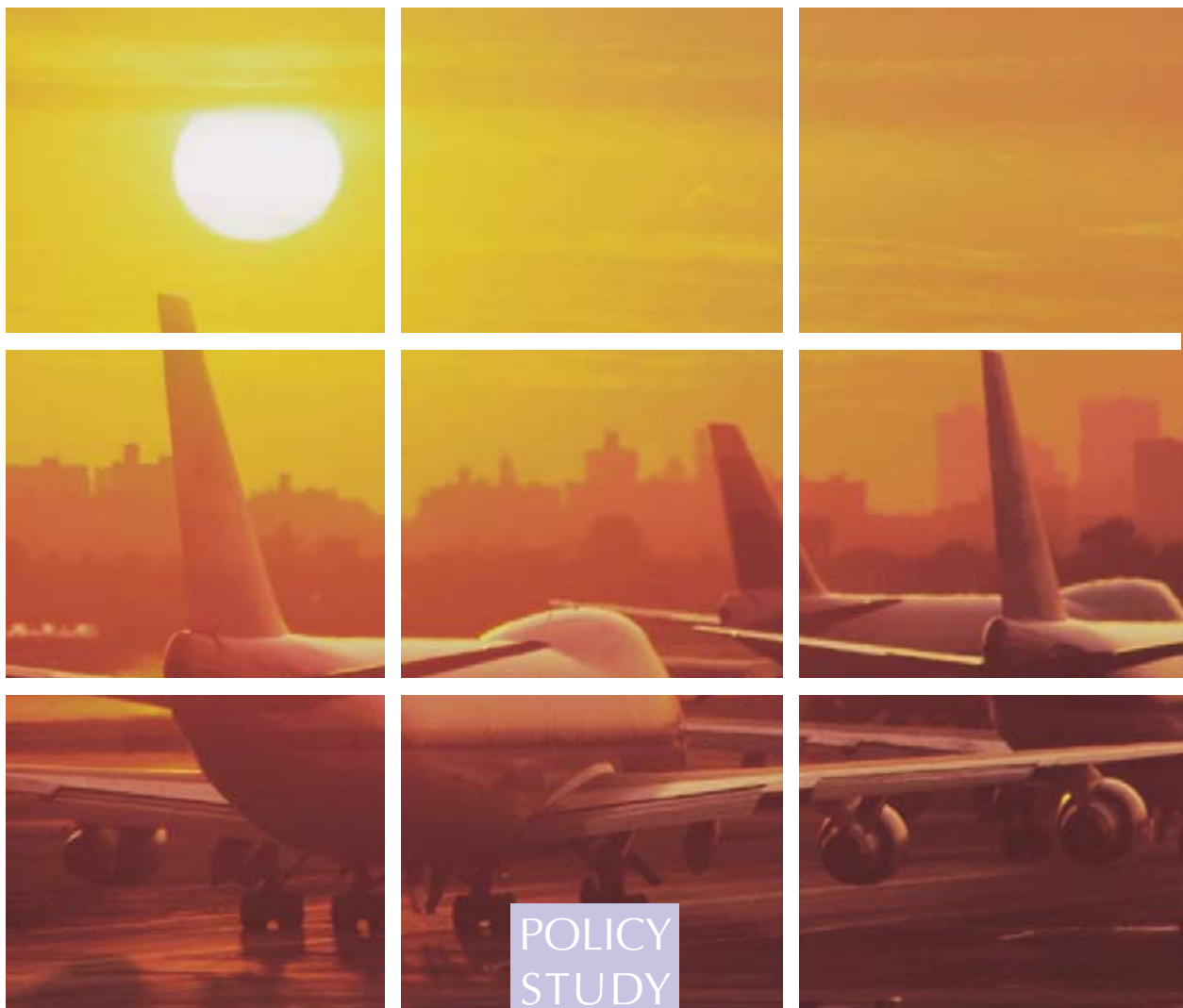


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CONGESTION PRICING FOR THE NEW YORK AIRPORTS: REDUCING DELAYS WHILE PROMOTING GROWTH AND COMPETITION

By Robert W. Poole, Jr. and Benjamin Dachis



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Congestion Pricing for the New York Airports: Reducing Delays while Promoting Growth and Competition

By Robert W. Poole, Jr. and Benjamin Dachis

The three major airports serving the New York metro area—Kennedy (JFK), LaGuardia (LGA), and Newark (EWR)—have become significantly more congested in the past five years and are now among the five most-congested in the country. The economic cost of this congestion to airlines and passengers in the metro area is in excess of \$1 billion per year.

Congestion exists because at peak times of the day, at each airport, airlines schedule far more flights than can safely be handled with existing runways and air traffic control technology and procedures. It is in the interest of each airline to act in this way, because an unpriced runway is an economic commons. An airline does not have to bear the costs of the delay it imposes on the other airlines' flights by adding its own additional peak-hour flight.

Airport congestion pricing would provide economic incentives to shift some flights out of the busiest hours and to provide some service using a smaller number of larger-capacity planes. Such pricing has been simulated extensively by economic modeling over the past two decades and more recently by a kind of “war game” in which airline, airport, and FAA players responded to a hypothetical pricing system at LaGuardia. The results agreed strongly with the results of economic modeling. Congestion pricing of runway access, with prices that vary by time period but not by aircraft size or weight, would significantly reduce delays, spread out peak demand to make better use of runway capacity, and lead to “up-gauging” of some flights to larger-size planes. Those changes would lead to reduced congestion and delays *without reducing passenger throughput*.

Our research addressed a comprehensive list of airline concerns—such as that pricing would be ineffective, that JFK (because of its trans-Atlantic service) is a special case, and that congestion pricing would divert attention and resources away from needed expansion of New York airport capacity. We analyzed nine specific airline concerns and concluded that a pricing system along the lines proposed in this report would deal with all nine.

Two of the most important concerns were that foreign carriers (at JFK and EWR) might be exempted and that revenues from congestion pricing would be diverted from airport capacity expansion. On the first, we found that although there is some history of foreign airlines being

exempted from *administrative demand management* (mandated cutbacks in flights), the legal basis for such exemptions does not apply to airport runway charges. And, in fact, the international body that develops aviation policy (the International Civil Aviation Organization) encourages use of congestion pricing for congested airports.

The Port Authority of New York & New Jersey operates all three airports. Unlike most other airports, which are constrained by federal law to spend all airport revenues on airport purposes, the Port Authority has a “grandfathered” exemption allowing it to spend net airport revenues on its other transportation activities. We therefore propose that, to the extent that airport congestion pricing produces additional net revenues, the new money be legally sequestered in a “lockbox” fund devoted solely to airport capacity expansion.

Delays at the New York airports are exacerbated by airspace congestion in addition to runway congestion. Such delays now account for one-third of the total delays in the New York region (and that total delay in 2007 was more than twice its level in 2004). We therefore recommend that the FAA charge a per-flight congestion fee for all turbine-powered flights operating under instrument flight rules (IFR) in New York airspace. This specific aspect of our recommendations is the only one that would require congressional action.

To sum up, we recommend that the Port Authority replace its current weight-based landing fee system at JFK, LGA, and EWR with a market-based price on departures. That price would vary by time of day, based on the estimated length of the departure queue at each period. While we estimate that such pricing would produce only the same or slightly more revenue than the landing fees it would replace, a key element of our proposal is the lockbox to ensure that any net new revenues be spent solely on expanding the capacity of the Port Authority airports.

The FAA, in turn, should charge high-performance users of the congested New York airspace if Congress permits them to do so. And the U.S. DOT should give top priority to implementing capacity-enhancing elements of its NextGen satellite-based navigation system at the nation’s most congested airports, beginning with those in New York.

This proposal is superior to auctioning off all existing airport slots. A congestion-pricing system is more flexible and able to adapt to periodic airline schedule changes. It is also a much better fit for non-scheduled flights, such as air taxis, corporate jets, and fractional jet operators who would be able to pay the market price when they choose to use JFK, LGA, and EWR.

And it is far superior to the airlines’ proposal that calls for grandfathering incumbent airlines’ slots and only permitting a secondary market in those few slots that may become available over time. That approach would make it very difficult for new entrants and therefore would suppress the competition that would provide better combinations of price and service to New Yorkers.

Although portrayed as a market-based approach, a system of slots allocated by the government is a continuation of the failed approach used at JFK and LGA for the past several decades. It is joined

at the hip with mandated cutbacks in flights, which would reduce passenger throughput and harm the metro area's economy. By contrast, our proposed congestion-pricing approach would minimize delays while maximizing passenger throughput.

What's needed is a three-way agreement among the Port Authority, the DOT/FAA, and the airlines. The DOT/FAA would prioritize airspace changes and NextGen investments for the New York airports and airspace. The Port Authority would implement the pricing and create the lockbox for net new revenues. The airlines and the metro area would avoid ruinous cutbacks in passenger throughput while gaining both near-term and longer-term improvements in airport and air traffic control capacity.

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Part 1

The History of Slot Controls and Exemptions

Access to a handful of congested airports has been limited by FAA regulation since the late 1960s. Restrictions on the number of flights were placed on the busiest airports in the national system: Washington National (DCA), New York's Kennedy (JFK) and LaGuardia (LGA), and Chicago O'Hare (ORD). Newark (EWR) had slot controls for only a few years. These airports were designated as High Density Rule (HDR) airports where the congestion problem due to excess demand was deemed to be sufficiently bad that government controls on the number of flights per hour were imposed.

Access to runways is allocated by granting an airplane the right to use that runway during a given time; these are known as slots. When FAA restrictions were in place, slots were mainly allocated to the incumbent airlines, with a mechanism later added that allowed airlines to trade slots between them. However, it was found that few airlines used this policy to sell airport slots to airlines that did not previously own slots but there was somewhat more leasing of slots between incumbent airlines. The market for slots was not particularly liquid as the only times that many slots became available for new entrants was when incumbent airlines, such as Eastern or TWA, went bankrupt or when capacity was expanded.¹ Although slot trading was expected to work in practice, the problems of market power and incumbency greatly restricted the efficacy of the secondary market when mandates restricted the number of available slots.

There were a number of exceptions given to certain services at airports under HDR. Firstly, only domestic service was required to apply for slots. Secondly, three types of slots were allocated, with one set given to regional carriers, a handful given to general aviation, and the others given to mainline carriers, with no scope for trading among the three types. In addition, there were exemptions for flights to small towns that were subsidized as part of the Essential Air Service (EAS) program. These rules led to an inefficient allocation of slots. Dissatisfaction with the many problems with slot controls has led to their removal at some point during the last seven years for all airports except Washington Reagan National, which still operates under restrictions on the number of slots and distances that planes can fly from that airport (known as a perimeter rule). LGA is the only other airport that still has this restriction on the distance that planes can travel to and from it with no flights to the west coast permitted for either LGA or DCA.²

Slot controls were re-imposed on an interim basis at Chicago O'Hare (ORD) in late 2004. The delay problem at ORD had become so bad that in November of 2004, the FAA stepped in to

allocate the distribution of slots with rules on trading slots between airlines. The two largest carriers at ORD, American and United, agreed to move 37 flights out of peak hours and to limit total operations to no more than 88 per hour.³ However, the accompanying slot trading system has not been particularly effective. Under the trading system used at ORD, airlines must have any trades authorized by the FAA, which then sends out the bid to other airlines that may want the slots. As a result there has only been one slot trade in the time that the slot controls have been in place.⁴ ORD is currently going through a significant redevelopment and runway redesign that is expected to considerably reduce delays there and allow slot restrictions to be removed in the future.

While this gives a brief history of slot controls at airports in the United States, the clear issue today is that of delays at LaGuardia, Kennedy, and Newark airports in the New York metro area.

A. LaGuardia (LGA)

The impact of airlines collectively scheduling more flights during certain periods than an airport can handle (“over-scheduling”) is clear when analyzing recent events at LaGuardia (LGA). As early as the 1960s, LGA was considered to be a high density rule (HDR) airport, meaning that the FAA mandated how many operations could go through the airport. In 2000, these restrictions were lifted, and airlines were allowed to seek exemptions to operate more flights than the previous restrictions mandated.

The result was a dramatically increased demand for flights at LGA. Airlines increased their number of total operations by more than 600 per day. As Table 1 shows, as the number of hourly flights increased, delays increased substantially. Nearly half of all domestic arrivals were at least 15 minutes late arriving into LGA after the effective removal of slot controls midway through 2000. The situation became sufficiently bad that the FAA reintroduced caps on the number of operations in January 2001. A lottery has been used in place of the previous slot controls since then. Delays returned to their earlier levels, and the drastic drop in air travel demand after 9/11 reduced delays even further.

Table 1 : Delays at LGA Before and After Slot Controls and Their Reintroduction			
	Slot Control (April 2000)	Post-Slot Control (October 2000)	Return of Controls (April 2001)
Hourly Slots at Peak Hour	71	104	81
Monthly Operations	31,116	37,373	34,874
Monthly Delays	3,109	10,226	2,941
Average Daily Delays	104	330	98
Percent of Flights Delayed	10	27	8

Source: Czerny, Tegner (2002) "Secondary Markets for Runway Capacity," *Imprint Europe*.

Controls were to remain in place at LGA until January 1, 2007, but their removal has been postponed while FAA works to develop a longer-term solution. Even with controls in place at LGA, delays at both JFK and LGA are now just as bad, or worse, than when the congestion problem was considered bad enough for the FAA to institute slot controls. In both October 2000 and October 2006, around 35 percent of all flights that left LGA were delayed by at least 15 minutes. Even more flights arriving into LGA were delayed by at least 15 minutes, almost half in 2000 and 40 percent in 2006.

According to Bureau of Transportation Statistics (BTS) delay data, out of 30,902 flights out of LGA during June, July, and August 2007,⁵ 10,494 arrived at their destinations at least 15 minutes late. Nationwide, these delays are second only to JFK, and the two airports combined make up the largest share of total delays of any individual city in the country. The two airports combined also account for a much larger share of delayed flights than their share of total flights. Twelve percent of all delayed flights in the country either take off from or arrive at JFK or LGA, whereas they only handle a combined seven percent of the total number of flights in the country.

B. Kennedy (JFK) and Newark (EWR)

Similar slot controls to those seen at LGA were applied to JFK starting in the 1960s. In the 1980s, the airport operator—the Port Authority of New York and New Jersey (PANYNJ)—doubled landing fees for general aviation flights and implemented a surcharge for all flights during peak hours, but these actions had little appreciable impact on congestion. Nothing representing congestion pricing has ever been applied to JFK, and the peak pricing system used before was exceptionally modest compared to other airports that have attempted it. (See Part 2.)

Slot controls were in place at JFK until January 1, 2007. As of this writing in late 2007, there are no slot controls, and the change in delays in less than a year has been dramatic. In just one year, between 2006 and 2007, delays during the summer months increased from around 32 percent of all flights to nearly 40 percent. Delays have increased even more dramatically relative to 2000, when delays were around 20 percent of flights landing or departing from JFK. As with LGA, delays are worse now than when the FAA stepped in to deal with delays in 2000.

Of the 32,558 scheduled domestic departures from JFK during the months of June, July and August 2007, 13,316 of these departures arrived at their destinations at least 15 minutes late. Of these flights, 9,299 were delayed by at least 15 minutes before they even took off from JFK. In summer 2007, out of all major airports in the United States, JFK had the highest percentage of flights that were at least 15 minutes late. As Table 2 shows, JFK went from having only the 14th highest percentage of delays in 2004 to having the fifth highest in 2006. So far in 2007, of all major airports in the United States, JFK has the highest percentage of flights delayed by at least 15 minutes.

Table 2 : Percent of Flights Delayed, 2004-2006						
	2004		2005		2006	
Airport	Probability of Delay over 45 Minutes	National Rank of Delay	Probability of Delay over 45 Minutes	National Rank of Delay	Probability of Delay over 45 Minutes	National Rank of Delay
O'Hare (ORD)	14%	1	12%	6	17%	1
Newark (EWR)	14%	2	18%	1	16%	2
LaGuardia (LGA)	13%	3	17%	2	15%	3
Kennedy (JFK)	9%	14	12%	8	14%	5

Source: George Donohue, "Optimum Fleet Utilization Under Congestion Management at NY LGA," Presented at NEXTOR Wye River Conference, June 7, 2007

Although it has received far less attention in the media and in recent policy debates, Newark (EWR) actually outranks both LGA and JFK in delays during the last several years as Table 2 makes clear. Hence, we have included EWR in this study.

While there are various reasons for why aircraft may be delayed, a major reason is that more aircraft than the airport can reasonably accommodate during a given period are collectively scheduled by airlines. During one 2007 day of JFK schedule data analyzed, airlines collectively scheduled 22 departing flights during one 15 minute period and as many as 60 during a given hour.

Airport capacity measures at JFK are controversial. The PANYNJ reports that the maximum capacity of at JFK is a combined 75 operations per hour, which is lower than the current capped operations at LGA, which does not have two independent runways. Some airlines have suggested that capacity could be as high as 100 operations per hour if the infrastructure at JFK were fully utilized, whereas the FAA claims that no more than 87 operations per hour is feasible.⁶

Currently, the average time it takes airplanes to taxi from the gate to their actual take-off is over 30 minutes during peak evening periods. This time spent on the taxiways has a huge economic cost, both in terms of increased operating costs for airlines, which is passed on to passengers through higher ticket prices, and wasted passenger time. To make matters worse, this time is particularly wasteful for passengers as safety rules preclude the use of electronics, such as laptops and DVD players, that keep passengers productive and entertained.

Using standard valuations of passenger time and aircraft operating costs, we estimate the total economic cost of taxi-out delays nationwide was upwards of \$10 billion in 2006. This understates the full cost of congestion since it only considers the amount of time that aircraft sit on the tarmac. Once the economic costs of cancellations and flights avoided altogether are included, the actual costs are much higher.

The three major New York airports—LGA, JFK and EWR—account for \$1.2 billion of our estimate of the total national economic cost of needlessly sitting on the airport tarmac. A more narrowly focused study by the New York City Comptroller’s Office assessed just the increase in costs to New York air travelers, due to the increased level of taxi-out delays in 2005–2007 compared with a decade earlier. That estimate was \$187 million.⁷

A congestion charge that deals with this problem could turn this wasted economic output into tangible wealth for both the national and New York economy. That was one of the recommendations of the Comptroller’s Office report.

Part 2

The Pricing Approach

“The laggard performance of the public sector in allowing more efficient development and use of critical aviation infrastructure is a serious deficiency that will become more troublesome as air travel expands. Crowded airports, flight delays, and passenger discontent over fares and services should not be seen as shortcomings of deregulation—but rather as clarion calls to complete the deregulation process by instilling market incentives wherever sensible and feasible.”

—John R. Meyer, 1999

The enormous economic cost of delays is due to the inefficient manner by which aircraft pay for the right to use runways. At most airports around the world, and at all airports in the United States, aircraft pay for runway use based on how much the plane weighs. For example, a plane that weighs 300,000 lbs. would be charged five times the amount of a plane that weighs 60,000 lbs.

A weight-based fee was originally justified on the grounds that it is a proxy for the damage cost that each airplane imposes on airport infrastructure. However, this has not been the case since the 1960s, when aircraft manufacturers began modifying landing gear to reduce the physical stress of aircraft weight on runways. In fact, if their landing gear is properly designed, large planes can inflict less damage on runways than much smaller planes.⁸

A. The Market Failure of Runway Use: The Reason for Congestion Pricing

In most markets for goods and services, an unfettered market is the most efficient way of allocating goods. This is based on the assumption that the markets operate in ways that the incentives for each individual actor lead to the collectively optimal allocation of resources. However, if the incentives for individual actors are such that a *laissez-faire* approach is sub-optimal, there is scope for corrective action to properly align individual incentives. The current market for runway use is fraught with market failures that present a case for corrective action by either the government or the airport authority. These market failures should be addressed using the simplest possible course of action, such as congestion charging for which the case will be made later in the paper.

1. The Tragedy of the Commons

Airport runways are treated as a common resource, since there is no price that is specifically applied to the use of a runway. A runway “slot”, the right to use a runway, is good for a given time; an airline just needs to use it at least 80 percent of the time if the slot allocation guidelines from the International Air Transport Association (IATA, the worldwide airlines trade association) are used. The cost of using the runway is bundled into a single weight-based runway fee, implicitly covering both an arrival and a departure, with no regard to how much demand there actually is for a runway at a given time. A runway is, in fact, an excludable good, meaning that one aircraft’s use of it means that others cannot use it, but a price based solely on aircraft weight does not account for this. A weight-based fee prices an excludable good as if it were a public good, creating this “tragedy of the commons” problem.

