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COMMISSION AUTHORIZED

BEFORE THE
FEDERAL AVIATION ADMINISTRATION
DEPARTMENT OF TRANSPORTATION
WASHINGTON, D.C.

In The Matter of	)	
	)	
High Density Traffic Airports:	)	Docket No. 25758
Slot Allocation and	)	Notice No. 88-18A
Transfer Methods	)	14 C.F.R. Part 93

Comment of the Staff of the Bureau of Economics of the Federal Trade Commission*

November 15, 1991

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* This comment represents the views of the staff of the Bureau of Economics of the Federal Trade Commission. They are not necessarily the views of the Commission or any individual Commissioner. Inquiries regarding this comment should be directed to Bruce H. Kobayashi (202-326-3363) of the FTC's Bureau of Economics.

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I. Introduction and Summary

The staff of the Bureau of Economics of the Federal Trade Commission (FTC) appreciates this opportunity to respond to the Federal Aviation Administration's (FAA) Supplemental Notice of Proposed Rulemaking (SNPRM).[2] The FAA is seeking comments on several proposed amendments to the regulations governing allocation and transfer of landing slots at the four High Density Traffic Airports (HDTA).[3]

The general intent of the amendments now proposed is "to make slots available to new entrants through encouraging the sale

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[2] *See High Density Traffic Airports: Slot Allocation and Transfer Methods -- Supplemental Notice of Proposed Rulemaking*, 56 Fed. Reg. 46674 (September 13, 1991).

[3] 14 C.F.R. Part 93.

of marginally used slots by incumbent carriers, in order to promote competition in the airline industry to the extent possible without substantial disruption of existing air service."[4] This comment discusses three major issues: (i) the likely effect on slot usage of reallocating slots from large to small carriers; (ii) the possible effects of proposed changes to the FAA's "use or lose" rules; and (iii) the possible effects of proposed additional restrictions on the sale and transfer of lottery slots.

The proposed regulations and our comment focus on an airline's slot usage rate at an HDTA. Other potential competition policy issues, such as the effect of the proposed regulations on airline competition in individual city pair markets, are not directly addressed by the proposed regulations, and are outside the scope of this comment.

Our principal findings, based largely on empirical study of historical slot use, are set out in detail in Part IV and are briefly summarized here. First, two specific theories of anticompetitive effect in the current regulatory environment are tested by comparing carriers' shares of available slots to the rate at which the carriers used them. The usage rate is measured by the number of days the slot was used during the period studied (May and June, 1990). On balance, the data do not suggest that carriers with relatively large shares of the slots at a HDTA were restricting service anticompetitively, by hoarding their slots or

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[4] *See* SNPRM, *supra* note 2, p. 46676.

using them at a low rate compared to carriers with smaller shares. At the most concentrated HDTA, Chicago's O'Hare Airport, statistical analysis shows that the carriers with larger shares of slots tended to use their slots more, not less, intensively. At New York's LaGuardia and at Washington's National airports, there was generally no statistically significant relationship between slot share and slot usage. At New York's Kennedy Airport, the relationship was negative and statistically significant, implying that high slot share was associated with lower usage; however, this finding is probably explained by the operating problems experienced by the largest carriers at that airport. In general, the data from the period studied do not support the anticompetitive theories about carriers' patterns of slot holding and usage.

Next, possible effects of proposed changes to the "use or lose" rule are assessed. The data show that most carriers, on average, used their slots at a rate that was at or above the proposed minimum criterion of 90 percent usage on weekdays. Thus the change from the present criterion of 65 percent usage over all days may affect only a few slots. But because carriers with more slots and operations may enjoy greater flexibility in allocating flights among slots and rearranging schedules to ensure their slots meet the minimum "use or lose" standard, the 90 percent weekday rule could have a greater effect on the carriers with fewer slots.

Finally, we discuss the effect of proposed restrictions on the sale and transfer of slots obtained in a lottery. This issue is studied by examining the events that followed the 1986 slot lottery. The vast majority of the slots allocated then were traded or sold by the lottery recipient within two years, that is, within the minimum mandatory holding period proposed in the SNPRM. Almost all of the carriers that received slots in the 1986 lottery have since exited the industry, *via* merger or bankruptcy. If this experience is a guide to the future, many slots allocated in lotteries would be traded if there were no restrictions on transfer. In the absence of market power, slot transfers likely represent an efficient reallocation of resources from lower to higher valued uses, and imposing significant delays or other restrictions on transfers may reduce welfare. In addition, although the FAA's proposed restrictions on the sale and transfer of lottery slots may effectively deter a carrier from entering lotteries solely for the purpose of obtaining slots for resale, a more efficient way to achieve this goal may be to disqualify from future lotteries a carrier who has sold its lottery slots too quickly.

II. Expertise of the Staff of the Federal Trade Commission.

The FTC is an independent regulatory agency responsible for maintaining competition and safeguarding the interests of consumers.[5] In response to requests by federal, state, and

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[5] 15 U.S.C. Parts 41 - 59.

local government bodies, the staff of the FTC often analyzes regulatory or legislative proposals that may affect competition or the efficiency of the economy. In the course of this work, as well as in antitrust and consumer protection research, nonpublic investigations, and litigation, the staff applies established principles and recent developments in economic theory to competition and consumer protection issues.

The FTC staff has a longstanding interest in aviation issues, including the allocation and transfer of slots at HDTAs. The FTC staff filed comments in previous FAA administrative proceedings on slot allocation and transfer methods.[6] In addition, the staff has participated in various administrative proceedings involving airport access,[7] and has issued staff reports on slot allocation and on airline deregulation.[8]

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[6] *See* comments of the staff of the FTC, in *Slot Transfer Methods*, FAA Docket No. 24105, August 1984, and *Slot Allocation Alternative Methods*, FAA Docket No. 24110, 1984.

[7] *See* comments of the staff of the FTC in *Elimination of Airport Delays*, FAA Docket 24206, *Discussion Authority for Agreement to Shift Schedules*, Department of Transportation, Docket No. 44634, February 23, 1987, and *Charges for the Use of Metropolitan Washington Airports*, FAA Docket No. 25204, April 13, 1987. *See also* Comments of the Bureaus of Economics, Competition and Consumer Protection of the Federal Trade Commission, Massport, Program for Airport Capacity Efficiency, February 29, 1988.

[8] *See* D. Koran and J. Ogur, *Airport Access Problems: Lessons Learned from Slot Regulation by the FAA*, Bureau of Economics Staff Report to the Federal Trade Commission, May 1983, and J. Ogur, M. Vita and C. Wagner, *The Deregulated Airline Industry: A Review of the Evidence*, Bureau of Economics Staff Report to the Federal Trade Commission, January 1988.

Our present comment addresses certain issues relating to economic efficiency and competition, based upon price theory and welfare economics as understood in the interpretation and enforcement of the antitrust laws. Except as noted, it does not discuss other policy considerations, such as distributional issues, that may be relevant to the FAA.

III. Background of and Issues Contained in the SNPRM.

A. Background of the Current Slot Rule

A "slot" is a right to take off or land during a specified period of the day at one of four HDTAs (Chicago's O'Hare, Washington, D. C.'s National, and New York's Kennedy and LaGuardia airports).[9] Slots were defined in 1968 to deal with excess demand and noise problems at these four airports. Before 1985, the incumbent airlines at each HDTA decided how slots would be allocated, with any reallocation requiring their unanimous consent. The incumbent airlines could trade slots among themselves, one for one.[10] Increasing competition in the post-1977 deregulated era strained this method severely;[11] in many cases, the allocation system broke down completely, freezing the

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[9] *See* 14 C.F.R. Part 93.123 (1990).

[10] *See* Department of Transportation, Federal Aviation Administration, High Density Traffic Airports: Slot Allocation and Transfer Methods, Final Rule; Request for Comment, ("FAA 1985 Final Rule") 14 C.F.R. Parts 11 and 93, 50 *Fed. Reg.* 52180, 52185 (1985).

[11] *See* D. M. Grether, R. M. Issac, and C. R. Plott, "The Allocation of Landing Rights by Unanimity Among Competitors," 71 *Am. Econ. Rev.* 166 (1981).

previous allocation in place[12] and denying slots to new entrants.[13]

Starting in April 1986, revised FAA regulations have encouraged development of a market-based HDTA slot transfer system.[14] Initial allocation was determined by "grandfathering," giving the right to a slot to the carrier that had been operating it.[15] Subject to exceptions and procedures described below, the revised regulations permit slot holders to sell, trade, or lease their slots, and permit slots to be held by any party. The FAA retains the right to repossess slots, which the regulations describe as operating privileges, not property rights.[16] Slots may be withdrawn for such reasons as making necessary allocations for international flights and implementing

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[12] *See* FAA Final Rule, *supra* note 10, p. 52180. *See also* Comments of the Department of Justice, *Slot Allocation: Alternative Methods and Slot Transfer Methods, Notice of Proposed Rulemaking*, FAA Docket No. 24110 and 24105, August 6, 1984, pp. 11-12.

[13] After the 1981 air controllers strike, slot restrictions were imposed for a limited time on an additional 18 airports. For a six-week period in 1982, the FAA allowed slots to be traded among airlines at these 22 airports. For a detailed discussion of the effects of this six-week market, *see* Koran and Ogur, *supra* note 8. Noting that over 190 slots were sold during this period despite the simultaneous existence of slot trading programs, they suggest that the large number of sales reflect the markets' ability to facilitate the movement of slots from low to high valued uses.

[14] *See* FAA 1985 Final Rule, *supra* note 10, p. 52180, and 14 C.F.R. Parts 93.211--93.229. The rules were suspended for Newark, which is also an HDTA.

[15] *See* 14 C.F.R. Part 93.215, and DOJ Comments, *supra* note 12, pp. 12-14.

[16] *See* 14 C.F.R. Part 93.223(a).

competition goals.[17] A priority system for these withdrawals is set out in the regulations.[18] Slots will be recalled for reallocation if used less than 65 percent of the time.[19]

Lotteries distribute slots that are not currently allocated, such as those recalled for nonuse or voluntarily returned to the FAA.[20] Both incumbent and new entrant carriers may enter these lotteries, in which the order of choice is determined by random drawing, but new entrant carriers are given some advantage.[21] Slots obtained in a lottery are subject to a sixty-day "must use" period before they can fully enter the slot market.[22]

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[17] *See* 14 C.F.R. Part 93.223(a). For example, in March of 1986, the FAA withdrew 5 percent of the slots from incumbent carriers for distribution *via* lottery to new entrant carriers. This lottery is discussed in more detail in Section IV.C, *infra*.

[18] This is done by assigning a withdrawal priority number to each slot. At the time of the initial allocation in 1985, each slot was randomly assigned a recall priority number, with the lowest numbered slots being the first to be withdrawn. Slots owned by carriers with eight or fewer slots are exempt from withdrawal, except those used less that 65 percent of the time over a two-month period. *See* 14 C.F.R. Part 93.223(f).

[19] *See* 14 C.F.R. Part 93.227.

[20] *See* 14 C.F.R. Part 93.225.

[21] During the first lottery sequence, 25 percent of the slots (but no less than two) are set aside for new entrant carriers. *See* 14 C.F.R. Part 93.225(h).

[22] A slot obtained by lottery may be traded one for one for any other slot at the same HDTA during the "must use" period; however, it cannot otherwise be sold or traded until it has been used 65 percent of the time during a sixty-day period. *See* 14 C.F.R. Part 93.221(a)(5).

B. Background of the SNPRM and Proposed Changes to the FAA Slot Rule

This proceeding dates from 1988, when the FAA denied a petition to reallocate incumbent carriers' slots to new entrants and smaller carriers, but at the same time called for comment on the relationship between the slot allocation regulations and several competition and market entry issues.[23] The SNPRM continues the 1988 proceeding.[24]

The general intent of the amendments proposed in the SNPRM is "to make slots available to new entrants through encouraging the sale of marginally used slots by incumbent carriers, in order to promote competition in the airline industry to the extent possible without substantial disruption of existing air service."[25] The FAA believes that new entry and growth of smaller carriers can foster competition and that increased competition can benefit the public through reduced fares and greater services. But because competition among carriers at each HDTA is "intense", with none dominated by a single carrier, and each high density market area is also served by alternate

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[23] The call for public comment was required by P. L. 100-457. *See High Density Traffic Airports: Slot Allocation and Transfer Methods -- Notice of Proposed Rulemaking*, 53 Fed. Reg. 51628 (December 22, 1988).

