

ABSTRACT

This paper explores the economic implications of new policy initiatives that seek to introduce terminal competition at Dublin Airport, in the context of the recent regulatory history of the three busiest Irish airports. There are very few examples of direct competition occurring between rival terminals at a single airport. The paper reviews the particular circumstances that have motivated the Irish government to consider the introduction of terminal competition, and explores various aspects that will be relevant to the modelling of the microeconomic consequences and implications of such competition.

Keywords: Transport Economics; Regulation; Irish Aviation; Airport Competition; Terminal Competition.



GEARY DISCUSSION PAPER SERIES

Competition Between Airport Terminals: The Issues Facing Dublin Airport

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INTRODUCTION

Dublin Airport is the centrepiece of the Ireland's airport network, dominating all national measurements of passenger throughput and aircraft movement, and thereby facilitating the international and inter-regional connectivity that supports the wider Irish economy. Management and development of the airport are major issues in Irish transport policy, and feature regularly and prominently on the political agenda. An interesting recent development is the proposal to introduce a second terminal at Dublin Airport that would compete directly with the facility operated by the incumbent State-owned airport monopoly. While the proposal has captured the imagination of certain airport users, it is justified by its supporters purely on broad *laissez-faire* principles, and without significant public analysis of its technical or operational merits.

In an attempt to ventilate these issues through the application of microeconomic theory, this paper reviews the evolving regulatory framework for airports in Ireland and examines, at a general level, the economic implications of terminal competition at Dublin Airport. We describe Ireland's network of airports, and highlight the dominance of the three largest – Dublin, Shannon and Cork. These airports are currently owned and operated by a company owned by the Irish government that was, until 1 October 2004, known as Aer Rianta. We then review the institutional and regulatory history of these “Aer Rianta airports”, and discuss the price caps that have been controversially imposed and reviewed by the Commission for Aviation Regulation (CAR) since 2001, as well as the imminent separation of the ownership of these airports.

In the “Airport Regulation vs Airport Competition” section we discuss the traditional explanations for the prevalence of regulation rather than competition as a driver of efficiency in the airport industry. The notion of competition between individual terminals at Dublin Airport is introduced as a measure that has the potential to overcome the locational barriers to competition and provide an alternative to “heavy regulation”.

Aspects of the microeconomic modelling of terminal competition are considered in the sections that follow. The “Efficiency Enhancement” section details the various forms of inefficiency that will contribute to a welfare-based metric against which a reformed market for airport services can be judged, while the following section introduces the complications raised by the differences between airline business models. A chronological view of an aircraft turnaround is presented in the “Operational View of the Airport” section, along with the observation that terminal services are one of many inputs bundled sequentially into the production of this service at an airport, in a manner analogous to a mid-stream industrial input.

The need to recognize the tensions between terminal competition and the existing airport business model is discussed in the following section, as are a number of operational issues that will need to be resolved in order to make the restructured arrangements workable. Issues surrounding the potential effect of terminal competition upon incentives for adequate future investment are then discussed in the “Investment Implications” section, and some conclusions and recommendations are presented at the end of the paper.

SITUATION OF IRELAND'S AIRPORTS

The Irish Republic is served by a network of three larger publicly owned airports and six privately owned 'regional airports'. Figure 1 shows the location of the Republic's airports and the estimated hinterland for each¹. The three larger airports, at Dublin, Shannon and Cork, are owned and operated by the semi-state company that was, until 1 October 2004, known as Aer Rianta.

[Figure 1 about here]

The three Aer Rianta airports handle roughly 97% of all air traffic to, from and within the Irish Republic. Table 1 illustrates the dominant role of Dublin Airport in Irish aviation - it handles approximately 80% of Aer Rianta traffic. Table 1 also illustrates the rapid growth in traffic at the three Aer Rianta airports during the late 1990s, which accompanied Ireland's rapid economic growth during the period. Rising consumer incomes and increased demand for intra-European and North Atlantic passenger and freight services for business activities and tourism fuelled the increase in traffic.

Much of this additional demand has been satisfied or was generated by the emergence of a low-fare/"low-cost carrier" ("LCC") air service business model, as adopted with notable success by Ryanair. The presence of this LCC has been critical in driving cross-channel and intra-European passenger growth in the past decade (Barrett, 1997). The Ryanair presence has also been influential in encouraging Aer Lingus, the major Irish "legacy carrier", to modify its strategy from that of a "full service carrier" ("FSC") to one embracing significant

¹ Hinterland is based on driving distance of one hour from each regional airport and one and a half hour's drive from each of the international airports with jet runway facilities. The map is taken from Reynolds-Feighan (1993, 2003a).

elements of the LCC model. Dublin Airport is unusual in a European context in hosting the operational bases of both a legacy carrier (Aer Lingus) and an LCC (Ryanair).

[Table 1 about here]

Ireland's island status, geography, population density and dispersed settlement pattern have given rise to a heavy dependence on road and air transport. Ireland was ranked first in the EU15 in 1999 in terms of per capita intra-European enplanements (revenue passengers boarding aircraft) and total air passengers per capita (Reynolds-Feighan, 2003a). Although it is difficult to isolate precisely the impact of air services upon the Irish economy, it is reasonable to suppose that the quality and quantity of international air links to and from Ireland are significant factors in the decision of tourists to visit the country, and anecdotal evidence suggests that these links are also highly influential in the decisions of foreign firms to locate production facilities in Ireland.² Similar arguments will apply at a regional level.

REGULATION OF IRELAND'S AIRPORTS – A BRIEF HISTORY

Aer Rianta was incorporated in 1937 as a holding company for Aer Lingus (the Irish national airline, founded in the previous year), with the Irish Minister for Finance holding all of the share capital of the company. In addition to its role as a holding company for Aer Lingus, Aer Rianta functioned as an airport management company for Dublin Airport (which was

² Foreign direct investment ("FDI") plays a significant role in the Irish economy. FDI flows into Ireland amounted, on average, to 79% of gross fixed capital formation during the 1999-2002 period. The stock of FDI in Ireland amounted in 2002 to approximately 150% of Irish GDP. See United Nations Conference on Trade and Development (2002). A useful discussion of the relationship between the quality of international air transport links and industrial location appears in Button and Taylor (2000).

established in 1941) and statutory responsibility for this function was granted in 1950³. In 1966 the roles of the airport authority and airline were separated, with Aer Rianta retaining its role as agent of the government in the management of Dublin Airport. These responsibilities were extended to Cork and Shannon airports in 1969. Pursuant to the Air Navigation and Transport (Amendment) Act, 1988, the three airports were vested in Aer Rianta, and their management and ownership was thereby unified.

The reform of this ownership structure is imminent: pursuant to the State Airports Act, 2004, Shannon and Cork airports will each be vested in a new autonomous company. Aer Rianta has already been renamed “Dublin Airport Authority” in recognition of what will be its sole remaining Irish airport asset. All three airport companies will, for the time being, remain in Irish government ownership.

The management by Aer Rianta of its airports has long been subject to regulation. Until 2001 the Irish Minister for Transport imposed and published caps for Ireland’s airport charges, and reviewed these caps periodically in an ad hoc manner in light of the overall financial position of Aer Rianta. At the time of the passage of the Aviation Regulation Act, 2001, which removed this regulatory function from the Minister, the caps on airport charges had remained static since 1987. However, Aer Rianta had during the 1990s operated a scheme under which deep discounts were applied to these published tariffs, as an incentive for airlines to develop traffic on new routes serving Dublin Airport. Dublin Airport’s charges were below the European average at the time of the 1997 survey conducted by ATG at Cranfield University (ATG, 1997) - see Figure 2, taken from the Association of European Airlines (AEA, 1998), which summarised the Cranfield data. These data reflected the published airport charges and

³ Section 23 of the Air Navigation and Transport Act, 1950.

thus represent an upper bound on the airport charges at the time. As the labeling suggests, it was also reported that at European airports where there existed a ground handling monopoly, airport charges were generally higher than at airports where a choice of handler was available.⁴

[Figure 2 about here]

