Airport Runway Slots: Limits to Growth

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Abstract:

The United States–European Union market accounts for approximately 25% of all international tourist arrivals worldwide, and is arguably the busiest market in the world. This paper argues that landing slot policy and the manner in which airport capacity is allocated among airlines across the north Atlantic is likely to underpin the future geographic structure of the tourism industry. By analyzing the historical evolution of slot policy, this paper attempts to enhance the extant literature on how government authorities allocate scarce airport resources. The paper concludes by arguing that various slot reform proposals need to be adopted to make airports more "elastic" when managing origin-destination tourist flows.

Keywords: airlines | airports | tourism research | air transport industry | airport capacity

Article:

1. INTRODUCTION

The crucial role that transportation plays in shaping the tourism product is widely acknowledged in the literature (Britton 1991; Butler 1980; Debbage 1990; Graham 2000; Ioannides and Debbage, 1997 and Ioannides and Debbage, 1998; Page 1999; Pearce 1995; Prideaux 2000; Vellas and Becherel 1995). Transport is often conceptualized in the literature as the critical element that effectively links tourist demand or origin with key supply or destination areas. Consequently, many of the models have focused on the relationship between tourism and transport in terms of accessiblity levels (Gunn 1994; Inskeep 1991; Lundgren 1982; Miossec 1976). Others have examined the important role that transportation innovations (such as the railway, the jet engine, and the automobile) have played in influencing the historical evolution of mass tourism (Gilbert 1939; Holloway 1989; Mill 1992; Prideaux 1993; Robinson 1976).

However, a more thorough understanding of the transport function is critical because its cost is frequently a substantial portion of total travel costs especially on international trips by air. Perhaps more crucially, airport planners and airline consultants have become increasingly

concerned that the international tourism system may be substantially constrained or bottlenecked in the near future as many key gateway airport locations (including Heathrow and JFK) continue to suffer from a lack of runway slots, insufficient terminal capacity, and airspace congestion (Aviation Week and Space Technology 2000; Graham 2000). In much of the world, strong air transport growth continues to outpace runway-building projects.

The purpose of this paper is to investigate how airport-based infrastructural constraints can influence tourist flows, particularly in the major international gateway airports of the United States (US)—European Union (EU)/United Kingdom (UK) market. According to the UK Department of the Environment, Transport and the Regions (2000a), more air services exist between the United Kingdom and the United States than between the latter and any other European nation, plus almost 40% of all US bound passengers fly from or via the United Kingdom. By arguing that the fundamental links between international airport operations and the tourism product have been overlooked in the literature, the paper pays particular attention to how the lack of sufficient take-off and landing slots at major international airports can shape and constrain the interaction of tourism demand and supply. In doing so, the paper provides a historical overview of slot policy in the US–UK market and assesses the strengths and weaknesses of the various policy proposals that have been put forth to alleviate runway slot congestion. Out of necessity, the paper embraces a political economy perspective in an attempt to unravel the key connections that link slot allocation policy to the international tourism system. Humphreys (personal interview with Director of External Affairs and Route Development for Virgin Atlantic Airlines in 2000) has argued for a similar approach since “economic theory and modeling are, perhaps, less relevant than an assessment of the various policy machinations in any examination of present or future slot allocation priorities”. Certainly, the methodology used to allocate airport slots has become “one of the most controversial topics in the whole field of air transport economics” (Hanlon 1999:169).

2. INTERNATIONAL AIR TRANSPORTATION AND TOURISM

By some estimates, between 30 and 40% of all international tourist arrivals are by air (Mann and Mantel 1992; Page 1999; Vellas and Becherel 1995), and in some island destinations the reliance on this mode is even more acute, especially in the Caribbean and the Pacific. It is not uncommon for some destinations to receive over 90% of all arrivals by air. Consequently, some researchers have begun to focus on the central role that air transport has played in the distribution of international tourism (Hanlon 1999; Raguraman 1995; Wheatcroft 1994). Others have studied how US-style airline deregulation initiatives have lowered air fares and radically reconfigured international air route networks, thus dramatically reshaping tourist accessibility levels across the world (Button, Haynes and Stough 1998; Caves 1997; Debbage, 1993 and Debbage, 1994; de

Murias 1989; Doganis 1991; Findlay 1996; Gourdin 1998; Graham 1998; Kasper 1988; Oum 1996). In particular, Prideaux (2000) and Wheatcroft (1994) have persuasively argued that liberal aviation policies will trigger additional tourism growth.