[24] Like the 1988 proceeding, it also implements a statutory call for a rulemaking proceeding. Rather than specify particular issues, the law simply calls for consideration of "more efficient methods of allocating existing capacity at high density traffic airports in order to provide improved opportunities for operations by new entrant air carriers." P. L. 101-508, Title IX, Part 9126. *See* SNPRM, *supra* note 2, p. 46675.

[25] *See* SNPRM, *supra* note 2, p. 46676.

airports without slot restrictions, the FAA believes it is uncertain whether new entry at the HDTAs would actually enhance competition in those markets.[26]

The SNPRM's principal proposals would affect the "use or lose" threshold and the slot lotteries. The proposed new "use or lose" rule would require carriers to use their slots 90 percent of weekdays; slots used less frequently would be withdrawn. By contrast, the present rule requires carriers to use their slots 65 percent of all days, including both weekdays and weekends. In each case, the percentage usage is measured in two month reporting periods. The FAA suggests that this change will increase the number of slots available on the market and thus enhance competitive opportunities for new entrants.[27] If any

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[26] *See* SNPRM, *supra* note 2, p. 46677, 46679-80. Theoretical analysis suggests circumstances in which promoting entry artificially could reduce welfare. For example, welfare could fall if a slot reallocation resulted in an incumbent abandoning the only service to a destination and a new entrant adding marginal service to a different destination that was already served by many competitors. Borenstein suggests that such an outcome is likely, as the profits from "stealing business" from existing carriers on a high-traffic route likely outweigh the profits from being one of the few carriers serving a low-traffic route. *See* Borenstein, "On the Efficiency of Competitive Markets for Operating Licenses," 103 *Q. J. Econ.* 357 (1988). For a general discussion of the problems faced by regulators in making such decisions, *see* Koran and Ogur, *supra* note 8, Douglas and Miller, *Economic Regulation of Domestic Air Transportation: Theory and Policy* (1974) and Demsetz, "Information and Efficiency: Another Viewpoint," 12 *J. L. & Econ.* 1 (1969).

[27] *See* SNPRM, *supra* note 2, at 46678. The current 65 percent "use or lose" threshold will continue to apply to slots held by carriers less than seven days per week (*e.g.*, a slot held by one carrier on Tuesday and Thursday, and held by a second carrier the other five days of the week).

slots are actually withdrawn for nonuse, they would be allocated to carriers qualifying as new entrants or limited incumbents.[28]

The proposed new slot lottery rules would further restrict trading in slots obtained through lottery and would also further restrict lottery participation. The "must use" retention period would be extended, to require that a slot obtained in a lottery be used for two years before it could enter the market without restrictions. During this two year period, lottery slots could only be traded for other lottery slots at the same airport, and could be sold or leased only to a new entrant or limited incumbent. Now, a slot obtained in a lottery can be sold or traded without restrictions after a "must use" period of only sixty days, and during that period may be traded one-for-one for any other slot at the same airport. The FAA states that the proposed restrictions on transfer are designed to encourage continued use of slots by new entrants and limited incumbents. The FAA believes that result would foster competition, by discouraging lottery participation by parties interested more in liquidation than operation, and by reducing the smaller carriers' ability to choose between using their operating authority or selling it.[29]

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[28] The FAA also proposes to require carriers to report slot usage on international flights, to reduce carriers' ability to count international flights toward the "use or lose" requirement, to relax the "use or lose" provisions for a period following bankruptcy or mergers, and to remove obsolete penalty provisions.

[29] *See* SNPRM, *supra* note 2, p. 46676.

In addition, the proposed rules would change the lottery procedures to limit the set of carriers able to participate. First, the definition of "new entrant carriers" would be narrowed, by applying the term only to a carrier holding both appropriate Department of Transportation (DOT) economic authority and an FAA part 121 or part 135 operating certificate.[30] Now, a carrier that has made substantial progress toward obtaining an FAA operating certificate is considered a "new entrant" and may participate.[31] Second, the role of large carriers in the lotteries would be reduced, by assigning primary participation to new entrants and a newly-defined class of "limited incumbents." A limited incumbent at an HDTA is defined as an air carrier or commuter operator that holds, or has held, fewer than twelve slots.[32] The basic lottery procedure, which would remain unchanged, calls for each participant to choose two slots in each round until the available slots are exhausted. New entrants are given an advantage by having 25 percent of the slots during the

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[30] The FAA states that experience with carriers not currently holding an FAA certificate "actually beginning and continuing operations after selecting slots has not been positive, and the Department believes that participation in current lotteries should be limited to those carriers most likely to be able to make efficient use of slots." *See* SNPRM, *supra* note 2, at 46676.

[31] 14 C.F.R. Part 93.225(g).

[32] For example, a carrier that once held 20 slots but now holds four, after selling 16 to other carriers, would not qualify as a limited incumbent. The 12-slot threshold is consistent with the definition of "new entrant" in the statute that calls for the rulemaking proceeding. P. L. 101-506, Title IX, Part 9126; *see* SNPRM, *supra* note 2, pp. 46675, 46676.

first round reserved for them. The proposed rules would limit lottery participation to new entrants and limited incumbents (who could choose slots reserved for new entrants if they went unclaimed) until after they had finished their selections or had chosen enough slots to exceed the 12-slot "limited incumbent" definition. Only then could other incumbent carriers participate; moreover, any slots they chose could only be held until the next lottery.[33] The FAA says this change is intended to "permit new entrant and limited incumbent carriers to acquire any available slots without competing with carriers already holding a substantial number of slots at the airport."[34]

IV. An Analysis of the Proposed Changes in the Slot Rule

This section assesses the possible consequences of the proposed changes by reviewing empirically the experience under the present regulations. Part A, by examining the relationship between a carrier's share of the slots at an HDTA and its use of those slots, explores whether a reallocation of slots from carriers with a large number of slots at an HDTA to carriers with few slots appears likely to increase economic welfare. Data obtained from the FAA, detailing both how many slots carriers hold and the number of days they use them, does not suggest that

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[33] Current rules make no distinction between large and small incumbents during lotteries. Limited incumbents and certified new entrants would also be given preferential treatment under slot withdrawal rules.

[34] *See* SNPRM, *supra* note 2, p. 46676.

carriers with relatively large shares of slots at an HDTA hoarded their slots or used them at comparatively low rates. This result is inconsistent with anticompetitive theories about carriers' patterns of slot holding and usage. Part B examines the effect of the proposed changes to the "use or lose" rules. Historical use data suggest that a 90 percent weekday rule may affect carriers with a small number of slots at an HDTA more than carriers with a large number of slots. Finally, Part C discusses the proposed additional limitations on trade in lottery slots. The vast majority of slots allocated to new entrants in the 1986 lotteries changed ownership within a short time period. If this experience is a guide to the future, many slots allocated in lotteries would be traded, if there were no restrictions on transfer. In the absence of market power, slot transfers likely represent an efficient reallocation of resources from lower to higher valued uses, and imposing significant delays or other restrictions on transfers may reduce welfare.

A. The Relationship Between Slot Share and Slot Use

(i) Theory and Hypotheses

Commentators have pointed to higher concentration and prices for airline travel at HDTAs relative to non-HDTA airports as evidence of a lack of competition at HDTAs. For example, estimates of the effect of limited slot availability on airfares suggest that slot restrictions increase average or median fares eleven percent on short haul routes, and four percent for all

routes to and from the HDTAs.[35] There also has been a focus on the levels of concentration at the HDTAs.[36] Based on slot holdings, each of the HDTAs considered alone is either moderately or highly concentrated, according to the standards of the Department of Justice Merger Guidelines.[37] Table 1 lists the unrestricted air carrier slot holdings and the Herfindahl-Hirschmann Index (HHI) of concentration at the four HDTA's as of

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[35] *See* "Airline Competition: Effects of Airline Market Concentration and Barriers to Entry on Airfares," GAO Report to Congressional Requesters, RCED-91-101. Borenstein found a similar 3-5 percent increase in yields at Chicago's O'Hare airport. His study focused on hubs, and therefore did not examine the other three HDTAs. *See* S. Borenstein, "Hubs and High Fares: Dominance and Market Power in the U.S. Airline Industry," 20 *Rand J. Econ.* 344 (1989).

[36] *See, e.g.*, U.S. General Accounting Office, "Airline Competition: Industry Operating and Marketing Practices Limit Market Entry," U.S. General Accounting Office Report to Congressional Requesters, RCED 90-147 (1990), pp. 21-30 ("GAO Entry Report"). *See* also Testimony and Exhibits of America West Airlines, Inc., DOT, USAir-Piedmont Acquisition case, Exhibit AWA T-1,2, Docket 44719, September 21, 1987. Some critics have also addressed distributional issues, observing that incumbent carriers received a valuable (and salable) right for free. *See, e.g.*, FAA 1985 Final Rule, *supra* note 10, p. 52184. Such distributional issues will not be addressed in this paper. While it might be better for the Federal treasury that airlines pay for slots, the Coase Theorem implies that in the absence of transactions costs (which seem low), the initial allocation of rights does not affect the allocative efficiency of the final market allocation. *See* Ronald Coase, "The Problem of Social Cost," 3 *J. Law & Econ.* 1 (1960).

[37] *See* U.S. Department of Justice, "Merger Guidelines," *Antitrust & Trade Regulation Report*, Special Supplement (June 14, 1984). Under the DOJ Guidelines approach, markets are "moderately concentrated" if their HHIs are between 1000 and 1800 and "highly concentrated" if their HHIs are greater than 1800. Our analysis focuses on overall slot concentration at an HDTA, and not slot concentration during certain time periods. This focus is appropriate as long as flights in different slot periods compete significantly.

June 30, 1990. New York's LaGuardia, at 1241, and Washington's National, at 1282, were "moderately concentrated." New York's Kennedy, at 1816, and Chicago's O'Hare, at 3126, were "highly concentrated." Concentrated markets for airport slots could create conditions for the exercise of market power or other anticompetitive action.[38]

[38] Concern about excess concentration in slots at Washington National and LaGuardia was an important part of the ruling of a Department of Transportation administrative law judge in 1987 that would have prevented USAir from merging with Piedmont. *See* Recommended Decision of Administrative Law Judge Ronnie A. Yoder, USAir-Piedmont Acquisition Case, DOT Docket 44719, September 21, 1987, at 90-102. This decision was later overturned by the Secretary of Transportation.

TABLE 1
DOMESTIC SLOT HOLDINGS AND CONCENTRATION

SLOT HOLDER (6-30-90) UNRESTRICTED SLOTS	LAGUARDIA (LGA)		NATIONAL (DCA)	
	NUMBER OF SLOTS	SHARE	NUMBER OF SLOTS	SHARE
UNITED (UAL)	45	7.28	28	4.87
AMERICAN (AAL)	57	9.22	35	6.09
USAIR (USA)	151	24.43	148	25.74
EASTERN (EAL)[39]	72	11.65	82	14.26
NORTHWEST (NWA)	45	7.28	53	9.22
DELTA (DAL)	56	9.06	47	8.17
SHAWMUT BANK (BNK)[40]	24	3.88	44	7.65
PAN AM (PAA)	64	10.36	38	6.61
CONTINENTAL (COA)	29	4.69	48	8.35
TRUMP (TPS)	57	9.22	28	4.87
AIR WISCONSIN (AWI)	0	0	0	0
MIDWAY (MID)	14	2.27	16	2.78
AMERICA WEST (AWE)	0	0	4	0.7
MIDWEST EXPR. (MEP)	4	0.65	4	0.7
AM. TRANS AIR (AMT)	0	0	0	0
FLYING TIGER (FTL)	0	0	0	0
COMMAND AIR (CMD)	0	0	0	0
UNITED PARCEL (UPS)	0	0	0	0
MGM AIR (MGM)	0	0	0	0
FED. AV. ADM. (FAA)	49		0	
N	667		575	
HHI		1241		1282

[39] Although Eastern and Continental were merged in 1986, control of Eastern was taken away from Texas Air (Continental's parent entity) by a Federal bankruptcy court on April 18, 1990. We therefore treat Eastern and Continental as separate carriers.