During the period between 1995 and 2000, Aer Rianta gradually withdrew its discounting scheme, and introduced a series of new charges for both airlines (e.g. check-in desk fees and ground handling administration fees) and the traveling public (e.g. car parking fees). The airlines operating from the Aer Rianta airports (particularly Dublin Airport) made an increasing number of public statements protesting at what were argued to be high airport charges relative to the level of services provided. Ryanair argued that the withdrawal of the discount scheme resulted in a doubling of its airport charges. In the course of a heated and very public debate between Aer Rianta and Ryanair, the airline announced that it had frozen the development of new routes to and from Dublin in protest at the level of airport charges and the management style of the airport authority, and made the further assertion that the lack of transparency and consultation in the setting of charges was symptomatic of a poor relationship between the airports and their airline customers.⁵

⁴ Dublin Airport had introduced competition in ground handling services in 1995, although it was not required to do so by Irish legislation until 1999. Servis Ireland was granted the second ground handling concession at Dublin Airport in January 1995. The European Communities (Access to the groundhandling market at Community airports) Regulations, 1998 (S.I. No. 505 of 1998) gave effect in Irish law to Council Directive 96/67/EC, and required that competition in ground handling should apply “from 1 January, 1999, at any airport whose annual traffic is not less than 3 million passenger movements or 75,000 tonnes of freight and, as from 1 January, 2001, at any airport whose annual traffic is not less than 2 million passenger movements or 50,000 tonnes of freight”.

⁵ Ryanair’s aggressive and confrontational strategy may be explicable in part by the observation that a key factor in the success of low-cost/low-fares operations is the availability of low airport charges, since the proportion of total costs that these charges represent is greater for low-cost operators than for full-service operators (AEA, 2000). See also Ryanair (2001) and Creaton (2004).

In line with international practice, the Irish government then sought to establish an independent regulator for the Irish airports. The Commission for Aviation Regulation (the “CAR”) was established under the Aviation Regulation Act, 2001 on 27 February 2001. That Act required the CAR to make, no later than 6 months following its establishment, 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. The determination was duly made on 26 August 2001.

The price cap that CAR then imposed upon Aer Rianta was designed to reflect the company’s capital expenditure requirements, and to increase annually in accordance with an “RPI-X” formula⁶. In calculating the level of the cap, the CAR applied a ‘single-till’ approach⁷, essentially taking into account both aeronautical and non-aeronautical airport revenues in the setting of maximum airport charges. In order to reduce the ability of Aer Rianta to use revenues derived from Dublin Airport to cross-subsidise its other airports, a specific price cap for Dublin Airport was set below the level of the general cap set for the average revenue per passenger at all Aer Rianta airports.⁸

The initial CAR determination was disputed by most of the affected parties: Aer Rianta attempted to bypass the grievance procedure set out in the Aviation Regulation Act by seeking judicial review of the determination, and five other parties, including Aer Lingus and Ryanair, invoked the statutory procedure by filing appeals against the determination. Pursuant to the statutory procedure, an appeal panel was constituted to consider the 21

⁶ This form of regulation allows for charges to increase in order to cover an increase in the operator’s cost base, but also requires the operator to make improvements in productivity of approximately ‘X’ percent per year. Similar regulatory regimes are in place at Manchester and Hamburg airports and the three London BAA airports.

⁷ See Reynolds-Feighan and Feighan (1997) for a detailed discussion on ‘single-till’ versus ‘dual-till’ regulatory approaches.

⁸ See the discussion of this issue by CAR (2001, p20).

specific aspects of the determination against which appeals had been filed. At the direction of the panel, the CAR in February 2002 revised its determination in relation to 9 of these issues.

Meanwhile, the scope of Aer Rianta's judicial review litigation narrowed to a consideration of whether the CAR was entitled to base the determination on its own estimate of Aer Rianta's capital expenditure requirements. The Irish High Court held in April 2003 that the CAR's regulatory powers included the power to review the airport operator's capital expenditure programme – including its controversial design for a new “Pier D” LCC terminal - although at a later hearing the court held that the issue was of “exceptional public importance” and granted Aer Rianta leave to appeal the finding to the Irish Supreme Court. A hearing before the Supreme Court is set down for October 2004, more than three years after the original determination was made.

The CAR subsequently conducted a mid-term review of its 2001 determination, and published the resulting adjustments in March 2004. The CAR has become a regular target of Ryanair's campaign of public criticism, and the airline's increasingly hostile attitude to the regulator is reflected in the following excerpts from its response to the results of the review:

“The main purpose of the Aviation Regulator is to replicate the effects of competition. Competition reduces charges and improves services. This Regulator has totally failed to do either.... How can we reasonably expect this inefficient civil service quango to effectively regulate another inefficient semi-state service airport monopoly?”⁹

⁹ Ryanair Press Release, “Ryanair To Appeal Aviation Regulator's Latest Decision”, 6 April 2004, available on www.ryanair.com

The enactment of the State Airports Act, 2004 may be viewed as a product of the Irish government's dissatisfaction with the regulation of airport services at the three main airports, and especially the prospect of the price cap regulatory function becoming entangled in a complex and protracted dispute resolution process. The legislation is driven by a cautious willingness to explore competition as a market-based alternative to active regulation. As part of the restructuring envisaged by that Act, the regulatory remit of the CAR is to be confined to Dublin Airport, and Cork and Shannon airports will be left to operate in unrestricted spatial competition against the other regional Irish airports.

The Irish government has also indicated its commitment to the unprecedented prospect of competition occurring between rival terminals at Dublin airport, although this intention has not yet been reflected in legislation. The June 2002 Programme for Government (Fianna Fáil and the Progressive Democrats, 2002, p14) included an undertaking to "examine proposals for a new independent terminal at Dublin Airport and progress them if evidence suggests that such a terminal will deliver significant benefits". The Irish Minister for Transport then sought and obtained expressions of interest for the construction, ownership and operation of an additional terminal to compete with the existing Aer Rianta facility. A review of the expressions of interest received concluded that "an independent terminal is a viable strategic option for the development of Dublin Airport and would elicit considerable market interest" (Irish Department of Transport, 2003, p15).

¹⁰ Cited at *ibid*, p17.

AIRPORT REGULATION VS AIRPORT COMPETITION

European aviation has been described by Barrett (2000) as having been characterised by a conspicuous absence of overt competition between airports, due in part to the restrictive effect of bilateral international agreements upon the development of air services. Together with a similar lack of competition between airlines, this has led, in his view, to high fares, high costs, low productivity, and rent-seeking¹¹ by airlines and airport service providers. Less tangibly, it may also have protected airports from the need to think and act “commercially” (Starkie, 2002).

However, recent changes in the market for air travel are likely to have a significant impact on the market for airport services. Barrett (2000, p25) describes the emergence of competition between Continental airports for low-cost carrier (“LCC”) traffic¹², and predicts that this process will assist in “transforming European aviation from collusion to competition”. This transformation seems to be accompanied by a gradual erosion of the “state level” view of aviation, as market-driven competition slowly replaces the industry’s former dependence upon public sector ownership and investment, and the heavy regulation of commercial activity.

Airports have traditionally attracted monopolistic government ownership and investment – and consequently regulatory attention - on the basis that each is a “natural monopoly”: the characteristics of the relevant production technology are such that the cost to society of meeting market demand is minimised if only one firm is present in the market. Such a

¹¹ Economic rent is the extent to which a return on an asset exceeds the minimum amount necessary to induce the owner to use the asset in such a manner or, alternatively, the amount by which the return exceeds the “next best” return available.

¹² This is consistent with the observation that airports are increasingly being treated by airlines – especially the more aggressive LCCs - as “suppliers” whose product is subject to competition. See Morrell (2003).

situation requires that economies of scale (or, equivalently, declining average costs) are present over a sufficient range of output levels relative to market demand – this is a reasonable suggestion in the case of the provision of airport services due to the significant fixed costs associated with airport land requirements. In such an environment, if more firms were to compete for a share of the same market, each firm would produce a fraction of the monopolist's output, and would not be able to fully exploit the economies of scale that are available. Average cost per unit of output would be higher than under monopoly, representing a waste of society's resources (Train, 1991).