However, much of the traditional transportation literature only indirectly discusses the movement of tourists. Furthermore, in the tourism literature the interface between air transport and tourism is still poorly understood, particularly with regard to the manner in which government policy and specific airport-based infrastructural constraints can directly impinge on the tourism system as a whole. Some exceptions to this rule include Hobson and Uysal (1992) and Page (1999). The former argued that the infrastructural constraints of the transport system will be the biggest limitation facing tourism policymakers into the foreseeable future. Page offered similar conclusions in his analysis of origin-destination demand for transport systems while also suggesting that airports in particular are "poorly understood in a tourism context" (1999:217).

2.1. US–EU Airport Capacity Constraints

It is a growing feature of international air transportation that many of the world's largest airports suffer from inadequate runway capacity. Furthermore, there is little chance of expanding capacity at many of these gateway airports or developing options for replacement airports due to the substantial financial costs and the intense environmental opposition that usually accompanies such projects (Caves 1997; Debbage 2000). It is a geographic irony that the worst shortages involve the largest tourist flows while there is much surplus runway capacity at the lesser-visited peripheral regional airports in many countries (Graham and Guyer 1999). The implications for international tourism are profound given the predisposition for economies of scale in the industry, and the intense geographic concentration of tourist arrivals to a select number of critical international gateway destinations. For example, the US Federal Aviation Administration (FAA) has historically restricted access to the four most congested airports in this country by limiting flights and assigning take-off and landing slots at Chicago's O'Hare airport, New York's JFK and La Guardia, and Washington's National. Such problems are even more acute in Europe where an Association of European Airlines (1995) report has suggested that severe capacity constraints exist at nearly all the major European airports. The congested airports in this report included key destinations like Amsterdam, Athens, Frankfurt, London, and Paris, among others.

One of the most gridlocked routes across the North Atlantic is the New York–London market. Most of the major airports in each metropolitan area are officially slot-constrained, and they include London's Heathrow and Gatwick, and New York's JFK and La Guardia. Based on the latest International Civil Aviation Organization (ICAO) figures, this route was the second busiest

market in the world with 3.82 million passengers in 1999, up from 2.34 million in 1991. In terms of specific airports within each metropolitan market, the JFK–Heathrow route was the busiest US-based passenger gateway to the world with 2.6 million passengers in the year ending June 1999. Furthermore, five of the top ten US-based gateways to the world feature Heathrow as the foreign gateway and they include JFK, Los Angeles, Chicago, San Francisco, and Washington DC (US Department of Transportation 2000). Not surprisingly, recent studies of slot policy at Heathrow have illustrated the severe difficulty airlines face when attempting to acquire new slots (UK Civil Aviation Authority 1995).

It is increasingly apparent that both US-style deregulation and EU-mandated liberalization of the airline-related segment of air transport has not been complemented with equivalent reform in its airport service segment (Bass 1994; Janda 1993). While the airline industry has been able to develop new destinations and more sophisticated route networks through new "open-skies" arrangements among various countries, market distortions in existing airport operations are now significantly exacerbated. For example, a recent European Commission review of its air transportation market suggested that the present mechanism for allocating airport take-off and landing slots "represents a barrier to entry and as such is at variance with the basic thrust of EU competition policy" (1997:26). In the United States, the US General Accounting Office 1990, US General Accounting Office 1996 and US General Accounting Office 1999 has argued that capacity constraints and the administrative rationing of slots in Chicago, New York, and Washington DC have resulted in higher-than-normal air fares and barriers to entry for new entrants.

The inability of some key gateway airports to deploy and expand capacity in response to changing demand may eventually constrain the ability of some destinations in reaching their full potential, and may even spark a fundamental restructuring of the geography of origin-destination tourist flows across the North Atlantic and beyond. At the very least, "congestion at the airline-airport interface—slots, gates, runways—constitutes one primary constraint on efforts to regulate for a more competitive airline industry" (Graham 1994:96). By extension, airport congestion also constitutes a primary constraint on efforts to regulate for a more competitive tourism that can offer both a multitude of destinations and competitively-priced products.

Since airport capacity and landing-slot policy is an increasingly intractable problem and such a vital component in the development of any successful North Atlantic tourism product, it is critical that policymakers develop a clearer understanding of the machinations that govern the distribution of airport slots. As already noted, the US–EU market is arguably the busiest international tourism market in the world. Thus, how airport capacity is allocated among airline

competitors across the North Atlantic is likely to underpin, at the macro-scale, the future geographic structure of tourism.