[40] This bank now holds slots formerly held by TWA. *See* Table 4, showing TWA as the only significant slot user that did not hold any itself.

TABLE 1 (CONTINUED)

	KENNEDY (JFK)		O'HARE (ORD)		ALL HDTAs	
	#SLOTS	SHARE	#SLOTS	SHARE	#SLOTS	SHARE
UAL	6	3.11	658	44.25	737	25.14
AAL	21	10.88	491	33.02	604	20.60
USA	20	10.36	45	3.03	364	12.41
EAL	17	8.81	21	1.41	192	6.55
NWA	12	6.22	71	4.77	181	6.17
DAL	9	4.66	64	4.37	167	6.00
BNK	60	31.09	36	2.42	164	5.59
PAA	42	21.76	4	0.27	148	5.05
COA	0	0	36	2.42	113	3.85
TPS	0	0	0	0	85	2.90
AWI	0	0	44	2.96	44	1.50
MID	0	0	0	0	30	1.02
AWE	1	0.52	7	0.47	12	0.41
MEP	0	0	2	0.13	10	0.34
AMT	0	0	5	0.34	5	0.17
FTL	1	0.52	3	0.2	4	0.14
CMD	2	1.04	0	0	2	0.07
UPS	1	0.52	0	0	1	0.03
MGM	1	0.52	0	0	1	0.03
FAA	9		1		59	2.01
TOTALS	202		1488		2932	
HHI		1816		3122		

Source: Tabulated from FAA Slot Data, May-June 1990.

At the outset, it should be noted that neither higher concentration nor higher prices at HDTAs necessarily implies anticompetitive effects or causes. First, economic theory predicts that in competitive markets, fares at slot constrained airports will be higher, *ceteris paribus*, than in markets where there are no slot restrictions. Equilibrium competitive prices

for air travel must reflect slots' associated scarcity rents.[41] Indeed, if travel prices were not higher at slot constrained airports, this would imply that landing rights at HDTAs were not a valuable resource, so slots would not trade at positive prices.[42] Higher fares at HDTAs may merely reflect scarcity rents, rather than monopoly rents.

Second, there may be a procompetitive reason for seemingly high concentration in airport slot markets: in competitive markets, more efficient firms, which offer their customers better combinations of price and service, generally will gain market share at the expense of the less efficient.[43] That is, an industry might be relatively concentrated because its larger firms are more efficient, not because they are less competitive. Thus, it is possible that only a few airlines hold a majority of the slots as a consequence of those carriers' greater efficiency.

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[41] Scarcity rents arise when competition for a resource in limited supply causes the price of that resource to rise above the marginal cost of providing the last unit. In the HDTA setting, scarcity rents would reflect the FAA's decision to limit the number of slots. In contrast, monopoly rents result from anticompetitive output restrictions. Here, monopoly rents would be additional rents due to slot holders' decisions to exercise market power by restricting slot use in a way that prevents existing slots from moving to their highest valued use.

[42] In a competitive market, a slot's value would equal the net present value of its associated scarcity rents.

[43] For example, the apparent high concentration at O'Hare may be the result of its use as a major hub by United and American. Use of these hub and spoke operations can increase efficiency. *See*, S. Morrison and C. Winston, *The Economic Effects of Airline Deregulation*, Washington, D. C.: Brookings (1986). For a general statement of this proposition, *see e.g.*, H. Demsetz, *The Market Concentration Doctrine* (1973).

Finally, the concentration figures for HDTAs may overstate the potential for anticompetitive activity because they do not describe antitrust markets. In antitrust analysis, before concentration is measured markets must be defined. A concentration number for something that is not an antitrust market, that does not include relevant product and geographic competitive factors, will be misleading. Each of the HDTAs is near one or more regional airports without slot constraints (Midway at Chicago, Newark at New York, and Dulles and Baltimore-Washington International at Washington).[44] If flights from these airports are in the same antitrust market as flights from

[44] *See* SNPRM, *supra* note 2, p. 46677 and FAA 1985 Final Rule, *supra* note 10, p. 52166.

the HDTAs,[45] their competitive presence can constrain the prices of flights from the HDTAs.[46]

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[45] An illustration of how the HDTAs and their regional competitors could be considered to be in the same antitrust market is provided by the positions the Department of Justice ("DOJ") has taken in the Eastern Airlines bankruptcy proceedings. The DOJ opposed United's proposed purchase of Eastern's National Airport slots and facilities, on the grounds that it would "lessen competition" between Washington and other cities because the airline is already the dominant carrier at Dulles International Airport and the acquisition would have also given it control of 20 percent of the slots at National. *See* "Justice Dept. to Dispute Deal for Eastern Slots," *Washington Post,* (February 15, 1991) p. B2; 60 *Antitrust & Trade Regulation Report* 152 (January 31, 1991), 186 (February 7, 1991), and 272 (February 21, 1991). But the DOJ did not object to Northwest Airlines' purchase of those assets even though Northwest had more slots than United at National prior to the bankruptcy sale. Similarly, despite the fact that United was the largest carrier at O'Hare, the DOJ did not object to United's purchase of Eastern's O'Hare slots, a position consistent with considering Midway Airport flights to be in the same antitrust market as O'Hare flights.

[46] The fact that slots are scarce at one airport, and thus sell for positive prices, while they are not scarce at another airport in the same region is not alone an indication of whether or not the two airports are in the same antitrust market. Two regional airports can be in the same antitrust market even when prices for slots vary between the airports. However, an HDTA alone could be a relevant antitrust market, and anticompetitive price increases could occur, even when there is another non-slot constrained airport in the region that is a substitute at current prices. In antitrust law, the ambiguity of using price alone to determine antitrust markets is sometimes called the "cellophane trap" because of its association with the "cellophane" case, *U.S. v. E.I. du Pont de Nemours & Co.*, 351 U.S. 377, 404 (1956). The term refers to a failure to take into account whether an observed price is supracompetitive rather than competitive when determining whether certain products or services are in the same antitrust market. For a further discussion, see Richard A. Posner, *Antitrust Law: An Economic Perspective* (1976), pp. 127-129. In addition, Borenstein, *supra* note 35, p. 348, notes that local airports may constitute separate antitrust markets if airlines can price discriminate among passengers at different airports. (*See also* DOJ *Guidelines*, paragraph 2.13, *supra* note 37.)

In sum, the possibility of other reasons for both high prices and high concentration at HDTAs limits the usefulness of these variables alone to inform public policy decisions. To avoid the ambiguities of tests that emphasize price effects, our empirical work uses a measure of output, instead of price, in an attempt to differentiate between procompetitive and anticompetitive uses of slots.[47] Focus on output is also consistent with the current and proposed FAA "use or lose" rules and will allow the likely effect of the proposed rules to be examined directly.[48]

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[47] Leading antitrust scholars have suggested using changes in "physical" output to distinguish between procompetitive and anticompetitive practices. *See, e.g.,* Richard A. Posner, "The Rule of Reason and the Economic Approach: Reflections on the Sylvania Decision," 45 *Univ. Chicago L. Rev.* 1 (1977), and Frank H. Easterbrook, "The Limits of Antitrust," 63 *Texas L. Rev.* 1 (1984).

[48] Because of data and time limitations, our empirical work does not take into account output choices other than the number of days a slot is used. A hypothetical monopolist also could reduce output by flying smaller planes. Since slot use and aircraft size are complements, a hypothetical monopolist would be expected to address both. Output tests that do not take into account all output choices by a hypothetical monopolist also can be ambiguous. When the unobserved and observed measures of quantity (*e.g.*, days the slot was used and seats per plane) are highly complementary, a hypothetical monopolist may increase price, and both the observed and unobserved quantity above the efficient levels provided in a competitive market. *See* Keith B. Leffler, "Ambiguous Changes in Product Quality," 72 *Am. Econ. Rev.* 956 (1982). However, the use of smaller planes does not necessarily imply anticompetitive behavior, even if it means higher prices. Aircraft operating characteristics may make it more efficient to use smaller planes on shorter routes. In an efficient slot market, passengers on shorter routes with smaller planes will pay a premium if this represents the higher per-passenger scarcity rent associated with that slot.

The hypotheses to be tested in this comment all derive from theoretical predictions about the output-setting choices made by relatively large firms compared to those of smaller firms. The first hypothesis to be tested rests on the standard market power scenario, in which dominant firms have a larger incentive to reduce output than the fringe firms. Standard theory predicts that the fringe will increase output in response to a contraction of output by the dominant firm.[49] It has been suggested that the carriers with a large number of slots at a HDTA will attempt to restrict output by reducing the number of days on which a slot is used.[50] In the context of an airport slot market, this implies that larger carriers will use their slots less intensively than the smaller "fringe" carriers. Conversely, if slots are being used efficiently, the larger carriers' slot usage would be as great or greater than slot usage by smaller carriers. The testable implication of such a procompetitive theory is that slot usage will be positively related to the market share of the carrier using the slot. In contrast, the anticompetitive theory implies the reverse, *i.e.*, that the dominant or colluding

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[49] *See* A. A. Alchian and W. R. Allen, *Exchange and Production: Competition, Coordination and Control*, 3rd. ed., (1983), pp. 266-268.

[50] For example, airlines holding at least three slots in a period can distribute two flights over three slots, thus using three slots 66 percent of the time (above the minimum 65 percent required by the FAA), instead of using two slots 100 percent of the time. *See* SNPRM, *supra* note 2, p. 46678.

carriers will use their slots less than the competitive fringe.[51]

Another form of the anticompetitive hypothesis is that dominant carriers would be unwilling to sell slots to potential new entrants at competitive rates,[52] but instead would lease slots to selected other carriers, their purpose being to deter entry into HDTAs by carriers likely to increase overall slot use.[53] The testable implications of this hypothesis are that

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[51] This analysis assumes the number of slots allocated per hour is set so that full utilization of all the slots in a period would not induce large congestion effects. If congestion effects are induced by full utilization, a reduction in slot use may be efficient. That is, a dominant carrier may wish to purchase and not use a slot in order to reduce the costs associated with excess congestion and delays imposed on the large number of their flights operated in that slot period. Carriers with a small number of slots in that slot period would be affected less and would have a smaller incentive to internalize these costs. Concerns about excess congestion have led the FAA to reject calls to expand slot capacity at the HDTAs. *See* SNPRM, *supra* note 2, p. 46677.

[52] *See* Recommended Decision of Administrative Law Judge Ronnie A. Yoder, USAir-Piedmont Acquisition Case, *supra* note 38 at 93, and Testimony and Exhibits of America West, *supra* note 36, pp 8-11. However, one cannot distinguish this anticompetitive hypothesis from the situation where a potential entrant makes a false claim that it cannot obtain slots from private parties, pressed in order to gain them from the government for free. The current regulatory regime, which includes a slot market, cannot inhibit entry more than the previous regime of nontransferable historical allocations, in which entrants were unable to obtain slots under any circumstances. *See* Koran and Ogur, *supra* note 8. For a similar argument, *see* John R. Lott, Jr., "Licensing and Nontransferable Rents," 77 *Am. Econ. Rev.* 453 (1987). For a general discussion of entry, *see* Demsetz, "Barriers to Entry," 72 *Am. Econ. Rev.* 47 (1982).

