would have to fall. Moreover, the existence of variable costs would allow the firm to cut total costs by reducing output and by raising prices in order to reach the revenue ceiling. In the presence of deviations from projected demand forecasts, prices would move inversely with those deviations. This could generate uncertainty about future charges.

3.3.3 A Hybrid Cap – Tariffs and Total Revenue

This would allow for a maximum percentage change in some proportion of the regulated firm's total revenues, while allowing the remainder to vary with output through a simultaneous allowance for a maximum percentage change in the charges for some or all of the firm's services. The incentive to expand output is less strong than with a cap on charges, but the tendency for frequent price changes because of deviations from forecasted demand patterns is reduced relative to a cap on total revenue. Such a price control mechanism would seek to reflect the factors determining the costs of the business. In particular, where the majority of costs are variable, there would be a tendency towards regulating charges. This would serve to neutralise the incentive to reduce output in order to reduce total costs. However, it would incentivise the minimisation of the variable cost per unit. Where the majority of costs are fixed, there would be tendency to regulate total revenues. This would serve to neutralise the incentive to expand output in order to reduce the fixed cost per unit (which would boost retained earnings

under a system of capped charges), and incentivise the minimisation of total fixed costs.

3.3.4 A Cap on Revenue-Yield

This allows for a maximum percentage change in revenue per unit of output. The CAA has proposed the application of this mechanism in the regulation of charges for en route services in UK airspace, where the unit of output is a chargeable Eurocontrol service unit (CSU) (see section 4.4.2.1 below). The regulated firm retains the difference between average revenue and average cost, so there are strong incentives to minimise the latter in order to boost profits. Total revenues rise and fall in line with output and, so, there are strong incentives to increase output in the presence of large fixed costs. Such a control could create the incentive for the firm to raise prices in areas or during times when demand for aviation terminal services is relatively inelastic, which would serve to boost total revenues without affecting passenger numbers, thereby boosting revenue per passenger.

Question 22: By what mechanism should the determination on maximum ATS charges be operated?

In addition to the permitted changes in prices or revenues that operate over the five year period, a re-basing of the initial charges could be considered necessary if these were judged to be too high or too low at the start of the control period.

3.4 Section 36 of the Aviation Regulation Act, 2001

In making its determination, the Commission is required by law to “aim to facilitate the development and operation of safe, cost-effective terminal services which meet international standards” (section 36). In doing so, the Commission is required to have due regard to seven specified factors:

- (a) the relevant charging principles of the International Civil Aviation Organisation and of Eurocontrol,
- (b) the level of investment in aviation terminal services by the Authority, in line with safety requirements and commercial operations, in order to meet the current and prospective needs of the airline industry,
- (c) the efficient and effective use of all resources by the Authority,
- (d) the level of the Authority’s income from aviation terminal services and other revenue earned by the Authority generally,
- (e) operating and other costs incurred by the Authority in providing aviation terminal services,
- (f) the level and quality of aviation terminal services, and the reasonable interests of users of these services, and

(g) the cost competitiveness of aviation terminal services with respect to international practice.

3.4.1 Statutory Objective

It falls to the Commission to decide how the statutory objective is to be facilitated having due regard to the factors specified in Section 36 of the Act.

One of the elements of the statutory objective is the development and operation of cost-effective terminal services. *Operational* cost-effectiveness corresponds to the economic concept of productive efficiency (introduced in section 2.1). Recall that productive efficiency refers to a situation where the regulated firm produces a given level of service at minimum cost.

The *development* of cost-effective terminal services, on the other hand, corresponds to the economic concept of dynamic efficiency (also introduced in section 2.1). Recall that dynamic efficiency refers to efficiency over time and is particularly concerned with investment and innovation. Therefore, the Commission, in making its determination must aim to facilitate appropriate investment decisions concerning the development of terminal services.

In addition, the Commission, in making its determination, must also aim to facilitate safe terminal services. Therefore, it must ensure that measures that are designed to achieve cost-effectiveness do not threaten safety standards.