2.2. Historical Evolution of Slot Policy

Based on International Air Transport Association (IATA) and EU rules, a slot is the scheduled time of departure or arrival available or allocated to an aircraft movement at a specific date at the so-called capacity-constrained airports (also referred to as slot-controlled, slot-restricted, slot-constrained, or slot-coordinated airports). According to Bass, a slot is in effect "permission to schedule a flight at a particular airport at a particular time" (1994:145), although this should not be construed as an absolute right given the potential for delays due to bad weather, airspace congestion, or ground-handling problems, among other factors. Therefore, a slot is the scheduled time, but not necessarily the actual time of the aircraft movement. Based on this definition, slots exist only at slot-constrained airports where the demand for flights has outgrown existing runway capacity or supply. According to Abeyratne (2000), the capacity problem is so acute that by the end of 1997, 132 airports worldwide were slot-constrained including most of the major airports in Europe and the busiest ones in the United States. To better understand how the present system of slot allocation was developed, it is helpful to trace back the historical roots of international slot policy.

Historically, the allocation of airport runway slots has been self-administered by the airlines through IATA (the airlines trade association). Initially, the airlines found it useful to convene to discuss interline connections through IATA scheduling committees. These committees were normally administered by the major airlines at each airport and operated based upon a Scheduling Procedures Guide published by IATA.

The original objectives of the Scheduling Committees was to simply improve inter-airline connections among participating carriers and countries, and thus to indirectly facilitate origin-destination tourist flows. These objectives gradually changed as airlines began to experience difficulty obtaining slots at congested airports. However, price was never seriously considered as a mechanism to ration demand to limited runway capacity. Instead, the allocation mechanism adopted by IATA was a process of administrative rationing where slot allocation is managed through twice-yearly IATA conferences. At these biannual meetings, slots are administratively allocated by an independent coordinator working under the basic principles of grandfather rights and effective use. According to Bass:

The basic principle of grandfather rights is that an airline that held and used a slot last year is entitled to do so again in the same season the following year. Effective use means that preference is given to an airline that plans to use a slot more intensively: for example, a daily service rather than one that is less than daily, or a service that operates throughout the season rather than only in the peak (1994:146).

Given the complex combinatorial or route network complexities of each airline's multi-stop and multiple route systems, the IATA conferences are particularly crucial in guaranteeing the availability of appropriate inter-linked slot times between slot-constrained airports. Since these are invariably major tourism destinations in their own right, these conferences play an enormous role in outlining the essential parameters of growth for tourism by "connecting the dots" of the airline network that serve to link world cities like New York and London.

However, the system is not without problems. The principle of effective use clearly favors daily scheduled carriers over less-frequent, non-scheduled, or charter carriers, and this has significant implications for those leisure or tourist-class passengers that favor the low-fare packaged deals offered by tour operators through charter airlines. Less than optimal slots are typically available to such carriers. It has also been suggested that the principle of grandfather rights is essentially anti-competitive serving to advantage incumbents over would-be new entrants. In response to this criticism, IATA modified the scheduling guidelines where half of all slots that become newly available are to be first offered to new entrants (defined as any airline with less than four slots per day at the slot-coordinated airport in question). IATA has also introduced a "use-it-or-lose-it" rule to minimize slot hoarding by the dominant airlines where those not used 80% of the time within a two-month period are relinquished and put back into a pool to be reallocated to other carriers, including new entrants.

Although some critics view such amendments as inadequate, it is important to recognize that the present operation has been in place since 1947 and is well accepted by much of the international airline industry, and also by many national aviation and airport authorities. Additionally, the current system is not excessively disruptive since an airline's past investments in developing new route networks are rewarded through grandfather rights. Some market flexibility is provided since within the existing system airlines can exchange slots among themselves through a process of "one-for-one" trading. However, there is little doubt that as demand has increased at the key gateway airports across the North Atlantic, the IATA-based system of administrative rationing has become increasingly anti-competitive. Despite amendments, new entrants continue to be unable to obtain access to slots at congested airports, and incumbents have frequently exercised market power through the historical grandfather rights granted by IATA.