[53] *See, e.g.*, GAO, *supra* note 36. In this scenario, airlines choose their competitors by leasing slots to them. In this way, the dominant firm(s) can ensure that less efficient firms will be competing with them for the same passengers, while

(continued...)

the dominant air carriers will be net lessors of slots and that these leased slots will be used relatively less intensively than slots held and operated by the dominant carriers.[54]

The two principal hypotheses tested in the comment deal solely with an airline's slot usage rate. Broader concerns, such as the likely effect of the proposed slot regulations on airline competition in individual city pair markets, are not addressed in this comment. Furthermore, given that the slot regulations do not directly address such concerns (*e.g.*, through explicit route regulation), accurate prediction of the effect of the proposed regulations may be difficult.[55] This is a cross-sectional study, examining data from a two-month sample period. If the

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[53](...continued)
simultaneously deterring the entry of more efficient firms. For a theoretical discussion of this effect, *see, e.g.*, K. E. Rockett, "Choosing the Competition and Patent Licensing," 21 *Rand J. of Econ.* 161 (1990), which examines a single incumbent (with a patent) facing a limited number of potential entrants. Weakening either the single incumbent or limited entrant assumptions weakens this theoretical result. Thus, this theoretical result would be less likely to apply to airline markets where there is more than one incumbent or more than one equally efficient potential entrant. For a general discussion of the fragility of the entry deterrence models, *see* D. Malueg and M. Schwartz, "Preemptive Investment, Toehold Entry, and the Mimicking Principle," 22 *Rand J. Econ.* 1 (1991), and M. Waldman, "The Role of Multiple Potential Entrants/Sequential Entry in Noncooperative Entry Deterrence," 22 *Rand J. Econ.* 446 (1991).

[54] *See, e.g.*, GAO Entry Report, *supra* note 36, Chapter 2.

[55] The FAA notes that "there is no *ex ante* way to estimate the system impact or even whether it is positive or negative." *See* SNPRM, *supra* note 2, p. 46680. To the extent anticompetitive problems exist, such problems can be addressed through the enforcement of the antitrust laws. *See, e.g.*, the discussion of the Eastern bankruptcy proceedings in note 45, *supra*. *See*, also, Borenstein, *supra* note 26.

sample is not representative, perhaps due to recent changes in the industry or at the specific airports considered, then the results may not reflect current conditions in the market for slots.

(ii) Empirical Results

The data were obtained from the FAA's Office of Slot Administration. The FAA collects daily ownership and usage data for monitoring airline compliance with ownership and usage rules. The slot office keeps this data for the two previous years, thus limiting the time periods available for examination. Data from the period May-June 1990 were chosen because it lies between the extremes of airlines' seasonal demands. May and June generally have lower demand for air travel than July and August and higher demand than January and February. In addition, May-June 1990 was after the time period when Eastern Airlines was unable to operate a large proportion of its planes due to the strike by its employees in March 1989. May-June 1990 was also prior to the August 1990 Iraqi invasion of Kuwait and the resulting decline in demand for air services. This time period consists of 44 weekdays and 61 days in total.

The dataset contains 2242 total air carrier slots at O'Hare, 1323 at LaGuardia, 956 at National, and 580 at Kennedy. Statistical analysis is based on the set of slots meeting three criteria: (i) the slot was held and operated by a domestic airline on a domestic route; (ii) use of the slot was not restricted by the FAA; and (iii) the slot was not exempt from the

FAA's "use or lose" rules.[56] This set contains 1488 slots at O'Hare, 667 at LaGuardia, 575 at National and 202 at Kennedy.[57]

(a) Average Slot Use

Table 2 shows the average slot use by carrier at the four HDTAs measured by the proportion of total days used (TPCT) and weekdays used (WPCT). Examining the data, there is no obvious pattern supporting the anticompetitive hypothesis. That is, the data do not suggest that the intensity of use of a slot was negatively related to the share of slots held by the carrier. At the most concentrated HDTA, O'Hare, almost all of the slot holders used their slots on average at least 90 percent of the time. The only exceptions were American Trans Air, based on all days, and Midwest Express, based on weekdays. Examining the numbers for the other HDTAs reveal similar high rates of use. At National, only Eastern, at 86 percent, was below a 90 percent average use rate, based on weekdays; at Laguardia, only Northwest, at 89 percent, was below 90 percent. Finally, at Kennedy the data show four carriers were below 90 percent, but

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[56] International routes, and thus foreign airlines, are subject to different slot allocation rules.

[57] At O'Hare, 220 slots were not allocated or otherwise restricted by the FAA, 88 were international slots, 7 were domestic slots being used with international flights, and 4 were international slots operated domestically. At National, 147 slots were not allocated or otherwise restricted by the FAA. At LaGuardia, 298 slots were not allocated or restricted by the FAA, 36 were international slots, 23 were domestic slots operated internationally, and 15 were international slots operated domestically. Finally, at Kennedy, 219 slots were not allocated or restricted by the FAA, 74 were held and operated internationally, and 11 were domestic slots operated internationally.

for three of these the data are probably inaccurate. For Pan Am, the use rate was 88 percent for both all days and weekdays, but for Eastern, Flying Tiger, and MGM Grand, the rates were so extremely low (in two cases, zero) as to suggest that data are missing.[58] Thus, except for a few cases, all slot holders at the four HDTAs, on average, used their slots at a rate more than twenty-five percentage points above the current FAA "use or lose" threshold.

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[58] Of the slots held by Eastern, only those leased to other carriers were reported as being used during the period studied. But no slots were withdrawn from carriers for "use or lose" rule violations during May-June 1990.

TABLE 2
AVERAGE SLOT USE

Average use rates below 90 percent in **bold**.

SLOT HOLDER	NUMBER OF SLOTS	TPCT	WPCT
CHICAGO - O'HARE AIRPORT			
UNITED	658	0.94	0.97
AMERICAN	491	0.93	0.93
NORTHWEST	71	0.90	0.94
DELTA	64	0.94	0.96
USAIR	45	0.90	0.95
AIR WISCONSIN	44	0.92	0.97
CONTINENTAL	36	0.92	0.93
SHAWMUT BANK	36	0.91	0.93
EASTERN	21	0.97	0.97
AMERICA WEST	7	1.00	1.00
AMERICAN TRANS	5	**0.81**	0.90
PAN AM	4	0.94	0.95
FLYING TIGER	3	0.92	0.91
MIDWEST EXPRESS	2	0.91	**0.88**
FAA	1	0.89	0.89
WASHINGTON, D.C. - NATIONAL AIRPORT			
USAIR	148	0.93	0.97
EASTERN	82	**0.86**	**0.86**
NORTHWEST	53	**0.89**	0.91
CONTINENTAL	48	0.92	0.96
DELTA	47	0.94	0.96
SHAWMUT BANK	44	**0.89**	0.91
PAN AM	38	0.93	0.95
AMERICAN	35	0.95	0.96
UNITED	28	0.90	0.95
TRUMP	28	0.94	0.93
MIDWAY	16	0.91	0.97
MIDWEST EXPRESS	4	**0.88**	0.99
AMERICA WEST	4	1.00	1.00

TPCT = number of days slot was used ÷ 61.
WPCT = number of weekdays slot was used ÷ 44.

TABLE 2 (CONTINUED)

SLOT HOLDER	NUMBER OF SLOTS	TPCT	WPCT
NEW YORK- LAGUARDIA AIRPORT			
USAIR	151	0.91	0.95
EASTERN	72	0.93	0.94
PAN AM	64	**0.88**	0.91
TRUMP	57	0.93	0.93
AMERICAN	57	0.90	0.92
DELTA	56	0.96	0.97
UNITED	45	0.90	0.94
NORTHWEST	45	**0.87**	**0.89**
CONTINENTAL	29	0.90	0.94
SHAWMUT BANK	24	0.91	0.91
MIDWAY	14	**0.89**	0.94
MIDWEST EXPRESS	4	**0.84**	0.98
FAA	49	0.89	0.90
NEW YORK - KENNEDY AIRPORT			
SHAWMUT BANK	60	0.91	0.91
PAN AM	42	**0.88**	**0.88**
AMERICAN	21	0.90	0.90
USAIR	20	0.91	0.92
EASTERN	17	**0.16**	**0.17**
NORTHWEST	12	0.94	0.94
DELTA	9	0.95	0.95
UNITED	6	0.97	0.98
COMMAND	2	0.99	0.99
FLYING TIGER	1	**0**	**0**
MGM GRAND AIR	1	**0**	**0**
UPS	1	0.90	0.91
AMERICA WEST	1	1.00	1.00
FAA	9	0.90	0.89

Source: Tabulated from FAA Slot Data, May-June 1990.

(b) Leased Versus Owned Slots

Tables 3A and 3B compare leased slots with owned and operated slots. The left side of Table 3A shows each slot holder's rate of use of its owned and operated (O&O) slots, and the right side of Table 3A shows the rate of use of its slots

that were used by others. Table 3B lists the differences in the rate of use between each slot holder's O&O slots and its slots leased to others, along with two measures of the statistical significance of this difference. The anticompetitive leasing hypothesis implies that this difference should be positive, *i.e.*, that the slot holder's O&O slots are used at a higher rate than the slots leased to others.[59]

At O'Hare, the three largest airlines (in terms of slot market share) leased to carriers who used the slots more than did the lessors, based on weekday usage, with the difference being statistically significant for American. Based on all-days usage, the slots United leased to others were used slightly more than United's O&O slots and the slots American leased to others were used slightly less than its O&O slots; neither difference was significant, however. Northwest's all-days difference was negative and significant. Examining the other HDTAs in the Table, in only one case (USAir at National) was the difference between O&O and leased slot usage for one of the top three slot holders positive and significant. Contrary to the prediction of the anticompetitive leasing theory, it was the carriers with smaller slot shares, rather than the larger ones, that were more likely to use their O&O slots more intensively. On balance, these results do not support the hypothesis that carriers with

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[59] No inference can be drawn from observing equal rates of use between O&O and leased slots because such an observation is consistent with both the competitive and anticompetitive hypotheses.

large slot shares cause anticompetitive harm through the way they lease slots to other carriers.

TABLE 3A
RATES OF USE IN OWNED AND OPERATED VERSUS LEASED SLOTS

Positive and statistically significant differences in bold

	OWNED AND OPERATED			LEASED		
	N	TPCT	WPCT	N	TPCT	WPCT
CHICAGO - O'HARE						
UNITED	639	0.940	0.966	9	0.942	0.970
AMERICAN	411	0.928	0.931	44	0.928	0.960
NORTHWEST	33	0.858	0.929	33	0.942	0.946
DELTA	39	0.942	**0.970**	21	0.929	**0.935**
USAIR	36	0.902	**0.954**	6	0.902	**0.909**
CONTINENTAL	17	0.934	**0.958**	18	0.899	**0.909**
EASTERN	12	**0.993**	**0.998**	9	**0.934**	**0.932**
WASHINGTON, D.C. - NATIONAL						
USAIR	137	**0.934**	**0.972**	6	**0.879**	**0.897**
EASTERN	75	0.863	0.868	1	0.934	0.932
CONTINENTAL	39	0.923	0.960	9	0.903	0.960
NORTHWEST	29	0.882	0.902	19	0.923	0.943
DELTA	41	0.938	0.954	4	0.946	0.983
PAN AM	34	**0.928**	0.948	2	**0.877**	0.955
AMERICAN	21	0.970	0.970	9	0.949	0.965
MIDWAY	14	0.913	0.979	1	0.820	0.886
NEW YORK - LAGUARDIA						
USAIR	129	0.904	0.954	12	0.941	0.939
EASTERN	63	0.934	0.934	6	0.912	0.977
PAN AM	51	0.872	0.897	10	0.916	0.959
DELTA	44	**0.980**	**0.984**	10	**0.888**	**0.925**
AMERICAN	34	0.874	0.910	17	0.938	0.945
NORTHWEST	15	0.885	0.891	20	0.893	0.920
UNITED	31	0.919	0.957	2	0.918	0.943
CONTINENTAL	11	0.918	0.955	13	0.877	0.927
MIDWAY	13	**0.905**	**0.965**	1	**0.672**	**0.681**
NEW YORK - KENNEDY						
PAN AM	29	0.865	0.858	7	0.925	0.938
USAIR	14	0.901	0.899	4	0.943	0.955
EASTERN	14	0.000	0.000	3	0.918	0.955
AMERICAN	11	0.933	0.934	1	0.705	0.681
DELTA	4	1.000	1.000	5	0.918	0.918
UNITED	5	**0.987**	0.982	1	**0.869**	1.000