2. The Prisoner’s Dilemma

Airlines would collectively prefer to agree to operate only a certain number of flights out of an airport per day. If such cartel action were legal or practically possible, there would be fewer flights between cities but also fewer delays. However, it is in the interest of any individual airline to not abide by such an agreement and to offer the most flights out of an airport to win as much market share as possible while imposing congestion delays on other airlines. The other airlines will respond to this by also scheduling as many flights as they can in order to prevent any other airline from winning the entire market share at an airport. Since there is no legal mechanism whereby airlines coordinate when they will be arriving, airlines fall victim to a prisoner’s dilemma where each airline wants to be able to schedule as many flights as possible to prevent other airlines from doing likewise. It is this market failure caused by inefficient pricing of runway time use that has led to delays at JFK, LGA, and increasingly EWR as well.

3. The Externality Effect

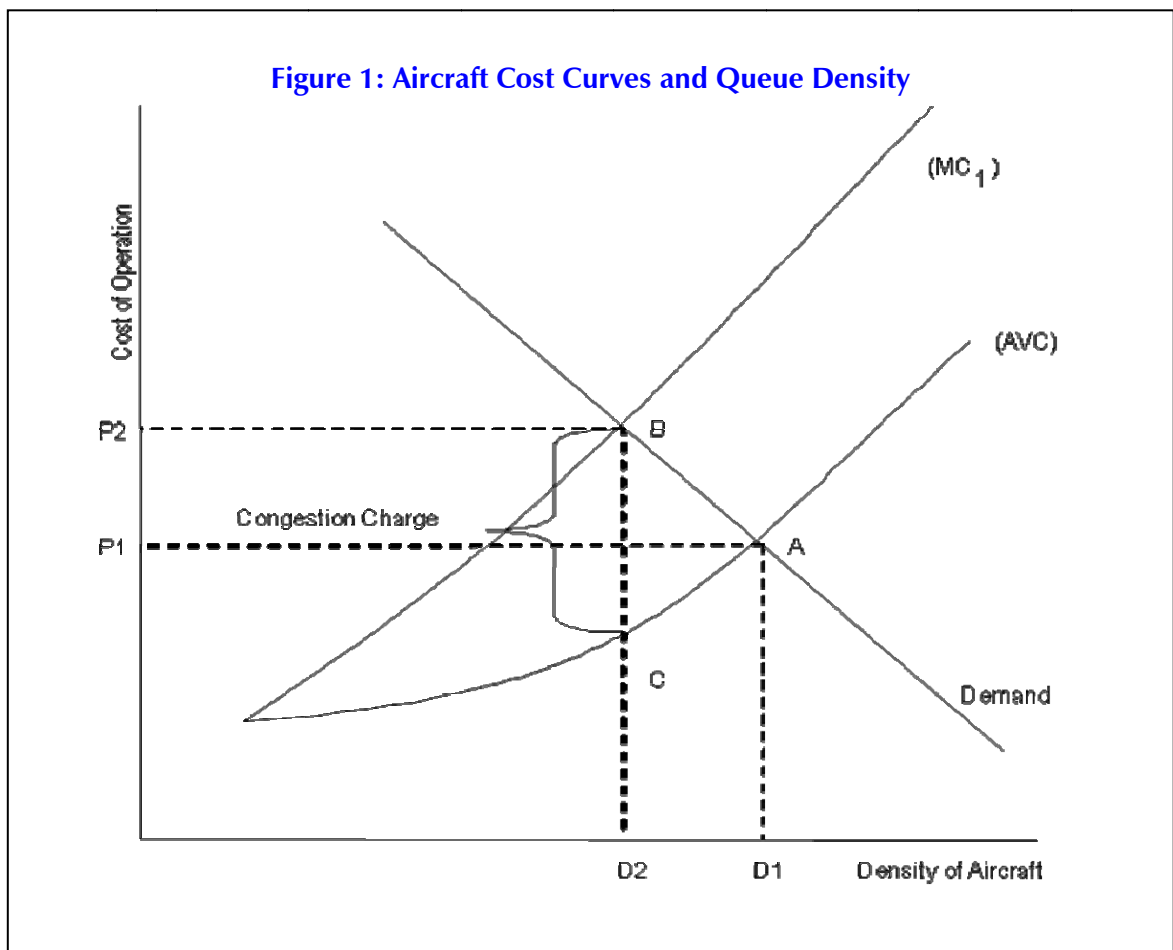
Each aircraft requires a certain amount of runway and departure spacing time to use and clear the runway for later aircraft. Had this aircraft not chosen to depart, the planes behind it would have spent less time waiting in the departure queue. Airlines do not consider that the time it takes their plane to take off means that other aircraft behind it must wait and incur extra time costs.⁹ This leads to more departing aircraft than would be scheduled if airlines considered the external costs of the time it takes for their aircraft to take-off.

However, airlines internalize the costs of these delays if they are only delaying planes that are within the same airline.¹⁰ Hence, a congestion charge is most applicable to airports where individual airlines only have a minority market share. This suggests that LGA and JFK are excellent candidates for a departure congestion charge, as the two largest airlines at JFK, Delta and JetBlue, only make up approximately 20 percent of total operations each, and at LGA no airline represents more than 20 percent of operations.

A congestion charge applied to departing aircraft would require aircraft to compensate others behind it in the departure queue for the delay it imposes. As the number of aircraft behind it in line

increases, the expected external delay cost increases. It is this external delay cost to which a congestion charge can be applied in order to reach an optimal level of departures. The congestion charge should be related only to how much delay an airplane imposes on others behind it. Generally, this would mean that a charge would not be based on individual aircraft characteristics. However, certain aircraft, such as wide-bodies, require greater departure spacing and thus impose a greater externality cost on other aircraft. Partly basing a congestion charge on aircraft based on their weight as a proxy for delays imposed, along the lines of a hybrid congestion and weight charge, could represent a more accurate measure of delay cost rather than congestion fees or weight-based fees alone. A similar approach can be taken to the quantifying the delay cost imposed by arriving aircraft that do not consider the external cost imposed on other departing or landing aircraft.

Figure 1 shows the average variable cost (AVC) of a single plane departing an airport. Each individual plane has an AVC that increases as it spends more time waiting in the departure queue due to greater density of aircraft. The external marginal cost is represented by the curve MC1. Currently, aircraft only consider their internal costs of delays, and schedule flights up to the point D1. The congestion charge will be the distance BC; this charge will bring internal aircraft costs in line with the external cost imposed on other departing aircraft and will reduce the demand for departures at a given time period, not necessarily overall, to the level D2.



B. Previous Literature and Case Studies on Airport Pricing

An extensive literature on the economics of congestion and airport pricing exists. This section will summarize some of the academic literature on estimating congestion charges and their expected effects and then briefly examine specific case studies of airport peak pricing. In summary, there is considerable empirical evidence that a congestion charge could be a very practical solution to airport delays and that all previous examples of airport pricing have not truly embraced congestion pricing.

1. Academic Literature

The first comprehensive approach to estimating the cost of airport delays is by Steven Morrison and Clifford Winston.¹¹ They estimate that the annual savings to the U.S. economy of using a congestion charge for runways in place of the current weight-based fee would be in the order of \$3.8 billion in 1989 dollars, which would be \$6.4 billion in 2007 dollars.

While there are clear winners from airport congestion pricing, advocates of congestion pricing must admit that there are also clear financial losers. While passengers on most medium to large airplanes will likely see savings in both time delays and perhaps ticket prices, there may be a negative impact on general aviation (GA) and regional carriers due to higher prices for using runways. In one estimate, the gains of congestion pricing can outweigh the losses by ten to one.¹² However, this definition of the “losers” from congestion pricing only considers how much their costs increase. General aviation could have much to gain, as their higher-income passengers will likely have a higher than average value of time and place greater value on certainty of access to airports that use congestion pricing in place of mandatory restrictions on flights. With a congestion charge used to deal with the externality of delays, GA (e.g., corporate and fractional jets) will have more certain access to JFK or LGA, as long as they are willing to pay the now- higher price, whereas an administrative demand management system would restrict their access without any consideration that their willingness to pay for access may be very high.

Even at airports where general aviation is a considerable proportion of total operations, such as at Minneapolis/St. Paul (MSP), the airport used in one of the most comprehensive analyses of the hypothetical imposition of a congestion charge,¹³ the benefits to airline passengers far outweigh the costs to GA. At LGA and JFK, where GA makes up a minuscule share of operations, it is likely that the net benefits would be much higher.

The first paper to address the marginal cost of delays imposed on other planes found that practical limitations in data and the ability to properly value use prevented marginal cost pricing.¹⁴ The situation is different now. Technological advancement makes the estimation of marginal cost pricing and the resultant dynamic equilibrium substantially easier now than in 1970.

2. Network Externalities and Airport Delays

One argument against congestion pricing is that major airlines offer greater service to other destinations through a hub network, and that a congestion charge will reduce the number of “spokes” on the “wheel.” The negative externality of aircraft imposing delays on other departing or arriving aircraft is partly offset by the benefit of airlines operating a network that increases in value as more destinations are added. It may also be the case that when a single airline has a considerable share of operations at one airport, it is mostly delaying other aircraft of its own; hence that airline has internalized much of the cost of delays.

This is supported in theory by Jan Bruecker and with evidence by Christopher Mayer and Todd Sinai.¹⁵ However, other evidence suggests that this effect is not apparent using other metrics.¹⁶ In any case, charging individual airlines different fees based on their share of operations would be legally dubious, since it would be clear discrimination in favor or against certain carriers. Since LGA and JFK are both largely origin and destination (O&D) airports, with JFK largely only a connecting hub for international flights, this argument does not particularly apply to them. While JetBlue does operate a hub at JFK, at least 80 percent of their delays are externalized onto other aircraft, and it is far from the monopolistic airline assumption that previous literature has defined as the prerequisite of delay internalization. However, since EWR is a major hub for Continental airlines, there may be a stronger case that network externalities may be considerable there.

3. Auctions of Airport Slots

An alternative to congestion and peak pricing would be to auction off slots. Numerous studies have been conducted on different types of auctions that can be applied to airport slots.¹⁷ In one often proposed system, airports would auction off the right to use a runway, both departures and landings separately or in a single package, at a specific time (for example, a landing between 10:15 and 10:30 and a takeoff between 11:30 and 11:45) to an airline for a given period. In the primary market (the stage of selling directly from the airport to the airline), there could be a number of stages to the bidding before a slot is actually sold. A portion of slots, say 20 percent, would be sold each year with the rights to use that slot granted for five years. An initial price would be set for slots for a specific time by the airport, and airlines would respond with how many slots they desire. The airport then recomputes the price based on how many airlines demand slots during this period and will raise prices if demand exceeds the safe maximum or lower them if certain time slots receive low demand. Airlines can then trade amongst themselves afterwards when short and medium term modifications to schedules change their demand for slots at a given time.

There are numerous modifications and variations to auction design, but one proposed solution’s benefits and possible negative consequences will be addressed here. Among the many possible benefits of using such a system of auctioning, as opposed to congestion pricing, is that congestion can be controlled with greater certainty by allowing the airport authority to sell slots only to the point when safe maximums are reached. The market system will be transparent and open to all

bidders. All airlines can access the market, and new operators will always have the chance to place the highest bid on access.

A primary market is very different from a secondary market. The secondary markets that currently exist at other airports, as shown above, have been plagued by the problem of the market power of incumbent airlines. In a primary market, an incumbent airline must pay the exact same price as a potential entrant and has greatly limited scope to force potential entrants out of a market.

The disadvantages of a slot auction relative to congestion charging are also numerous. First, airport officials need to have an accurate understanding of the exact capacity of airports in order to set the right number of slots to be auctioned.¹⁸ This informational problem is also apparent with the setting of congestion charges—officials need to know at what price to set slot access *a priori*. However, congestion charging can utilize a quasi-auction of iterative pricing and can set the price for slot access using the implicit price that airlines place on slot access through their imposed cost of delay. Auctioning only 20 percent of slots per year also raises the problem that airlines will place less value on only a transient asset versus a permanent one and that only a portion of slots will be properly priced during the implementation phase of auctions. Cost certainty for airlines would possibly be reduced as the auction may not have upper bounds, and short-term fluctuations in price are possible.

Similar systems have been used in practice in numerous situations, in particular for bandwidth and radio spectrum auctions. Part 4 of this paper will introduce a hypothetical auction used at LGA in a strategic game that followed rules similar to those outlined above.

4. IATA Rules for Slot Allocation and Trading

Airlines are currently advocating for the introduction of IATA slot allocation guidelines for U.S. airports. They argue that the United States is the only country in the world that does not use this system. In summary, the IATA slot allocation system begins with grandfathering the slots of incumbent airlines while preferentially allocating a share of any new slots to new entrants every year. Any surplus slots that become available (e.g., due to an airline bankruptcy) go into what is called the “pool” of available slots. These slots, as well as those owned by incumbents, may be traded in what is called a secondary market. Since few such slots become available, the IATA system is an effective way for already existing airlines to prevent new entrants from competing with them at airports they already dominate. IATA represents the interests of currently existing airlines, not future potential airline entrants.

This system creates perverse incentives that may in fact make congestion worse, not better. The IATA system requires that airlines use a certain slot at least 80 percent of the time, in a “use-it-or-lose-it” fashion. This creates an incentive for airlines to hoard as many slots as possible. This is illustrated by the situation at London Heathrow, where the greatest asset for some airlines is their slots. In order to hold onto their slots, airlines needlessly schedule flights that are nowhere near capacity or which are a poor use of the slot to ensure that they hold onto them for the future. One

result of this is that airlines will occasionally even fly empty planes into LHR to retain the slots rather than go below the minimum usage requirement that would lead to them losing the right to that slot.¹⁹

Furthermore, the “pool” of available slots made available to new entrants has been exceptionally small in cases where this system is used. For example, at London Heathrow only three percent of total slots are usually made available for new entrants, and these slots are usually at undesirable times.²⁰

The grandfathering rule has the effect of locking in current airlines at the expense of future entrants. Grandfathering assumes that historical use is the best predictor of the efficient allocation of slots.²¹ Airlines are notorious—despite their differences and competitive nature most of the time—for speaking with one voice when it comes to preventing new entrants. A recent example is how hard U.S. airlines collectively fought against granting Virgin America an operating license. IATA rules may require antitrust immunity in the United States since this system does require scheduling meetings among airlines and airports.

IATA rules allow for slot trading between airlines (the so-called secondary market). There is ambiguity as to what airlines can specifically trade for slots. Certain rules would allow airlines to trade services or other goods in-kind, rather than simply cash, in what is supposed to be a blind system wherein airlines do not know with whom they are trading slots. However, as the slot trading system that has arisen at Chicago O’Hare has shown, this allows airlines to signal to the other potential airline with which airlines they are trading. This creates a trading environment wherein airline alliance partners only trade among themselves, and the supposed mechanism that new entrants can obtain slots with does not in fact work. In fact, only one slot has traded at O’Hare in the last two years.

Incumbent airlines have little or no incentive to give a possible new entrant a chance to compete with it at that airport. This means that airlines that place low value on market slots will not trade with other airlines that place a much higher value on access to an airport. An asymmetry of values would normally result in a trade between parties, but the incumbency benefit granted by IATA rules for slot trading limits how much airlines will trade slots.

In summary, the IATA system of slot allocation is designed to ensure that airlines already using the airport hold on to their access at airports regardless of whether or not incumbent use of slots is the most efficient allocation of runway resources.

5. The Australian “Rebuke” of Congestion Pricing

The Australian experience of airport pricing is often cited as an example of airport pricing gone wrong. Critics will often cite the Australian Competition Commission²² report that congestion pricing would not work at airports there. This takes the decision of the Australian Competition Commission out of context. A series of public demonstrations against airport expansions and

increases in aeronautical charges was one of the key reasons for the formation of the Commission, and the Commission made this recommendation based on the expectation that no capacity growth in Sydney was possible given the public opposition.

In fact, the Australian Competition Commission encouraged the use of congestion pricing as long as certain conditions were met. The commission left the door open for airports to set their own charges to deal with congestion using time-variant runway fees. Specifically, the Commission concluded they would “allow them to introduce peak charges, minimum charges and other measures to better manage congestion.” The key provision of the report was that the government monitor, not regulate, the growth rate of airport charges and not how they were specifically set.²³

The final recommendation was that Australian airports not be directly regulated. In fact, the current hands-off policy has been sufficiently successful that the most recent report of the Australia Productivity Commission has suggested that this approach be continued for another five years.²⁴

6. Boston Logan “Peak Pricing”

Critics of congestion pricing will invoke the case of Boston Logan’s attempt to implement a new pricing system for runway usage. A new runway was being built and revenues to finance it were necessary.

It is apparent after looking into the details of the Boston PACE charging system that it was by no means a congestion charge or peak charge by any definition. The new charging system did not charge by time of day; it was simply an increase in the fixed cost of landing to \$91 per operation plus a decrease in the additional weight-based charge per 1,000 lbs.²⁵ This had the clear impact and intent of discriminating among different types of aircraft. General aviation operations decreased by 33 percent during the short time this charge was in effect, and regional jet service decreased by three percent.²⁶

This system had the effect of charging all flights more regardless of how much capacity was being utilized at any given time. This didn’t just decrease demand at certain peak times; it decreased demand at all times. It also had the effect of driving smaller planes out of the market, which led the courts to invalidate it, since general aviation (GA) did not have good alternative airports to use. Furthermore, charging an increased landing fee for future development contravenes the charging guidelines of the International Civil Aviation Organization (ICAO) to which the United States is a signatory.

Although the original peak pricing program at Boston Logan failed, a new peak pricing system is now being implemented, but only for a single runway. Air taxis, GA, and small regional jets are able to use Logan’s new, short runway. A peak period charge of \$150 will be added to landing fees when demand is high or when flight operations are constrained by weather. Peak period charges will be set out to identify peak periods up to six months in advance, in addition to real-time pricing to redistribute some flights to off-peak periods. This program, though limited to GA and small

regional flights, does meet the revenue-neutrality criterion and does not unduly discriminate among users. However, it is not a true congestion charge as it is limited in scope and does not truly account for the delay imposed on other flights.²⁷

The situation is different in New York since many alternative airports for general aviation exist, such as PANYNJ's own Teterboro (TEB). Also, the proposed congestion charges at JFK and LGA would be completely indifferent to aircraft characteristics and are based on the economic principles of allocation of runway usage instead of being designed to reduce usage of the airport by specific types of aircraft.

7. "Peak Pricing" at London Heathrow (LHR)

London Heathrow is the closest case of an airport applying a time-variant runway use fee. However, this was not a congestion fee that was based on the marginal costs of delays or usage of runway space. Pricing at Heathrow has been greatly limited by regulatory constraints and concerns of market power that airport owner/operator BAA exercises over the London airport system. This has been exacerbated by a regulatory structure that favors revenues from retail and shopping at LHR while under-pricing runway access.

BAA imposed two different runway charges, a regular fee and a discounted fee for operations during off-peak periods. The peak-pricing system was deemed to be arbitrarily set, with no regard to the economic or accounting cost of runway use. U.S. carriers sued BAA and extracted nearly \$30 million in compensation for this pricing system.²⁸

The key failure of the London system is that a peak/off-peak differential alone is of little value. The pricing system did not truly account for the fact that demand at LHR was sufficiently high at all times that no real off-peak period existed. Instead, a system that continually estimates the marginal cost that each aircraft imposes on other aircraft is a true congestion price. Contrary to the arguments used in the LHR case, that the price had no economic grounding and was set at an arbitrary level, a congestion price based on external costs can be estimated. The application of marginal cost pricing, estimated in the case of JFK in Part 5 of this paper, will be shown to not be arbitrarily set, as was the case in both London and Boston.

The above case studies and academic literature on congestion pricing applied to airports show (1) that the previous critiques of congestion pricing applied to airports have little grounding in the academic and empirical literature on the subject and (2) that a true congestion charge has not been yet been applied in practice.