In February 1993, the European Commission introduced Regulation 95/93 in an attempt to establish common rules for the allocation of slots at its slot-constrained airports. An administrative process based on “neutral, transparent, and non-discriminatory rules” was established to theoretically facilitate competition and encourage entry into the air transportation market. However, the EU guidelines largely endorsed existing IATA procedures relating to slot allocations. Regulation 95/93 recognized the historical merit of slot usage or “grandfather rights” whereby an airline inherited the option to a slot if it had already made use of the runway at the same time during the preceding equivalent season. Furthermore, policies relating to new entrants, the establishment of an independent slot coordinator and secondary trading deviated little from existing IATA guidelines. According to Langner, the only real “difference between EU regulation and the IATA mechanism today is mainly that the latter relies on mutual agreements, whereas the EU regulation is a binding legal framework” (1996a:72).

The perception that EU 95/93 merely codified the status-quo has resulted in much criticism from industry observers (Bass 1994; Button et al 1998; Castles 1997; European Commission 1997; Janda 1993; Langner, 1996a and Langner, 1996b; Starkie 1998; UK Civil Aviation Authority 1995 and UK Civil Aviation Authority 1998). For example, EU 95/93 established a mandatory slot pool which included newly created, unused and/or returned slots, with half of all these to be reallocated to new entrants. However, a UK Civil Aviation Authority (1995) investigation of slot practices at Heathrow Airport during the summer 1994 season indicated that 95% of all slots were reallocated on the basis of grandfather rights. After the inclusion of newly available slots due to expanded capacity at Heathrow, the mandatory slot pool only accounted for 7–8% of the total. Furthermore, although new entrants could claim up to half of the slot pool, they only took up around 20% of the pool, and 40% of the slots in the pool were left unused due to the unattractive timings of the slots (commonly before 7am or after 9 pm).

According to Bass, EU Regulation 95/93 “has not had, and could never really have been expected to have had, a major impact on new entry at Heathrow” (1994:147). For example, the market share of slots held by the top five airlines at Heathrow has changed little during the 90s. Furthermore, in the busiest hours at Heathrow Airport demand continued to exceed the available slots by more than 30% during the summer of 1994 (Table 1)—nearly two years after Regulation 95/93 had been passed by the European Commission. Given the difficulties experienced in London and throughout the EU with administrative rationing, European policymakers have begun to pay close attention to the American experience of free-market-based slot-trading at the so-called “high-density traffic rule airports”.

2.3. The US Experience

In the United States, the IATA-based system of administrative rationing does not apply, largely for anti-trust reasons, and so slots are essentially allocated on a first-come, first-served basis at nearly all its airports (Langner, 1996b and Starkie, 1998). Consequently, US carriers simply schedule flights to account for expected delays at the more congested airports. However, this is not the case at Chicago's O'Hare, New York's JFK and La Guardia, and Washington's National. Given the heavy traffic at all four airports, a slot quota mechanism has been in place since 1968 at each of these "high density" airports to limit air traffic congestion and noise. More crucially for the purposes of this paper, since 1986 the FAA has allowed domestic slots at the high density airports to be bought and sold for money, rather than merely being swapped for other slots as is the case in the "one-for-one" trading system established by IATA.

The US approach to slot trading is in stark contrast to EU Regulation 95/93 which allows slots to be freely exchanged but is silent on the matter of price and ownership. For European policymakers, the critical question emerges as to what lessons might be learned from over a decade of American-style monetarized slot trading. The 1986 "Buy–Sell Rule" authorized US airlines and other institutions to purchase, sell, trade, or lease slots pending certain conditions laid down by the FAA (such as the "use-or-lose" rule and new entrant slot pool). Such a ruling allowed a secondary market in slots to flourish where US airlines were allowed to trade historic entitlements to slots. However, they were traded through a clearing house operated by the Air Transport Association (the US airlines trade body), rather than through an independent slot broker (Langner 1996a). Consequently, the process was not especially transparent and the financial terms of slot transfers were not generally made public. However, it is widely accepted that peak-time slots can now cost up to $4 million (Starkie 1998).

Even less clear is the issue of who actually owns the slots. The FAA has explicitly ruled that slots do not represent a property right for US carriers but instead are an operating privilege subject to FAA control. However, the quasi-private property status of existing slots has been highlighted in a number of well-publicized transactions. Most notably, the 1991 public auction of Eastern Airlines slots at the four high density airports seemed to suggest that slots were airline assets rather than FAA or airport assets. For example, United Airlines paid $35.5 million for Eastern's 76 slots at Washington National. Additionally, a significant number of slots are held by non-carriers and some US airlines have mortgaged their slots to financial institutions (Table 2). For example, the airline trustee Shawmut Bank held 158 slots at the four airports in the 90s (Air Transport World 1994).