The reference to international standards in the statutory objective refers to a number of or all aspects of ATS, including safety and the efficient utilisation of the ATS system. Moreover, such international standards are designed such that the requirements of the users of ATS (the airline industry and, ultimately, consumers) are met.

Based on the above analysis of the statutory objective, in aiming to facilitate the development and operation of safe, cost-effective terminal services that meet international standards, the Act appears to be concerned with productive and dynamic efficiency, subject to the constraint of safety and the requirement to meet international standards. Once safety and international standards are met, economic welfare tends to be maximised where these efficiencies are observed and where prices are cost-reflective and assume an efficient structure. Economic welfare may be expressed as the excess of the total *value* of a service to society over its total *costs*. On this principle, regulatory choices would be made so as to maximise economic welfare from a given service (such as ATS), subject to any constraints (such as the requirement to meet safety and international standards, as in the case of ATS). Accordingly, in having due regard to each of the seven factors specified in Section 36, the Commission will aim to determine the extent to which reliance on each of the factors maximises economic welfare from ATS. By using this test, the Commission will be in a position to determine with greater accuracy, the extent to which

reliance on each of the seven factors furthers the objective of the Commission to facilitate the development and operation of safe, cost effective terminal services that meet international standards.

Question 23: Are there more appropriate ways by which the contribution of each of the factors specified in section 36 to the achievement of the statutory objective may be assessed?

Question 24: In your opinion, what international standards are relevant for the purposes of the statutory objective?

3.4.2 Statutory Factors

This section details some initial considerations on each of the 7 factors specified in section 36 of the Aviation Regulation Act, 2001.

3.4.2.1 Factor (a): International Civil Aviation Organisation (ICAO) & Eurocontrol Charging Principles

The Council of the International Civil Aviation Organisation (ICAO) publishes principles for the calculation of charges for air navigation services (see footnote 8). As noted in section 2.4.1.2, these principles advocate 100% financial cost recovery for the provision of these services. Moreover, these principles, as noted in section 2.4.2.1, also state “where charges for approach and aerodrome control are levied...the charge...could take aircraft weight into account but less than in direct proportion.”

Based on these ICAO principles, Eurocontrol publishes “Rules Governing Terminal Charges in Ireland” (see footnote 7). These rules specify that a terminal charge (**R**) shall be levied for each flight departing from the State aerodromes in Dublin, Shannon and Cork and that this charge “shall constitute remuneration for the costs incurred by Ireland in respect of terminal facilities and services.” **R** is calculated in accordance with the following formula:

$$\mathbf{R} = \mathbf{t} \times \mathbf{N}$$

where **t** is the unit rate of charge and **N** is the number of chargeable service units corresponding to terminal services used or made available.

Article 4.1 of the (Eurocontrol) Rules Governing Terminal Charges in Ireland specifies that “for a given departing flight, the number of service units in respect of ATS charges, designated (**N**), shall be equal to the maximum certificated take-off weight (MTOW) for the aircraft concerned...” In effect, **N** determines the structure of ATS charges, which, in turn, is concerned with MTOW. At present, the Authority applies the average MTOW of each airline’s fleet for the purposes of charging those airlines for ATS.

Article 3.3 of the same rules state that “the unit rate of charge (t) shall be published by Ireland.”

As also noted in section 2.4.1.2, the Authority currently applies the charging principles of Eurocontrol and ICAO in the provision of ATS. However, these principles may not be binding on European terminal air navigation service providers. Therefore, an issue for the Commission in making its determination on ATS charges is whether, to the extent that these principles are not binding, they can be improved upon through a charging system that applies some of the principles that were outlined in section 2.4 of this paper.

3.4.2.2 Factor (b): Level of Investment

ICAO is the body charged with the responsibility for developing international rules that govern all areas of civil aviation. All air and ground navigational aids, satellite systems, communications and weather forecasting facilities and procedures are based on the safety standards that are set by ICAO and utilised throughout the world. Similarly, all air and ground crews are trained to the same ICAO standards. In Ireland, safety standards in aviation are monitored and enforced by independent safety regulation provided by the Authority. The Commission, in its economic regulation of ATS charges, shall assume, for the purpose of having due regard to the level of investment, in line with safety requirements, that the Authority, in its provision of ATS, continues to meet the safety standards that have been handed down to it by ICAO and that it will always maintain a strong corporate safety culture.