Part 3

Airline Concerns

In the current debate over the possibility of using pricing mechanisms to reduce congestion at the New York airports, the Air Transport Association (ATA) and individual large airlines have raised a number of concerns. One of those is that pricing has been tried but has not worked at selected airports, but, as we noted in Part 2, none of these airports have attempted to find market-clearing prices for congested periods. Instead, they have resorted only to peak/off-peak differentials, which have generally not been sufficient to make a significant difference in the level of flight activity.

The large number of other airline concerns fall into several categories. We briefly list and explain the main ones here, providing a baseline against which we can examine proposed pricing mechanisms for the New York airports in subsequent parts of this policy study.

A. “Pricing Will Be Ineffective”

This set of concerns says that market pricing might be effective at airports with some degree of congested peak hours, but not at severely congested airports such as those in New York. This point includes at least four specific claims:

- 1. “There are no off-peak times.”** It is claimed that demand to use LGA and JFK, in particular, is so high that there are effectively no off-peak periods to which scheduled landings or take-offs could be shifted.
- 2. “There are effectively no alternative airports.”** In principle, if demand exceeds capacity at one airport, a high price there could shift some flights to alternative airports. But in the greater New York City area, it is claimed, each of the three principal airports is unique and has no real substitute: LGA is the only close-in airport for short/medium-haul service; JFK is by far the United States’ biggest international hub; and EWR is the only practical airport for both domestic and international service for the large New Jersey portion of the metro area. And the secondary airports—such as MacArthur, Westchester, and Stewart—are either too far away or too limited in size to have much impact.

3. “Up-gauging won’t happen.” To the extent that either or both of the above points is true, pricing proponents argue that in response to high prices, airlines will shift some flights from smaller planes to larger planes, which is called up-gauging. In principle, up-gauging would allow a smaller number of flights (consistent with reduced congestion) to handle the same or a larger number of passengers as is being handled with today’s delay-plagued scheduling. Airlines say that there are good reasons for using small planes on many routes (e.g., to provide the frequency of service their customers demand) so they will not change.

4. “Carve-outs and exemptions will distort the market.” In the real world, where Congress is likely to take an interest in any solution for New York airport congestion, there is high likelihood that favored categories of flight activity will be exempted from the pricing system. Such carve-outs are said to be likely for general aviation (which includes corporate jets and turboprops, fractional jets and turboprops, and air taxi services), service to certain small hub and non-hub airports, certain air carriers defined as “new entrants” or “non-incumbents,” and foreign air carriers (on grounds that they have a right to their current level of service under bilateral aviation agreements).

B. “JFK (or EWR) Is a Special Case”

Despite the growth of other U.S. gateway airports in the decades since airline deregulation, New York (JFK plus EWR) has twice the international passenger volume of second-ranked Los Angeles (LAX) and three times that of third-ranked Miami (MIA). Hence, international air travel is important to the principal airport operator, the Port Authority of New York and New Jersey (PANYNJ), and to the economy of the metro area. The airlines have raised three concerns about harm that could be done to their international operations if pricing were imposed at JFK and EWR.

1. “There is no alternative to the trans-Atlantic departure window.” Most international departures from these airports are overnight flights to Europe, timed to arrive there in the morning. Having them depart New York prior to the early-evening window would make their arrival in Europe occur well before dawn, which in some cases violates airport curfews and in nearly all cases would be uncomfortable for passengers. Arriving later than early/mid-morning means that travelers would miss the better part of their first day in Europe.

2. “Connecting flights are essential to an international hub operation.” JFK and EWR serve as hubs for such traffic, aggregating passengers from numerous other U.S. cities, along with passengers originating in the New York metro area, to provide sufficient numbers to support non-stop flights to dozens of overseas destinations. In a recent presentation, Delta notes that a typical 767-300 transatlantic flight is roughly 50 percent locally originating passengers and 50 percent connecting passengers. Of the latter, about half come from “mainline” connecting markets, such as Atlanta, Seattle, or Salt Lake City, while the other half come from “regional” connecting markets, such as Boston, Columbus, or Pittsburgh. The concern is that pricing, by cutting back the number of arriving flights, would eliminate some of the feed needed to make certain international flights viable.

3. “Foreign competitors will gain an unfair advantage.” This concern rests on the previous history of capacity controls at selected U.S. airports, under which foreign airlines were exempted from negotiated cuts in flights on grounds that they are entitled to those flights based on current bilateral agreements. The airlines assume that a similar legal argument would be made by foreign carriers, arguing that they be exempt from any new pricing system.

C. “Pricing Would Undercut Needed Capacity Expansion”

This concern has two aspects. First, it is applied as a general argument that the priority of the U.S. DOT, the FAA, and the airports ought to be on expanding airport capacity, rather than on allocating what capacity exists. Second, it is raised with special focus on the circumstances that apply to airport governance in New York.

1. “Capacity expansion, not scarcity management, should be the focus of aviation policy.” In various public statements as well as in recent deliberations of the U.S. DOT’s Pricing Committee of the Aviation Rulemaking Committee (ARC), the ATA and individual airlines have argued that by focusing on the use of pricing and/or activity caps at highly congested airports, DOT is undermining incentives for rapid action to expand capacity—such as implementing the FAA’s airspace redesign and quicker installation of advanced technologies that can more efficiently manage traffic on the ground (e.g., ASDE-X and ADS-B) to permit more closely spaced arrivals (via Continuous Descent Approaches (CDAs)).

2. “The Port Authority airports can spend airport revenue on any number of non-aviation projects.” Most U.S. airports are governed by FAA grant assurances that prevent the diversion of airport revenue to non-airport purposes. But PANYNJ has a “grandfathered” exemption from that provision and may legally spend excess revenues on any of its many areas of activity, such as the PATH trains between New Jersey and lower Manhattan. Thus, airlines are very concerned that a pricing system generating net new revenues would amount to a large new tax on aviation with no offsetting benefits (such as expanded airport capacity).

D. “It’s Not Just the Airports; It’s Also the Airspace”

The Air Transport Association has analyzed FAA’s OPSNET and ETMS databases to identify the types of flight activity taking place in the terminal-area airspace controlled by the FAA’s New York TRACON. That breakdown showed the following (in July 2007):

Table 3: Flight Activity in New York TRACON Airspace	
Air Carrier	30.9%
Air Taxi	22.0%
General Aviation	46.3%
Military	0.8%
Total:	100.0%

Source: FAA OPSNET and ETMS databases

Thus, the airlines contend that congestion in the New York area is not simply a phenomenon of congested runways at the three large airports; it is also a matter of complex and congested terminal-area airspace. There are eight airports within this TRACON area with over 200 departures per day and six more with over 100 per day. Thus, any solution to New York congestion needs to address airspace congestion as well as runway congestion at the three largest airports.

E. The Levine Challenge

Concerns over whether pricing will address the problem of New York airport congestion are not limited to the airlines. One of the country's most respected aviation experts is Professor Michael E. Levine of New York University. One of the architects of airline deregulation (when he was on the staff of the Civil Aeronautics Board in the 1970s) and an aviation law expert who has also held management positions in several airlines, Levine was one of the first to propose market pricing as the best remedy for addressing situations where airport demand greatly exceeds capacity.²⁹

In a recent policy brief for the Reason Foundation, Levine reaffirms his support for airport pricing.³⁰ But he cautions, "Under the particular conditions of New York, there are reasons to be very concerned that the proposed project will not just fail and do economic damage, but will develop a political constituency that would make it very hard to undo." This concern stems from "institutions and legislation already in place that don't make sense economically but, in concert with the [pricing] proposal, will create even more perverse incentives." Levine argues that we need to fix these impediments before implementing congestion pricing at the New York airports.

Levine sets out three preconditions for an effective pricing system for these airports (and others with similar institutional constraints—especially a grandfathered exemption from the normal anti-revenue-diversion provisions). They are as follows:

There must be no exemptions. Under this heading Levine includes possible exemptions for foreign carriers, general aviation, and service to small communities. Such exemptions would be both economically inefficient (hence failing in the goal of putting the scarce capacity to its highest and best use) and discriminatory against those airlines that would be subject to paying the congestion prices.

Airport monopolies must be addressed. In nearly all large metro areas (which is where congested airports are located), there is either a single air-carrier airport or a single provider of the large majority of all air-carrier airport capacity. Unless there are controls on how such monopolistic providers use the revenue from airport pricing, "the incentives for most airport operators are all wrong, including incentives to encourage environmental objections [to capacity

expansion], restrict output, and create scarcity, thereby gaining revenue and reducing cost at the expense of the traveling public and the economy.” Note that Levine assumes that the entity doing the pricing would be the airport provider, not the FAA since the FAA does not appear to have legal authority to do so in the absence of legislation that Congress would have to enact.

Create a congestion-charge fund for capacity expansion. One way to address the airport monopoly concern is to legally sequester the net new revenue raised by airport pricing to expand the capacity of the airport or airports in question. Levine suggests that only projects that expand runway capacity be eligible expenditures of these funds (though he includes off-airport expenditures, such as soundproofing nearby homes, that would make such expansions possible). He also suggests that this capacity-expansion fund be created at the federal level so that “airports in different metropolitan areas where congestion charges were imposed could compete for money from the new fund by expanding capacity.” This clearly would require legislation if implemented in this way.

In subsequent sections of this policy study, we will refer back to both the Levine Challenge and the airline concerns set forth in this section.

Part 4

Pricing for LaGuardia

Since true market-clearing prices have never been used at congested airports, we cannot point to working models from elsewhere. Instead, we must rely on the best work that has been done to simulate the effects of market pricing. There has been considerable academic work on this subject, summarized in Part 2. Here, we review the most recent research on pricing for LGA. In the following section, we will do the same for JFK and EWR.

A. The NEXTOR Strategic Game

Most research on the application of pricing to specific airports has used some form of simulation model. But several years ago, the FAA funded a more-advanced technique: strategic simulation (otherwise known as “strategic games”). This kind of exercise involves people with expert knowledge in the field in question playing the roles of key decision-makers dealing with a specific real-world situation. War games and corporate strategy games are familiar examples.

The FAA National Center of Excellence for Aviation Operations Research (NEXTOR) is an academic research consortium, funded largely by the FAA. The NEXTOR Congestion Management Project has been researching demand-management options for the New York airports. In 2004, the NEXTOR universities were asked by FAA and DOT to design and conduct a series of strategic games to explore what might happen under several alternative demand-management approaches if applied at LGA. George Mason University (GMU) and the University of Maryland (UMD) took the lead on this project, assisted by UC Berkeley, MIT, Harvard, and GRA, Inc. The first strategic game took place in November 2004 and the second in February 2005. A summary of these exercises and their results is contained in a recent policy brief by George Donohue and Karla Hoffman of GMU.³¹

As a tool to support the players, the research team used previously developed simulation models of the National Airspace System based on historic data along with the GMU Stochastic Network Delay Model. For each alternative policy tested, the resulting aggregated schedule was fed to the two independently developed simulation models to calculate the resulting levels of delay and cancellations. The first exercise compared two administrative measures and two rounds of pricing to the schedule represented by the projected November 2007 schedule as the baseline.

As in a war game, the fidelity of the results depends on both the accuracy of the models used and the knowledge and experience of the players. The major players in the LGA strategic games were schedulers from American Airlines, Delta Airlines, a team representing US Airways and Spirit, the airport operator (PANYNJ), the FAA, and the U.S. DOT. Other participants included ATA, other airline representatives, and experts from industry and academia, as resource people. The airline teams were asked to make scheduling decisions under the various alternative policy environments.

The results of the first game, comparing administrative measures and congestion pricing with the baseline, are very interesting. For the administrative measures (Admin 1 and Admin 2), the government team came up with various (non-price) means of reducing capacity from the 1,400 operations/day to 1,250. Admin 1 allocated the 1,250 slots on the basis of historic use. Admin 2 modified this by limiting slot allocations to 20 years, with the slots randomly divided into 20 groups with the lifetime of the first group expiring after one year, the second group expiring after two years, etc. Slots whose ownership expired were reallocated administratively, with preference given to new entrants and slot-limited carriers.

These two administrative measures did reduce congestion, but overall delay was still high, and passenger throughput was reduced. PANYNJ wants passenger throughput of 30 million annual passengers (MAP), which corresponds to about 68,000 per day. But under both Admin 1 and Admin 2, daily passenger count was in the 57-58,000 range, about 15 percent less than PANYNJ desires. Under these conditions, airlines eliminated the least-profitable flights from their schedules, but did not up-gauge their equipment on the flights they continued to operate.

The results were very different for the congestion-pricing cases (CP 1 and CP 2). In response to significantly higher landing charges, the airlines altered their schedules in ways that increased their average aircraft size (up-gauging) at nearly all hours of the day. Some carriers with large numbers of historic operations at LGA reduced their operations while others increased theirs. Daily passenger throughput, as a result of these changes, was nearly 68,000 in both CP versions. CP 2 had somewhat higher prices and a somewhat different distribution of prices at various times of day and as a result produced slightly greater reductions in cancellation and delay costs than CP 1.

The way congestion pricing was developed was as follows. Because neither the Port Authority nor FAA/DOT wished to set the prices, the game invented a hypothetical Pricing Board. This body proposed a set of prices to go into effect in 90 to 120 days. The airlines adjusted their schedules in response to the prices and submitted them to the Board. The Board evaluated the new schedules and adjusted the prices to reduce demand at over-subscribed times. The airlines then tweaked their schedules in response to the revised prices, and the process continued until the schedules met the targeted number of operations for each time period. This process enabled airlines to announce their schedules and fares well in advance of each pricing period.

In their policy brief, Donohue and Hoffman note that both the administrative and pricing alternatives could have produced greater congestion reduction had the FAA/DOT been willing to set a lower capacity target. Also, in the case of the pricing alternative, the game was not continued

beyond two rounds because, by that point, the airline players said that to make further changes in response to even higher prices would involve higher-level consultation with management, due to possible system-wide impacts.

The second strategic game exercise used slot auctions instead of congestion pricing. Specifically, the airlines were taught how to use combinatorial clock auction software to bid for slots with only price and aggregate demand information provided at each round of the auction. Given a set of slot prices at various times of day, the airlines were asked to develop schedules. The results were similar to those of the congestion-pricing exercise with similar outcomes in terms of up-gauging and flight frequencies.

In their policy brief, Donohue and Hoffman conclude that either slot auctions or congestion pricing would produce similar results at a congested airport like LGA; in fact, congestion pricing decided several months in advance is the functional equivalent of a short-term auction. In assessing the two, they write: “Shorter term pricing mechanisms require less financing and more ability to move in and out of markets. Longer term auctions provide more stability and thereby more ability to market new locations and services and to invest in infrastructure.”³²

B. Implications of the NEXTOR Findings

We can now review the airline concerns about whether or not congestion pricing would “work” at LGA, items A1 through A4 in the discussion in Part 3. (The other airline concerns will be addressed in subsequent sections.)

1. No Off-Peak Times?

As can be seen in Table 4, the base schedule (with no pricing) included only a handful of hourly periods with less than 80 operations—but five off-peak hours are still more than zero. More important is what happened *after* pricing was implemented. In response to prices that varied from a low of \$275 to a high of \$1,200 per operation, CP 2 produced 14 hourly periods with fewer than 80 operations—a dramatic change. Since most of the hourly periods had prices significantly higher than current landing charges (which range from \$73 to \$549 for aircraft actually operating at LGA), those prices definitely led to shifts of flights away from a number of the busiest hours, as well as to the reduction in the total number of scheduled operations (from 1,428 to 1,292).

All Fees Are Per Operation						Reference Approx PANYNJ Dep Fee Per Operation	
Beginning of Hour	Base Sched. Ops.	Round 1 (\$)	Round 1 Sched. Ops	Round 2 (\$)	Round 2 Sched. Ops	SF3	\$73
0430		\$275	1	\$275	1	ER3	\$110
0530	27	275	42	275	42	CRJ	\$123
0630	75	600	67	600	67	F100	\$245
0730	93	800	66	800	76	B717	\$274
0830	94	800	87	1000	73	B733	\$311
0930	90	800	71	1000	67	A319	\$385
1030	84	600	97	1000	96	A320	\$413
1130	84	600	92	1000	71	B757	\$549
1230	97	800	61	800	81	B763	\$1,015
1330	86	800	63	800	80	Fees are in lieu of existing departure fees.	
1430	84	600	85	1000	71		
1530	83	600	101	1000	101		
1630	85	800	62	1200	54		
1730	89	800	86	1200	82		
1830	92	800	94	1200	81		
1930	91	800	73	800	85		
2030	81	600	80	600	79		
2130	58	600	36	600	39		
2230	25	275	38	275	38		
2330	10	275	8	275	8		
All Other	0	\$275	0	\$275	0		
Total Operations	1428		1310		1292		

2. Smaller Communities Cut Off from New York?

The NEXTOR results do not say whether some of the flights pulled from the LGA schedule were reassigned by the airlines to other New York metro area airports. Since 92 percent of LGA service originates or terminates at LGA, it is quite possible that the real-world effect of this kind of congestion pricing would be to shift some of that O&D traffic to other airports in the region. This could include off-peak times at EWR or JFK, depending on what capacity would be available under a congestion-pricing structure at those airports, but more likely would target the other three air-carrier airports in the area.

MacArthur (ISP) serves a catchment area on Long Island, which could extend to the eastern portions of the Bronx and Queens (and might already do so for those willing to drive a greater distance to avail themselves of Southwest's generally lower airfares). The November 2007 *Official Airline Guide* shows that ISP currently has service to 18 markets, via three carriers. These include short-haul service to Boston, Baltimore, and Philadelphia; medium-haul service to Atlanta,

Chicago, Dallas, Orlando, and New Orleans; and long-haul service to Las Vegas, Los Angeles, and Oakland.

Westchester (HPN) serves southeastern Connecticut and the northern suburbs of New York City, but can also serve the Bronx and Manhattan. The *OAG* shows service on nine carriers to 20 markets, including six Canadian cities served by Air Canada, cities in Florida, and cities the Midwest, but not cities on the West coast. HPN has historically imposed limits on passenger numbers, but in recent years both JetBlue and AirTran have been able to establish service there, to Atlanta and to multiple points in Florida.

Stewart (SWF), recently acquired by the PANYNJ, currently serves seven markets via five carriers, all of them East coast destinations as far south as Florida, except for one in the Midwest (Detroit). Stewart is a possible alternative for northern New Jersey, Westchester County and other northern New York City suburbs, and southeastern Connecticut. With improved ground access, it has great potential as a significant part of the metro area's airport capacity.

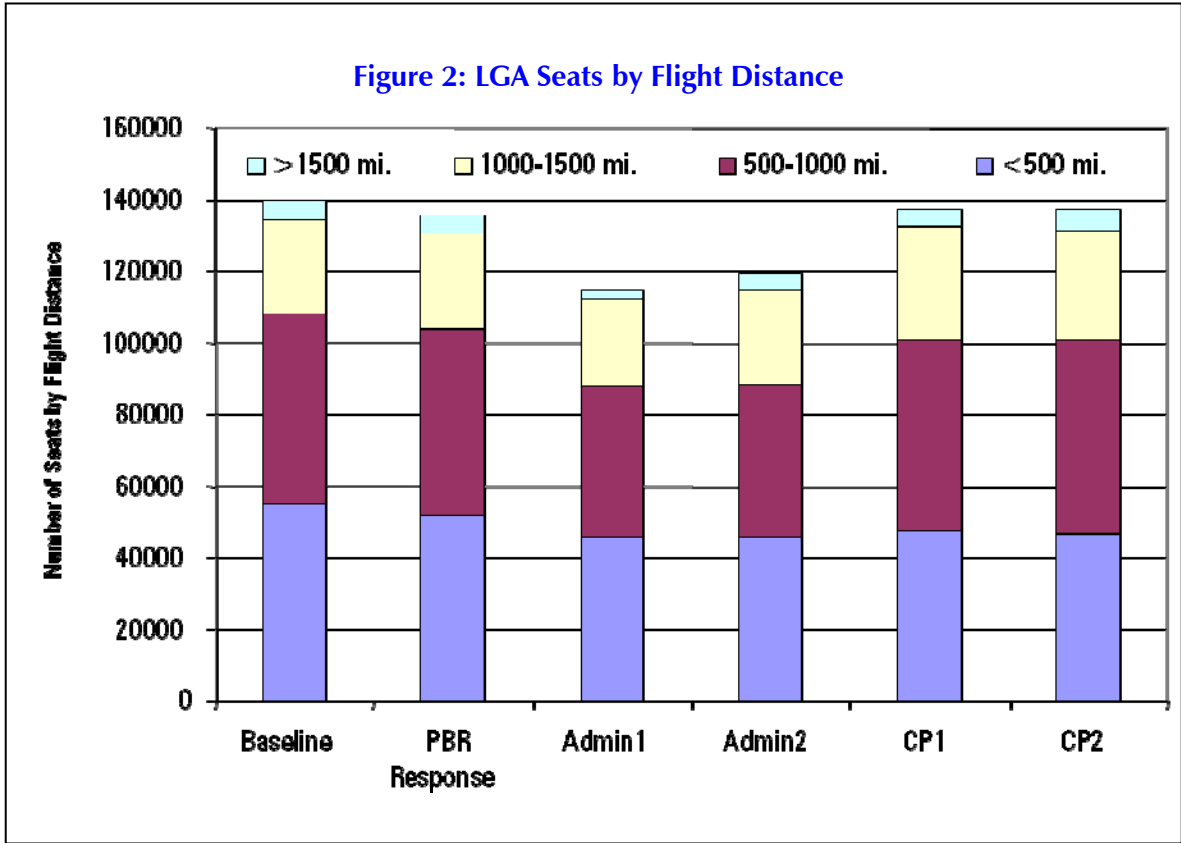
Congestion pricing would clearly raise the price of getting to and from the New York metro area's most centrally located airport, LGA. But there are five other options for the O&D market within the region.