In Europe, Regulation 95/93 allows slots to be exchanged, although it is less clear that money transfers and slot ownership claims by airlines are against the rules. A recent UK High Court ruling that suggested that slots can be freely exchanged for money sets the stage for conflict with the European Commission (Air Transport World 1999a), although the UK Department of the Environment, Transport and the Regions (2000a) has recently indicated that the UK government should make it clear that slots are community assets and not airline assets.

Despite the ambiguities over monetarized trading and slot ownership issues across the North Atlantic, many industry observers believe that the secondary market in airport slots in the United States has generated a relatively dynamic and fluid market, despite the concerns about predatory and anti-competitive behavior. For example, Kleit and Kobayashi (1996) found no evidence that the dominant carriers at Chicago O'Hare (American and United) were hoarding slots to prevent low-fare new entrants from entering the market. McGowan and Seabright (1989) also examined whether airlines with market power might engage in predatory bidding for slots and concluded that it is an unnecessarily expensive way to deter or drive-out competitors. They argued that it was more likely that incumbents would direct any entry-deterring or predatory behavior to the route-specific service they operate rather than through the hoarding of slots. Further, Starkie (1998) has suggested that the secondary market in slots has encouraged a more efficient use of scarce slots, although he also suggested that a free-market is unlikely to increase route competition when capacity is scarce. He also argued that monetarized trading on its own would not be enough to offset an incumbent's pre-existing competitive advantage in the marketplace.

Pre-existing advantages are a problem because monetarized slot trading was introduced at the high density airports based on the grandfathered rights of the existing incumbents as they stood in 1986. This has remained a fundamental problem ever since because the pre-existing slot holders were, in effect, granted an unwarranted windfall gain by government. Furthermore, those carriers that acquired the historic rights to the high density slots appear to have accentuated their competitive advantage over time. For example, a study by the US General Accounting Office (1996) found that the dominant carrier share of slots at each of the four airports has risen sharply between 1986 and 1996 (Table 2). Additionally, US airlines appear reluctant to sell-off slots or to lease slots to other carriers for lengthy periods. Instead, the bulk of uneven slot trades are based on lease contracts which terminate within 12 months (Wolf 1999).

Starkie has suggested that a better approach might be to increase the price charged for landing aircraft because this act "would have the effect of reducing the scarcity rent enjoyed by the incumbent airline, thus placing incumbent and entrant on a more equal footing" (1998:115). Certainly, government pressure appears to be building to modify the high density program. For

example, the US Senate has recently recommended gradually phasing-out the ‘high-density rule’ (Air Transport World 1999b), while a Congressional panel has recently argued that access to the airports should be controlled by charging higher fees for peak-period slots (Aviation Week and Space Technology 1999).

2.4. The UK Approach

Traditionally, airport charges have been calculated based on aircraft weight plus, in some cases, passenger charges and a minor contribution for aircraft parking. Charging formulas are normally based on guidelines provided by IATA and the International Civil Aviation Organization (ICAO). The underlying principle of the guidelines is one of recovery costs, where over 80% of landing costs are attributable to the effects of the aircraft’s landing weight (Janda 1993). However, “airport charges are a remarkably low and constant proportion of airline operating costs—4 percent worldwide in 1992” (Toms 1994:77).

Although the actual use an airline will make of its slot allocation will be heavily influenced by the price the carrier must pay, few airport authorities have introduced market-clearing pricing schemes based on the market demand for access at various times (that is, peak charging). Some observers have proposed that airports need to introduce a marginal cost pricing system that reflects the scarcity of slots during peaks, and is based on a system of market-clearing prices.

Only a small number of airports around the world have introduced peak charges, although the British Airports Authority (BAA) experiment is probably the most comprehensive and well-known program currently in place. Since 1972, the BAA has gradually developed a peak-hour landing fee scheme for Heathrow and Gatwick that essentially abandoned the weight-related charge in peak periods. Instead, the BAA moved to a fixed runway movement charge with a higher landing fee at peak periods to “reflect the higher marginal cost of using scarce runway resources at peak periods” (Doganis 1992:94). Additionally, peak passenger and parking charges were also introduced to encourage greater efficiency in the allocation of scarce airport resources and to coerce traffic into off-peak periods.