The provision of ATS is a technology-intensive business. Therefore, it is vital that its economic regulation be consistent with levels of investment that allow innovations to keep pace with the emergence of new technologies, such that international standards can continue to be met.

Investment is costly and made against a background of uncertainty as to the future demand from airlines and general economic conditions. Therefore, economic regulation must seek to provide the incentives to invest in the correct areas, at correct levels and in a manner that is efficient. This requires an assessment of capital expenditure (CAPEX) programmes in an attempt to ensure that what they deliver is valued by the airlines (the users of the service) to an extent that makes the investments worthwhile.

Capital expenditure increases a firm’s assets and, for a regulated firm whose prices are set in part to allow for a return on those assets, there may be incentives to project over-investment. This would cause regulated prices to be higher than they would otherwise be. Subsequently, when it comes to implementing such projections, there may be further incentives to underspend on actual investment. Therefore, a regulated firm’s investment plans require careful scrutiny as to their timing and efficiency. Once prices are regulated in a manner that incentivises the efficient level of investment, the regulated firm may require further incentives to implement those investments.

Question 25: What measures should the Authority undertake in order to ensure that CAPEX programmes meet current and prospective user needs in terms of the level, manner and efficiency of investments? In your view, how should the Commission analyse and assess the Authority's performance in this regard?

Question 26: What measures, if any, should the Commission put in place to ensure that the incentives are provided to subsequently implement projected investment plans?

Question 27: Should the provision of such incentives dictate when investments are included in the assets on which an allowed return is included?

3.4.2.3 Factor (c): Efficient and Effective use of Resources

Efficiency and effectiveness in the use of resources by the Authority is related to the economic concepts of productive and dynamic efficiency (see section 4.4.1). In its task of realising the statutory objective (aiming to facilitate the development and operation of safe, cost-effective terminal services which meet international standards), the Commission must have due regard to this statutory factor. However, it will be necessary for the Commission to devise a method by which the level of these efficiencies (or inefficiencies) can be assessed.

Question 28: How should the efficiency and effectiveness of resource use by the Authority be assessed?

Question 29: At the overall level, relative to comparable providers of ATS, is there evidence of either inefficient or ineffective use of resources by the Authority?

3.4.2.4 Factor (d): The Authority's Income and Revenue

This statutory factor specifies that, in making its determination, the Commission must have due regard to the Authority's income from ATS, as well as 'other revenue' earned by the Authority generally.

As outlined in subsection 2.4.2.2, the demand for ATS is a derived demand from the airline industry, in particular, the airlines that land and take-off at Irish airports. The Authority may earn revenues for services (other than ATS) that are also a direct consequence of those airlines operating from Irish airports. Taking full account of such income streams in the regulation of ATS charges would, in effect, return some of the benefits to those airlines.

Question 30: In your view, is there any revenue earned by the Authority for services other than ATS that are a direct consequence of airlines (to whom ATS is provided) landing at or taking off from Dublin, Shannon and Cork?

3.4.2.5 Factor (e): The Authority's Operating and Other Costs

This statutory factor specifies that the Commission must have due regard to the “operating and other costs incurred by the Authority in providing aviation terminal services.” As outlined in section 4.4.1, an element of the Commission’s statutory objective of aiming to facilitate the operation of cost-effective ATS is related to the economic concept of productive efficiency. Therefore, in its task of realising this part of the statutory objective, the Commission will be seeking to ensure that the operating costs of the Authority are no higher than is necessary for the provision of a given standard of ATS to users.

Question 31: In your view, how should the Commission assess the operational efficiency (operating cost minimisation) of the Authority in the provision of ATS?

Due regard to this factor will also require consideration of the issues and questions raised in sections 2.4.1 and 4.1.