3. *No Up-Gauging?*

One of the most important findings of the NEXTOR LGA strategic game was that airline schedulers would up-gauge certain flights to get more productive use out of certain operations. Table 5 shows in some detail what kinds of flights were deleted from the schedule. Interestingly, it was not mostly the under-30-seat aircraft. Of the 182 flights removed, only 18 were in that smallest size category. By far the largest number were in the 31-70 seat category. These are mostly regional jets that are used to provide a given number of daily seats in a market at higher frequencies. For example, Delta Connection currently offers nine daily E70 (Embraer 170 RJ) flights each day from Chicago Midway to LGA. American Eagle offers nine daily ER3 (Embraer RJ-135) flights from LGA to Boston. Up-gauging involves the substitution of a smaller number of daily flights of somewhat larger aircraft, which is what underlies the changes shown in Table 5.

Further evidence that up-gauging was what the airline schedulers elected to do is provided in Figure 2. This graph compares the total number of seats offered in the emerging daily schedule in each of the alternatives modeled in the LGA strategic game. It is clear that the two administrative policies led to simple cutbacks in flights without up-gauging, which led to a large decrease in total seats. But both congestion-pricing alternatives produced nearly as many daily seats as the baseline, and with a similar distribution of flight distances (albeit with some reduction in the under-500-mile category). It is this up-gauging that increases LGA's performance, allowing it to handle the same number of daily passengers as the baseline but with significantly less congestion and delays.

Table 5: Flights Removed from LGA Schedule Due to Congestion Pricing									
Hour	Per Operation Congestion Fee	Flights Removed from Schedule (Seat Size)							Total
		<30	31-70	71-100	101-150	151-180	181-225	>251	
0	275	0	0	0	0	0	0	0	0
1	275	0	0	0	0	0	0	0	0
2	275	0	0	0	0	0	0	0	0
3	275	0	0	0	0	0	0	0	0
4	275	0	0	0	0	0	0	0	0
5	275	0	0	0	0	0	0	0	0
6	275	1	3	0	4	0	0	0	8
7	1200	1	10	0	1	0	0	0	12
8	1200	4	14	2	4	0	0	0	24
9	1200	0	11	0	3	0	1	0	15
10	1200	0	7	0	1	0	0	0	8
11	1400	2	5	1	1	0	0	0	9
12	1200	3	15	0	1	0	0	0	19
13	1400	0	4	0	0	0	0	0	4
14	1400	0	10	1	0	0	0	0	11
15	1400	1	10	0	1	0	0	0	12
16	1400	1	16	0	8	1	1	0	27
17	1800	3	8	0	2	0	0	0	13
18	1800	2	10	1	1	1	0	0	15
19	1800	0	15	0	4	0	1	0	20
20	1800	0	7	1	1	0	1	0	10
21	1200	0	10	0	2	0	0	0	12
22	275	0	3	0	1	0	0	0	4
23	275	0	0	0	1	0	0	0	1
Total Removed		18	158	6	36	2	4	0	224
Total Base Case		26	502	56	588	82	86	10	1350
Pct Removed		69%	31%	11%	6%	2%	5%	0%	17%
Total Removed Earlier		2	20	1	10	1	0	0	34
Total Removed Later		0	9	0	1	0	0	0	10



That airline schedulers opted for up-gauging is not surprising, given how recent the current configuration of aircraft serving LGA is. Table 6 shows how much down-gauging has taken place at LGA over the past five years, with a 35 percent increase in regional jets accounting for all of the net increase in flight activity, while planes larger than 200 passengers have been eliminated altogether.

Table 6: Down-Gauging at LGA in the Last Five Years			
Aircraft Size Category	Aug. 2002	Aug. 2007	Change
Under 100 seats	240	324	+35%
100-200 seats	292	273	-6.5%
Over 200 seats	6	0	-100%
Total:	538	597	+11%

Source: Simat Helliesen & Eichner, based on OAG data.³³

4. Carve-Outs and Exemptions?

On this final concern about the effectiveness of airport congestion pricing, the NEXTOR results have less to say, because carve-outs and exemptions are a matter of government policy. The FAA or Congress might mandate such interventions, so all we can do here is explain how they were handled in the strategic game.

In this exercise, the existing 36 daily general aviation operations at LGA were assumed to remain in operation; that is a tiny fraction of the 1,300–1,400 daily operations and not enough to worry about. In fact, a congestion-pricing approach with no GA exemption might offer greater flexibility for the occasional fractional or corporate jet operator that wants to operate at LGA and is willing to pay whatever the market price is.

On the question of service to small cities (which have received carve-outs in some previous version of slot controls at LGA), no specific exemptions were included in the exercise, so it was possible to see how airlines would handle such service in the absence of a mandate. In the two congestion-pricing rounds, 10 cities were dropped from the schedule and four new ones added. Presumably, the airline schedulers recalculated the profitability of every LGA flight in their schedule, factoring in the new price to use LGA. In addition to making up-gauging decisions (trading off aircraft size and frequency in particular markets), they also identified the least-valuable flights under these changed conditions and dropped some of them from their schedule.

That the net loss of cities served was only six (out of approximately 80 served from LGA based on the schedule used in the exercise) suggests that the loss of access is a small problem from the New York metro area's standpoint. The congestion-pricing system yielded essentially the same daily number of passengers at LGA as the delay-plagued status quo, only slightly altering where those passengers came from or went to. More detailed analysis would be needed to determine whether any of the 10 cities that lost all LGA service would end up with no service to any airport in the overall New York region.

It is also worth noting that (as of this writing in late 2007) there is only one Essential Air Services (EAS) market served out of LGA, Lebanon, NH, with only four daily round trips.

Part 5

Pricing for Kennedy (JFK) and Newark (EWR)

To address concerns that congestion pricing at JFK and EWR will not work, we have conducted an analysis similar to the NEXTOR strategic game. We used an alternative approach to estimating congestion charges based on historical schedule and delay data. This approach estimates the cost of delays imposed by departing aircraft onto other aircraft departing after them and uses this value to estimate what congestion charge airlines should be willing to pay instead of paying the implicit price of a delay. As discussed in further detail in Part 2, airlines do not consider that the time it takes for their planes to utilize the runway precludes other aircraft from departing at that time and thus slows down their departure. The congestion charge estimated here would bring private costs in line with social cost of using a runway.

This section estimates at what levels such a congestion charge would approximately be set and what the consequences and implications of those charges would plausibly be. If the airlines can submit a schedule for which they receive a quote for congestion charges and can then re-evaluate the proposed charges, this iterative process essentially becomes a quasi-auction for slots.

A. Delays at JFK and Estimation of a Congestion Charge

1. *The Cause of the Problem at JFK: Over-Scheduling*

A cursory look at the departure delays at JFK shows that delays are worst during the mid-morning and the early evening. On average, it takes planes 30 minutes longer from the time they leave the gate to the time they take off during these congested periods than when the runways are not congested.

The reason for this delay is that airlines have scheduled more flights to depart than the airport can physically handle during peak-periods. For example, on one random 2007 day analyzed, airlines scheduled 59 departures between 8:30 and 9:30 AM. The FAA's calculation of the safe maximum number of departures per hour from JFK (assuming that planes are also arriving at this time) is between 42 and 50 depending on the capacity and weather condition estimates. (Weather and limited visibility reduce the number of aircraft that can depart during a given period.) When either

too many operations are scheduled or departure capacity is constrained, the result is inevitable: delays.

2. An Estimate of Congestion Charges at JFK

A congestion charge that is applied to departing aircraft can be estimated based on the cost that each individual aircraft imposes on other aircraft behind it. This is calculated by determining the queue length behind each aircraft to estimate the taxi-out delay. Using the values that airlines place on the cost of delays, the excess cost of delays is translated into what these aircraft would be willing to pay for a congestion charge to remove this delay. The external cost increases with each aircraft in the queue behind a departing aircraft.

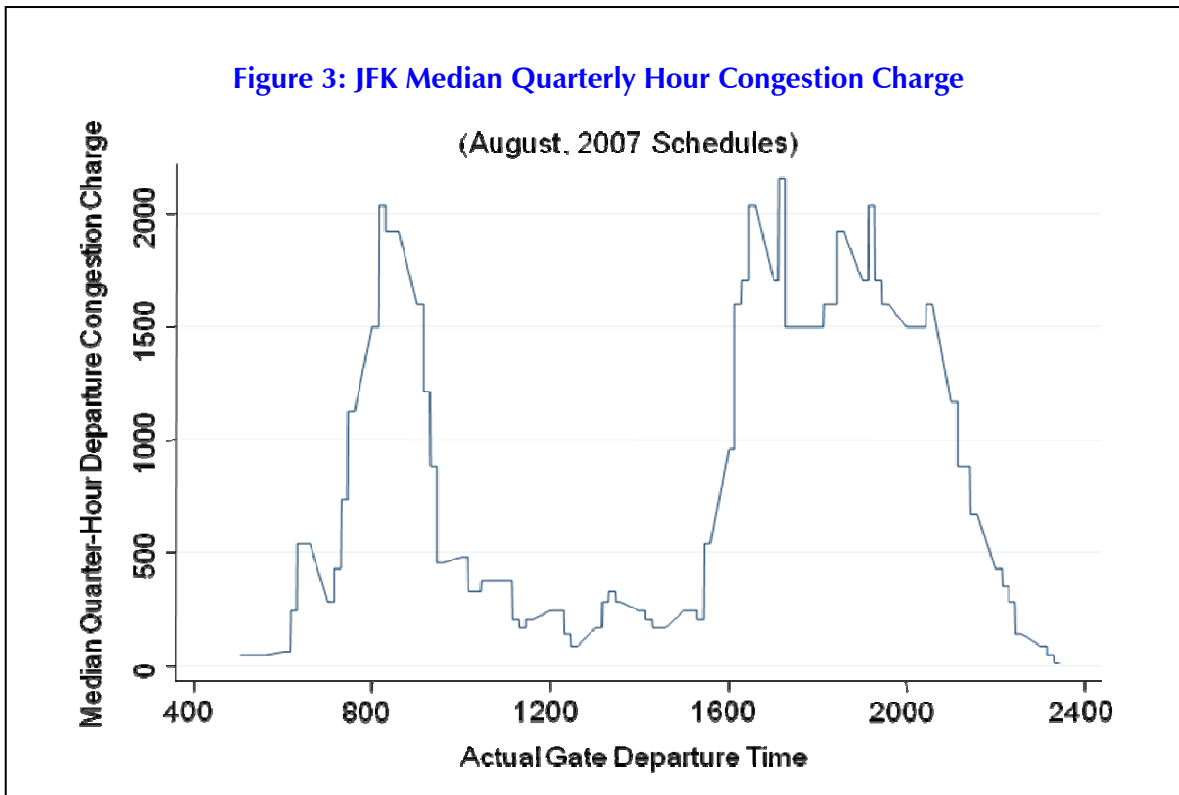
This approach to estimating a departure congestion charge offers some guidance as to what levels congestion charges would need to be during certain times of the day to reduce congestion and what the possible effects of a congestion charge would be. We use a congestion charge that would be set via an iterative process for each schedule season. The computer program used to estimate the congestion charge can be used in a quasi-auction format wherein airlines submit their schedules and receive a price for a departure during that time slot. Airlines can then adjust their schedules and resubmit, and a new price for each slot is set. This process continues until airlines stop rescheduling flights or the airport authority continues to raise the price up to the point where the number of departures is in line with what the FAA permits them to manage safely.

Using the above criteria, the amount that a departing aircraft should pay to compensate other airlines for the cost of delays can be estimated. The average operating cost for the average aircraft at JFK is approximately \$36 per minute. The value of passenger time used in the NEXTOR study is applied to the estimates of JFK for consistency. The total passenger time cost per plane is based on an estimate of the average number of passengers per plane using data on the average number of seats per plane and average load factors. The combined average cost per minute of delay is estimated at \$50 per minute. An average time cost per plane is used as planes should be charged the cost of the planes they are delaying, not their specific costs. The estimated results of the level of congestion charges and the revenues from congestion charge are highly sensitive to different assumptions about the cost per minute of delay.

Presumably, airlines would be indifferent between paying this cost for each minute they are delayed or a congestion charge that eliminates the delay for departing aircraft. This is the market clearing price at which it becomes too expensive for aircraft to be both incurring the delay cost and paying the congestion charge. However, the charge airlines pay to use a runway should be based on how much their use of a runway delays others behind it. Departing aircraft are charged based on how many planes behind it depart during the time that the plane is taxiing. For example, a plane that leaves the gate at 10:00 AM and leaves the runway at 10:20 AM will be charged for the cumulative cost of delays imposed on all the planes that leave their gate during this time. If 20 planes depart the gate during this period, the original plane is charged for the excess costs of delays

for these 20 planes due to it taking up a runway slot. The more flights that are scheduled during a flight's departure period, the higher the congestion charge will be.³⁴

Using schedules from August 2007, an estimate of congestion charges is shown in Figure 3. There are two periods during which the highest charges would be applied, the morning and evening periods where the highest delay occurs. Peak charges of \$2,000 for a 15-minute departure slot would approximately correspond to the necessary level for some aircraft in this period to move operations to another time slot or to consolidate multiple smaller planes going to the same destination



B. Addressing Airline Concerns on Congestion Pricing at JFK

Part 3 presented the expressed concerns of airlines to the possible implementation of congestion pricing at the New York airports. The above estimate of a plausible congestion-pricing system for JFK allows us to put these concerns to the test to see which concerns about pricing are indeed valid.

1. No Off-peak Times?

Delays behave in a very non-linear manner. At a certain point reasonably below capacity, delays are not substantial. However, as the number of operations comes closer to the maximum capacity, delays grow at a much faster rate than operations do.

Why does this matter? Congestion is severe enough to merit high congestion charges only during periods when operations are very close to (or above) the maximum capacity. Thus, even a slight shift in operations away from peak periods can have a substantial downward effect on delays if the relationship between number of operations and delays is non-linear.

As Figure 3 above shows, delays are only severe during two periods of the day, during the mid-morning and the early evening. Early and late-morning and mid-afternoon delays are generally very mild. This creates a sizeable off-peak period where otherwise unprofitable flights can be rescheduled.

2. Will Connecting Flights and Small Community Service Be Lost?

There will clearly be a reduction of flights during peak morning and early-evening hours from the implementation of congestion pricing.

For this analysis, it is assumed that flights that see an increase in total operating costs of greater than 10 percent due to the implementation of congestion costs are removed from airlines' schedules. (A change in total operating costs of 5 and 15 percent was also modeled, without significantly changing the results.) In the absence of schedule simulation games like the NEXTOR exercise for LGA, assumptions like this are the best way to anticipate how airlines will respond to a congestion charge.

Flights on regional jets between JFK and large and medium-sized hubs were seen to be the most common flights that would be made uneconomical during peak periods. On one random day of operations used as an example, August 14, 2007, flights to Boston, Raleigh-Durham, Washington-Reagan, and Baltimore were the most common flights to see total costs increase by more than 10 percent, with at least four flights to each destination made uneconomical.

Out of 21 flights to Boston per day, five are on small regional jets with less than 60 seats operating during peak pricing periods. Ten out 30 flights to the Baltimore/Washington, DC area are on small regional jets during peak hours that would be priced out of their current time slots.

In contrast, only a handful of flights to small towns were made uneconomical. Two flights to Albany, three flights to Syracuse, and one to Burlington saw an increase in total costs of over 10 percent. However, this does not account for the likelihood that airlines will seek to reschedule these flights to off-peak times, as discussed above. Also, there may be a minimum number of flights that need to operate between airports for a segment to be viable.

3. Up-gauging Won't Happen ?

A simple evaluation of how much a congestion charge will increase costs for aircraft operating at JFK belies the claim that up-gauging will not occur. The flights that see the highest increase in per-passenger costs are regional jets with between 35 and 70 seats. As in the NEXTOR exercise, the

congestion charge does not substantially increase costs for turboprop aircraft flying out of JFK. Turboprops are already operating in off-peak hours and generally hold more passengers than many regional jets.³⁵ Thus, about 35 percent of turboprop flights will be priced out of their current slots, while about 45 percent of the flights on small regional jets, such as the Embraer 145, become uneconomical. Only a marginal amount of up-gauging is needed to have a better allocation of runway slots.

There is considerable scope for airlines to up-gauge their flights that go to large and medium hubs rather than continue to serve them with small regional jets. The number of displaced passengers (from RJ flights made uneconomical) is less than 10 percent of the total number of seats that fly between hubs per day. For segments such as JFK to Boston, this means only 14 extra passengers to be redistributed across the other flights. The average plane size on these hub-to-hub segments is only 89 seats, suggesting that airlines only need to up-gauge planes from medium-large regional jets, such as the Embraer 170, to slightly larger RJs, such as the Embraer 190, or small mainline jets, such as the A318.

Large airlines themselves will not feel the brunt of this up-gauging. These smaller RJs are operated by regional airlines that operate under contract for major airlines. The capital cost burden of a reduction in demand for regional jets and increased demand for larger planes would be shared by both parties.

As noted in Part 4 for LGA, significant down-gauging has also taken place at JFK over the last five years, as shown in Table 7. Despite JFK's role as an international hub for wide-body, long-haul flights, flight activity by that category of aircraft has actually declined by 12 percent over this period while RJ flights have more than doubled. The U.S. carriers that complain about congestion at JFK impeding their international service should acknowledge that they've brought it on themselves via this down-gauging. A pricing system would provide incentives to fix the problem via up-gauging.

Table 7: Down-Gauging at JFK in the Last Five Years			
Aircraft Size Category	Aug. 2002	Aug. 2007	Change
Under 100 seats	75	171	+128.0%
100-200 seats	143	314	+119.6%
Over 200 seats	163	144	-11.7%
Total:	381	629	+65.1%

Source: Simat Helliesen & Eichner, based on OAG data.³⁶

There is considerable evidence that passengers are more willing to fly at different times or accept lower flight frequencies rather than pay a higher price for flights.³⁷ A one percent decrease in flight frequency, as expected from a congestion charge, would have less impact on passenger throughput than a one percent decrease in price; hence, it would be easier for airlines to reschedule flights than

to pass on the cost of congestion charges from operating in peak periods. Furthermore, Homan's study shows that passengers place higher value on their flights having shorter duration than the value they place on cost. Airlines today must pad their schedules due to delays, and passenger demand studies suggest that airlines would see a larger increase in passenger volume from a one percent decrease in delay time than a one percent decrease in price.

4. Will Carve-outs and Exemptions Distort the Market?

Three possible exemptions from congestion pricing have been suggested: essential air service to small communities, general aviation, and international carriers.

Essential Air Service: Currently, no flights to airports with service subsidized by the Essential Air Service (EAS) operate out of JFK. Furthermore, as shown above, only a handful of flights to small towns will be made uneconomical. A more detailed look at departure schedules shows that airlines are already scheduling their flights to small communities from New York into off-peak hours. This may be because the cost of sitting on the tarmac during delays would make these flights to small communities unprofitable or because these planes would otherwise not be utilized during off-peak hours.