Although Doganis, Dennis and Graham (1990) suggested that some evidence exists that the BAA peak charge experiment encouraged a few carriers to reschedule flights to off-peak times, the overall success of the program was mixed. Part of the problem was that peak charge prices at Heathrow and Gatwick were still fairly low, and thus unlikely to substantially affect airline operations in a significant manner. For example, an Institute of Air Transport (1997) study found

that on the Heathrow–Rome route, peak period airport charges only accounted for 3.1% of the share of the price of an economy class airline ticket (Gatwick–Rome amounted to only 2.5%). The relatively modest prices were put in place partly because of the limitations placed on the BAA by both the government price cap regulation and the "single-till" philosophy.

The British government has traditionally capped airport charges by linking them to the national retail price index minus a so-called X-factor (which attempts to capture productivity increases at the airport and is reviewed every five years). At London's major airports, the losses incurred by the unusually low airport charges are covered by the surpluses generated from duty-free retail sales and other commercial activities at the airport (or the "single-till" approach). The cross-subsidization of airport charges by commercial rents is grounded in the logic that the opportunity for BAA to earn profits on commercial operations is attributable to the airline industry transporting potential customers to the airport terminal. Ironically, the end result is that two of the most congested international airports in the world (Heathrow and Gatwick) have some of the lowest airport charges in the world. According to the UK Monopolies and Merger Commission (1996) responsible for the five-yearly BAA reviews, the single-till approach has not yielded an economically efficient pricing mechanism because charges are still lower than the overall cost of supplying airport services to airlines. However, a complete abolishment of price regulation would be inappropriate, particularly where airports possess substantial market power (or no nearby competing airport to offer choice to travelers). Unregulated airports would inherit the potential to earn monopoly profits which might deter significant airline operations and/or increase air fares for travelers.

Additional problems with the BAA experiment included the difficulties involved in quantifying the many different peak and off-peak periods based on traffic type, and the inability of airlines to reschedule flight times to off-peak periods given the complex combinatorial scheduling difficulties involved in developing route networks. For example, the value of any landing slot for an airline depends on the availability of an appropriate take-off slot at the other end of the route. Acquiring the appropriate slots at two congested airports like Heathrow and JFK is extraordinarily difficult given the scarce capacity and the government bilateral regulations that constrain route choice at both airports. The UK Monopolies and Mergers Commission, in its five-yearly review of BAA pricing policies, suggested that "the advantages of Heathrow are such that it would take a very substantial increase in airport charges, possibly as much as tenfold, before airlines would seriously divert operations to other airports" (1996:9).

Given the confused and highly politicized context of peak charge programs and slot allocation policies in general, it is difficult to conceive of effective slot allocation remedies in the near

future short of building additional runways, terminals, and airports. However, expanding capacity in this way can be time-consuming and costly, plus it is unlikely to offer an easy or timely solution. Fortunately, alternative solutions have been proposed and a more critical assessment of the various slot reform proposals put forth in recent years is central to the overall health of international tourism across the North Atlantic, and elsewhere. This is because congestion levels at key gateway airport terminals threaten to substantially constrain traffic growth in certain markets.

2.5. Slot Reform

For the suppliers of tourism services, developing slot reform policies that better manage scarce resources is critical given the profound ways in which airport infrastructural constraints can shape accessibility levels between tourist origins and destinations. One potential remedy that may facilitate a more competitive market includes expanding the definition of a new entrant with respect to the European Union and the United States pools for new and withdrawn slots (European Commission 1997). Currently, a new entrant, entitled to half of all slots allocated to the slot pool, is tightly defined as any airline holding no more than 3% of all slots at the airport in question. As a consequence, many new entrants are unable to offer enough flight frequencies and seat capacity to develop a viable competitive service. By contrast, more competitive medium-sized airlines like British Midland remain ineligible for the new entrant allocation in the slot pool despite being effective competitors to British Airways at Heathrow.

In response to this problem, Coopers and Lybrand (1995) proposed that the definition of a new entrant should be broadened to include airlines with up to 10% of the daily slots. Additionally, the UK Civil Aviation Authority 1993 and UK Civil Aviation Authority 1995 has argued that the allocation of new entrant slots should be targeted in “bundles” to enable new entrants to be more effective competitors on specific high-density, short/medium haul routes where it is assumed a third carrier can be accommodated.