TABLE 3B
DIFFERENCE AND TESTS OF STATISTICAL SIGNIFICANCE

	ALL DAYS DIFF = $TPCT_{O\&O} - TPCT_{LEASED}$			WEEKDAYS DIFF = $WPCT_{O\&O} - WPCT_{LEASED}$		
	DIFF	t^e	t^u	DIFF	t^e	t^u
CHICAGO - O'HARE						
UNITED	-0.002	-0.09	-0.09	-0.004	-0.20	-0.42
AMERICAN	0	0.02	0.02	-0.029**	-2.03	-2.50
NORTHWEST	-0.084**	-3.88	-3.88	-0.017	-0.98	-0.97
DELTA	0.013	0.67	0.73	**0.035****	**2.00**	**2.09**
USAIR	0.000	0.00	0.00	**0.045****	**2.63**	**2.52**
CONTINENTAL	0.035	1.34	1.34	**0.049****	**2.88**	**2.89**
EASTERN	**0.059****	**3.22**	**2.78**	**0.066****	**3.96**	**3.41**
WASHINGTON, D.C. - NATIONAL						
USAIR	**0.055****	**2.27**	**1.24**	**0.075****	**3.50**	**1.17**
EASTERN	-0.071	-0.58	-	-0.064	-0.52	-
CONTINENTAL	0.020	0.62	0.68	0.000	0.20	0.21
NORTHWEST	-0.041	-1.26	-1.40	-0.041	-1.38	-1.56
DELTA	-0.008	-0.20	-0.43	-0.029**	-0.73	-2.15
PAN AM	**0.051****	**0.73**	**2.73**	-0.007	-0.11	-0.45
AMERICAN	0.021	0.90	0.70	0.005	0.23	0.19
MIDWAY	0.930	1.21	-	**0.093****	**3.26**	-
NEW YORK - LAGUARDIA						
USAIR	-0.037**	-2.08	-3.09	0.015	1.04	1.02
EASTERN	0.022	0.61	0.83	-0.043**	-1.12	-2.76
PAN AM	-0.044	-1.14	-1.39	-0.062**	-1.79	-3.20
DELTA	**0.092****	**7.05**	**3.64**	**0.059****	**4.13**	**2.14**
AMERICAN	-0.064**	-2.26	-2.30	-0.035	-1.17	-1.19
NORTHWEST	-0.008	-0.17	-0.17	-0.029	-0.76	-0.71
UNITED	0.001	0.01	0.01	0.014	0.58	0.25
CONTINENTAL	0.041	1.06	1.03	0.028	0.74	0.73
MIDWAY	**0.233****	**3.34**	-	**0.284****	**11.43**	-

TABLE 3B (CONTINUED)

NEW YORK - KENNEDY

PAN AM	-0.060	-0.75	-1.09	-0.08	-1.00	-1.61
USAIR	-0.042	-0.31	-0.55	-0.056	-0.41	-0.76
EASTERN	-0.918**	-52.6	-21.17	-0.955**	-52.19	-21.00
AMERICAN	0.228	2.63	-	0.253	2.89	-
DELTA	0.082	1.31	1.48	0.082	1.32	1.50
UNITED	0.118**	7.80	-	-0.018	-0.87	-

t^e - t statistic, with variances of distribution of leased and O&O slots assumed equal.
t^u - t statistic, with variance of distribution of leased and O&O slots estimated separately.

** Significant at .05 level
* Significant at .1 level

Source: Tabulated from FAA slot data, May-June 1990.

Table 4 lists the net leasing positions of specific carriers. The anticompetitive leasing hypothesis predicts that carriers with a large share of the slots at an HDTA will tend to be net lessors, so the hypothesis would be supported if the difference between the number of slots operated and the number of slots held is negative. But the data show otherwise. Instead, the carriers with relatively large slot shares were almost always net lessees. At O'Hare, the carrier with the largest number of slots, United, leased 20 more slots from others than others leased from United; for the second largest, American, the comparable figure is 34.

At National and LaGuardia the top three slot holders were net lessees. The largest slot holder at National, USAir, was a

net lessee of slots *vis a vis* every slot holder it dealt with.[60] Finally, at Kennedy, the top two slot holders that are air carriers, Pan Am and American, were net lessees; moreover, the largest holder of slots at Kennedy, Shawmut Bank, could also be considered a net lessee for these purposes, by comparing the number of slots held by Shawmut Bank in trust for TWA (60) to the number of slots TWA operated (62).

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[60] It has even positions with Delta (one slot), is a net lessor to Northwest (4 slots leased from Northwest, 3 slots leased to Northwest), and leases one slot from Continental. In addition, USAir leases two slots to TWA and leases 4 slots from the bank that holds TWA's slots. Thus, although USAir's relatively intense use of its O&O slots, compared to the usage rates of its lessees, would be consistent with the anticompetitive leasing hypothesis, the fact that it operates more slots than it owns is not.

TABLE 4
SLOTS OWNED, OPERATED, AND NET LEASING POSITION

Slot holders with positions as net lessors in **bold**

SLOT HOLDER	SLOTS HELD	SLOTS OPERATED	SLOTS OPERATED - SLOTS HELD
	CHICAGO - O'HARE		
UNITED	658	678	20
AMERICAN	491	525	34
NORTHWEST	**71**	**55**	**-16**
DELTA	**64**	**52**	**-12**
USAIR	45	46	1
AIR WISCONSIN	44	45	1
CONTINENTAL	36	38	2
SHAWMUT BANK	**36**	**0**	**-36**
TWA	0	27	27
EASTERN	21	13	-8
AMERICA WEST	7	7	0
AMERICAN TRANS AIR	5	0	-5
PAN AM	4	2	-2
FLYING TIGER	3	0	-3
MIDWEST EXPRESS	2	0	-2
FAA	1	0	-1
TOTAL	1488	1488	0
	WASHINGTON, D.C. - NATIONAL		
USAIR	148	152	4
EASTERN	82	82	0
NORTHWEST	53	57	4
CONTINENTAL	**48**	**47**	**-1**
DELTA	**47**	**46**	**-1**
SHAWMUT BANK	**44**	**0**	**-44**
TWA	0	33	33
PAN AM	38	39	1
AMERICAN	35	39	1
UNITED	28	28	0
TRUMP	28	28	0
MIDWAY	16	16	0
MIDWEST EXPRESS	4	4	0
AMERICA WEST	4	4	0
TOTAL	575	575	0

TABLE 4 (CONTINUED)

SLOT HOLDER	SLOTS HELD	SLOTS OPERATED	SLOTS OPERATED - SLOTS HELD
	NEW YORK LAGUARDIA		
USAIR	151	163	12
EASTERN	72	78	6
PAN AM	64	70	6
TRUMP	57	57	0
DELTA	56	63	7
AMERICAN	57	64	7
UNITED	45	45	0
NORTHWEST	**45**	**41**	**-4**
CONTINENTAL	**29**	**28**	**-1**
SHAWMUT BANK	**24**	**0**	**-24**
TWA	0	32	32
MIDWAY	14	18	4
MIDWEST EXPRESS	4	6	2
AMERICA WEST	0	2	2
FAA	49	0	-49
TOTAL	667	667	0
	NEW YORK - KENNEDY		
SHAWMUT BANK	**60**	**0**	**-60**
TWA	0	62	62
PAN AM	42	48	6
AMERICAN	21	24	3
USAIR	**20**	**19**	**-1**
EASTERN	**17**	**14**	**-3**
NORTHWEST	**12**	**0**	**-12**
DELTA	**9**	**5**	**-4**
FAA	**9**	**0**	**-9**
UNITED	6	6	0
COMMAND	2	2	0
MGM GRAND AIR	1	1	0
FLYING TIGER	1	1	0
UPS	1	1	0
AMERICA WEST	1	2	1
METRO AIR, N.E.	0	13	13
PAN AM EXPRESS	0	4	4
TOTAL	202	202	0

(c) Regression Analysis

A multiple regression setting was also used to examine the anticompetitive and competitive hypotheses. In these regressions, the dependent variable is the number of days a slot was used. The dependent variable is measured by using either all 61 days in the period or only the 44 weekdays. To test the anticompetitive usage hypothesis -- that slots held by carriers with a large share of the slots at an HDTA will use their slots less intensively than carriers with a small slot share -- against the procompetitive hypothesis, which suggests the opposite, the slot holder's share of slots at an HDTA was included as an independent variable. To examine the anticompetitive leasing hypothesis -- that carriers with relatively more slots will lease their slots to carriers that use them at lower rates -- a dummy variable that denotes whether or not a slot was leased and a variable that interacts this dummy variable with the slot share variable were included as independent variables. To control for other factors that may affect slot use, dummy variables that denote whether a slot was traded or was operated by more than one carrier during the time period were included as independent variables. To control for differences in use in peak versus off-peak periods, dummy variables that denote the beginning of the time period defined by the slot were included as independent variables. To control for differences in slot use resulting from the fact that a carrier has an extensive route structure (as opposed to differences in slot use resulting from a carrier's

large presence at an HDTA), the slot holder's national market share, based on revenue passenger miles, was included as an independent variable.[61] Finally, the slot withdrawal number was included as an independent variable to control for possible differences in the strength of the property right associated with holding the slot.[62] The following linear specification was estimated using ordinary least squares (OLS):[63]

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[61] These shares were obtained from Air Carrier Traffic Statistics Monthly, *U.S. DOT* (May 1990) and (June 1990).

[62] *See* the discussion in note 17, *supra*. The property right associated with a low numbered slot may be less clear than that associated with a high numbered slot because the low numbered slot is more likely to be withdrawn. If the absence of clearly defined property rights inhibits slot trading, low numbered slots would be less likely to move to their highest valued use. *See* A. Kleit, "Competition without Apology: Market Power and Entry in the Deregulated Airline Industry," 14 *Regulation*, (forthcoming 1991).

[63] In addition to the OLS regressions reported in Table 5, several other sets of regressions were run. First, the relationship between Air Wisconsin and United was addressed. Although Air Wisconsin was independently owned and operated, it had a "code sharing" arrangement with United (*i.e.*, it agreed to a large number of joint fares with United and was listed in the Official Airline Guide and on Computer Reservation Systems as UA*.) The regressions reported in Table 5.1 assume that United and Air Wisconsin are separate carriers. The regressions were also run for O'Hare under the assumption that United and Air Wisconsin were one carrier, but the results were not quantitatively or qualitatively different from those reported in Table 5.1. In addition, the regressions in Table 5.1 - 5.4 were estimated using a Tobit procedure with an upper limit at the maximum number of days; again there was very little difference in the results. Finally, potentially unused slots were included. The regressions reported in Table 5.1 - 5.4 do not include the few slots that, according to the data, were used less than 65 percent of the time (for example, at O'Hare those totaled four, held by American). Because no slots were withdrawn for failure to meet the FAA's "use or lose" standard during the period studied, these observations may represent missing data rather than nonuse. All of the regressions were also run with these

(continued...)

$$NDOPER = \alpha_0 + \alpha_1 SLMS + \alpha_2 NAMS + \alpha_3 WITHD + \alpha_4 LEASE +$$

$$\alpha_5 LEASE*SLMS + \alpha_6 MULTO + \alpha_7 MULTO*SLMS +$$

$$\alpha_8 MULTH + \alpha_9 MULTH*SLMS + \sum \alpha_t P_t + \varepsilon$$

where

NDOPER	is the number of days (or weekdays) the slot was operated in the two month period,
SLMS	is the slot holder's share of the total number of nonrestricted and nonexempt slots at the end of the two month period,
NAMS[64]	is the slot holder's national market share (based on Revenue Passenger Miles) for the two month period,
WITHD	is the FAA withdrawal priority number,
LEASE[65]	is a dummy variable that equals one if the slot is operated by a single operator other than the slot holder, zero otherwise,
MULTO[66]	is a dummy variable that equals one if the slot is operated by more than one operator, and was not traded in the two month period, zero otherwise,
MULTH	is a dummy variable that equals one if the slot holder changed during the two month period,
P_t	is a dummy variable that equals one if the slot's hour or half-hour period starts at time t. The dummy variable for the latest slot period is left out.

The anticompetitive usage hypothesis -- that carriers with a large share of the slots at an HDTA will use their slots less

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[63](...continued)
observations (and their low usage rates) included; unless otherwise noted, no substantive changes arose.