General Aviation: Only a small handful of operations at JFK can be classified as general aviation. Out of the over 13,000 operations at JFK during the month of August 2007, only 61 were business jets. If not exempted, these few planes would see a substantial increase in landing charges. While landing charges for the median airline plane at JFK would increase approximately 20 percent (assuming that congestion pricing replaces existing weight-based fees), charges for general aviation would increase by over 500 percent relative to weight-based fees. Even if GA were exempted from congestion charging, since they are a miniscule proportion of operations, the effect would be negligible. On the other hand, GA would likely do better with a pricing system than with administrative controls since a pricing system would allow flights that really need access to JFK to purchase it.

Exemptions for International Carriers: Planes that operate international segments tend to be much larger than the average planes that operate on domestic flights. As a result, their weight-based fees are higher than the predicted congestion fees even for the peak periods. For example, a 747-400 operating out of JFK would be charged a weight-based landing fee of approximately \$3,200, and a 777-200 would pay around \$2,300. Congestion charges at the levels estimated here during times when international flights operate would be less than or equal to landing fees currently paid by larger aircraft.

Losses by airlines due to increased costs for passengers coming in on regional jets may be compensated for by reductions in operating costs for international operations out of JFK.

As discussed in Part 6, the legal grounds for exempting international carriers from congestion pricing are questionable. However, if exempted foreign carriers continue to pay current weight-

based fees rather than congestion charges, their costs would likely be higher than those of U.S. carriers paying the congestion charges. Thus, foreign carriers would be better off under the congestion-pricing system.

5. *Would Pricing Interfere with Connections to International Flights?*

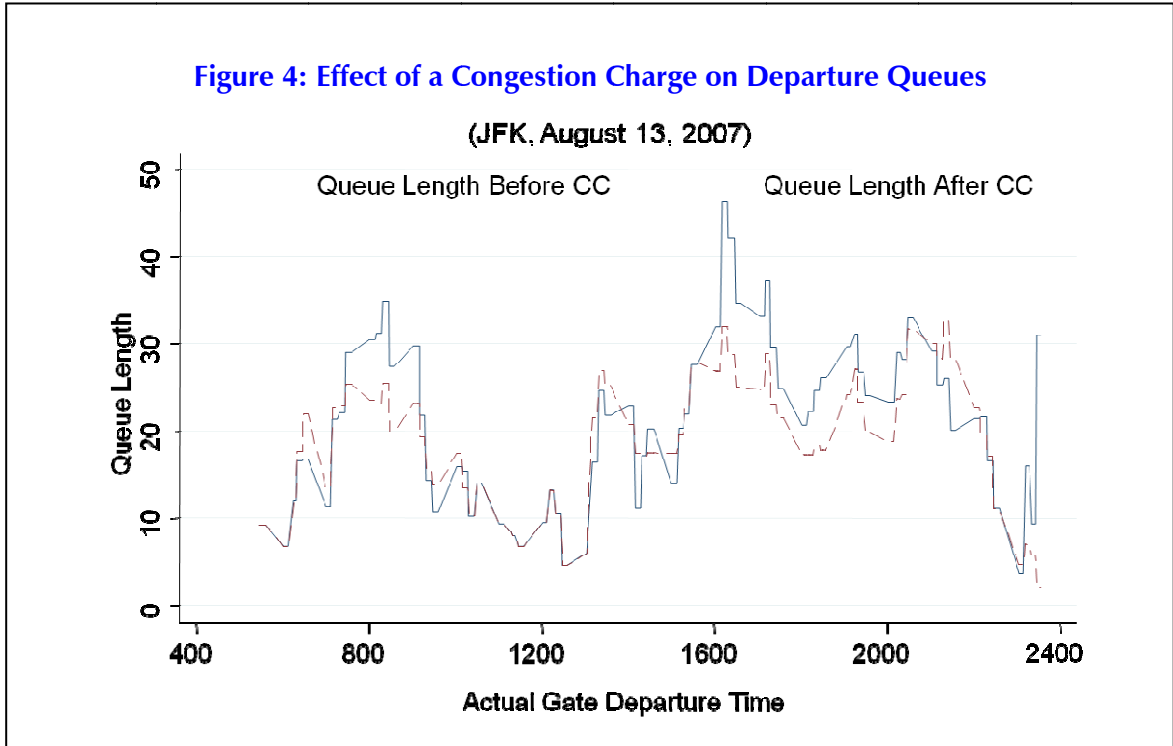
That connecting passengers flowing into JFK are a critical component of its international departures is not in doubt. For example, only about half the passengers on Delta international flights out of JFK originate from the New York metro area. Of the incoming connecting passengers for these flights, half come into JFK on mainline Delta flights and the other half come in on regional carriers.

Using the congestion prices modeled above, no mainline flights see a significant increase in operating costs from the implementation of congestion pricing. Also, there exists a considerable off-peak time directly before the more expensive peak evening hours. As these regional flights are often short, they can leave their destinations any time in the late morning or early afternoon to connect to an international flight that evening.

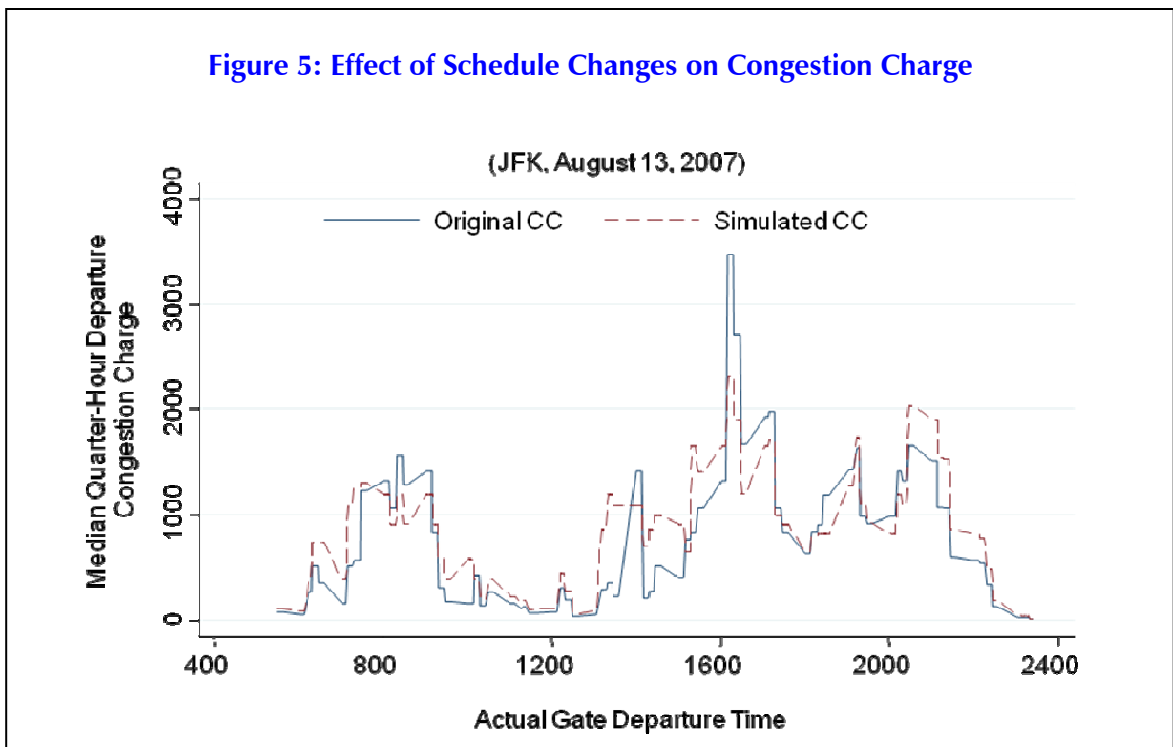
C. The Congestion Charge Response to Airline Rescheduling

Using an iterative process similar to an auction, airlines would adjust their schedules to reduce the cost of landing fees. In a simple simulation using the exact same cost increase assumptions from above, regional jets with a cost increase of more than 10 percent had their flight departure times moved by at most three hours before or after they currently depart. Similar to a quasi-auction process, a new congestion charge was estimated based on this hypothetical airline scheduling response.

As Figure 4 shows, peak congestion is reduced from 45 aircraft in a departure queue to approximately 30 at more times during the day. The schedule change response of airlines to the hypothetical congestion charges is to move some operations from periods of peak pricing to slots during considerably cheaper off-peak times. Using this simulation, the effect of congestion charging for airports is similar to that seen on toll lanes where time-variant pricing is used; the peak period is spread out, with lower levels of congestion over a larger number of hours, and capacity is more fully utilized at all times of the day.



As departure queue length changes in response to schedule shifts, so does the congestion charge. More operations during off-peak hours means that slots during this period become more expensive, and fewer operations during peak hours leads to lower peak-hour prices. The estimated charges for one day’s schedule, rather than the monthly aggregate shown above, equalize across time slots.



D. Congestion Charge for Arriving Aircraft

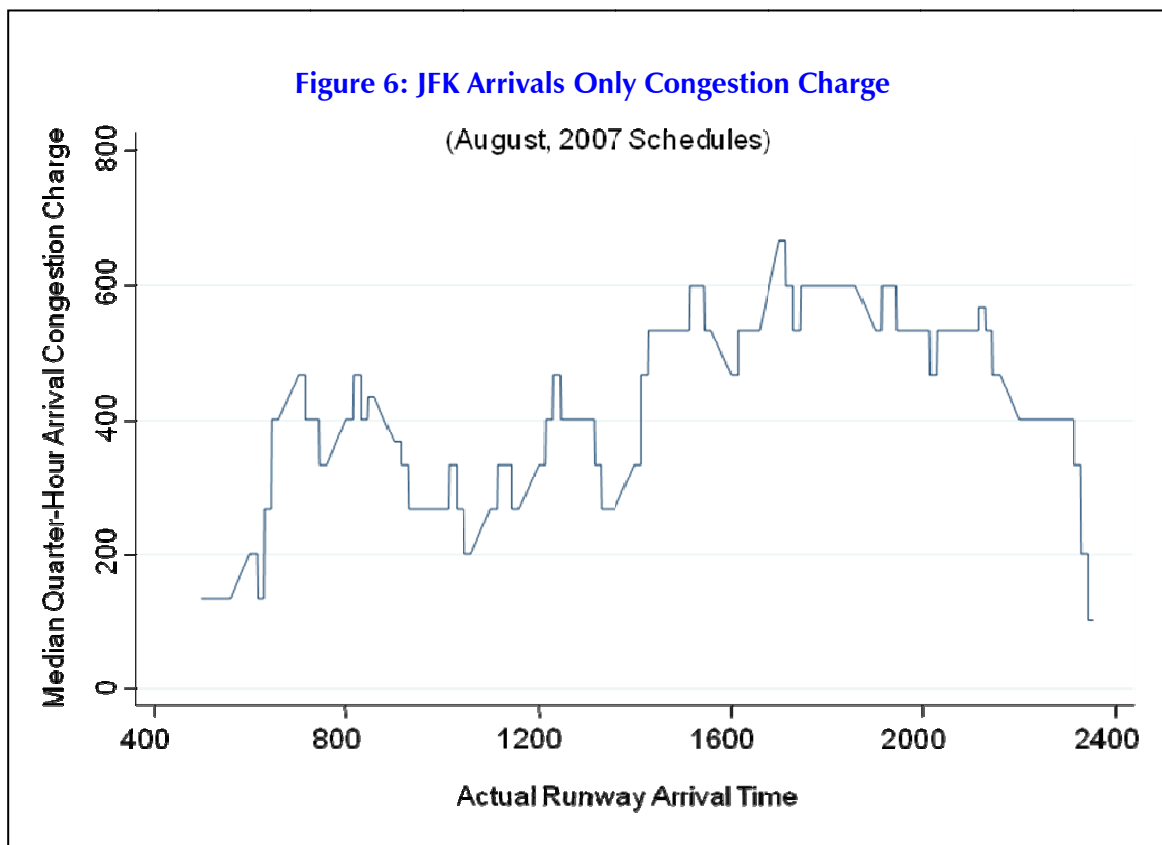
The above estimates of a congestion charge are only for departing aircraft. This charge is based on the number of departing aircraft that have left their gates but have not yet departed from the runway. Each departing aircraft is charged an escalating fee for the number of aircraft behind it that it delays while taxiing. Planes that incur delays on more aircraft behind itself, such as by occupying the taxiway for longer or requiring more time to takeoff from the runway, will face a higher congestion charge. The median amount of all planes for each 15 minute departure window is calculated as the user charge for that specific slot in this analysis.

A similar approach was taken to estimating a charge applied to arriving aircraft. An arriving aircraft is charged for how many planes behind it will be delayed for the length of time it takes on the runway and taxiways; the more aircraft that are behind it that also want to land at a similar time, the more the charge for landing at that time. However, this approach deals with only one element of delays from arriving aircraft. First, it does not consider the delays that aircraft will experience while circling an airport waiting for a landing slot to be free. Second, it does not account explicitly for the delay arriving aircraft impose on departing aircraft although this is partly taken into consideration, since taxi-in delays will be longer when many departing aircraft are in a departure queue.

Arrivals are much more evenly spread throughout the day than departures, with no more than 17 ever occurring during any 15 minute slot during the month of August. This is likely because actual landing time decisions are not directly in the hands of airlines but in those of air traffic controllers. Controllers cannot allow more than a safe maximum number of arrivals for any given period, whereas airlines can schedule departures with the consequence being that aircraft sit idly on taxiways.

Figure 6 shows the estimated congestion charge for arriving aircraft using the same definition of delay costs of \$50 per minute as above. In contrast to the extremely peaked departure congestion charge, an arrival congestion charge would be much more consistent across the day. This pattern of the arrival congestion charge peak period extending to at least two hours before the peak departure congestion charge is expected since all aircraft that need to depart during the peak period would arrive at least one hour prior to their departure times.

Since delays due to arrivals are less severe than those seen from departures, the expected peak arrival congestion charge is less than that for peak departures; average taxi-in time is half that of the average taxi-out time. Estimated peak arrival congestion fees would likely be \$600, whereas off-peak periods during the day would never be lower than \$200. This \$400 difference is unlikely to motivate airlines to reschedule arrival times as much as large differences in departure charges would. However, this charge would likely be higher if the cost of delays incurred by planes still in the air were estimated. Consequently, these values should be considered lower-bound estimates of any arrival congestion charges.



An arrivals congestion charge in addition to a departure congestion charge would be appropriate if there were little connection between when the same aircraft landed and when it departed. Different aircraft will take different lengths of time to prepare for their next flights. A small regional jet will take less time to refuel, board passengers, etc. than will a large passenger jet. Since many different aircraft types operate through JFK, a congestion charge applied separately to arrivals and departures might be more efficient than charging just for departures. However, we recommend that congestion pricing at the New York airports be introduced solely for departures.

E. Comparison to Other Estimates of Congestion Charges

The above estimates of congestion charges for JFK are very much in line with previous estimates of congestion charges for other airports. A peak congestion charge of approximately \$500 was found to remove delays at Minneapolis International Airport.³⁸ Since delays are considerably worse at JFK and the operating cost of aircraft presumably higher, the above estimates for JFK seem plausible. Another estimate of congestion charges for Chicago O'Hare places optimal charges between \$2,000 and \$4,000.³⁹

The most comprehensive estimate of possible congestion charges for U.S. airports has come to similar conclusions about the level of possible congestion charges and in fact found that only modest increases are needed to see reductions in delays. GRA Inc. conducted a simulation using airline network modeling software that looked at possible market pricing mechanisms for the major

airports in Boston, Philadelphia, and San Diego.⁴⁰ This study estimated the consequences of auctions and congestion pricing and found that both revenue neutral and slightly revenue positive congestion charges would have very positive impacts on the airports.

For example, peak fees of only \$600 at these airports during heavily congested periods would have the effect of redistributing or canceling only a handful of flights. This modest amount of rescheduling is expected to have a significantly positive impact on delays with very few passengers displaced from the market, no cities losing service, and less than a one percent increase in fares. However, it should be noted that this study is also not testing a true congestion charge; it uses a peak pricing mechanism that does not completely account for the marginal cost of delays as done above.

F. Pricing at Newark Liberty (EWR)

A congestion charge applied to only one or two airports in the New York area would likely result in the other airports in the region seeing a considerable increase in demand and resultant delays. Ideally, a congestion based runway fee would be applied to all three major airports in the area, JFK, LGA, and Newark Liberty (EWR). Although the main policy debate in late 2007 has been on reducing delays and congestion at JFK and LGA, we will briefly outline a possible congestion charge applied to EWR. In summary, a congestion charge there would be very similar to that of JFK and LGA.

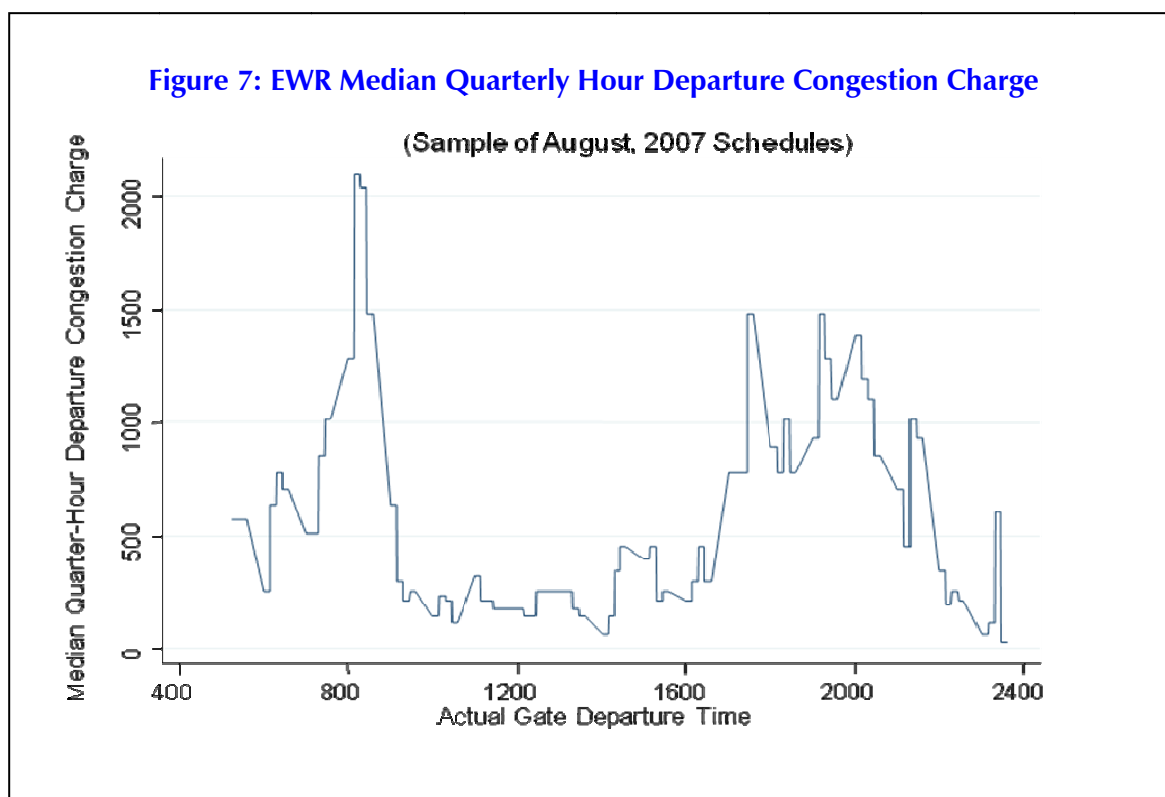
Major delays are not limited to LGA and JFK. As Table 2 showed, EWR has an equally severe, if not worse, delay problem. During the summer months of 2007, over 30 percent of all flights that left the airport were delayed by at least 15 minutes—up from only 25 percent of flights in the very congested summer of 2000.

Airline schedules at Newark follow very similar patterns to those of JFK. International flights make up a large part of the schedule, especially during the evenings; there are two periods of peak congestion and taxi delays (morning and evening); and regional jets have seen considerable growth there in the last few years. The only significant difference is that one airline, Continental Airlines and its subsidiary and contracted regional carriers, has a significant hub at EWR and represents over 50 percent of all flights out of that airport whereas JFK is not dominated by any one airline. It should also be noted that there are no EAS flights into EWR as of 2007.