At the heart of the slot conundrum is the lack of spare capacity. Most major airports in Europe have managed to increase declared hourly capacities during the 90s (Table 3). For example, the average number of hourly slots at Heathrow increased from 69 movements in 1978 to 84 in 1998 during peak periods. The additional runway capacity has been developed under the remit of the National Air Traffic Services—a wholly owned subsidiary of the Civil Aviation Authority responsible for estimating runway capacity. Recent government proposals to partially privatize it may initiate new, innovative technical developments that may further enhance capacity at Heathrow and Gatwick.

However, some observers have argued that only marginal increases in runway capacity can now be achieved without the major construction of new runways and terminals. By contrast, US policymakers have asserted that hourly capacity at Heathrow could be dramatically enhanced overnight if the airport were to switch from segregated mode operations to mixed mode. Presently, Heathrow's parallel runways are "segregated" where there are separate runways for landings and take-offs. According to one United Airlines executive "the major constraining factor at Heathrow is that you can only use one runway at a time because of environmental concerns" (Air Transport World, 1994:75). If the UK government allowed mixed mode operations at Heathrow, where runways simultaneously accommodated both landings and take-offs, then their capacity would dramatically increase and the number of slots would be greatly enhanced. However, such a remedy is of little value at airports that already utilize mixed mode operations (such as Gatwick and most US airports).

In the United States, lotteries have been used to re-allocate under-utilized slots at the high density airports with a built-in bias in favor of new entrants. Such an approach can enhance competition but at the expense of greater uncertainty. According to Fawcett and Fawcett, "the only real use of a lottery is as a threat to force airlines to reach agreement in order to avoid the randomness of the lottery" (1988:49). Certainly, relying on pure chance to allocate scarce airport resources may be irrational since the winning airlines are not rewarded on the basis of efficiency or quality of service.

By contrast, slot auctions are more efficient mechanisms in that they tend to allocate resources to the highest available use, where bid prices essentially establish the true market price. Although an auctioning system is simple in theory, no slot auction regime currently exists anywhere in the world largely because its implementation poses many problems. For example, auctions inevitably exclude capital-poor users, so it is possible that the deep-pocket megacarriers will be able to slot-hoard and dominate the situation at key gateway airports. Additionally, the value of a take-off slot depends on the availability and price of a landing slot elsewhere, making isolated airport-specific auctions impractical. The real commodity for sale is the route that links two airports together.

However, many of these problems are not insurmountable and even though a slot auction may become more difficult and complex than the familiar single event English arts auction, it could be done at what is called combinatorial auctions. In such a case, hourly blocks or various bundles of pairs of landings and take-offs would be opened to a process involving simultaneous rounds of

bidding at airports that share both similar peak/capacity problems and a significant volume of origin-destination traffic (JFK–Heathrow). To minimize disruption and uncertainty, this might be gradually phased in over a period of time by only auctioning 10% of all slots each year and entitling airlines to use any newly acquired one for a period of seven years or more. Additionally, a portion of available slots might be set aside for first bids by new entrants to prevent incumbents from re-establishing market dominance.

Not surprisingly, one of the most radical slot reforms yet proposed has been put forth by Virgin Atlantic Airways—which has successfully competed across the North Atlantic despite controlling only 2% of all slots at Heathrow and Gatwick (Financial Times, 2000 and Virgin Atlantic Airways, 2000). Virgin Atlantic Airways (2000) has argued that all grandfather rights should be limited to a fixed period of time (like 10 or 15 years) where a certain percent of all slots (such as 10%) are returned each year to be bid for and recirculated. The proceeds of all sales would return to government as is the case in the bidding for radio, TV, and rail franchises in the United Kingdom. According to Virgin Atlantic Airways such an approach could generate over $1.5 billion per annum in government revenues which could then be used to remove the present air passenger duty or enhance capacity at congested airports.

Such an approach appears to be gaining favor in the UK Treasury which anticipates significant revenues for the Exchequer. Additionally, John Prescott, the Deputy British Prime Minister recently indicated that the duration of grandfather rights should be reviewed such that a system is established where slots are allocated to airlines for a defined period of time (UK Department of the Environment, Transport and the Regions 2000a and UK Department of the Environment, Transport and the Regions 2000b). Given the current review of both the BAA by the UK Competition Commission (formerly the UK Monopolies and Mergers Commission) and Council Regulation 95/93 by the European Commission, it may be that grandfather rights will be restricted in the future, although powerful vested interests may make such a solution politically unfeasible.