On the other hand, the unfettered behaviour of a profit-maximising monopolist airport will have adverse welfare consequences for the industry, which will be multiplied in the wider economy due to the access function of the airport. Monopolists are generally expected to charge higher prices, and meet a lower fraction of market demand, than equivalent competitive firms. In an airports context, behaviour of this kind can be viewed as giving rise to a bottleneck, in which the throughput of both passengers and cargo would be discouraged by high access prices.

The imposition of regulation upon a natural monopolist, often in return for the legal protection of the monopoly, is a common way of avoiding these bottleneck effects. The regulator will implicitly or explicitly estimate an "optimal" level of output, and will attempt through the design of the regulatory package to induce the regulated firm to produce this level of output in an efficient manner. In the case of a natural monopoly, the second best average cost-pricing rule will ensure that the difference between market price and marginal cost is minimised, subject to the constraint that unsustainable negative profits are avoided.

As a regulator will lack full information as to underlying cost structures and optimal input mixes, she is unlikely to be in a position to prescribe the precise manner in which the regulated firm should operate. The regulatory tools at its disposal are likely to be fairly blunt, and will need to be consistent with the profit-maximising behaviour of the monopolist. Starkie (2002, p64) has suggested that:

“... there is a trade-off between living with imperfect regulation or with imperfect markets. It is only when the market does not work well, when there is a clear case of natural monopoly *and* when regulation can reasonably be expected to improve matters that the regulatory option is worthwhile. Market imperfections alone are not a sufficient justification for intervention.”

The reform of the ownership of Dublin, Cork and Shannon airports, the contraction of the CAR's jurisdiction and the proposals for the introduction of terminal competition at Dublin Airport together indicate a degree of dissatisfaction with the Irish experience of regulated monopoly, and a political appetite to explore market-led alternatives based on microeconomic principles.

The natural monopoly view of airports is now being challenged by empirical findings that some large European airports are in fact subject to **diseconomies** of scale,¹³ which suggests that these airports could reduce their average costs by reducing the scale of their operations. These airports typically act as “hubs” in the networks of FSCs, and find it optimal to expand beyond a cost-minimising scale in return for a share of the additional revenue that passengers are prepared to pay for access to such networks. It is generally acknowledged that FSCs and

¹³ See Pels *et al*, 2003, pp 341-361.

their alliance partners design their networks, and choose their hub airports, as part of a competitive game played against other airlines and alliances.

This observation has been accompanied by a recognition that even non-hub airports are subject to varying degrees of competition in a spatial setting. To see this, it is useful to reflect on the nature of consumer demand for air transportation services, and its relationship with the demand by airlines for airport services. Consumer demand for air travel will be derived from the demand for other activities at the relevant destination. The “generalised” costs faced by the consumer in travelling will include the airfare, the fares associated with any other intermediate modes of transport used, as well as a component to reflect the time costs of travel. When planning the route, a consumer will always have a choice of airport – in fact, the choice of airport is merely part of the broader range of route and mode choices that exist for the proposed journey. Each airport will present the consumer with implicit or explicit costs that are closely related to the ease with which the airport can be accessed by surface from the origin, or provide access by surface to the destination. The consumer will then evaluate these airport-specific costs together with any airfare differentials that exist between the routes, and any time and refreshment costs associated with the need to transfer between flights at an intermediate airport.

The effect in a spatial context is hinted in Figure 1 above. Each airport will be surrounded by a catchment area, which can be roughly defined as the area in which the lowest airport access costs are the costs related to that particular airport. Access to and from Irish airports is available only by road, so it is reasonable to define these areas by reference to road journey time. To assist in defining the catchment area of each airport, the region within which road journey time is less than one hour has been drawn in Figure 1 around each of the airports.

The radius of a particular catchment area will depend upon the overall length and generalised cost of the air routes that are available from the relevant airport. Medium- and long-haul air services tend to be available only from the larger airports with jet runway facilities (i.e. the three Aer Rianta airports, Knock and Kerry airports), and the “higher-order” long-haul transatlantic services are concentrated at the Aer Rianta airports only. Long-haul passengers living in remote areas will often minimise their generalised costs by making the initial stage of their journey by surface to one of the Aer Rianta airports rather than flying from their local regional airport, due to poor co-ordination between the two flights that would be required. To reflect this effect, an additional region within which road journey time is less than 1.5 hours has been drawn around each of the Aer Rianta airports.

Consumer demand for travel through a particular airport will arise from the inhabitants of its catchment area, and from this demand airlines will derive their demand for airport services. This suggests that the relevant markets in which airports operate are determined by reference to the location of the origins and destinations of their potential passengers. Where a pool of potential passengers has quick road access to two or more neighbouring airports, these airports will compete for the custom of these passengers. This situation applies in Figure 1 where neighbouring access regions overlap.

Consider the unique position of Dublin Airport as depicted in Figure 1. With catchment areas defined according to the stated road access specifications, Dublin’s catchment areas do not abut those of any other Irish airports. This can be interpreted to mean that Dublin Airport has significant market power¹⁴ within its catchment area, based on its distance from any other

¹⁴ “Market power” refers generally to the degree to which a producer may profitably control the selection of the price that it charges. At one extreme, operators in a “perfectly competitive” market are regarded as lacking market power because they are unable to profitably deviate from the prevailing market price, while at the other extreme a monopolist may select the most profitable price from a range of prices at which profits are potentially

airport and the consequent absence of overlap with any other access region. Because of its dominance in the traffic hierarchy, it faces no competition for air services in several market segments.

Depending upon entry restrictions and geography, one might expect “locational market power” of this type to be eventually competed away by the construction of one or more intermediate airports. Standard microeconomic analysis would suggest that if an incumbent profit-maximising airport with significant locational market power attempts to exploit this power by levying high landing charges, the resulting “super-normal profits” will attract the interest of entrants, who will seek to build new airports within the catchment area of the profitable incumbent. Investment in alternative airport facilities will continue until competitive forces suppress price levels. However, potential developers of new airports typically face substantial regulatory obstacles, including the need to engage in and exhaust extensive planning and appeals processes under which the project’s land-use implications are scrutinised. Obstacles of this nature will effectively protect, in the short and medium term, the locational market power of the incumbent, and regulatory intervention may be justified on this basis.

The introduction of terminal competition can avoid many of the land access difficulties that have protected airports against direct and proximate competition. The competing terminal will, for obvious operational reasons, be located next to the existing runway, and is likely to have the same accessibility as the incumbent terminal. In view of the large areas of vacant land that surround the runways at modern airports, it will often be possible to site new

positive, and is therefore regarded as possessing market power. Market power will be influenced by the sensitivity of demand to changes in price - a notion captured by the concept of demand elasticity. Inelastic demand means that demand does not fall significantly in response to an increase in price, and this is associated with a relatively high degree of producer market power.

terminals on land that is already zoned for the purpose. Even if this is not the case, the legal and planning transactions required for the introduction of the new terminal are unlikely to approach the complexity and expense of those required for the construction of a new airport. Competition between terminals will supplement the existing competition that already takes place between neighbouring airports. Questions of self-interest aside, the advocates of the construction of a separate terminal at Dublin Airport would argue that competition can supplement or even replace regulation as a driver of efficiency and pricing restraint in the management of strategic and costly terminal facilities.

The UK Civil Aviation Authority (2001) has identified potential benefits of terminal competition, including the avoidance of a need for “heavy” regulation, the provision of better value service at reduced cost to users, more innovative use of existing assets to increase terminal capacity, improvements in service quality provision in line with users’ needs, and specialisation of service provision at terminals. According to British Airways (British Airways, 2001), terminal competition is also consistent with the stated policy of the OECD Competition Policy Roundtable on International Airport Services that “effective competition in the market for air transport services requires adequate competition in both aircraft and airport services”. These arguments have also applied to the European rail industry, where the separation of track and service provision has been justified on efficiency grounds.

EFFICIENCY ENHANCEMENT

Economic efficiency enhancement should form the basis for the assessment of the benefits of terminal competition. However there are several possible sources of inefficiency. The

statements by Ryanair promoting the idea of competing terminals highlight the need for efficiency improvements. For example, the company argues (Ryanair, 2004) (with emphasis added):

“Ryanair has consistently battled against Aer Rianta’s abusive pricing and this is a great victory for all airlines operating at Dublin Airport ... It is also a victory for consumers as **lower costs lead to lower fares.**

...