[64] Shawmut Bank took possession of the slots, as a trustee, from TWA in July 1989, and simultaneously agreed to long term leases of the slots back to TWA. Consequently, slots held by Shawmut Bank were assigned TWA's national market share.

[65] Slots held by Shawmut Bank and operated by TWA were not counted as leased.

[66] In cases where there was more than one slot holder, the slot was assigned, for purposes of this analysis, to the entity that held the slot the majority of the days during the two-month period.

intensively than carriers with a small slot share -- is H_0: $\alpha_1 < 0$, and the procompetitive hypothesis is H_1: $\alpha_1 \geq 0$. The anticompetitive leasing hypothesis -- that carriers with a large slot share will lease their slots to carriers who will use these slots at a lower rate -- is H_0: $\alpha_4 + \alpha_5 SLMS < 0$ for SLMS large, and the procompetitive hypothesis again implies the opposite.

The results from these regressions are reported in Table 5 for all four HDTAs. The results from each HDTA will be discussed separately, in turn. In general, the results do not support either anticompetitive hypothesis.

1. Chicago - O'Hare

O'Hare is the most concentrated HDTA and is also the only HDTA that is primarily used as a hub (by American and United). The high concentration might suggest that the potential for anticompetitive behavior would be greatest at O'Hare.[67] On the other hand, the fact that O'Hare is the only HDTA used primarily as a hub suggests that efficiency-based theories may better explain its concentration level.

Table 5.1 reports the results for O'Hare. The anticompetitive usage hypothesis can be rejected for both the all-days and the weekday-only regressions. The coefficient on slot market share (SLMS) is positive and statistically significant in both cases.[68]

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[67] *See* DOJ Guidelines, *supra* note 37.

[68] In all cases, the coefficient is small in magnitude. For example, a coefficient of 2.62 implies that a 40 percent increase (continued...)

Examining the anticompetitive leasing hypothesis, the coefficients on the lease dummy variable (α_4) and on the lease dummy interacted with slot market share (α_5), for the weekday regression, are both statistically significant. The regression implies that leased slots would be used more intensively than the lessor's owned and operated slots if the lessor's slot holding share were above 20.5 percent.[69] That is, according to the regression results, the two largest carriers at O'Hare, United and American, would lease slots to carriers that used them at rates greater than or equal to the rate at which United and American used their owned and operated slots. This finding is consistent with the findings in Table 3. In the all-days regression, neither coefficient is significant.

As for the other variables, the coefficients on the variables denoting whether a slot changed operators suggest that

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[68](...continued)
in slot share (*e.g.*, roughly the difference between the leading carrier, United, and third largest carrier, Northwest) would result in the slot being used just over one additional day per two month period. Because all air carriers at O'Hare use their slots at high rates, this small difference may reflect differences in the abilities of large carriers with hub operations at O'Hare to cover mechanical or personnel problems, rather than planned differences in schedules.

[69] The critical slot share is given by $-\alpha_4/\alpha_5$. That is, if α_4 is positive and α_5 is negative, the estimated coefficients imply that a slot leased from a carrier with a slot share greater than this ratio is likely to be used more intensively than the lessor uses its O&O slots. On the other hand, if α_4 is negative and α_5 is positive, the estimated coefficients imply that a slot leased from a carrier with a slot share lower than this ratio will be used more intensively than the lessor uses its O&O slots.

these slots were used less.[70] Similarly, the coefficients on the variable that denotes whether a slot had more than one owner during the period studied suggest that these slots were used less. The coefficient on national market share is negative in both the all-days and weekday-only regressions and is statistically significant in the weekday-only regression.[71] The coefficient on the withdrawal number is positive and is statistically significant in the weekday regressions.[72] For expositional convenience, the coefficients on the time dummy variable are not reported.[73] Overall, all regressions are statistically significant at the 1 percent level.

The regression results for O'Hare support the procompetitive hypotheses. There was a positive and statistically significant relationship between slot share and rate of use. In addition, the regression based on weekdays suggests that slots leased by large carriers to others were used at a higher rate than their

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[70] The coefficient on the dummy variable MULTO is negative and significant in all the O'Hare regressions. The interaction term MULTO*SLMS is positive, but is not statistically significant in any regression.

[71] At O'Hare, the two carriers with the largest slot shares are also the largest national carriers. The large negative coefficient on national market share likely reflects the relationship for other carriers at O'Hare, all who have small (less than 5 percent) slot shares there.

[72] This possible relationship may reflect the assignment of highly valued or profitable flights to those slots least likely to be withdrawn (*i.e.*, those with the highest withdrawal numbers).

[73] Estimates of these coefficients are available upon request.

O&O slots. Both results are inconsistent with the anticompetitive hypotheses.

TABLE 5.1
REGRESSION RESULTS

CHICAGO - O'HARE AIRPORT

DEPENDENT VARIABLE - NUMBER OF DAYS OPERATED, MAY-JUNE 1990
(t-statistics in parenthesis)

VARIABLE	COEFFICIENTS	
	ALL DAYS	WEEKDAYS ONLY
CONST	52.30**	41.79**
	(31.15)	(39.30)
SLMS	2.15**	2.62**
	(2.30)	(4.42)
NAMS	-0.29	-11.81**
	(-0.09)	(-6.08)
WITHD	0.0003	0.0002*
	(1.46)	(1.94)
LEASE	0.43	-0.88**
	(0.92)	(-3.00)
LEASE*SLMS	-1.57	4.29**
	(-0.79)	(3.39)
MULTO	-1.91**	-1.56**
	(-2.71)	(-3.50)
MULTO*SLMS	1.08	3.36**
	(0.40)	(1.96)
MULTH	2.63	1.07
	(1.39)	(0.90)
MULTH*SLMS	-14.09**	-4.41
	(-2.47)	(-1.22)
N	1480	1480
MEAN DEP. VAR.	56.90	41.96
R-SQUARED	0.29	0.25
ADJ R-SQUARED	0.27	0.23
F	15.59	12.99
LOG LIKELIHOOD	-3923.29	-3247.49

* Significant at the .05 level (one-tailed test)
** Significant at the .025 level (one-tailed test)

2. Washington, D. C. - National

Table 5.2 reports the results for National. The coefficients on slot market share, for both the all-days and weekday-only regressions, are negative, but small and not statistically significant. Thus, the data show no discernable relationship between slot market share and usage rate.

The coefficients on the lease and lease interaction variables are also not statistically significant. The regression based on all days implies that carriers with a market share greater than 8.9 percent, which in the period studied would include USAir, Northwest, and Eastern, leased slots to carriers that used them at a lower rate. Eastern has exited the airline business, and USAir and Northwest were both net lessees, positions inconsistent with the anticompetitive leasing hypothesis. Thus, the data do not suggest an anticompetitive problem with leased slots at National.[74]

The coefficient on national market share is positive and statistically significant in both regressions. The coefficients on the multiple operator and holder variables imply that slots operated by more than one carrier were used less intensively.[75]

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[74] As noted previously, USAir is a net lessee both in general and *vis-a-vis* each slot holder. *See* Table 4, *supra*, and the discussion in note 60.

[75] Because the number of trades at Kennedy, LaGuardia and National was small, the multiple holder dummy variable and the interaction term containing this variable both could not be included in the regressions for these HDTAs. The coefficient on the interaction term, the variable included in the regressions, is not significant in any of the regressions.

The regression results for National present no discernable pattern relating slot share and the rate of slot use. Nor do the regression results suggest that slots leased by larger carriers to others were used at a significantly lower rate.

TABLE 5.2
REGRESSION RESULTS

WASHINGTON, D.C. - NATIONAL AIRPORT

DEPENDENT VARIABLE - NUMBER OF DAYS OPERATED, MAY-JUNE 1990
(t-statistics in parenthesis)

VARIABLE	COEFFICIENTS	
	ALL DAYS	WEEKDAYS ONLY
CONST	56.44**	40.62**
	(23.07)	(23.82)
SLMS	-1.91	-0.37
	(-0.71)	(-0.02)
NAMS	12.09**	11.13**
	(2.81)	(3.71)
WITHD	-0.00005	0.0001
	(-0.05)	(0.13)
LEASE	1.07	0.70
	(0.93)	(0.88)
LEASE*SLMS	-10.40	-7.87
	(-1.12)	(-1.22)
MULTO	-2.49	-2.19*
	(-1.45)	(-1.83)
MULTO*SLMS	4.10	4.26
	(0.29)	(0.43)
MULTH		
MULTH*SLMS	-1.06	-0.33
	(-0.06)	(-0.03)
N	572	572
MEAN DEP. VAR.	55.92	41.48
R-SQUARED	0.19	0.17
ADJ R-SQUARED	0.15	0.13
F	5.09	4.32
LOG LIKELIHOOD	-1711.92	-1505.30

* Significant at the .05 level (one tailed test)
** Significant at the .025 level (one tailed test)

3. New York - LaGuardia

Table 5.3 reports the results for Laguardia. The coefficient on the slot market share variable is negative in the all-days regression and positive in the weekday-only regression;

however, neither coefficient is statistically significant. For the weekday regressions, none of the coefficients on the lease and lease interaction variables is statistically significant. For the all-days regression, the coefficients are statistically significant and imply that carriers with slot shares greater than 18.9 percent leased slots to others that used them at a lower rate than their O&O slots. The only carrier with a share that high is USAir, which at LaGuardia was both a net lessee and leased to carriers that used these slots at a higher rate.[76]

The coefficient on national market share is negative but not statistically significant, and again, slots operated or held by more than one carrier were used at a lower rate.

The results for Laguardia are similar to those for National: the regression results present no discernable pattern relating slot share and the rate of slot use, and do not suggest that slots leased by large carriers to others were used at a significantly lower rate.

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[76] *See* Tables 3 and 4, *supra*.

TABLE 5.3
REGRESSION RESULTS

NEW YORK - LAGUARDIA AIRPORT

DEPENDENT VARIABLE - NUMBER OF DAYS OPERATED, MAY-JUNE 1990
(t-statistics in parenthesis)

VARIABLE	COEFFICIENTS	
	ALL DAYS	WEEKDAYS ONLY
CONST	50.11**	35.81**
	(14.29)	(15.65)
SLMS	-5.40	2.03
	(-1.62)	(0.94)
NAMS	-1.86	-0.16
	(-0.54)	(-0.07)
WITHD	-0.0003	-0.0006
	(-0.35)	(-1.06)
LEASE	-3.05**	-0.75
	(-2.89)	(-1.08)
LEASE*SLMS	24.75**	3.15
	(2.63)	(0.51)
MULTO	-3.15**	-1.64**
	(-2.66)	(-2.12)
MULTO*SLMS	12.28	5.43
	(1.17)	(0.80)
MULTH		
MULTH*SLMS	-65.07	-86.06**
	(-1.14)	(-2.30)
N	614	614
MEAN DEP. VAR.	55.76	41.40
R-SQUARED	0.19	0.18
ADJ R-SQUARED	0.13	0.12
F	3.12	2.95
LOG LIKELIHOOD	-1797.38	-1535.23

* Significant at the .05 level (one tailed test)
** Significant at the .025 level (one tailed test)

4. New York - Kennedy

Finally, Table 5.4 lists the regression results for Kennedy. The coefficient on slot market share for both the all-days and weekday-only regressions is negative and statistically significant. Although this result is consistent with the anticompetitive usage hypothesis, it may also be explained by special circumstances at Kennedy. The largest slot holder, with 31 percent of the slots, was a bank that entered a purchase-lease arrangement with TWA. The second largest slot holder was Pan Am. Both TWA and Pan Am had been experiencing financial difficulties on transatlantic flights.[77] Thus, the negative coefficient on market share may simply reflect these largest carriers' reduced output due to operating difficulties, rather than a monopolistic output reduction.[78]

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[77] Based on the set of unrestricted slots and international slots, international slots make up 23.5 percent of the slots at Kennedy, compared to 7.2 percent at LaGuardia, 4.9 percent at O'Hare,and 0 percent at National. Both Pan Am and TWA relied heavily on transatlantic flights for operating revenues, and many of these flights operated out of Kennedy. Pan Am received more than three-quarters of its operating revenues from international operations, over half of these revenues coming from transatlantic service. TWA received over a third of its operating revenues from its transatlantic service. *See* Secretary's Task Force on Competition in the U.S. Domestic Airline Industry: International Air Service," *U.S. Department of Transportation*, February 1990, pp. 14-15. Although these international flights used restricted international slots that are not in our dataset, passengers from these flights were an important source of traffic for these airlines' domestic flights, which used slots that are in our dataset.