3. CONCLUSION

If tourism between the United States and the European Union is to continue to flourish, ways need to be found to make airports more “elastic” through the efficient use of existing infrastructure, particularly given the environmental and socioeconomic difficulties faced in developing new airports. Unfortunately, the existing system of IATA-inspired administrative rationing continues to proliferate even though it is a transparent example of the protection of vested interests. Incumbent carriers have successfully colluded to create significant barriers to

entry for potential competition thus exacerbating the inefficient allocation of scarce airport resources.

Although a market-based allocation of slots is no panacea, several potentially fruitful market-based alternatives have been discussed that may ameliorate the numerous bottlenecks to tourist flows now building over the North Atlantic. Certainly, establishing “highest and best” slot use by fiat rather than through market demand is unlikely to lead to an optimal allocation of slots. Such matters are of critical importance to the tourism industry and policymakers because these “hidden” constraints have the potential to fundamentally dictate the essential nature of the tourism playing field in the near and distant future.

Resort destinations that are highly dependent on air-based tourist arrivals are especially vulnerable, particularly if the demand originates in markets that depend on gridlocked international airport gateways (such as JFK, Heathrow, or O’Hare) for feeder traffic. Tourism planners may find it difficult to develop new markets in such cases, especially given the inertia of current slot allocation methods. Competitive pricing of the tourism product may also be difficult in some cases because low-fare, new entrant airlines may be unable to acquire the relevant slots needed to effectively compete on certain key routes. Some tourists may then be tempted to visit alternative, more inexpensively-priced destinations that have been more successful in facilitating competitive airline route connections. These issues affect tourism at large since many hoteliers, car rental agencies, travel agents, and tour operators are heavily reliant on the airline industry for customers. Consequently, this paper encourages policymakers to be more active in lobbying the IATA and airline carriers when planning and developing the tourism product. Air transport is often the crucial element that links demand and supply, yet how airport operations and slot allocation methods impinge on the geography of tourism is less clearly understood—this paper has been a first stab at articulating these connections.

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Table 1. Heathrow Slot Capacity and Initial Demand for Peak August Weekday (1994)

Hour (GMT)	0700	0800	0900	1000	1100	…	1700	1800
Arrivals								
Slot Demand	59	47	50	52	42	…	50	42
Slot Capacity	39	39	38	38	38	…	40	39
Excess demand	20	8	12	14	4	…	10	3
Departures								
Slot Demand	47	50	47	51	53	…	50	53
Slot Capacity	40	40	40	39	39	…	39	40
Excess Demand	7	10	7	12	14	…	11	13

Source: UK Civil Aviation Authority (1995).

Table 2. Slot Allocations at the Four High Density Airports

Airport/Slot Holder	% of Total		
	1986	1991	1996
Chicago O'Hare			
American and United	66	83	87
Other Established Airlines	28	13	9
Financial Institutions	0	3	2
Post-deregulation airlines	6	1	1
New York JFK			
Shawmut Bank, American and Delta	43	60	75
Other Established Airlines	49	18	13
Financial Institutions	0	19	6
Post-deregulation airlines	9	3	7

Airport/Slot Holder	% of Total		
	1986	1991	1996
New York La Guardia			
American, Delta, and US Air	27	43	64
Other Established Airlines	58	39	14
Financial Institutions	0	7	20
Post-deregulation airlines	15	12	2
Washington National			
American, Delta, and US Air	25	43	57
Other Established Airlines	58	42	20
Financial Institutions	0	7	19
Post-deregulation airlines	17	8	5

Source: US General Accounting Office (1996).

Table 3. Declared Hourly Runway Capacities for Summer Busy Periods

Airport	Capacities		
	1993	1995	1998
Single Runways			
Gatwick	36–45	40–47	42–48
Manchester	41	42	45–47
Milan Linate	24	22	32
Converging Runways			
Barcelona	28	30	47
Madrid	35	35–50	50

Airport	Capacities		
	1993	1995	1998
Vienna	30	45	54
Parallel Runways			
Heathrow	77–79	77–81	75–84
Frankfurt	68	70	76
Paris Charles de Gaulle	76	76	76–84
Paris Orly	70	70	70

Source: UK Civil Aviation Authority (1998).

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