The Commission for Aviation Regulation has failed to force Aer Rianta to **reduce its costs and to provide cost efficient facilities.**

...

We therefore call on the Government to proceed with plans to break up this abusive monopoly and to allow competing terminals at Dublin Airport.”

The introduction of terminal competition is presented as a remedy for certain negative aspects of Aer Rianta’s trading behaviour. “Allocative efficiency” refers to an equality between the price paid by consumers (which reflects the value that they place upon a good or service) and the cost of the resources consumed in the production of the marginal unit. This situation is efficient in the sense that it represents the maximisation of economic welfare in the market. An industry populated only by a profit-maximising monopolist would generally be expected to exhibit allocative inefficiency, where the price charged would exceed marginal cost. The monopoly producer would capture some of the economic surplus that would have been available to consumers under competitive conditions, and there would also be a significant “deadweight loss”, representing the difference between the actual aggregate surplus and the potential allocatively efficient maximum. To the extent that Ryanair’s complaint of “abusive

pricing” refers to a mark-up over Aer Rianta’s marginal costs, the airline is suggesting that allocative efficiency could be improved by lowering prices towards actual marginal cost.

“Productive efficiency” refers to the equality between a firm’s actual average total cost of production, and the minimum average total cost that is obtainable given the best available technology. Achieving productive efficiency requires the firm to be fully aware of, and exploit, all available economies of scale, by choosing the level of production that minimises its average total cost. There is no reason for a monopolist’s profit-maximising level of output to coincide with this level of output. However, firms in a competitive market will be motivated to seek a “productive efficient” level of output because if they do not, they will be vulnerable to a loss of market share at the expense of more efficient competitors. In the case of a true natural monopoly, some productive inefficiency is inevitable because, by definition, average cost continues to decline as quantity increases beyond that demanded by the entire market.

A related concept is “x-efficiency”, which measures the effectiveness with which a given set of inputs is used to produce outputs. If a firm is producing the maximum output that is theoretically available, given the resources that it employs and the state of technology, it is said to be x-efficient. A firm whose goal is profit maximisation might be expected to strive for x-efficiency, as to do otherwise would imply the squandering of potential profits. Notwithstanding this, numerous instances of rapid productivity improvement have been reported, under a variety of market structures, suggesting that x-inefficiency is a common and significant source of inefficiency (see for example Liebenstein, 1966). Airport operations have been anecdotally associated with the x-inefficient practices of “marble cladding” –

elaborate embellishment that serves no operational purpose – and the employment of excessive numbers of workers.

Assuming that the “costs” are those faced by Aer Rianta, Ryanair’s complaint that Aer Rianta has not “[reduced] its costs and ... [provided] cost efficient facilities” may be interpreted as an accusation of both productive and x- inefficiency: productive inefficiency to the extent that Aer Rianta operates with a scale and scope that does not minimise its cost per unit of output, and x-inefficiency to the extent that Aer Rianta is not extracting the maximum output from the resources that it employs.

It has been suggested that in many airport services markets, productive inefficiency and x-inefficiency may be the most significant sources of inefficiency (Forsyth, 2001), and may overshadow the importance of allocative inefficiency. Whether this is in fact the case will depend upon the underlying technological factors that determine the relevant cost functions for the provision of airport services.

It is conceivable that the introduction of terminal competition may have a positive impact from the perspective of one or more forms of efficiency, while decreasing other forms of efficiency. The net welfare effect will depend upon the aggregate of these individual effects. For example, research in the emerging field of airport productivity analysis suggests that airports operate under increasing returns to scale when producing air passenger movements (Pels *et al*, 2003). This implies that introducing additional terminals, and thereby reducing the scale of each terminal operation, may be a productively inefficient step. Against this, terminal competition might be expected to eventually mitigate any x-inefficiency, especially if airline customers are free to choose between terminal operators, a vigorously contested

market for terminal services develops as a consequence, and this “adversity” leads to aggressive cost-cutting measures and innovation among the managers of the competing terminals.

APPROPRIATE INFRASTRUCTURE

The Irish Department of Transport’s “strategic aviation objective” is to:

“ensure that the principal gateway airports of the State are in a position to provide the appropriate infrastructure to meet the current and prospective needs of airlines and other aviation companies, at the lowest cost to those users consistent with fully commercial airport operations.”

One way of determining the “appropriateness” of infrastructure is to consider the requirements of airlines, as under the prevailing airport business model it is the airlines that contract and pay for the use of terminal infrastructure by their aircraft.

The preceding discussion of productive efficiency concentrated on the scale of terminal operations, under the implicit assumption that only one model of terminal operations exists, and that attaining efficiency is therefore simply a matter of adjusting the scale of these operations.

The reality of modern airport operations is more complicated. The differences between the standards of service offered by FSCs and LCCs give rise to significant differences in the

airport facilities required by the respective airline types. An example is the infrastructure required to sort off-loaded baggage. Because many passengers of FSCs transfer between connecting flights and (in the case of interlining passengers) to other airlines, a baggage handling system will be required that can sort and transfer bags from one aircraft to another. By contrast, LCCs do not generally offer connecting services or interlining arrangements. When devising their own connecting itineraries to make use of sequential flights in and out of an LCC “hub”, passengers bear the responsibility for reclaiming their bags and transferring these to the onward flight. The LCC fulfils its obligation to its passengers by presenting all baggage for reclamation at the end of each individual flight. The LCC business model rejects any investment - whether direct, or by contracting with baggage handling agents - in complex airside baggage sorting infrastructure. Another visible difference between LCC and FSCs is the tendency of LCCs to avoid expenditure on services that are not strictly necessary for the provision of the core air transport product, such as the use of air bridges.

This means that airside facility requirements differ tremendously between FSCs and LCCs. What is “appropriate infrastructure” for one airport may not be suitable for another, due to a different mix of LCC and FSC traffic. In agitating for the construction of a new competing terminal at Dublin Airport, Ryanair has repeatedly specified its requirements for a dedicated LCC facility. Although Aer Rianta's pricing schedule separates out certain services, such as the use of air-bridges, Ryanair would contend that the price of the most basic service package includes a contribution towards infrastructure that is not required by the airline. There is even scope for debate as to the optimal design of a dedicated LCC facility, as is demonstrated by the fact that Ryanair asserted, in its appeal against the CAR’s original determination, that Aer

Rianta's proposed Pier D facility was forecast to cost twice as much as Ryanair was prepared to countenance.¹⁵

Part of the problem is the tripartite relationship that exists between airports, airlines and passengers. Airports typically derive revenue from both airlines (directly through service charges) and passengers (indirectly through rents from retailers, funded by purchases made by passengers at airport concessions), whereas an airline will not have access to the latter revenue stream unless it controls its own terminal facilities. In designing infrastructure to maximize the aggregate of both revenue streams, an airport may depart from the terminal infrastructure specification that an airline would select if the terminal were an integrated part of its business. An element of Ryanair's criticism of Aer Rianta's investment proposals may therefore be attributed to the conflicting business models and product offerings of the respective firms, rather than any particular x-inefficiency on the part of the airport operator.

AN OPERATIONAL VIEW OF THE AIRPORT

Modelling the economic consequences of terminal competition requires a decomposition of airport activities into the constituent functions. The services provided by an airport terminal are a subset of the bundle of services provided by the airport to its airline, passenger and freight customers, and constitute only part of the inputs required in the production of the product: the movement by air of passengers and cargo.

¹⁵ See Decision of the Aviation Appeal Panel, 10 January 2002, p30.

A stylised chronological view of the various distinct airport functions is presented in Figure 3 from the perspective of a single aircraft turnaround, as this is the relevant unit of service provided by an airport to its airline customers. Each airline then sells to its passengers a package consisting of the flight, and portions of each of the turnarounds that occur at the origin and destination.

[Figure 3 about here]

This chronological view of an aircraft turnaround resembles the supply chain for manufactured goods, where a number of discrete processes are applied in turn in order to produce the relevant output. The introduction of terminal competition directly affects the “mid-stream” terminal services indicated on Figure 3.