Although the data used to calculate the congestion charge are different from that available for JFK,⁴¹ similar levels of congestion and delays are seen. The average departure delay was over 25 minutes in August 2007, and the queue lengths for departing aircraft are as high as 86 during peak periods with an average queue length of 20.

As Figure 7 shows, considerable off-peak periods exist where regional flights that act as feeders for international flights could still operate at, or below, their current landing fee cost. Peak fees would likely not exceed \$2,000 and would be in the range of a few hundred dollars during off-peak

periods. As with JFK, these would likely not be the final prices that airlines would face; many flights would be expected to be scheduled away from the peak period around 8:00 or from the evening rush to afternoon off-peak hours.



The only cities with significant impacts from the pricing system would be Raleigh-Durham, NC, Manchester, NH, Columbus, OH, Hartford, CT and Albany, NY. Each would have approximately one flight a day either removed or placed into another time slot. As with JFK, these flights to small and medium-sized cities represent only a small share of the total frequencies to those locations (less than one-quarter). Some peak-period flights to *large* cities, such as Boston or Washington, would be priced out the market.

As we saw with LGA and JFK, significant down-gauging has also taken place at EWR in recent years, some of which would likely be reversed under a pricing system. Table 8 shows that nearly all the growth in EWR flight activity from 2002 to 2007 has been via regional jets, which increased by nearly 34 percent.

Table 8: Down-Gauging at EWR in the Last Five Years			
Aircraft Size Category	Aug. 2002	Aug. 2007	Change
Under 100 seats	184	246	+33.7%
100-200 seats	320	327	+2.2%
Over 200 seats	45	45	0
Total:	549	618	+12.6%

Source: Simat Helleisen & Eichner, based on OAG data.⁴²

Were a congestion fee to replace a weight-based fee, international flights would see a slight increase in landing fees by approximately one percent whereas domestic flights would face an average landing fee increase of 25 to 30 percent. However, international flights would still be paying higher fees than domestic flights as they predominantly use the more expensive evening slots.

In summary, a congestion charge along the lines proposed earlier for JFK could easily be introduced to EWR. However, the external cost of delays, measured as the amount of delay imposed on aircraft of another airline, may be less than that of JFK or LGA because of the hub nature of EWR. In this case, an airline-specific congestion charge would be economically efficient, as airlines that impose delays on their own aircraft have already internalized the cost of delays and would thus only be willing to pay a lower congestion fee. However, it is likely to be politically impossible to charge airlines differently based on the number of flights they operate.

G. Estimating a Congestion Charge for JFK and EWR in Practice

A process of continuous updating of congestion prices for a departure period could easily be accomplished in the initial stages of airline and airport scheduling. Airlines can submit an initial schedule to the FAA or the PANYNJ, and estimated congestion fees for that given schedule can be returned to airlines for them to reevaluate the profitability of each flight. The new schedule would then be submitted and congestion prices estimated again. This technique would be what the FAA or PANYNJ would use to continuously update charges until the airlines finalize the schedules. This system preserves the best aspects of congestion charging (marginal cost pricing) and auctions (interaction between the buyer and seller to reach an optimal price and quantity). This system of continuous updating of optimal charges would reduce the risk of the FAA or PANYNJ incorrectly setting the congestion charge.

As the OECD notes,⁴³ congestion pricing is the best approach to dealing with delays at airports. The primary problem with the system is that those who set the charges do not know the value that would be placed on what they are selling. The estimates in this paper and those of other studies would help airport administrators and the FAA properly calibrate congestion charges based on what the marginal costs of delays are. As airlines change their schedules, the congestion charge could easily change in response to more properly priced peak periods. Rather than simply setting a higher charge for certain times, as peak pricing does, the congestion-pricing system advocated by this paper is one that responds to actual delays that are imposed by aircraft, making it a true congestion charge.

The major limitation of the above estimate is that it only looks at the external cost of departing aircraft. A full congestion charge system would also include the external effect of arriving aircraft as it takes a similar amount of dedicated runway time for an aircraft to land. Adding further variables, such as the number of arriving aircraft per slot period, to an empirical estimate of congestion charges is necessary before such a method is used to set the final price of airport slots.

The cost of setting up the system should not be onerous since the numerous existing computer programs, such as network scheduling systems, could easily compute new schedules to be plugged into a marginal cost framework laid out above or in other prior literature. Such an analysis, as done by GRA Inc. or by Joseph Daniel, could easily be applied to JFK and EWR based on their prior studies of other airports. These estimates deal with the only major criticism of congestion pricing, that administrators cannot accurately determine the price of a slot *a priori*.

Part 6

The Foreign Carrier Issue

Since both Kennedy and Newark are critically important international hubs for U.S. carriers (especially Delta at JFK and Continental at EWR), the question of possible unfair treatment of U.S. carriers vis a vis foreign competitors via a pricing approach must be addressed.

A. The Basic Issues

In past efforts to cap the number of flights at congested airports (e.g., the previous High Density Rule at LGA, JFK, ORD, and DCA and subsequent interim schedule reduction agreements at ORD), the U.S. DOT did not request or require foreign carriers operating at those airports to reduce their flights, but put the entire burden on domestic carriers. The reason for this action was that the United States has agreed to numerous bilateral air services agreements. U.S. “open skies” bilaterals, including the historic 2007 agreement with the European Union, deregulate much of international service. Thus, any airline from an open skies country (or bloc of countries) is assured the right to operate from any point in its territory (or the bloc) to any point in the United States and can fly as often as it likes, charge any price, etc. Any unilateral effort to reduce the flights of foreign carriers therefore runs afoul of a central obligation undertaken by the United States in these open skies agreements.

Hence, in its 2007 request to the airlines for *schedule-reduction* meetings concerning JFK, the FAA excluded foreign carriers from those meetings, deciding to grandfather their historic levels of service while requesting U.S. carriers to negotiate cutbacks. In a Nov. 7, 2007 filing to DOT and FAA in response, Delta took issue with this decision, arguing that “FAA cannot discriminate against U.S. carriers. FAA’s decision to grandfather all historic rights of foreign flag carriers [at JFK] while seeking reductions from U.S. carriers is blatant discrimination that is both unlawful and terrible aviation policy.”⁴⁴

Whether the FAA/DOT position on this issue is legally sound is not for us to say. However, there are several reasons to believe that whatever may be valid law with respect to mandated schedule cuts may not apply to the kind of congestion-pricing approach discussed in Parts 4 and 5. Pricing and negotiated schedule cutbacks are very different approaches to dealing with congestion.

First, with a pricing system, any cutbacks that would be made in response to higher landing/take-off charges would be at the discretion of each airline, regardless of nationality. No discrimination

of any kind is involved in treating all airport customers equally, requiring anyone who wishes to use scarce runway space to land or take off at 8 PM to pay, say \$2,000, to do so. Operating costs already vary widely from airport to airport, and although airport charges are typically only a few percent of airline operating costs, they are still a factor that airlines take into account in determining which airports to serve and with what volume of service. A new landing-fee regime, as long as it is applied even-handedly to all, is simply a new ingredient in the airline resource-allocation decision-making process.

Second, there is the question of whether airport congestion pricing would conflict with underlying international law governing airline service. As discussed in the section below, there is good reason to think there is no conflict. Congestion pricing seems clearly to be permitted under the Chicago Convention, to which the United States is a signatory, and to be consistent with ICAO charging guidelines.

Third, depending on how the pricing system were set up, it is not clear that international flights—whether operated by U.S. carriers or foreign carriers—would be negatively affected. As the price modeling for JFK discussed in Part 5 suggests, the difference between current weight-based landing fees and peak-period congestion fees would be the least for the heavy wide-body aircraft used in most international service (767s, 777s, 747s, A-330s, A-340s, etc.). And because of the large number of passengers carried by those planes, the cost per passenger would be small (e.g., a \$2,000 peak-period take-off charge on a 350-passenger plane would be just \$5.71 per passenger), compared with the impact on a 90-seat regional jet (\$22.22 apiece for a \$2,000 charge). Thus, if congestion prices *replace* current landing charges, the impact on large, trans-Atlantic flights would be small.

The next two sections look more closely at international aviation law and the relevant specifics of U.S. bilaterals.

B. ICAO Policy on Congestion Pricing

It is important point for policymakers and aviation stakeholders to understand that congestion pricing is fully compatible with international aviation law.

The framework for international aviation law is the Convention on International Civil Aviation (the Chicago Convention), signed by 52 governments in 1944 and adhered to today by 190 member states, including the United States. The Convention created the International Civil Aviation Organization (ICAO) to codify the principles and techniques of air navigation among nations. The ICAO Council adopts standards and recommended practices for aviation.

One such document is ICAO Doc. 9082, *ICAO's Policies on Charges for Airports and Air Navigation Services*.⁴⁵ ICAO describes it as a “policy document.” Since it does not by itself have the force of law, as would an Annex to the Chicago Convention, signatories are not required to

abide by it. But an ICAO spokesperson explains that “since it has been elaborated on the basis of international consensus, it has a high moral value, and States generally adopt and observe the policies thus elaborated.”⁴⁶ Therefore, if this ICAO document says that airports may adopt congestion pricing under certain circumstances, then it would be difficult to argue that an airport that did so was somehow acting contrary to the Chicago Convention.

So what does ICAO Doc. 9082 have to say on this subject? Paragraph 26 acknowledges and accepts the general practice of charging for landings on the basis of aircraft weight. But it then goes on to say:

“However, allowance should be made for the use of a fixed charge per aircraft or a combination of a fixed charge with a weight-related element, in certain circumstances, such as at congested airports and during peak periods.”

A related document is ICAO Doc. 9562, *Airport Economics Manual*.⁴⁷ As ICAO’s spokesperson explains, “The Manuals have been developed to help states apply the policies in Doc. 9082. They are thus more detailed and attempt to explain the practicalities of applying the various facets of the Policies.” Indeed, in Doc. 9562 we find much detail on airport pricing in paragraphs 7.6 through 7.17. Here are some important excerpts from those paragraphs.

“In certain circumstances it may be appropriate to augment the traditional average cost approach to the setting of charges with an economic pricing approach. While the use of economic pricing may not always be feasible, when feasible it can be an effective tool to encourage the efficient utilization . . . better match the demand of aircraft operators for services with current capacity . . . and provide incentives for long term expansion of capacity. . . Economic pricing results in efficient short-term allocation of scarce resources because it allots capacity to the highest value applications. In the longer term, it can provide pricing signals to direct the expansion of investment to areas with the greatest value in eliminating capacity shortages.” (Paragraph 7.6)

“Examples of economic pricing include but are not limited to marginal cost, peak-period, and congestion pricing. . . It . . . might be considered an equitable way of recovering all or most of the capacity costs from users whose demand is the cause of investment in additional capacity.” (Paragraph 7.7)

“Congestion pricing could be appropriate to address the situation where one particular set of users impose a cost on another set of users—but the cost of which the first set of users do not themselves incur.” (Paragraph 7.10)

“Without the discipline of competition, it is therefore essential that service providers should not exploit the use of pricing to gain monopoly rents. . . . When charges generate revenue beyond the cost base, some accommodation or institutional arrangements would be needed Such accommodations may be the use of revenue to finance capacity expansion or the design of a revenue neutral charge system. (Paragraph 7.13)

“With the application of economic pricing principles it is necessary to ensure that the determination of charges be done in a transparent manner, facilitating user consultation.

Users should have the opportunity to review the process in which charges are set and offer comment on the approach employed.” (Paragraph 7.16)

We have provided these lengthy excerpts simply to illustrate how seriously ICAO takes pricing alternatives, including congestion pricing. Given that both ICAO’s charging policy (Doc. 9082) and its airport economics manual (Doc. 9562) recommend the use of pricing in situations such as seriously congested airports, any legal challenge that sought to overturn a congestion-pricing regime instituted at the New York airports as contrary to international aviation law would be difficult to sustain.

C. Bilateral Agreements

The Chicago Convention left the negotiation of commercial access to bilateral agreements. If there is a legal obstacle to airport congestion pricing for foreign air carriers, the source of the problem would be the bilaterals, not the Chicago Convention.

Every current U.S. bilateral agreement contains provisions that limit airport fees and charges to “the cost of providing service, plus a reasonable return on investment” or comparable language. We quote here the text of the “user charges” article from the 2007 U.S.-E.U. open skies agreement:

1. User charges that may be imposed by the competent charging authorities or bodies of each Party on the airlines of the other Party shall be just, reasonable, not unjustly discriminatory, and equitably apportioned among categories of users. In any event, any such user charges shall be assessed on the airlines of the other Party on terms not less favorable than the most favorable terms available to any other airline at the time the charges are assessed.

[Comment: There seems to be no conflict of this provision with the kind of congestion pricing proposed in Part 5.]

2. User charges imposed on the airlines of the other Party may reflect, but shall not exceed, the full cost to the competent charging authorities or bodies of providing the appropriate airport, airport environmental, air navigation, and aviation security facilities and services at the airport or within the airport system. Such charges may include a reasonable return on assets, after depreciation. Facilities and services for which charges are made shall be provided on an efficient and economic basis.

[Comment: If the congestion-pricing system is “revenue-neutral,” it should have no problem complying with this provision. Alternatively, if any and all net new revenues are used to expand airport capacity, as proposed in Part 7, there should also be no problem].

3. Each Party shall encourage consultations between the competent charging authorities or bodies in its territory and the airlines using the services and facilities, and shall encourage the competent charging authorities or bodies and the airlines to exchange such information as may be necessary to permit an accurate review of the reasonableness of the charges in

accordance with the principles of paragraphs 1 and 2 of this Article. Each Party shall encourage the competent charging authorities to provide users with reasonable notice of any proposal for changes in user charges to enable users to express their views before changes are made.

[Comment: This appears to be simply good governance, which of course should be applied in any congestion-pricing system.]

4. Neither Party shall be held, in dispute resolution procedures pursuant to Article 18, to be in breach of a provision of this Article, unless (a) it fails to undertake a review of the charge or practice that is the subject of complaint by the other Party within a reasonable amount of time; or (b) following such a review it fails to take all steps within its power to remedy any charge or practice that is inconsistent with this Article.

[Comment: Further good governance; no problem.]

Thus, it would appear that U.S. bilaterals are consistent with a congestion-pricing system that is applied without discrimination to all airport users, provided that either (1) the airport collects no more, in the aggregate, from the pricing system than from the previous landing-fee system or (2) the net new revenues from a revenue-positive pricing system are used for legitimate airport capacity-expansion projects.

Therefore, it would appear that there is no basis for an airport congestion-pricing system to exclude foreign airlines. On the other hand, there are solid legal arguments for exempting foreign airlines from mandated schedule cutbacks. Therefore, U.S. carriers should prefer the congestion-pricing approach (which applies even-handedly to all airlines) to the alternative of mandated (or negotiated) schedule reductions (from which foreign carriers are likely to be exempted).

Part 7

The “Cash Cow” and Capacity Expansion Issues

As noted in Part 3, the airlines are especially concerned that a focus on congestion pricing could turn into a new tax on captive airline customers of the New York airports, in which they would pay more and more but the underlying cause—insufficient airport capacity to meet the demand—is left unaddressed. This issue goes to the heart of the Levine Challenge presented at the end of Part 3. The concern would arise with any proposal to use congestion pricing at a congested airport, but it is especially acute in connection with the Port Authority airports, because PANYNJ has a grandfathered exemption from the normal federal rules that prevent diversion of airport revenues to non-airport uses.

To explore these issues, we first need to understand why it is that airports, rather than the FAA, will be the locus of any congestion pricing that gets implemented, at least in the near term. Then, the PANYNJ’s situation will be explored in further detail, and alternative ways of using net revenues from pricing will be enumerated. Next, a “lockbox for capacity expansion” proposed by the former head of PANYNJ airport operations will be considered. Finally, we look briefly at what sorts of capacity expansion would be possible at the New York airports.

A. Legal Authority for Airport Pricing

In a much-cited 2006 article, U.S. DOT senior attorney Nancy Kessler addresses the question of why airports are not already charging based on congestion.⁴⁸ Kessler reviews existing federal airports law, as it has evolved via both legislation and court decisions. That law requires that airport charges to airlines be “reasonable” and “not unjustly discriminatory.” In addition, except for a handful of airports that have grandfathered exemptions, airports must use all airport-generated revenue for the capital or operating costs of the airport (or airport system, in a multi-airport system). Airports must not seek to create a surplus (profit) in excess of the airport’s legitimate needs.

Kessler also points out that in the event of an airline-airport dispute over fees, the Office of the Secretary “will determine whether a fee is reasonable or unreasonable.” However, such decisions may be appealed all the way to the Supreme Court if necessary.

Kessler next addresses the question of whether a market-clearing congestion fee would be judged “reasonable” in a court of law. The answer, she writes, “may depend in part on whether an airport would be abusing any market power under such a pricing program and whether the aggregate fees charged and revenue realized would be excessive.” She goes on to note, “The Department has found in the past that a properly structured peak period pricing plan would not be considered discriminatory.” She writes, “A pricing plan that imposed greater costs on users choosing to operate in peak hours and reduced costs on operations in off-peak hours would not be unjustly discriminatory on its face. The OST/FAA would reserve a final decision on any such plan pending an analysis of a particular fee amount in the actual circumstances under which the surcharge is assessed.” And she notes the FAA’s approval of a stand-by congestion-pricing plan for the new commuter runway at Boston’s Logan Airport.

Finally—of great importance for this policy study—Kessler makes clear that “[t]he FAA currently lacks the power to charge users in ways that would promote more efficient movement of air traffic at congested airports or congested airspace.” If this interpretation is correct, then unless Congress were to enact legislation authorizing FAA to engage in pricing, the only entities with the authority to charge airlines and other airport users for landing and taking off are airports themselves.

B. The Port Authority Grandfathering Problem

The prohibition against airport diverting revenue to non-airport purposes originated in the 1982 Airport & Airway Improvement Act, which created the Airport Improvement Program (AIP) to make grants to airports. As a condition of receiving AIP grants, airports must sign “grant assurances” agreeing to a long list of requirements, one of which is non-diversion of airport revenue. At the time this legislation was enacted, however, a small number of airports operated by port authorities objected that they had always operated on the basis of consolidated financing and that their outstanding revenue bonds were backed by consolidated revenues from all their transportation operations. Besides PANYNJ, they included the port authorities of Boston, Seattle, San Francisco, Oakland, and several others. Those airports were given grandfathered exemptions to the anti-revenue-diversion requirement, allowing them to receive AIP grants on the same basis as other airports without having to change their long-standing practices regarding consolidated revenues and financing.

Thus the general concern that Levine cites—the possibility of airport monopolies exploiting captive airport customers—is more serious in the case of these grandfathered airports. Given that capacity expansion of airports in dense urban surroundings is costly and politically difficult and that numerous non-airport uses exist for new revenues the airports might generate, any such airport owner (not merely PANYNJ) would face incentives to take the path of least resistance if given a free hand to charge for congestion (i.e., to charge market-clearing prices but to use the resulting revenue for projects other than expanding airport capacity). As Levine notes, such “perverse incentives . . . could make the congestion problem worse, not better.”⁴⁹

Although the PANYNJ does not break out revenues and expenditures by entity, it is well-known that it uses surpluses generated by the airports to subsidize its other operations (such as the PATH trains between New Jersey and Manhattan). Airlines have a legitimate concern that a congestion-pricing regime at the New York airports could end up as a de-facto tax on them to fund expansion of other PANYNJ entities. This helps to explain the airlines' particularly strong opposition to proposed congestion pricing at these specific airports.

C. Possible Uses of Airport Pricing Revenues

In a recent policy brief, former PANYNJ Aviation Director David Plavin reviewed this situation with the aim of seeking a win-win solution.⁵⁰ Since airport pricing would presumably (absent a change in federal law) be carried out by the airports rather than by the FAA, the airport owner (PANYNJ) would have to come up with airport-specific uses of the revenues, to have any chance of gaining airline support. Here are Plavin's three alternatives.

1. Offset the revenues against costs in the current cost base.

In the spirit of seeking revenue-neutrality, the focus of this approach would be to substitute the congestion-pricing system for the current weight-based landing fee system. If there were incremental additional revenue above the levels generated by current landing fees, those revenues could be used toward paying off airport-related debt.