3.4.2.6 Factor (f): Service Level and Quality, and the Reasonable Interests of Users

The demand for ATS is a derived demand from the market for airline services. In order to take account of the reasonable interests of users, the level of ATS provision must be such as to meet that derived demand, both now and into the future.

Question 32: What level of ATS provision is necessary to meet the reasonable interests of users (the airlines) of those services? Please support your answer by relevant quantitative projections as necessary.

Price regulation serves the interests of users only if it is not offset by a reduction in service quality. In other words, appropriately calibrated, rising prices and falling service quality are equivalent. Regulated firms may have an incentive to degrade service quality, thereby reducing operating costs and boosting profits. Therefore, in its task of aiming to facilitate its statutory objective through the regulation of ATS charges, the Commission must have due regard to these incentives and ensure that the provision of ATS is sustained at a level and quality that meets the reasonable interests of users.

Question 33: What are the dimensions of quality for ATS?

Question 34: What incentives can be put in place to ensure that the Authority sustains terminal services at a level and quality that meets the requirements of users?

3.4.2.7 Factor (g): International Cost Competitiveness

The statutory objective of the Commission is to aim to facilitate the development and operation of safe, cost-effective terminal services that meet international standards. In aiming to facilitate this objective, this statutory factor requires the Commission to have due regard to international practice on cost competitiveness (productive and dynamic efficiencies) in the provision of safe terminal services that meet international standards. This may involve benchmarking the Authority against ATS providers elsewhere in the world that have similar characteristics such as, for example, size, traffic levels etc. However, the Commission is mindful that although benchmarking may have advantages, distortions could be introduced if inappropriate comparisons are made.

Question 35:

(a) In your view, how should the cost competitiveness of the Authority with respect to international practice be assessed?

(b) Do you think that benchmarking has a role to play? If so, against which entities should the Authority be benchmarked?

(c) What, in your view, are the advantages and disadvantages associated with reliance on benchmarking?

3.5 The Authority's Rate of Return

The Commission, as outlined in section 4.4.2.1, must have due regard to the relevant charging principles of the International Civil Aviation Organisation (ICAO). These principles (see footnote 8) state that “air navigation services may provide sufficient revenues to exceed all direct and indirect operating costs and so provide for a reasonable return on assets (before tax and cost of capital) to contribute towards necessary capital improvements.” Therefore, the ICAO principles recognise the link between the ability of the provider of air navigation services to undertake investment in improving its service and the rate of return that is earned by that firm. Moreover, the statutory factor in section 36(b) of the Act requires the Commission to have due regard to the level of investment in ATS by the Authority. Therefore, in a number of ways, the Act implicitly requires consideration of the Authority's rate of return. The magnitude of the allowed rate of return will affect the Commission's determination specifying the maximum levels of ATS charges.

Calculation of an allowed rate of return would require the Commission to establish or estimate:

(a) The value of the Authority's assets used in the provision of ATS (the value of the regulatory asset base); and

(b) The Authority's cost of capital.

A number of approaches to asset valuation are available, including historic book value, current book value, replacement cost book value, current market value (in the case of companies with publicly traded

shares) and net present value.

Question 36: What assets should be included in the regulatory asset base?

Question 37: In your view, on what basis should the regulatory asset base be valued?

A firm's cost of capital is a measure of the cost to a firm of obtaining investible funds. It comprises the cost of equity finance and the cost of debt finance (combined as a weighted average as appropriate).

Question 38: In your view, how should the Authority's cost of capital be calculated?

Question 39: In your view, has the capital asset pricing model a role to play in estimating the Authority's cost of capital? In your experience, what firms or industries in Ireland or elsewhere have similar risk profiles to the Authority and could therefore be used as benchmarks for determining the value of beta in the CAPM?

A firm's rate of return can be calculated in several ways, two of the most popular being the return on assets and the return on equity.

Question 40: In your view, what is the most appropriate way to define and measure Authority's rate of return?