Microeconomic analysis generally proceeds on the basis of an identifiable “market” for a good or service. The introduction of terminal competition represents a structural change in the market for only one of the inputs – terminal services - that make up the supply chain for the aircraft turnaround. Analysis should therefore begin with the effect of competition upon the market for terminal services which, it is suggested, will produce a fairly standard duopoly result. However, a more interesting level of analysis will be the entire turnaround output, and it will therefore be necessary to consider the effect of terminal competition upon the markets for the other turnaround inputs, as well as the turnaround productive process as a whole. The cumulative welfare effects of terminal competition can be derived by summing the results from each of these markets.

A complicating factor will be the effect of the LCC - FSC distinction upon the appropriate analytical structure. The differing infrastructure requirements of the two business models have already been considered. The manner in which these requirements are met under terminal competition will have significant implications for the cost functions that are applicable to the respective terminals, especially if each concentrates on serving a particular type of airline. Furthermore, on the demand side it may be argued that the differences between the products provided by LCCs and FSCs need to be taken into account. Significant product differentiation requires amendments to be made to the standard framework for the analysis of price competition under oligopoly.

In considering the price regulation of airport services, the Australian Productivity Commission (2002) conducted a detailed analysis of airport operations, which has useful implications for the current study. After presenting an extensive taxonomy of the bundle of services provided by airports, and drawing a broad distinction between aircraft movement facilities and passenger processing facilities, the Commission assessed the degree of market power accruing to a typical airport in each of the identified service categories. The Commission noted that (2002, p145):

“..although an airport that has market power in the overall market for airport services must have market power in some of the individual services, this does not mean necessarily that it has market power in all services provided at the airport.”

The Commission concluded that airports will have the greatest market power in the provision of the services which cannot be effectively substituted or scaled, the best example being

“core” aircraft movement facilities such as runway access¹⁶. By contrast, competition between terminals occurs in the markets that relate to the provision of passenger processing facilities. Passenger processing facilities can be defined as the facilities that provide services to departing passengers prior to enplanement, or to arriving passengers after exiting the aircraft – at a minimum these include check-in, security screening, baggage handling, immigration and customs processing and the provision of holding areas. Because the product supplied by airlines typically permits a degree of flexibility in the quantities with which these factors are employed, the airport’s market power in these areas will be moderated.

Airport terminals typically provide additional services such as business class lounges, retailing space and aircraft refuelling and maintenance services. Furthermore, for passengers and airlines to avail of the services provided by an airport, they must gain physical access to the buildings or land, as appropriate. The granting of this access may be viewed as a service provided by the airport, especially where the design of the physical infrastructure allows the airport to extract revenue from the provision of this access, such as the sale of car parking and taxi concessions.

The Commission’s finding of varying market power suggests that along the supply chain, an airport operator – monopolist or otherwise – will face a multiplicity of factor markets, each with its own underlying demand and supply conditions, and each therefore conferring an independent degree of market power upon the producer. The challenge in analysing the effect of terminal competition will therefore be to isolate the effects, upon upstream and downstream markets, of the introduction of competition into the mid-stream terminal services market.

¹⁶ Aircraft movement facilities include the provision of runways, taxiways, aprons and aircraft parking, and also airside grounds, airfield lighting, airside roads and lighting, airside safety, nose-in guidance and visual navigation aids. See Productivity Commission (Australia), 2002, p146.

IMPLICATIONS FOR THE AIRPORT BUSINESS MODEL

Having identified the various markets that may be affected by the introduction of competition between terminals, it will also be necessary to consider the manner in which a monopolist would be expected to satisfy demand in these markets, in order to enable comparison to be made between the two industry structures.

The integrated nature of the monopolist's business gives rise to conflicting pressures. Starkie (2002) has described the tendency for airports to bundle retailing and property businesses together with their core aeronautical services businesses. Retail revenues and rents are positively related to passenger throughput. This constrains the unregulated monopolist's ability to profitably exploit its aeronautical services market power by raising its aeronautical charges, as increasing charges would be expected to reduce passenger numbers and adversely affect revenue accruing to the retail business unit. Conversely, Figure 4 illustrates the situation in which it would be profitable for the integrated monopolist to reduce airside service charges below the level that would maximise the profit of a non-integrated terminal operator, due to the positive effect upon the demand for retail space.

[Figure 4 about here]

Compared to a situation in which aeronautical services are provided by a stand-alone monopolist, the integrated nature of the monopolist's business has positive welfare implications from an allocative efficiency perspective. However, this result requires the

assumption that productive inefficiency and x-inefficiency do not outweigh these welfare gains.

A number of features of the analytical framework make it difficult to apply this result to an environment that includes competition between terminals. For example, for the purpose of the above analysis the monopolist's runway and terminal service functions are bundled together as aeronautical services. To properly analyse the effect of a competing terminal, these aeronautical services will need to be separated into runway and terminal service components, as differences between expected economic welfare in the competitive and monopoly situations will derive from the effect of direct competition in the market for pure terminal services, as well as the fact that unlike the incumbent, the new terminal is unlikely to have a stake in the runway business. It is, however, likely that each competing terminal will still have access to both airline and passenger revenue streams, albeit with a reduced share of the passenger traffic.

Runway service allocation with competing terminals: This raises the issue of the practical relationship between the new terminal and the provider of runway services. Implicit in the discussion of terminal competition at Dublin Airport has been the assumption that any new terminal operator will confine its activities to terminal operations. At a practical level these activities will need to be co-ordinated with those of the runway. A business model will be required that enables the allocation of runway space between the aircraft traffic from both terminals, and the bundling of both runway and terminal services into a package that can be offered to airlines. There will also be microeconomic concerns arising from the facts that runway services will continue to be provided by a monopolist, and that - depending on the

exact model of terminal competition adopted - this monopolist may remain under the same management and ownership as the incumbent terminal.

Where the incumbent terminal remains under the same ownership as the runway, the owner of both will, unless restrained by regulation, continue to allocate runway slots in such a manner as maximises the profits of the integrated incumbent firm. The availability of runway slots to airline customers of the entrant terminal may be limited as a consequence, and the viability of the new facility may be compromised.

In order for the potential efficiency-enhancing benefits of terminal competition to be realised, procedures must be established to ensure the equitable distribution of runway slots between customers of both terminals. During periods of runway congestion the auction of runway slots, conducted between the terminal operators by an independent party, may be an appropriate method by which to achieve this end. However, antitrust literature suggests that even if such an auction system is used to determine the price of runway access, it may be attractive for the runway/incumbent terminal business to “over-bid” for runway access, and to effectively subsidise its terminal operations from the inflated proceeds of the sale of runway access. This arguably constitutes an anti-competitive practice, that will raise the competing terminal’s operating costs and undermine any efficiency-enhancing potential of terminal competition.

This practice may be prevented by the imposition of a cap on the price that may be charged for access to the runway, on a basis similar to the application of the “efficient component pricing rule” in the pricing of regulated access to fixed-line telecommunications networks. Terminal competition may not, therefore, dispense with the need for some residual form of

regulation. It is generally recognised that the optimality of such a regime requires that the downstream product – in this case, the provision of terminal services – is provided competitively. The vertical separation of the runway business from the incumbent terminal, whether by the restructuring of ownership or at an accounting level, would be another possible solution.

Our brief exploration of these issues is sufficient to suggest that it may be unreasonable to expect competition between airport terminals to deliver unambiguous welfare improvements if it is not accompanied by changes to the structure of the incumbent's business. The optimal structure will depend upon the manner in which competition is to be introduced, and several alternative models exist.

A “shared user” facility would be owned and operated by a company not affiliated to an airline, and use of the terminal would be open to all airline customers on a commercial basis. Alternatively, competing airlines might be offered leases over different parts of the new terminal. This model has been adopted in a number of Australasian airports, and generally leads to the airline lessee investing heavily in the branding of its particular area of the terminal building. Use of the leased area then tends to be reserved exclusively for the lessee and its contracted feeder airlines, although it is not clear whether this exclusivity is a condition imposed by the landlord, or whether it is a strategic decision taken by the lessee.