2. Use net new revenues for new capital projects.

Plavin notes that the current PANYNJ capital plan includes several billion dollars worth of airport projects through 2015; there are also several billion dollars in other projects that are "clearly needed but not in the plan." This approach could be applied to a large volume of capital projects if congestion pricing were used in addition to the current landing fee system or to a smaller amount if the pricing replaced current landing fees.

3. Use net new revenues solely for projects to expand the airports' capacity.

This alternative would directly respond to the airlines' concern about the danger that implementing congestion pricing would undercut incentives to take serious actions to expand airport capacity. Plavin suggests that the first priority for the use of pricing revenues generated by a particular airport be capacity expansion at that airport. Once all meaningful capacity projects at that airport had been carried out, any further net revenues would then be shifted to other airports in the multi-airport system to expand their capacity.

As anyone familiar with accounting knows, money is fungible. There would likely be airline concerns under any of these alternatives that the PANYNJ might still be able to shift more net revenues to non-airport uses if it had more total revenues being generated at the airports. This led to Plavin's actual recommendation, discussed next.

D. The Plavin Lockbox

In his policy brief, Plavin suggests the following:

“The first feature of any realistic approach in this area should be a true ‘lockbox,’ into which net pricing proceeds would be deposited and from which, ideally, funds would be dedicated, exclusively, for meaningful capacity expansion projects. To make that possible, any such structure would have to ensure that lockbox funds are not diverted to any other purpose.”

What, precisely, would this entail? First, net new revenues would have to be defined. If congestion pricing is implemented in addition to the current landing-fee structure, the answer is simple: all such pricing revenues would be net new revenues. But if congestion pricing replaces the current landing-fee system, then it would be necessary to do a calculation each year of what the landing fees would have been—based on the actual landed weight in that year and the per-pound fee that would have been applied—so that this total could be compared with the total pricing revenues. The difference would be the amount sequestered in the lockbox.

Three parties would have to agree with both the concept and the methodology. Because of their lease agreements with the airports, the airlines would have to agree to this as either an addition to the current landing fee structure or a replacement of it. PANYNJ would have to agree that the funds in the lockbox would not be diverted or used for any purpose other than airport capacity expansion. And the cities of New York and Newark would have to agree that these new revenues are not subject to any formula for sharing airport revenue as part of the lease payments the PANYNJ makes to them as the underlying owners of the airport land. In addition, the agreement would need to be blessed by the U.S. DOT, preferably as Plavin suggests by a formal declaration that the spending of lockbox funds for capital expansion projects and related debt service are “reasonable” costs and do not constitute “revenue diversion.”

E. Capacity Expansion Prospects

Many people believe that LaGuardia, Kennedy, and Newark are maxed out on their capacity. They are built on very expensive urban land, hemmed in by other land uses (or water), and are in a part of the country where large-scale infrastructure is inherently very costly to build and where NIMBY and environmental opposition to such projects is strong. Thus, while some cities have expanded urban airports by reclaiming land from adjacent bays (Hong Kong), extending runways offshore (Nice), or even creating an artificial island (Japan’s Kansai), such options are very unlikely in the New York metro area. So in discussing airport capacity expansion projects, we will limit the options to what can be done within the existing airport boundaries.

1. Terminal Capacity to Match Up-Gauging

As shown in Parts 4 and 5, there is good evidence that congestion pricing at LGA and JFK will lead to up-gauging of equipment, especially the replacement of 30–70-seat RJs with larger aircraft. Some of the 15 terminals at the three airports would not be able to handle larger aircraft due to inadequately sized hold rooms, too-constrained taxi-lanes, and other factors. This is especially the case at LGA. At its Central Terminal (the largest), Plavin reports, “Many gates cannot accommodate larger-gauge aircraft. Taxi-lanes that are narrower than ideal restrict accessibility to interior gates, especially for larger aircraft, and the terminal has limited gate, ramp, security-screening, ticket counter, and baggage system capacity.” And this is true to a lesser extent at the other LGA terminals. At JFK, the newer terminals (1, 4, 5, and 8) can handle up-gauged aircraft, “but the older ones will have more difficulty.” Such problems are least severe at EWR.

Plavin notes a related problem in that PANYNJ leasing practices make it difficult to change the use of existing spaces. Currently, under the traditional unit-terminal approach, most terminal space (except in JFK Terminal 4) is leased to individual airlines, which then control the use of the space. Most European airports, and some in the United States (e.g., Phoenix and Raleigh-Durham), have moved away from that approach, making most or all of their facilities “common-use.” Under this approach, the airport actively manages gates, hold rooms, etc. and is able to dynamically assign space as needed to handle peaks and valleys in service patterns. This would be a major change for PANYNJ and its airlines and could not be done overnight. But such a change might be part of an overall deal with airlines under which lockbox funds could be used for large-scale terminal reconstruction to enable both increased passenger capacity and greater flexibility in handling aircraft.

2. Faster Implementation of NextGen Ground Systems

There are many ways in which the planned NextGen air traffic control system could increase the operational rate (capacity) of existing runways. A forthcoming Reason Foundation policy study goes into this subject in some detail, including some examples that apply to the New York airports.⁵¹ While ATC ground equipment has traditionally been the responsibility of the FAA to pay for, install, operate, and maintain, airports now have the option of using airport funds to purchase such equipment when, by doing so, they can accelerate the implementation of such systems. Among the systems that would help increase the capacity of the New York airports are:

- ASDE-X, to keep more precise track of all vehicles (including aircraft) on the airport surface, preventing conflicts and providing for faster movements between gates and runways.
- ADS-B ground stations, to enable the New York airports to offer more closely-spaced and environmentally friendly continuous descent approaches (CDAs).
- Precision-approach capability at Teterboro, to reduce the extent to which general aviation flights divert to EWR in bad weather, thereby slowing down already congested airline landings and take-offs.

3. New Runway at Kennedy

A recent technical paper by NASA researchers makes a persuasive case that the use of ADS-B along with advanced cockpit displays will make it feasible to do simultaneous operations on parallel runways as closely spaced as 750 feet during reduced-visibility conditions.⁵² That would make the low-visibility capacity of such closely spaced runways nearly as high as that during visual flight conditions. This would greatly benefit an airport such as San Francisco International (SFO) whose closely spaced parallel runways are only 750 feet apart.

In the forthcoming Reason paper, Viggo Butler makes the case that the same technologies will make it possible to add an additional closely spaced parallel runway to an airport that needs additional capacity. Butler proposes that such a runway be added at JFK, between the existing runways 4R and 4L. This is obviously not a near-term solution to JFK's capacity problem, but given the length of time it would likely take to plan, get needed approvals, and build such a runway, it could be ready for traffic by the time ADS-B and the required cockpit displays were available. Even without those technologies, it would provide dramatic capacity increases during clear-weather (VFR) conditions.

4. Accelerated Near-Term FAA ATC Improvements

The Air Transport Association has proposed a number of ATC improvements that the FAA could make that would increase capacity in the New York (TRACON) airspace and at the individual airports. One of the most obvious is to fast-track implementation of the recently completed New York/New Jersey/Philadelphia airspace redesign. Another would be to fast-track implementation of area-navigation (RNAV) procedures at the three major airports, as has been done during the last two years at Atlanta and Dallas/Fort Worth. These more-precise Standard Terminal Arrival Routes (STARs) and Standard Instrument Departure (SIDs) routes save time, reduce noise exposure, save fuel, and reduce controller workload since they can be programmed into aircraft flight management system (FMS) computers.

ATA has also proposed sensible near-term ATC improvements at each of the three major airports.

- At JFK, runways 31L and 31R are widely spaced and could be used for simultaneous ILS approaches in all weather. When conditions call for using intersecting runways at JFK, simultaneous departures on 22R and arrivals on 13R would increase the total number of operations per hour.
- At EWR, on the closely spaced 22R and 22L, the RNP Parallel Approach Transition (RPAT) procedure could be implemented for properly equipped aircraft.
- And at LGA, the use of RNAV and RNP procedures would reduce complexity and de-conflict traffic, permitting a modest increase in runway capacity.

PANYNJ's Flight Delay Task Force presents a 77-item list of changes that could be made in ATC procedures, in implementation of new technology, and in capital expenditures, such as runway and taxiway improvements.⁵³ Many of these would require action by the FAA in the near-term, mid-term, and long-term.

Making these kinds of efforts a major priority is one of the things FAA could offer to the airlines and PANYNJ in an effort to put together a win-win solution. The FAA could create a package of improvements and commit to an aggressive schedule for implementation.

F. An Estimate of Congestion Charge Revenues

How much revenue is raised from landing fees greatly depends on what value is placed on the cost of delays. This analysis uses \$50 per minute, based on the cost that one airline's departure imposes on other airlines, plus a conservative estimate of the value of passenger time.

At JFK, a congestion charge of \$2,000 during the busiest peaks (a figure in line with other estimates of optimal congestion charges at other airports) and as low as \$50 during off-peak periods would generate, on average, \$600,000 per day if applied only to departures. This is approximately equal to how much is currently raised through JFK's weight-based landing fees. A congestion charge that was applied also to arrivals would raise at least \$200,000 per day more (and likely more than that).

Revenues would be expected to increase slightly should airlines reschedule their flights away from peak periods and into shoulder and off-peak periods. In the JFK scenario presented above in Part 5, total revenues increased by \$80,000 per day when airlines were modeled as redistributing their flights across time. However, this conclusion should be considered tentative until a full simulation of how airlines will respond to congestion charges is conducted.

Whether or not a congestion charge is revenue neutral also depends on whether a congestion charge is imposed on top of existing weight-based fees or is used in place of them. We recommend that any initial pricing system implemented in time for summer 2008 be based on departures only. Addressing only the departure side of airport congestion may be an effective option since airlines seek to minimize the time that aircraft spend on the ground. A plane whose departure time is moved due to a congestion charge is also likely to have its inbound arrival time shifted in order to minimize the time the plane is idle at terminal gates.

As previous studies of congestion pricing have concluded, a congestion charge that is primarily used to efficiently allocate runway space among users, rather than aiming to increase airport revenues, could be approximately revenue neutral. Our estimates indicate this is likely to be the case if the charge applies to departures only.

Part 8

New York Airspace Congestion

Previous sections of this report have addressed only congestion at the three principal air-carrier airports in the New York metro area: EWR, JFK, and LGA. But what about the very complex airspace in the region? Airlines and airline pilots contend that non-scheduled flight activity (business jets and air taxi operators) contributes significantly to airspace congestion in the region—a claim that is denied by the air traffic controllers’ union and general aviation organizations, which attribute the problem solely to airline over-scheduling. Is airspace congestion a factor in airline delays, and if so, what could be done about it?

A. Aircraft Operations in the New York TRACON Airspace

The New York TRACON (Terminal Radar Approach Control center) manages the airspace for 15 airports with control towers (and over 30 other small airports). The airspace around the commercial airports is considered controlled airspace—defined as Class B in the area that includes the three major airports plus Teterboro (TEB) and White Plains/Westchester County (HPN), Class C around Stewart (SWF), and Class D around Islip/MacArthur (ISP). Most aircraft flying within that controlled airspace file flight plans and operate under instrument flight rules (IFR). Thus, when looking at data on aircraft operations in the congested airspace near these airports, what is most relevant for this discussion is IFR (as opposed to total) operations.

The FAA has two databases that are key sources for airport and airspace flight activity. OPSNET tracks all flights (VFR plus IFR), while ETMS tracks only IFR. A comparison of data for the 15 towered airports from 2000 and 2007 shows that IFR operations have increased dramatically during these seven years, while total operations have actually declined. This may account for the differing claims made by GA and airline groups, with the former claiming there is no airspace congestion problem and the latter claiming that there is. But as noted above, the relevant measure is what is happening to IFR flight activity, and that activity is up by more than 14 percent, to account for 60 percent of the total.

	2000	2007	Change
Average daily flight operations	8,729	7,806	-10.6%
Average daily IFR flight operations	4,153	4,753	+14.4%
IFR percentage of total	47.6%	60.1%	

Source: FAA OPSNET and ETMS databases; figures are for the first 10 calendar months of each year.

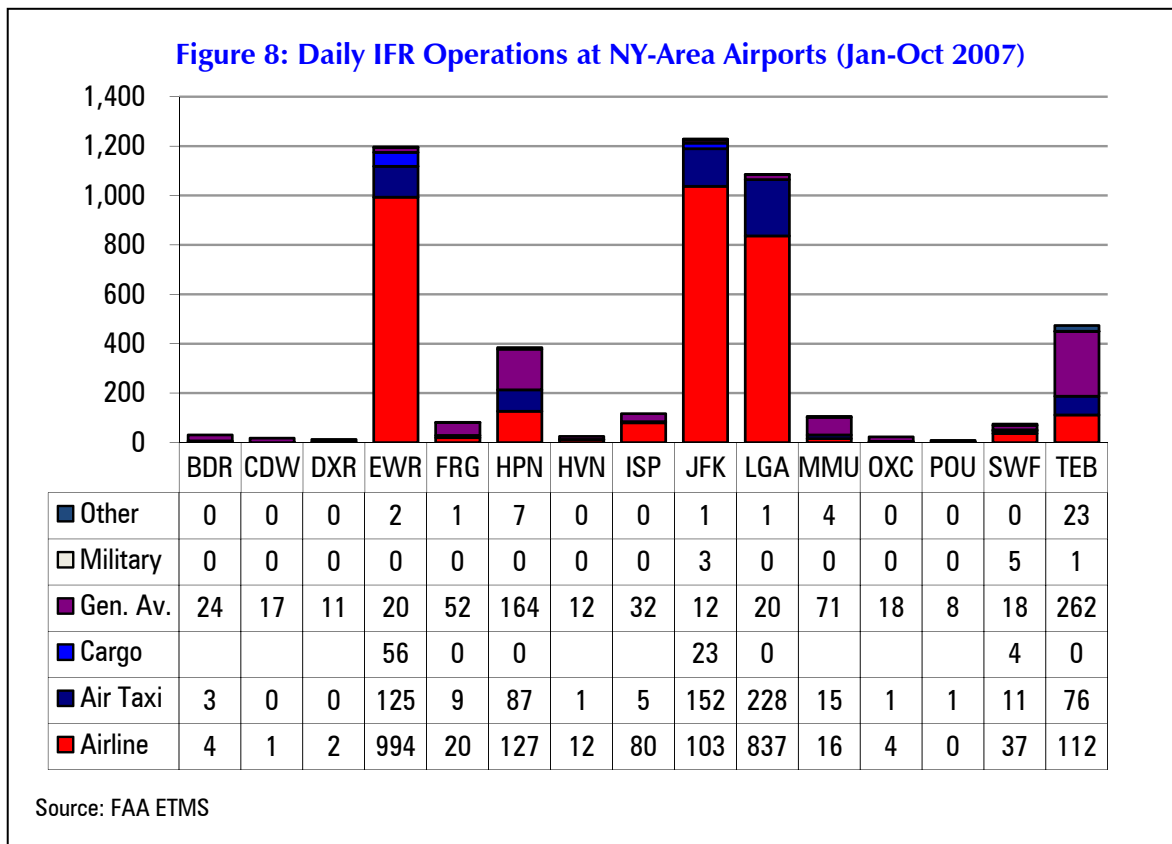
FAA data for the first 10 months of 2007 for IFR operations in the New York TRACON airspace break down by user type as shown in Table 10.

Table 10: IFR Flight Operations in New York Airspace	
Air carrier	42.0%
Air taxi	30.4%
General aviation	27.2%
Military	0.4%
Total	100.0%

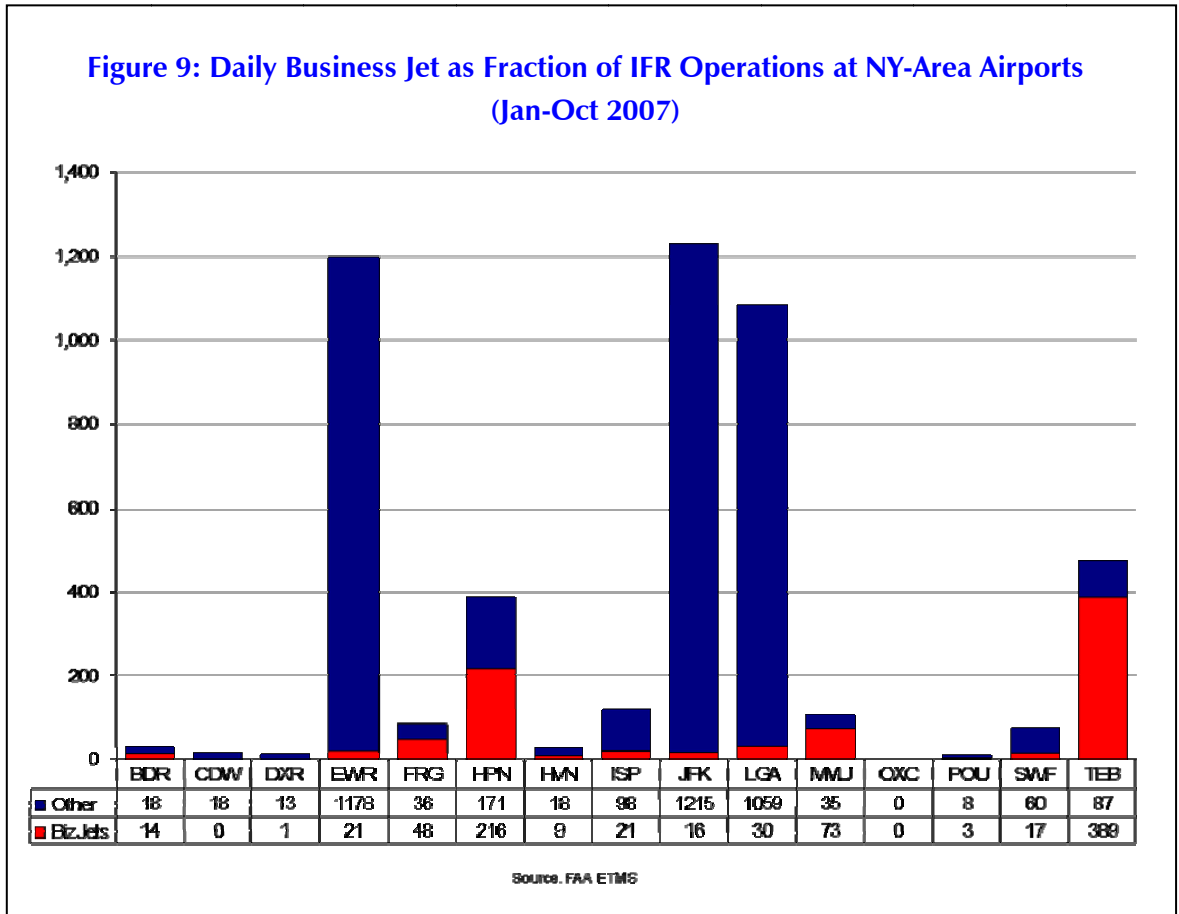
Thus, nearly 60 percent of IFR operations in this complex airspace are non-airline. However, since many flights categorized as “air taxi” are actually small regional jets operated by regional airlines, a possibly more useful number to look at is the total of air carrier and air taxi—which is the total that can be considered “commercial.” In this case, that

percentage is 72.4 percent. This still leaves about 28 percent of all IFR activity in this very busy airspace as non-commercial (nearly all of which is GA).