[78] Both carriers faced problems at various times due to fears of terrorism or increased competition on transatlantic routes. *See* Secretary's Task Force on Competition in the U.S. Domestic Airline Industry: International Air Service," *supra* note

(continued...)

The coefficients on the lease and lease interaction variables imply that leased slots would be used more intensively than the lessor's owned and operated slots if the lessor's share were above 10 percent. This is not consistent with the anticompetitive leasing hypothesis. The coefficient on national market share is negative but not statistically significant in both regressions.

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[78](...continued)
77, p. 15 and pp. 20-1. These two carriers were the largest carriers serving the transatlantic market in 1989, but were facing stiff competition from lower cost entrants. *Id.*, Table III-39, pp. 93. These difficulties subsequently resulted in both carriers selling, among other things, their transatlantic route authority from New York to other airlines. *See*, e.g., "Flight Plans: How Airlines Stack Up," *Wall Street Journal*, Monday, June 17, 1991, p. B1, and "DOT Rejects Bids on 3 London Routes," *Washington Post*, Friday March 15, 1991, p. D1. Thus, market forces have already reduced the presence of these two carriers at Kennedy Airport.

TABLE 5.4
REGRESSION RESULTS

NEW YORK - KENNEDY AIRPORT

DEPENDENT VARIABLE - NUMBER OF DAYS OPERATED, MAY-JUNE 1990
(t-statistics in parenthesis)

VARIABLE	COEFFICIENTS	
	ALL DAYS	WEEKDAYS ONLY
CONST	47.62**	40.45**
	(2.54)	(2.79)
SLMS	-26.84**	-22.89**
	(-2.43)	(-2.68)
NAMS	-8.41	-7.60
	(-0.77)	(-0.90)
WITHD	0.0021	0.0026
	(0.61)	(0.18)
LEASE	-1.87	-1.07
	(-1.60)	(-1.17)
LEASE*SLMS	13.59*	10.81**
	(1.95)	(2.01)
MULTO	-8.10**	-6.77**
	(-2.59)	(2.80)
MULTO*SLMS	45.85**	38.55**
	(2.86)	(3.11)
MULTH		
MULTH*SLMS	32.62	26.35
	(1.27)	(1.33)
N	169	169
MEAN DEP. VAR.	56.89	40.94
R-SQUARED	0.19	0.19
ADJ R-SQUARED	0.10	0.10
F	2.13	2.13
LOG LIKELIHOOD	-491.44	-448.15

* Significant at the .05 level (one tailed test)
** Significant at the .025 level (one tailed test)

In sum, the data provide little support for the anticompetitive usage and anticompetitive leasing hypotheses. A positive and significant relationship between slot share and slot use was found at O'Hare, and no discernable pattern relating slot

share and the rate of slot use was found at National and LaGuardia. The only result that might support the anticompetitive hypotheses, the negative and significant relationship between slot share and slot use found at Kennedy, is probably explained by the operating problems experienced by the largest carriers at that airport. In addition, the data do not suggest that slots leased by large carriers to others were used at a significantly lower rate, and suggest that the largest slot holders at HDTAs tended to be net lessees.

B. Changes in the "Use or Lose" Rules

The SNPRM contains a proposal to change the "use or lose" threshold from 65 percent based on all days to 90 percent based on weekday use only. To examine the potential impact of the proposed rule, Table 6 lists the number of slots, based on usage during the May-June 1990 reporting period, that would have complied under the proposed 90 percent "use or lose" threshold. According to the data, the rule would affect, based on current reporting practices, 15 to 20 percent of the slots at National, LaGuardia, and O'Hare, and over 30 percent of the slots at Kennedy.

TABLE 6
SLOT HOLDER COMPLIANCE WITH PROPOSED "USE OR LOSE" RULE

	NUMBER OF SLOTS USED		PERCENTAGE OF SLOTS
	< 90%	> 90%	COMPLYING
CHICAGO - O'HARE			
SHAWMUT BANK	8	28	77.8
AMERICAN	78	413	84.1
AMERICAN TRANS AIR	3	2	40.0
AMERICA WEST	0	7	100.0
AIR WISCONSIN	0	44	100.0
CONTINENTAL	8	28	77.8
DELTA	9	55	85.4
EASTERN	1	20	95.2
FLYING TIGER	1	2	66.7
MIDWEST EXPRESS	1	1	50.0
NORTHWEST	8	63	88.7
PAN AM	0	4	100.0
UNITED	94	564	85.7
USAIR	7	38	84.4
OVERALL	219	1269	85.3
WASHINGTON, D. C. - NATIONAL			
SHAWMUT BANK	13	31	70.5
AMERICAN	6	29	82.9
AMERICA WEST	0	4	100
CONTINENTAL	3	45	93.8
DELTA	9	38	80.9
EASTERN	40	42	51.2
MIDWEST EXPRESS	0	4	100
MIDWAY	2	14	87.5
NORTHWEST	14	39	73.6
PAN AM	3	35	92.1
TRUMP	3	25	89.3
UNITED	4	24	85.7
USAIR	14	134	90.5
OVERALL	111	464	80.7

TABLE 6 (CONTINUED)

	NUMBER OF SLOTS USED < 90%	NUMBER OF SLOTS USED > 90%	PERCENTAGE OF SLOTS COMPLYING
NEW YORK - LAGUARDIA			
SHAWMUT BANK	5	19	79.2
AMERICAN	12	45	79.0
CONTINENTAL	5	24	82.8
DELTA	4	52	92.9
EASTERN	9	63	87.5
MIDWEST EXPRESS	0	4	100
MIDWAY	1	13	92.9
NORTHWEST	12	33	73.3
PAN AM	19	45	70.3
TRUMP	7	50	87.7
UNITED	11	34	75.6
USAIR	17	134	88.7
OVERALL	118	549	82.2
NEW YORK - KENNEDY			
SHAWMUT BANK	19	41	68.3
AMERICAN	7	14	66.7
AMERICA WEST	0	2	100
COMMAND	0	2	100
DELTA	1	8	88.9
EASTERN	15	2	11.8
FLYING TIGER	1	0	0
MGM	1	0	0
NORTHWEST	2	10	83.3
PAN AM	13	29	69
UNITED	0	6	100
UPS	0	1	100
USAIR	2	18	90
OVERALL	61	133	68.6

Source: Tabulated from FAA slot data.

Table 6 may overstate the potential impacts of altering the "use or lose" rules. A carrier holding a large number of slots in a slot period might be able to comply with a new "use or lose" standard by moving flights among slots, taking flights assigned

to slots being used more than 90 percent of the time on weekdays and reassigning them to slots being used less than 90 percent of the time on weekdays. To illustrate, suppose an airline has five slots in a slot period, four of them listed as being used 39 weekdays in a reporting period (88 percent) and one listed as being used all 44 weekdays. At those rates, only one out of the five would comply with the proposed "use or lose" rule. However, by reassigning one flight from the 100 percent slot to each of the four slots being 88 percent slots, the holder could report all five slots being used 40 weekdays (90.9 percent), in compliance with the proposed 90 percent "use or lose" rule.[79]

Carriers with few slots per period would be less able to make such rearrangements. Thus, a higher "use or lose" threshold could affect these carriers more than larger carriers. If the five slots in the example above were not held by a single carrier, but instead each was held by a different one, then all four of the carriers with an 88 percent usage rate would have to add flights to comply with the proposed rule.[80]

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[79] A nonhypothetical case can be constructed from the data studied for this comment. During the 645-715am slot period at O'Hare, 17 out of the 19 American slots were not in compliance with the proposed "use or lose" rule; however, by reassignments among slots, American could have brought 18 of them into compliance. To keep the 19th slot, American would have had to add 28 weekday flights in the two month period. If instead it sold the slot, it would have had to cancel or shift to other slot periods 12 flights.

[80] The ability of large carriers at HDTAs to reallocate flights among slots to ensure compliance led the FAA to propose previously in the NPRM that the "use or lose" thresholds be based upon the number of slots held in any time period. Specifically, (continued...)

The overall weekday use rates for May-June 1990 imply that almost all slot holders already could be close to complying with the proposed 90 percent rule.[81] Achieving complete compliance would no doubt call for schedule rearrangements and some added flights, but the high level of usage suggests that the rule change may not increase significantly either the rate at which slots are used or the number of slots at risk of withdrawal for nonuse.

However, where the proposed "use or lose" rule is binding, a too restrictive "use or lose" provision could impose unintended costs on air carriers and may reduce welfare. First, the proposed "use or lose" threshold may increase the probability that slots are withdrawn for reasons beyond the control of the slot holder or air carrier.[82] Although, as the FAA explains,

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[80](...continued)
the use of lose threshold would have been 90 percent for carriers with ten or more slots in a hour, 80 percent for carriers with more than four but fewer than ten slots in an hour, and 65 percent for carriers with four or fewer slots in an hour. *See* SNPRM, *supra* note 2, p. 46674. The previous proposal to raise the "use or lose" percentage only for carriers with a larger number of slots per period has been dropped because carriers opposed it and because it would have made compliance and administration more difficult. The ability to re-allocate flights is not greater for larger carriers when cancellations in an hour are positively correlated. For example, if weather closes the airport, all slots in that period would be counted as not used. Thus, there would be no flights in that time period available to reallocate across slots.

[81] *See* Table 2, *supra*.

[82] Under the current "use or lose" reporting system, slots affected by flight cancellations (*e.g.*, due to weather related problems or the recent phone outage in New York) are counted as not used, and theoretically, five weekday airport closings 5 PM
(continued...)

the change to a 90 percent weekday rule will not reduce the allowable number of cancellations per period for a carrier operating a "normal" Monday through Friday schedule,[83] under the current rules a carrier can greatly increase the number of allowable cancellations by using or leasing the slot on weekends. And finally, to protect a slot against withdrawal, a carrier may add flights just to insure compliance with the proposed usage constraint. This behavior may be wasteful.[84]

C. Restrictions on the Sale and Transfer of Lottery Slots

Finally, greater restrictions are proposed on the sale and transfer of lottery slots to deter those carriers interested only in obtaining slots for resale from entering the lottery.[85]

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[82](...continued)
(*e.g.*, due to bad weather) in a two-month period would put all carriers at an HDTA in violation of the proposed "use or lose" rules. A carrier can request a waiver from the "use or lose" rules only if it experienced problems on nine or more consecutive days in a period. *See* 14 C.F.R. Part 93.227. The SNPRM contains no proposal to amend the waiver procedure.

[83] *See* SNPRM, *supra* note 2. Under the proposed 90 percent weekday rules, a carrier with one slot in a given hour at a given HDTA would have to schedule a flight on every weekday and would have a cushion of .5 flights per week (or equivalently, one weekday cancellation every two weeks). Now, the same airline scheduling weekday-only flights has a cushion of .45 flights a week.

[84] *See* Comment of the DOJ, supra note 12. Flight operations in addition to those that would have been conducted with a less binding constraint are likely driven by compliance with a rule and not the marginal benefits and costs of conducting the flight. Thus, in the absence of a monopolistic output reduction, it is possible that these additional flights will not increase and may even decrease total welfare.

[85] For a general discussion, *see* Richard A. Posner, "The Social Costs of Monopoly and Regulation," 83 *J. Pol. Econ.* 807 (1975).

These proposed rules are apparently in response to the observation that slots allocated to new entrant carriers were often quickly sold to large carriers. The FAA notes that, at times, such sales occurred on or soon after the expiration of the 60 day minimum holding requirement.[86] Examination of the ownership history of slots obtained in the 1986 slot lottery confirms this and suggests that the vast majority of these slots were traded or otherwise changed ownership within two years.