Examples of competing terminals: There are very few examples globally of competing shared user terminals at a single airport - Toronto Pearson International Airport is one example that is regularly cited in the airports management literature. Terminal 3 at Pearson was built by a private consortium and opened in 1991 under the control of a private sector manager (see

Juan, 1996). While airside charges at the two publicly owned terminals were calculated on a cost-recovery basis only, the operators of Terminal 3 were free to seek a profit in addition to the recovery of operating and capital costs, with the result that charges for access to Terminal 3 were twice as high as those relating to the publicly-owned facilities. Transport Canada, the government transport authority, coordinated Terminal 3's activities with those of the other terminals and the common runway facilities, and assigned international legacy carrier traffic to Terminal 3 and LCC, regional and local traffic to Terminals 1 and 2. The experiment lasted only a few years because of national air transport policy developments. These included the transfer of the operation of the country's larger airports, including Pearson, from the federal government to non-profit local airport authority companies on long-term leases. The Greater Toronto Airports Authority, which was created to operate Pearson Airport, purchased the private terminal in December 1996, and commentators have drawn few long-term lessons from the experience.

No public decision has yet been made as to the basis upon which any competing terminal is to be built and operated at Dublin Airport. It is generally assumed that there will be a significant degree of airline involvement in the ownership and management of such a terminal, mainly due to Ryanair's strident expressions of interest in participating in such a consortium (see for example Ryanair, 2000). Terminal competition therefore raises the prospect of an additional form of integration emerging in the industry - integration of airline and terminal businesses. While the integration of runway and terminal businesses may be the legacy of a political view of the airport as natural monopoly, the decision of an airline to integrate its business with that of a terminal will be based on whether economies of scope¹⁷ can be identified. This is the "make-or-buy" decision that faces every firm when considering the optimal scope of its

¹⁷ See Train, 1991, p8: "Economies of scope are said to exist if a given quantity of each of two or more goods can be produced by one firm at a lower total cost than if each good were produced separately by different firms".

activities. It should be noted by way of comparison that integration between air services and terminal services is common in the airfreight industry.

INVESTMENT IMPLICATIONS OF TERMINAL COMPETITION

Proposals for terminal competition have attracted negative commentary from some industry participants, due to its predicted effect upon investment incentives.

The Gatwick Airport Consultative Committee (which describes itself as “the statutory advisory body for Gatwick Airport”) stated, in a response to a consultation of the UK Competition Commission, that (Street, 2002):

“Introducing competition between terminals would not be in the best interests of passengers, the airlines using the airport or the airport operator as it could create extreme problems in the long term planning of the airport and timing of investment. It could also compromise the flexibility of the management of the airport to react effectively to changes in user airline operations and structures ... Also, introducing terminal competition could impede airport management in making best use of precious terminal capacity and could increase congestion within terminals in the short term when user airline business needs change. There is also the risk that competitive advantage gained by an airline may be used to the detriment of other terminal users whether existing or potential.”

The introduction of terminal competition will certainly impose fundamental changes upon the mechanism by which future investment is stimulated. Whereas a monopolist airport administrator can select terminal capacity based on the maximisation of some objective function, the presence of more than one terminal operator will result in a diffusion of the responsibility for present and future capacity provision. Future terminal enlargement decisions, and any stable capacity equilibria, will be the result of a competitive game rather than monopolistic optimisation. The fragmentation of commercial information-gathering and investment decision-making across multiple terminals, and possibly a separate runway operator, may obscure the evidence of potential demand growth and existing terminal capacity constraints.

Nevertheless, it is noted that decentralisation of capacity decision-making has not prevented liberalisation in other network-based industries, notably that of electricity generation and distribution. To the extent that consensus is not yet available as to the ability of such a decentralised system to deliver adequate capacity, some of the negative predictions of the Gatwick Airport Consultative Committee may be premature.

A more immediate cause for concern is the significant possibility that terminal competition will result in the stranding of assets. This relates to the inability of part of the existing terminal infrastructure to earn a productive return, which may occur if customer migration from the incumbent terminal to the entrant results in the disuse of capacity in the former building. Idle installed capacity imposes a cost upon society, as the relevant assets could have been put to more productive use elsewhere. The presence of this cost raises the practical issue of how it should be met, and will also have a welfare effect that will need to be considered in the context of the efficiency analysis that was discussed earlier.

CONCLUSIONS AND RECOMMENDATIONS

Proposals for competition between airport terminals will resonate at a general level with any agent that is dissatisfied with its relationship with the incumbent terminal services monopolist. This is especially true at Dublin Airport, where the presence of both Ryanair and Aer Lingus has resulted in intense competition on the Dublin-London routes, accompanied by pressure to mitigate all costs associated with the service. In order to constrain the behaviour of Aer Rianta, and fearing that it would otherwise engage in the conduct expected of a profit-maximising monopolist despite the identity of its owner, the Irish government has experimented with the independent regulation of the major Irish airports. The resulting flurry of protest across the aviation industry has encouraged the government to seek a more passive and politically neutral solution, incorporating unregulated spatial competition in the case of Shannon and Cork airports and, in prospect, competition between rival terminals at Dublin airport.

We have drawn from several strands of microeconomics literature to suggest a number of issues that would need to be explored in greater depth before the likely welfare effects of terminal competition could be predicted with any degree of confidence. Several separate notions of efficiency are relevant to the analysis, and the net effect of terminal competition may depend upon which of the various countervailing effects dominates, and the extent to which terminal specifications are matched to the requirements of different airline business models. Terminal services are mid-stream inputs in the production of an airport turnaround, and should be considered together with the other inputs, as well as the other sources of

revenue available to the typical terminal operator. The necessity for terminal users to also purchase runway services gives rise to a need for additional competitive safeguards, especially if the runway business is to remain integrated with that of the incumbent terminal. Finally, and in common with any industry involving the management of strategic infrastructure, the impact of competitive mechanisms upon investment incentives should not be ignored.

Its supporters would claim that competition between airport terminals is the panacea to economically wasteful behaviour by airport operators. We would contend that due to the complexity of the industry and its productive processes, considerable further work is necessary before such bald claims can be substantiated. It is our hope that this paper has highlighted some useful directions for future research.

UPDATE

On 18 May 2005 the Irish Department of Transport announced that the Irish government had approved a package of measures directed at the expansion of terminal capacity at Dublin Airport. The DAA has been directed to commission the construction of a second terminal, and will retain ownership of the facility. A contractor selected on the basis of an “open tender competition” will provide certain operational services at the terminal, but the range of services has not been specified. The announcement also included a reference to the future development of a third terminal, the delivery of which is to be “underpinned by an open competitive process” (Irish Department of Transport, 2005).

The decision indicates the Irish government's reluctance, in the short term at least, to adopt or facilitate fully-fledged competition between airport terminals. The DAA is to design, build and own the new terminal, and to this extent the extension in capacity can be regarded as an incremental expansion of the existing terminal. Similarly, it seems likely that the responsibility for contracting with airline customers in relation to the use of the second terminal will be assumed by the DAA. This excludes a competitive relationship between the respective terminals, and would appear to imply the retention of regulated monopoly as the mode of terminal services delivery. The compulsory tendering of management services at the second terminal raises, in principle, the possibility of mitigating x-inefficiency. However, no indication has been given as to the extent of the contract, and in particular whether it will be limited to the delivery of cleaning and maintenance services, or whether it will include responsibility for managing the use of terminal space by its various tenants. The DAA has indicated that it intends to submit a tender, and the tendering process will have to be carefully and independently managed in order that the DAA's informational advantage does not undermine the potential of the process to deliver efficiency gains.

We look forward to the emergence of more detail in relation to the model for the provision of terminal services at Dublin, and to observing the implementation of the plans as announced. In the longer term, it is clear that independent ownership is still viewed as a possible model for the delivery of a third terminal, and that the issues discussed in this paper therefore remain relevant at Dublin Airport.

REFERENCES

AEA (1998) *Benchmarking of Airport Charges – Information Package*. Brussels: Association of European Airlines.

AEA (2000) *Yearbook*. Brussels: Association of European Airlines.

ATG (1997) *User Costs at Airports in Europe, Asia & USA*. Air Transport Group, College of Aeronautics, Cranfield University, UK.

Barrett, S. D. (1997) The Implications of Ireland/UK Airline Deregulation for an EU Internal Market. *Journal of Air Transport Management*, 3(2), 67-73.