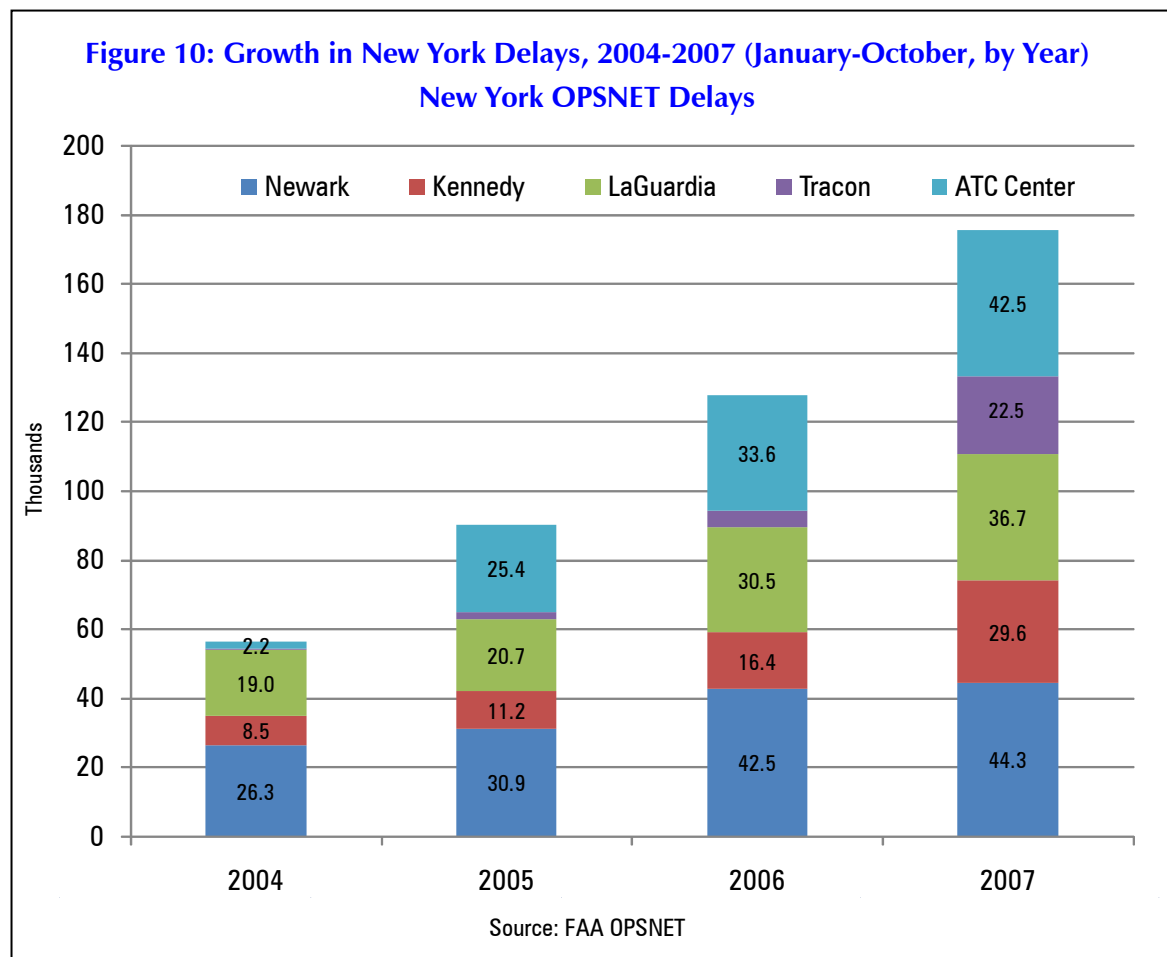
How this activity breaks down by airports is also worth noting. Figure 8 shows all daily IFR operations for the 15 towered airports in the New York TRACON airspace. General aviation is a very small portion of operations at the three major airports, but is by far the largest use at the other 12 airports.



How much of the GA operation to and from these towered airports consists of business jets? Figure 9 breaks down daily IFR business jet operations by airport, confirming frequent GA claims that such planes are only a very minor user of EWR, JFK, and LGA. But the numbers are much greater for TEB, HPN, and MMU. The nearly 400 such operations per day at Teterboro (TEB) is especially significant since arrival/departure paths of TEB and EWR conflict under certain weather conditions. And both TEB and Westchester (HPN) are within the Class B airspace shared with EWR, JFK, and LGA.



But what about delays, specifically? Figure 10 shows how total delays—airport plus airspace—have tripled during 2004 through 2007. Of the 2007 total, airspace delays now account for more than one-third.



B. Can Pricing Address Airspace Congestion?

In a letter to the editor of the *Washington Post* (Oct. 6, 2007), the former president of the Air Line Pilots Association Duane Woerth wrote, “On a typical Monday morning, the New York air traffic control facility [TRACON] dedicates 40 percent of its capacity to corporate aircraft using Teterboro, NJ, White Plains, NY, and other regional airports. How can a market-based solution such as [airport] congestion pricing for airlines reflect the fact that 40 percent of the rush-hour capacity is corporate aircraft? It cannot.”

Woerth’s dismissal of a pricing approach is consistent with the airlines’ current position regarding New York airspace congestion. Rather than calling for pricing access to that airspace, the ATA has proposed the following:

“During constrained periods, [FAA should] abandon the ‘first-come, first-served’ policy and assign scheduled, commercial operations the highest priority. Accommodate other users of regional ATC services by moving their operations to unconstrained periods.”⁵⁴

In its explanation of how this might be implemented, ATA goes on to define constrained periods as 3–9 PM weekdays and selected holidays/special events. And ATA justifies its proposal by stating

that “NY metropolitan area airspace is a scarce public resource and must be allocated in a way that yields the greatest public value.”

In making this recommendation, ATA is arguing that administrative allocation of a scarce resource is better for society than market allocation. Translated from rhetoric about “greatest public value,” what this means is that considerations of relative *economic* value should be ignored in such decisions. Thus, by ATA’s logic, a 30-seat RJ with 25 passengers paying \$150 each (\$4,500 total fares) is considered an inherently more valuable use of a departure slot from a busy New York airport than a Gulfstream business jet carrying four highly skilled million-dollar-a-year executives to a business meeting with billion-dollar consequences.

A market-pricing system is based on the premise that no external authority can possibly assess the relative values of these alternative uses and that the best (or least-bad) way to decide is to see who is willing to bid more to use each unit of the scarce resource. There is no one right answer to such questions. Some such RJ flights might be filled with highly skilled professionals on essential business trips; others may have a preponderance of price-sensitive leisure travelers. One Gulfstream flight may be an executive and her family on the way to a golf weekend; another may involve several executives closing a multi-billion-dollar transaction. The only fair way to decide among these many uses is to ration them by price. This is also the way most likely to maximize the economic value provided by air travel in capacity-constrained areas such as the New York TRACON.

That said, could some sort of pricing actually be applied to, say, IFR flights in congested airspace? In its 2007 reauthorization proposal, the FAA proposed a modest first step in this direction. As part of its user fee proposal, the agency called for GA users of terminal airspace surrounding the nation’s 30 most congested airports to pay a modest charge that would range from about \$5 for a Beech Bonanza to \$16 for a twin-jet Cessna Citation. While those very low sums would be unlikely to keep much GA traffic out of such TRACONs during busy periods, the principle was sound. To be more effective, however, a congestion fee for IFR flights within busy TRACONs should be a flat rate applied to all such flights.

Although the overall FAA reauthorization proposal was rejected by both the House and Senate authorizing committees, the Senate committee did propose a starter user fee. It would be a fee of \$25 per IFR turbine flight, whose proceeds would be used exclusively for NextGen capital investments, as the revenue stream for NextGen bonds. As proposed, that fee was estimated to be capable of supporting some \$5 billion in revenue bonds.

As proposed in the Senate, the ATC fee was not specific as to flight regime—i.e., terminal versus en-route. We could therefore implicitly take it as applying to en-route flights and suggest amending it to include an additional \$25 per IFR turbine operation in any TRACON serving the 30 most-congested airports, as defined by FAA. This would increase the total to be raised for NextGen capital investment, and those additional funds could be targeted toward terminal-area investments

in NextGen systems. This would be analogous to the principle discussed in Part 7 of using net new revenues from airport pricing to expand the capacity of the priced airports.

A fee of \$25 per IFR turbine operation in congested TRACON airspace may not be high enough to have a large impact, but it would set an important precedent and is probably the most that could be hoped for in the current reauthorization cycle. Airspace congestion, based on Figure 10, is thus far only one-third of the delay problem in the New York metro area. If it became a larger fraction in future years, a larger TRACON charge could be implemented.

Part 9

Conclusions and Recommendations

A. Findings

We have sought to demonstrate a number of things in this study. One of the most important is that real (market-clearing) airport congestion pricing has not been used before. The previous examples of runway pricing cited by critics were either modest peak/off-peak differentials or awkward combinations of landing fee changes and administrative allocation. In no cases has actual market pricing been attempted, so to say that it has been tried and failed is not correct.

Although airport congestion pricing has not been implemented thus far, there is solid evidence that such pricing would be effective at reducing delays and congestion at airports. This evidence comes mostly from increasingly sophisticated economic modeling, which takes into account airline scheduling practices. But that evidence is reinforced by strategic simulations such as those carried out, with airline scheduler participation, by the FAA's NEXTOR research consortium. The same kind of response to congestion pricing predicted by economic modeling was confirmed in the "war game" type of strategic game simulation.

When we conclude that congestion pricing would "work," at delay-plagued airports including those in the New York metro area, what does this claim encompass? Such pricing can realistically be expected to:

- Reduce delays significantly;
- Maintain high passenger throughput to and from the New York metro area;
- Not harm, but probably benefit, general aviation, by ensuring that high-value GA, such as corporate jets and fractional operators, can purchase access to the major airports when it is worth paying the market price for such access;
- Not harm the important domestic feed to international flights at JFK and EWR;
- Not give foreign carriers an unfair advantage, since they would likely be better off as long as the congestion charge is used to replace current weight-based landing fees; and

- Give new-entrant airlines a level playing field for gaining access to these premium airports, rather than entrenching incumbents (as would happen with the IATA process that grandfathers incumbent airlines).

And all this can be done in such a way as to aid, not hinder, the expansion of capacity at the New York airports.

B. Recommendations

To achieve the results outlined above, a number of specific policy decisions must be made. In order to achieve all of these results, all of the following policies must be put in place.

First, the party doing the pricing should be airport operators, not the FAA. In the case in point—the three major New York airports—this means the Port Authority of New York and New Jersey. There are several reasons for this. Airport operators have the clear legal authority to charge for the use of their runways, while the FAA apparently does not and might have to get Congress to enact legislation to that effect. That is not currently in the cards, and the congestion problem at the New York airports needs a solution in place prior to the summer 2008 travel season. We also think airports are the most appropriate party to be operating such a pricing system.

Second, all three congested airports should implement congestion pricing, using the approach described in Parts 4 and 5. To price only one or two of the three airports could divert some traffic to the third one, exacerbating the already serious peak-period delays at the non-priced airport.

Third, the congestion-pricing system should replace—not supplement—the current weight-based landing fees. The modeling results reported in Parts 4 and 5 suggest that this approach will produce significant reductions in delay without reducing passenger throughput. And by replacing the old landing charges with a new system, it appears that the result will be either revenue-neutral or only mildly revenue-positive.

Fourth, to reassure the airlines and other airport users that any net revenues will be spent for their benefit, a rigorous version of the Plavin lockbox concept should be implemented by PANYNJ. That way, any and all net new revenues will be devoted to capacity expansion projects at the New York airports—of which there are many.

Fifth, there should be no exemptions from congestion pricing. The airlines are right to be concerned that once any exemptions are granted, further exemptions could proliferate. This is both unfair and economically harmful, since the more users that are exempted from pricing, the higher the prices must be for the remaining users. The modeling results suggest very little negative impact on service to small cities and no need to exempt foreign carriers. And both GA and new entrants would be better off with a system where they can actually purchase access to these airports rather than battling endlessly to get a handful of carve-outs via the political process.

Sixth, since *airspace* congestion contributes to the delays in the New York area, all IFR turbine flights in the New York TRACON airspace should pay a congestion fee to use this airspace. This will require legislation, which could be done by amending the Senate version of the pending FAA reauthorization bill to add such a fee to the bill's current \$25 per IFR turbine flight user fee for NextGen.

Finally, the FAA should prioritize NextGen investments and other airspace improvements for airports with major congestion/delay problems, especially those willing to implement congestion pricing. The U.S. DOT's Congestion Initiative applies to both air and surface transportation, and in the latter, the Federal Highway Administration has gone out of its way to give cities and states incentives to implement congestion pricing. The FAA should do likewise.

C. Getting from Here to There

In order for congestion pricing to be implemented for the summer 2008 travel season at the New York airports, several parties must agree on the way forward. The PANYNJ must be on board, since it operates the airports and is the party that determines the charges for using the airports' runways. The airlines must also support this approach, since they would have to agree to revisions in their current lease agreements with PANYNJ (on which their current landing charges are based). The U.S. DOT must also be on board, since it must vet the legality of such a pricing system, for compliance with existing DOT Rates & Charges Policy and FAA grant assurances (that the pricing is nondiscriminatory, etc.) and for consistency with U.S. bilateral air services agreements.

As this is written, in late 2007, the airlines' (ATA) announced position is opposition to congestion pricing and reliance, instead, on the IATA approach—to grandfather existing slot allocations and allow secondary trading in any slots that become available. Despite having done considerable prior research on airport pricing, the PANYNJ has thus far sided with the airlines. The only party that seems committed to airport pricing is FAA/DOT. Given these announced positions, is there any way that the pricing approach set forth in this paper could come to be seen as win-win by ATA and PANYNJ?

We think the key factor in PANYNJ opposition (and at least some of ATA's opposition) stems from the FAA's announced intention of imposing a schedule cutback that would limit JFK operations to 80-81 per hour. As the NEXTOR exercise showed, the likely airline response to such a regime is cuts in service that would lead to significantly reduced passenger throughput. That would be bad for the New York metro area, as well as for the airlines serving JFK.

By contrast, the simulation models and the NEXTOR exercise showed that if delay-reduction were pursued by the kind of congestion-pricing system described in Parts 4 and 5, congestion could be cut significantly *with essentially no reduction in passenger throughput*. That objectively changes the impact on New York's economy and should lead PANYNJ to reconsider its position. In

addition, implementation of a Plavin lockbox to sequester any net new revenue for airport capacity expansion should be a net positive for PANYNJ. That change would leave intact the agency's grandfathered exemption from diverting a status-quo amount of airport revenue to non-airport purposes while creating a new fund for much-needed capital investment at its airports.

ATA should consider this approach as an alternative to the very real possibility of getting stuck with an FAA-imposed schedule cutback to 80-81 operations per hour at JFK (and possibly an equally unattractive limit at EWR given the levels of congestion there). And along with that administrative approach would come the likelihood that foreign carriers would be exempted from cutbacks, based on provisions in current bilaterals. So if the actual choices on the table are administratively mandated cuts in schedules versus pricing incentives that maintain passenger throughput and apply equally to foreign carriers, the airlines might conclude that pricing is the less-bad alternative.

If the U.S. DOT is as committed to airport congestion pricing as it claims to be, what could it do to sweeten the pot for ATA and PANYNJ? Besides providing a solid legal basis for the pricing system and making clear that it will defend it in any litigation that may arise to challenge it, DOT could put the same kind of program priority on airport congestion pricing that it has put on roadway congestion pricing. Dating back to the Congestion Pricing Pilot Program (1991) and continuing through 2007's Urban Partnership Agreement competition, DOT and FHWA have offered incentives to state DOTs and urban areas that are willing to study and implement various forms of road pricing. The department-wide Congestion Initiative, announced by former Secretary Norm Mineta in 2006 and continued by Secretary Mary Peters since then, is supposed to apply to air transportation as well as surface transportation. But thus far, DOT and FAA have offered no comparable incentives for implementing airport congestion pricing. That needs to change.

Former White House economist Dorothy Robyn, in a recent policy paper on air traffic control and airports, has proposed just such a course of action.⁵⁵ One key element could be putting airports that implement congestion pricing at the top of the priority list for implementing key NextGen building blocks, such as the runway-management system ASDE-X and ground stations for the critically important ADS-B, speeding up implementation of the New York airspace redesign, and expediting implementation of RNAV and RNP approach and departure procedures. These are all actions the airlines would like to see taken. In the case of the New York airports, FAA could come up with a package of such improvements and commit to an aggressive schedule for near-term implementation.

D. Longer-term Steps

The focus of this paper has been on reducing congestion at the New York airports primarily because DOT has made that a priority. If an initial pricing system along the lines recommended in this study is implemented there in 2008, what should happen thereafter?

First, the pricing modeling reported in Parts 4 and 5 (which charges market prices for departures) showed that it was possible to reduce congestion significantly without reducing passenger throughput. But it did not eliminate congestion. Further simulations, along the lines of the NEXTOR exercises, should be carried out to build on the experience gained from actual pricing at EWR, LGA, and JFK. Such exercises would test arrival as well as departure pricing, exploring airline responses and their impact on passenger throughput, cuts in service to smaller markets or in frequencies to larger markets, and net revenues. There are trade-offs among these variables, and realistic “war game” exercises involving high-level airport and airline players are an excellent way to explore those trade-offs.

Second, the pricing modeling and exercises reported here addressed only operations under normal weather conditions. They did not address what happens when inclement meteorological conditions (IMC) prevail, which generally leads to significant loss of runway capacity and much higher than “normal” levels of flight delay. Robyn and others have suggested the concept of offering airport users the opportunity to purchase, for a higher charge, “non-interruptible” service for particular routes at particular times of day. In other words, if weather reduces a runway’s safe throughput from 75 to 50 operations per hour, those who had contracted for non-interruptible service would have first priority for the 50 operations.⁵⁶

The U.S. DOT should also make longer-term policy changes once the immediate situation at the New York airports has been addressed. One would be to revise its airport Rates and Charges policy to make it compatible with an economically literate definition of costs, rather than its current basis in accounting costs. This would strengthen the underlying legal basis for both airport and airspace pricing.

In addition, DOT and FAA should develop the aviation counterpart of the current DOT/FHWA priority on incentivizing state and local governments to implement congestion pricing in the roadway system. An Airports Congestion Initiative could be targeted at all 35 airports the FAA has designated as capacity-constrained. Such an effort could focus not only on implementing pricing to reduce delays, but also on priority implementation of NextGen technologies that assist in capacity expansion. Such a policy of targeted improvements would encourage airlines and business jet operators serving those airports to equip their aircraft with the systems needed to take full advantage of RNP arrival and departure routes, continuous descent approaches using ADS-B, etc. Robyn points out that “the top two dozen to three dozen [aircraft] operators account for most of the operations at the 30-40 largest airports,” suggesting the potential of targeted NextGen investments at key airports to stimulate equipage by major aircraft operators.

E. In Conclusion

The DOT and the President have made reducing congestion and delays at the New York airports a priority issue, preferably using pricing as the principal tool. Evan Kwerel, the expert on spectrum auctions at the Federal Communications Commission, recently recommended that DOT’s first use

of market mechanisms to reduce airport congestion should be sufficiently bold that passengers will notice the improvement.⁵⁷ That is sound advice.

And as Michael Levine put it in coming up with the Levine Challenge (discussed in Part 3), a poorly defined attempt at pricing that ends up as a de-facto tax on air travel and discourages airport capacity expansion “will discredit the concept of congestion pricing in aviation. . . . It will have been ‘tried’ and will have ‘failed.’” What’s needed is “transparent and equitable pricing and efficient use of the funds generated.”⁵⁸

That is what we have proposed in this study. Replacing current landing fees with true congestion pricing at all three major New York Airports, and guaranteeing that any net new revenues are used to expand capacity, meets the Levine Challenge and should be embraced by aviation stakeholders as a true win-win approach.

About the Authors

Robert W. Poole, Jr. is Director of Transportation Studies at the Reason Foundation. He is the author or co-author of numerous policy studies on airport and air traffic control issues. He edits and produces two e-newsletters, *ATC Reform News* and *Airport Policy News*. He has testified on airport and ATC issues before House and Senate aviation subcommittees, as well as on aviation security. He has advised the Office of the Secretary of Transportation, the Federal Aviation Administration, and the White House Office of Policy Development and National Economic Council during several Administrations. He is a member of the Transportation Research Board's Congestion Pricing Committee and of the Government Accountability Office's National Aviation Studies Advisory Panel. He received his B.S. and M.S. in engineering from MIT and did graduate work in operations research at NYU.

Benjamin Dachis is a policy analyst at the Reason Foundation. His research involves aviation, urban land use and transportation economics, and privatization. He was a research fellow at the C.D. Howe Institute in Toronto before joining Reason. He has published commentaries on aviation for the C.D. Howe Institute and the *National Post*. He has also worked for a Canadian airline. Dachis received his undergraduate degree in economics from the University of Toronto and his MSc. in Regional Science from the London School of Economics.

Related Reason Publications

Using the Revenues from Airport Pricing, By David Z. Plavin, November 2007, Policy Brief 68.

Evidence That Airport Pricing Works, By Dr. George L. Donohue and Dr. Karla Hoffman, November 2007, Policy Brief 67.

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