Table 7 lists this set of slots allocated in this 1986 FAA lottery by HDTA and by lottery recipient at three of the four HDTAs.[87] Slots allocated in this lottery were obtained by withdrawing approximately 5 percent of the slots at HDTAs from incumbent carriers. Table 7 also lists the donating carriers and the number of days the original lottery slot was held by the lottery recipient.

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[86] *See* SNPRM, *supra* note 2, p. 46676.

[87] Data for the fourth HDTA, Kennedy Airport, were not available.

TABLE 7
1986 FAA LOTTERY SLOTS

Slots held more than two years are listed in **bold.**

LOTTERY RECIPIENT	DONOR	SLOT PERIOD	WITHDRAWAL NUMBER	DAYS ORIGINAL SLOT HELD BY LOTTERY RECIPIENT
	WASHINGTON, D.C. - NATIONAL			
AIR WISCONSIN	NORTHWEST	1600	1121	91
	MIDWAY	1600	1117	0
	DELTA	1100	1223	0
	NEW YORK AIR	1700	1188	185
	FAA	2100	1588	0
	NEW YORK AIR	1800	1303	185
BRANIFF	NEW YORK AIR	1900	1281	358
	PAN AM	1400	1666	217
AIR ATLANTIC	PIEDMONT	1300	1127	0
	EASTERN	1400	1076	241
	FAA	800	1274	90
	AMERICAN	900	1044	241
SKYBUS	EASTERN	1500	1009	112
	DELTA	1000	1230	112
	NORTHWEST	1500	1058	112
	PAN AM	900	1335	112
JET AMERICA	FAA	2000	1475	0
	FAA	2000	1097	0
	EASTERN	700	1140	441
	NEW YORK AIR	1900	1310	0
MIDWEST EXPRESS	**EASTERN**	**1000**	**1010**	**1894**
	FAA	1100	1138	0
PRESIDENTIAL	USAIR	1300	1175	23
	PIEDMONT	1200	1033	41
	AMERICAN	700	1321	23
	NEW YORK AIR	800	1150	23
TRANSTAR	USAIR	1300	1175	39
	PIEDMONT	1200	1033	17

TABLE 7 (CONTINUED)				
WESTERN	USAIR	1200	1298	210
	FAA	2100	1548	370
NEW YORK - LAGUARDIA				
AIR WISCONSIN	EASTERN	1530	3186	92
	EASTERN	1800	3436	92
	EASTERN	1830	3507	92
	NEW YORK AIR	1000	3709	0
	UNITED	1500	3819	186
SKYBUS	EASTERN	1430	3489	0
	USAIR	1630	1630	38
	AMERICAN	930	3201	0
	EASTERN	1000	3198	0
MIDWEST EXPRESS	EASTERN	1730	3064	501
	EASTERN	1900	3591	1834
	EASTERN	1030	3234	1834
	AMERICAN	1130	3260	175
OZARK	EASTERN	1400	3278	53
	TWA	1400	3055	0
PRESIDENTIAL	AMERICAN	800	3049	98
	EASTERN	1100	3253	214
	MIDWAY	2130	3136	222
	EASTERN	2030	3124	214
	NEW YORK AIR	2130	3029	214
	AMERICAN	1200	3328	214
	NEW YORK AIR	830	3347	145
WESTERN	UNITED	1700	3264	183
	NEW YORK AIR	1930	3848	210
	FAA	1300	3107	0
	USAIR	1600	1600	210
	NEW YORK AIR	2130	3063	210
	EASTERN	1200	3244	210
	PIEDMONT	700	3309	103

TABLE 7 - (CONTINUED)				
WORLD	EASTERN	700	3530	0
	TWA	1000	3156	0
	EASTERN	900	3230	90
	FAA	1300	3195	0
	PIEDMONT	2030	3750	88
	PAN AM	830	3336	90
	NEW YORK AIR	930	3283	91
CHICAGO - O'HARE				
AIR CAL	USAIR	1415	7646	243
	UNITED	1645	7021	549
	UNITED	1645	7041	549
	UNITED	745	7106	365
	AMERICAN	1745	8265	3
	AMERICAN	1915	7028	3
	AMERICAN	1815	8281	3
	AMERICAN	1515	7022	365
AMERICA WEST	USAIR	1915	8087	0
	NORTHWEST	1415	7412	1582
	FAA	1215	7400	0
	UNITED	1545	7809	0
	FAA	1215	7264	0
BRANIFF	OZARK	815	7816	661
EVERGREEN	FAA	1045	8142	0
	FAA	715	8453	0
SKYBUS	BRITISH AIRWAYS	1015	8035	0
	AMERICAN	945	7026	0
	FAA	915	7272	0
	NORTHWEST	1415	7630	0
	REPUBLIC	1515	7794	0
	FAA	1045	7400	0
	AMERICAN	1615	8303	0
	AMERICAN	915	7015	0
MCCLAIN	BRITISH AIRWAYS	1415	7559	0
	USAIR	1415	7107	0
	FAA	1315	8391	96
	AMERICAN	1245	7030	119
	DELTA	1145	7054	105
	PIEDMONT	2015	8565	344
	FAA	1245	7580	96
	FAA	1815	7112	0

TABLE 7 (CONTINUED)

PRESIDENTIAL	UNITED	1815	8048	0
	UNITED	1615	8226	0
PAN AM	AMERICAN	1915	7043	172
WESTERN	FAA	1315	8308	0
	FAA	1215	7135	113
	UNITED	2045	7006	274
	FAA	1145	8195	0
WORLD	REPUBLIC	1515	8410	0
	UNITED	2015	7086	0
	FAA	715	8453	0
	UNITED	2015	7085	0
	UNITED	2045	7080	0
	USAIR	1915	8087	0
	AMERICAN	745	7100	0
NOT PICKED	AMERICAN	2045	7011	
	AMERICAN	1915	7018	
	UNITED	1615	7505	
	AMERICAN	645	7536	
	UNITED	1645	7138	
	AMERICAN	645	7307	
	PEOPLE'S EXPRESS	1015	8659	
	UNITED	2045	7410	
	UNITED	645	7653	
	UNITED	915	7093	
	DELTA	1045	7050	
	UNITED	645	7038	
	AMERICAN	645	7613	
	FRONTIER	2045	7204	
	SIMMONS AVIATION	715	8270	
	UNITED	945	7154	
	AMERICAN	2045	7024	
	AMERICAN	1045	7034	
	PIEDMONT	2045	7534	
	AMERICAN	1715	8537	
	AMERICAN	645	7116	
	UNITED	2015	7148	
	AMERICAN	645	7116	
	AMERICAN	645	7335	
	OZARK	745	8172	
	AMERICAN	645	7297	
	UNITED	645	7674	
	UNITED	645	7627	

TABLE 7 (CONTINUED)

UNITED	1515	7517
UNITED	2045	7340
SIMMONS AVIATION	715	8486
UNITED	915	8209
UNITED	645	7071
AMERICAN	915	7020
UNITED	645	7384
AMERICAN	645	7245
UNITED	2045	7438
AMERICAN	2045	7060
AMERICAN	2045	7225
UNITED	645	7673
UNITED	2045	7103

Only one of the lottery recipients at National and LaGuardia -- Midwest Express -- owned slots or operated flights at National as of June 30, 1990. At O'Hare, only America West and Air Wisconsin remained as of June 30, 1990.[88]

All but four of the lottery slots changed hands within what would have been the two year "must use" period proposed in the SNPRM. Excluding these four slots, the average number of days a slot was held by the lottery recipient was 112 days at National, 118 days at LaGuardia, and 90 days at O'Hare.[89] To the extent that small and new entrant carriers in the future will face the

[88] Air Wisconsin is being purchased by United. Western Airlines was purchased by Delta and Ozark was purchased by TWA in 1986, and Air Cal was purchased by American in 1987. *See* Ogur, Wagner and Vita, *supra* note 8, Table II-3, pp. 28-29. The remainder exited as scheduled air carriers.

[89] This number does not include 41 lottery slots that were not picked at O'Hare. In addition, 19 of the slots at O'Hare were determined to have been returned or withdrawn by the FAA before the lottery recipient operated the slot. Not counting these 19 slots yield an average holding period of a little over five months (156 days).

same competitive pressures and economic incentives as they did following the 1986 lotteries, the data suggest that lottery slots allocated in future lotteries likely would be quickly traded, in the absence of rules prohibiting their transfer.

In the absence of market power, the strength of a market system is its ability to direct resources to their highest valued uses.[90] Relying on nonmarket methods such as grandfathering and lotteries initially to allocate slots *and* prohibiting or delaying their subsequent transfer would sacrifice the benefits of an unrestricted slot market.[91] Because nonmarket mechanisms are unlikely to result in an efficient initial allocation of slots,[92] the presence of an unrestricted slot market with a short or nonexistent minimum holding period would permit initially misallocated slots be transferred to more highly valued uses.

The FAA proposal would severely limit market reallocations by requiring the lottery participants to use lottery slots for two years before they could be transferred or sold freely. This prohibition on transfer, along with the stricter limits on primary participation in slot lotteries, will create, at least over a two year period, a user classification for new entrant and

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[90] *See* DOJ comments, *supra* note 12, p. 7.

[91] Auctions would be a market based method of initial allocation. For a discussion of the legal issues that may preclude or severely restrict their use, *see* the DOJ comments, *supra* note 12, pp. 13-15.

[92] *See* Comments of the DOJ, *supra* note 12, pp. 12-15. *See* also Koran and Ogur, *supra* note 8.

limited incumbent carriers (or small) airlines. If the lottery allocation has not resulted in the most efficient set of carriers receiving the lottery slots, the result could be to perpetuate an initial misallocation of resources for up to two years.[93] And given that it may be the larger, not the smaller, carriers who use slots most intensively, reallocation of slots to smaller carriers may induce reductions in slot utilization and consumer welfare. Whether the misallocation is significant would depend upon how many slots are affected.

Seeking slots without intending to use them might be deterred without the proposed two year "must use" period by barring from future slot lotteries a carrier who has sold its lottery slots too quickly. The proposed definition of a "limited incumbent" based on both current and past holdings is consistent with this approach.[94] If the costs of being excluded from future slot lotteries are large enough to cancel the gains from the slots obtained in the current lottery, the carrier will be

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[93] As in the case of the 90 percent "use or lose" rule, a carrier may choose to operate a flight for two years in order to obtain the valuable slot. This could result in much of the value of the slot being dissipated by the operation of the inefficient flight. *See* Posner, *supra* note 85.

[94] *See* the discussion in note 32, *supra*. A smaller carrier's sale of lottery slots soon after the minimum holding period expired may simply mean its profits were lower than it expected; if so, it would be wrong to infer from the quick sale that the carrier wanted the slot solely in order to sell it for a profit. Still, the costs imposed by that erroneous inference may not be large as long as slots remain transferable. If the smaller carrier would experience higher costs and lower profitability permanently, its future entry is unlikely anyway. If the carrier corrected its cost disadvantage, it could purchase a slot from lottery winner or an existing slot carrier.

deterred from entering the current lottery for what the FAA finds to be undesirable purposes. And if the implicit penalties from lottery "debarment" at a single HDTA are not large enough, the carrier-specific prohibition could be extended, for example, to include other HDTAs, or slot lotteries at future HDTAs. Such a system, coupled with the proposed selective screening of "new entrants," could reduce unwanted behavior and preserve favorable treatment for qualified small carriers with less potential for perpetuating an initial misallocation of resources.

V. Conclusion

Historical slot use at the four HDTAs is not consistent with the two anticompetitive theories studied. The data do not suggest that slots were being used at low rates, nor do the data suggest that carriers with larger shares of available slots used their slots at lower rates than carriers with smaller shares. Thus, the data do not present compelling reasons to believe that changing the existing slot allocation and transfer rules in the manner proposed would be necessary to increase slot usage rates to high levels. The proposed regulations and our comment address only slot usage, and not other aspects of airline competition.

The proposed changes to the FAA's "use or lose" rules would require a rate of use approximately equal to the average rate of use already voluntarily chosen by most carriers. The rule is likely to affect a carrier with fewer slots more than a larger carrier with many slots. The proposed restrictions on lottery

participation and lottery slot sales may prevent slots from moving to their highest valued uses, and thus could reduce welfare.