Barrett, S. D. (2000) Airport competition in the deregulated European aviation market. *Journal of Air Transport Management*, 6(1), 13-27.

British Airways (2001) *British Airways' Response to CAA on Competitive Provision of Infrastructure and Services Within Airports*.

Button, K. and Taylor, S. (2000) International air transport and economic development. *Journal of Air Transport Management*, 6(4), 209-222.

CAR (2001) *Economic Regulation of Airport Charges in Ireland*. Dublin: Commission for Aviation Regulation, CP2/2001.

CAR (2001a) *Determination In Respect Of The Maximum Levels Of Airport Charges That May Be Levied By An Airport Authority In Respect Of Dublin, Shannon And Cork Airports In Accordance With Section 32 Of The Aviation Regulation Act, 2001*. Dublin: Commission for Aviation Regulation, CP7/2001.

CAR (2001b) *Report On The Determination Of Maximum Levels of Airport Charges – Part I: Report on the Reasons for the Determination*. Dublin: Commission for Aviation Regulation, CP8/2001.

Creaton, S. (2004) *Ryanair: How a small Irish airline conquered Europe*. London: Aurum Press.

Fianna Fáil and the Progressive Democrats (2002) *An Agreed Programme for Government between Fianna Fáil and the Progressive Democrats*. Dublin: Fianna Fáil and the Progressive Democrats.

Forsyth, P. (2001) *Airport Price Regulation: Rationales, Issues and Directions for Reform*. Submission to the Australian Productivity Commission Inquiry: Price Regulation of Airport Services.

Garhart, R., Moloney, R., O’Leary, E. and Donnellan, T. (1996) *An Input-Output Model of the South-West*. Cork: University College Cork, Department of Economics Working Paper Series 97-7 1996.

ICAO (1987) *Airport Planning Manual, Part 1 – Master Planning*. Montreal: International Civil Aviation Organization, Doc 9184-AN/902, Second Edition.

Irish Department of Transport (2003) *Dublin Airport – Review of Expressions of Interest for an Independent Terminal – Panel Report to Minister for Transport*. Dublin: Irish Department of Transport. Available from: www.aer-rianta.ie/AR_Corporate/pdf/execsummary1.pdf [accessed 18 October 2004].

Irish Department of Transport (2005) *Government Approves Aviation Action Plan*. Dublin: Irish Department of Transport. Available from: www.transport.ie [accessed May 2005].

Juan, E. (1995) *Airport Infrastructure: The Emerging Role of the Private Sector*. Washington D.C.: World Bank, CFS Discussion Paper Number 115.

Juan, E. (1996) Privatizing Airports – Options and Case Studies. In: *Public Policy for the Private Sector*. Washington DC: World Bank, Note Number 82.

Leibenstein, H. (1966) Allocative Efficiency vs. “X-Efficiency”. *The American Economic Review*, 56(3), 392-415.

Moloney, R., Garhart, R., O’Leary, E., Donnellan, T. and Twomey, M. (1997) *The Economic Value of Cork Airport: An Input-Output Study of the Impact of Cork Airport on its Catchment Area*. Cork: UCC, Report for Aer Rianta.

Morrell, P. (2003) Airport Competition or Network Access: A European Perspective. Presented at: *The Role of Competition in the Future Airport Industry, 13 - 14, November 2003 Leipzig*. Hamburg: German Aviation Research Society.

Pels, E., Nijkamp, P. and Rietveld, P. (2003) Inefficiencies and scale economies of European airport operations. *Transportation Research, part E*, 39(5), 341-361.

Productivity Commission (Australia) (2002) *Price Regulation of Airport Services – Inquiry Report*. Available from: <http://www.pc.gov.au/inquiry/airports/finalreport> [accessed 18 October 2004].

Reynolds-Feighan, A. (1993) *Assessment of Performance and Prospects for the Irish Regional Airports*. Dublin: Irish Department of Transport, Energy and Communications.

Reynolds-Feighan, A. (2003a) A Review of Irish Airports Policy. *Irish Banking Review*, Spring 2003, 49-62.

Reynolds-Feighan, A. (2003) Accessibility, Transportation, Infrastructure Planning and Irish Regional Policy: Issues and Dilemmas. In: E.O’Leary, Ed. *Irish Regional Development: A New Agenda*. Dublin: Liffey Press.

Reynolds-Feighan, A. and Button, K. (1999) An assessment of the capacity and congestion levels at European airports. *Journal Of Air Transport Management*, 5(3), 113-134.

Reynolds-Feighan, A. and Feighan, K. (1997) Airport Services and Airport Charging Systems: A Critical Review of the EU Common Framework. *Transportation Research E: Logistics and Transport Review*, 33(4), 311-320.

Ryanair Ltd. (2000) *Ryanair Resubmits Proposals for Ten New Routes, 500 Jobs and over \$300m (sic) at Dublin and Shannon Airports*. Dublin: Ryanair. Available from www.ryanair.com [accessed 18 October 2004].

Ryanair Ltd. (2001) *Submission to the Commission for Aviation Regulation on the determination of airport charges*. Dublin: Ryanair.

Ryanair Ltd. (2004) *Aer Rianta Monopoly Price Increases Ruled Unlawful - Supreme Court Forces Aer Rianta to Repay the Money*. Dublin: Ryanair. Available from www.ryanair.com [accessed 18 October 2004].

Starkie, D. (2002) Airport regulation and competition. *Journal of Air Transport Management*, 8(1), 63-72.

Street, P. (West Sussex County Council) (2002) *Letter dated 4 April 2002 to Competition Commission: BAA London Airports Inquiry*. Available from: www.competition-commission.org.uk/inquiries/completed/2002/baa/extra/gaccsub.pdf [accessed 18 October 2004].

Train, K. (1991) *Optimal Regulation: The Economic Theory of Natural Monopoly*. Massachusetts: MIT Press.

Train, K. (1992) *Optimal Regulation: The Economic Theory of Natural Monopoly*.
Massachusetts: MIT Press.

UK Civil Aviation Authority (2001) *Consultation Paper: Competitive Provision of
Infrastructure and Services within Airports*. London: UK Civil Aviation Authority.
Executive summary available from
www.caa.co.uk/erg/ergdocs/CompetitionWithinAirportsFeb01.pdf [accessed 18 October
2004].

United Nations Conference on Trade and Development (2002) *FDI in brief: Ireland*.
Geneva: United Nations Conference on Trade and Development.

Figure 1: Travel distance by road to Ireland's three major international airports and seven regional airports