Economic analysis suggests an important relationship between a firm's rate of return and its cost of capital. That is, over the medium term, unless the rate of return matches the cost of capital, the company will be unable to replace its stock of assets, thereby jeopardising the sustainability of the firm's future operations. If, however, in a competitive market, the rate of return consistently exceeds the cost of capital, new firms will be attracted into the industry by the profits to be earned there. The increased competition will serve to reduce prices and, consequently, bring rates of return closer to the cost of capital. This reasoning would suggest that, in the absence of competition, a regulator should, over the medium term, set the allowed rate of return equal to the company's cost of capital.

Question 41: Should the Authority's allowed rate of return be explicitly related to its cost of capital? If so, how?

3.6 Conclusion

Section 4 makes preliminary observations and poses question about the policy choices facing the Commission in its task of aiming to facilitate the statutory objective through a determination specifying maximum levels of aviation terminal services charges, while having due regard to the seven statutory factors in section 36 of the Act.

4 Conclusion

This consultation paper has aimed to provide an outline of some of the regulatory approaches that the Commission might consider in making its determination specifying the maximum levels of aviation terminal services charges, as well as the pertinent issues that the Commission considers relevant in making that determination. The Commission has sought the views of interested parties and intends, once these responses have been received and considered, to produce a draft determination. Interested parties will have the opportunity to make representations on the draft determination during the statutory consultation period, which will be considered by the Commission prior to making its final determination.

[1] The IAA also regulates the safety standards of Irish civil aviation and provides aeronautical communication services on the North Atlantic (NAT).

[2] The marginal cost to the firm is the cost of producing one additional unit of output. It generally falls or rises as output increases depending on the productivity (which, in turn, determines the quantity) of inputs. For example, diminishing returns set in beyond a certain level of output because it requires an increasing number of inputs to produce a given level of output, so marginal costs will be increasing beyond that level of output. There may also be external social costs associated with the production or consumption of that unit. The sum of the two is the marginal social cost. Marginal social benefit is the total benefit to society from consumption of one additional unit. Most goods or services will yield only private benefits, but some also generate positive externalities, in which case the marginal social benefit will be greater than the private benefit to the paying consumer. Marginal social benefit generally falls as consumption increases because, for example, consumption of additional units generally yield less satisfaction than consumption of the first.

[3] Exceeding the output where marginal social cost and benefit of an additional unit of output are equalised would be wasteful because the marginal social cost of an additional unit would exceed the marginal social benefit derived from its consumption. Output that falls short of that level is also wasteful because production of an additional unit would yield at least as much social benefit as its social cost of production.

[4] In other words, society would be indifferent as to whether further capacity expansion was carried out. In practice, however, the costs of capacity expansion can become very high and/or lumpy.

[5] See PricewaterhouseCoopers (March, 2001), “Study of the Terminal Charges for Air Traffic Control

Services,” Final Report for the Commission of the European Communities.

[6] This opposition stems from a number of factors including a belief that such a charging regime is impractical, scepticism about the impact on demand patterns and concerns that such a system could, in the absence of competition in the provision of ATS, incentivise the provider to limit capacity and benefit from peak-related surcharges. The impact on demand patterns would require an assessment of the importance of ATS charges in airlines’ scheduling plans, while the issue of practicality could be assessed by looking at other industries where similar pricing systems may have been applied. Finally, an adequate system of economic regulation should mitigate concerns over the possible incentives of the ATS provider to limit capacity.

[7] See Information Circular: Terminal Charges in Ireland, Ref. EI 2000/01, which includes “Rules Governing Terminal Charges in Ireland.”

[8] These recommendations are published in ICAO (1997), “Statements by the Council to Contracting States on Charges for Airports and Air Navigation Services,” Fifth Edition, Doc 9082/5.

[9] Shanwick Communications provides a long range voice communications service for Oceanic Air Traffic Control in the eastern half of the North Atlantic, the Volmet Broadcast Service and is also the AFTN (Aeronautical Fixed Telecommunications Network) COM centre for Ireland.

[10] Exempt air traffic includes military and search and rescue aircraft, flights with heads of State and any aircraft with a weight under two tonnes.