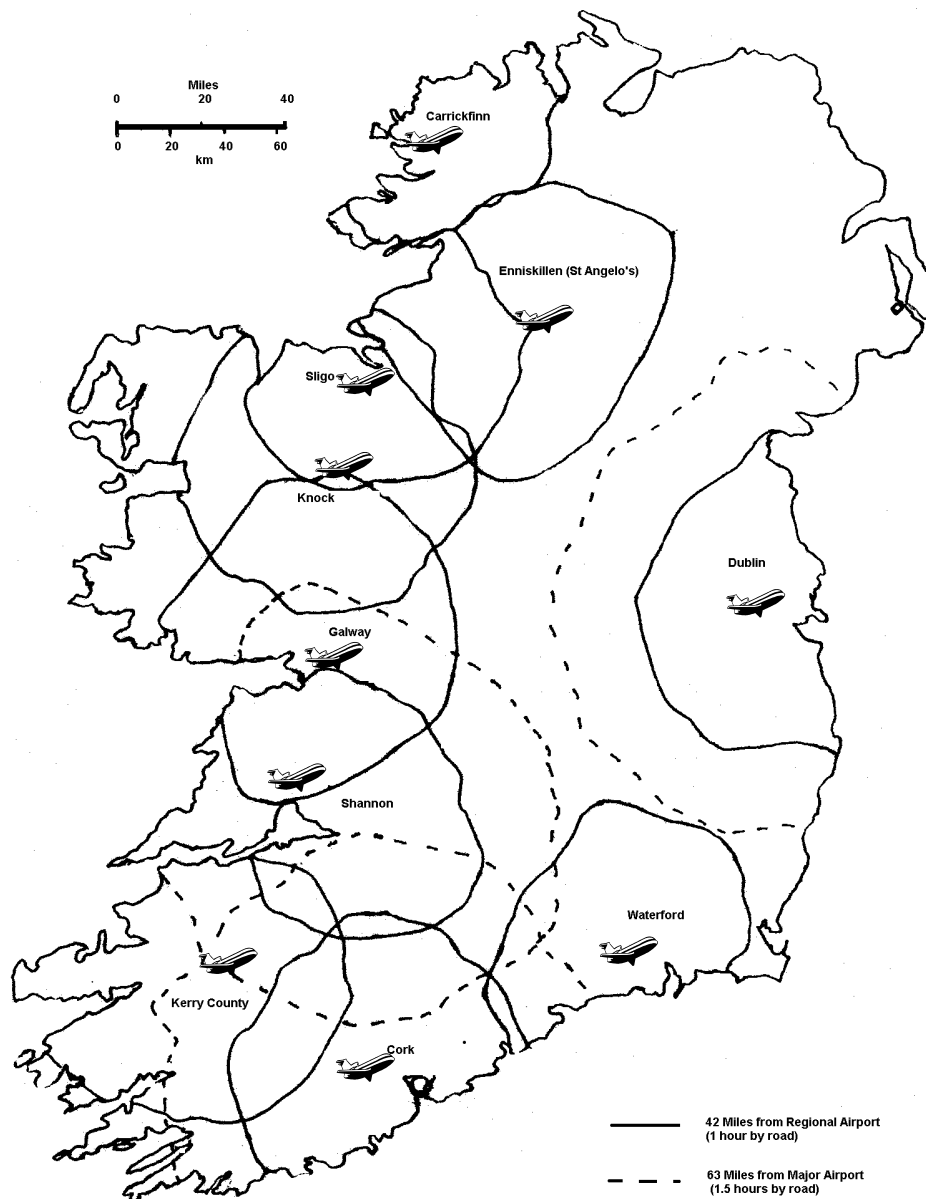


Table 1: Passenger traffic and traffic growth rates at Cork, Shannon and Dublin airports, 1995-2003

Year	Cork Airport		Shannon Airport		Dublin Airport	
	Passenger Traffic	Annual Traffic Growth Rate (%)	Passenger Traffic	Annual Traffic Growth Rate (%)	Passenger Traffic	Annual Traffic Growth Rate (%)
1995	971,319		1,573,770		8,024,894	
1996	1,124,320	16	1,700,174	8	9,091,296	13
1997	1,191,261	6	1,822,089	7	10,333,202	14
1998	1,315,224	10	1,840,008	1	11,641,100	13
1999	1,501,974	14	2,188,154	19	12,802,031	10
2000	1,680,160	12	2,408,252	10	13,843,528	8
2001	1,775,817	6	2,404,658	0	14,333,555	4
2002	1,874,447	6	2,353,530	-2	15,084,667	5
2003	2,182,157	16	2,400,677	2	15,856,084	5

Source: Aer Rianta

Figure 2: Average Charges per turnaround Departure at European Airports (for three aircraft types) in 1997 (Source: AEA, 1998)

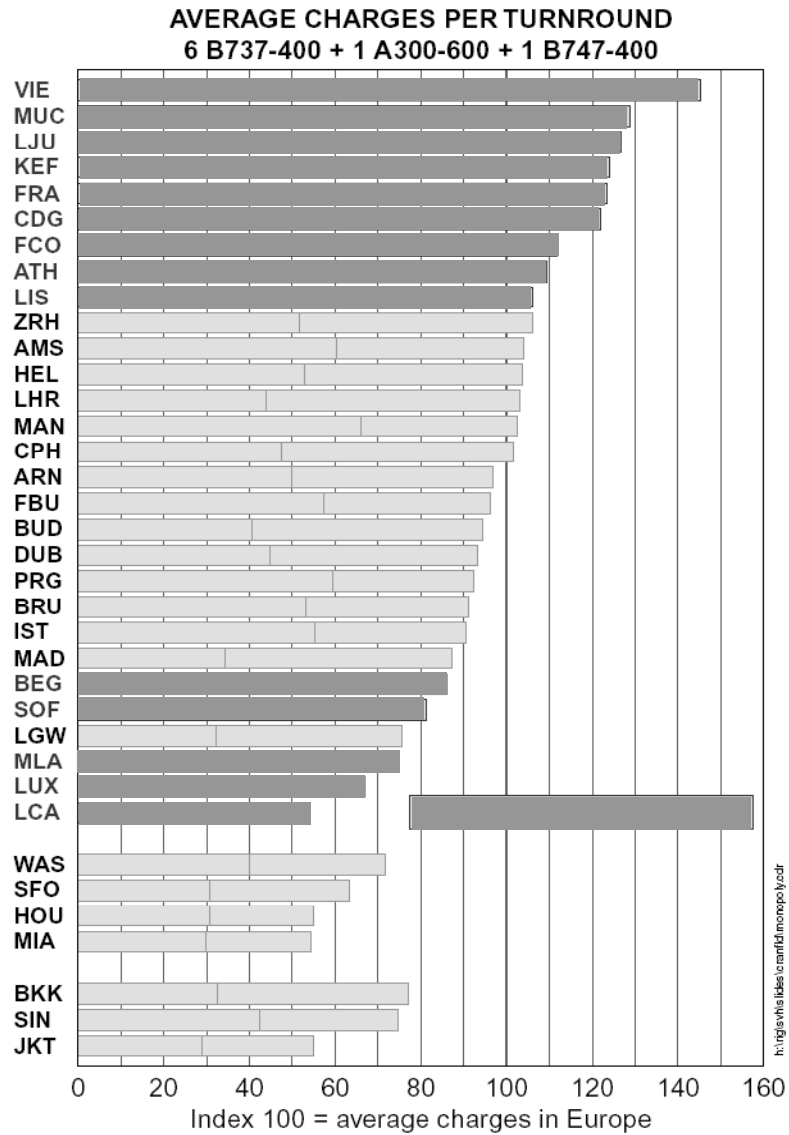


Figure 3: Airport functions per aircraft turnaround

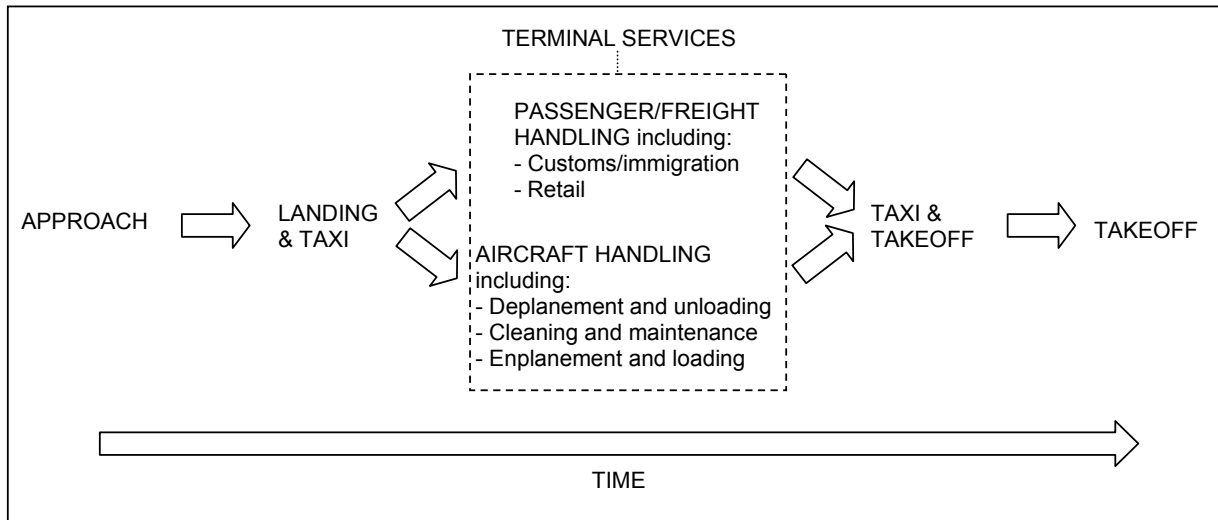


Figure 4: The integrated airport monopolist can profitably reduce airside charges

