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Delayed! U.S. Aviation Infrastructure Policy at a Crossroads

In the aftermath of the September 11 terrorist attacks, travelers' fears of flying have given way to their anxieties about delays they may encounter when going through airport security, leaving the departure gate and taking off, flying to their destination, and landing and disembarking from the aircraft. In 2005 in-flight delays and earlier airport arrivals for security screening were estimated to cost passengers and airlines in the United States $40 billion annually.[1]

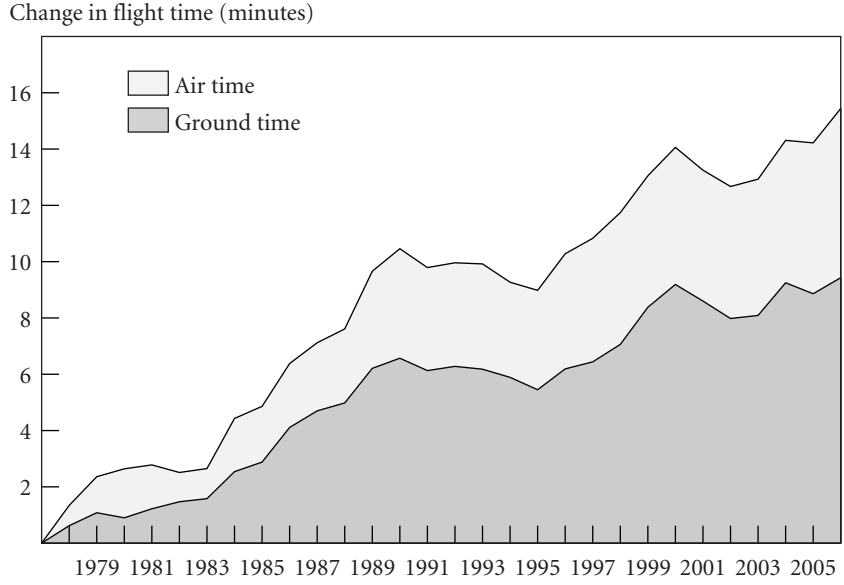
Of course, delays are hardly a new concern with airline travel. As shown in figure 2-1, travel times have been increasing for the past three decades. Forecasts by the Federal Aviation Administration (FAA) call for more than 1 billion passenger enplanements by 2016, indicating that landside and airborne delays and their associated costs will become significantly worse unless the nation's aviation infrastructure—airports and air traffic control—improves the efficiency with which it helps passengers get to their destinations.[2]

Currently responsibility for basic aeronautical services in the United States—including terminals, gates, taxiing areas, and runways—lies with local

1. Total delay costs for 2005 are obtained as follows. The U.S. Department of Transportation (2006) estimated that aircraft delays cost passengers $9.4 billion. This figure is likely to be an underestimate because the delays to passengers are inferred from delays to aircraft. Passenger delays are likely to be greater than aircraft delays because delays to passengers may cause them to miss connections. Using Federal Aviation Administration delay data, the Air Transport Association in 2006 estimated that the additional operating costs to airlines from delays were $5.9 billion. Finally, a one-hour earlier arrival at an airport for security purposes valued at $50 an hour (obtained by applying Transportation Department guidelines to determine the value of time in 2005 for airline travelers) for roughly 500 million trips resulted in an additional cost of $25 billion.

2. FAA (2006).

Figure 2-1. *Changes in Components of Actual Flight Time since 1977*



Source: Authors' calculations from data in U.S. Department of Transportation, Service Segment Data and Schedule T-100, Data Bank 28DS, Domestic Segment Data. The data in the graph are based on a fixed set of flight segments (that is, all domestic segments in the Service Segment and 28DS databases for which data were available for all years 1977–2006). Changes in flight time at the segment level were aggregated using 1977 passenger weights.

governments that operate airports either directly, as in the case of small airports, or through airport authorities, as in the case of medium and large airports. The Transportation Security Administration (TSA) is responsible for airport security, and the FAA provides air traffic control. In 2004 the FAA's air traffic control function was reorganized into the Air Traffic Organization (ATO), a "performance-based" organization. Nonetheless, the ATO remains an agency within a civil aviation administration that is funded by annual budget appropriations from Congress.

Congress has repeatedly criticized the FAA for the excessive delays and cost overruns it has experienced in trying to develop a technologically up-to-date air traffic control system that would reduce U.S. airborne delays by expanding usable airspace capacity. Some members of Congress have characterized the TSA as a bloated bureaucracy whose screening tasks could be performed better and more efficiently by private screeners. Congress has not singled out airport authorities for criticism, but before September 11, Rudolph Giuliani, then the mayor of New York City, advocated privatization of the airports managed

by the Port Authority of New York and New Jersey. Despite complaints by elected officials and an increasingly frustrated flying public, delays seem to be an inescapable part of air travel. Finally, in September 2007, President George W. Bush invited aviation officials and U.S. Department of Transportation secretary Mary Peters to the Oval Office to discuss solutions to air travel delays, proclaiming, "We've got a problem, we understand there's a problem, and we're going to address the problem."

In our view, excessive travel delays are—to a significant extent—a manifestation of the failure of publicly owned and managed airports and air traffic control to adopt policies and introduce innovations that could greatly improve the efficiency of the U.S. air transportation system. Given little economic incentive and saddled with institutional and political constraints, major airports and the air traffic control system have not exhibited any marked improvement in their performance for decades despite repeated assurances that they would do so, and they have provided little reason for policymakers and travelers to expect such improvements to ever occur.

Some observers believe that delays would be reduced if the nation invested more money in airports and air traffic control. However, the returns from such spending would be compromised by the system's vast inefficiencies. Thus, the key to reducing delays efficiently is to rid the system of its major inefficiencies. We believe that can be accomplished only by privatizing the nation's aviation infrastructure. The aim of this chapter is to argue that by operating in a less constrained and a more competitive environment, privatized airports and air traffic control would have the potential to improve service to travelers and reduce the cost of carrier operations while maintaining the nation's outstanding record of air travel safety in the face of an ever greater volume of traffic. In addition, privatized airports could facilitate greater competition among airlines that would lead to lower fares.

We recognize that privatization of public aviation facilities does not guarantee that monopolies will not be formed. Thus, we call for carefully designed privatization experiments to preview the extent of competition that is likely to develop among airports and the resulting economic effects and to alleviate concerns that public airports will be replaced by private monopoly airports. We also recognize that privatization faces strong resistance from entrenched interests who benefit from current policies. At the same time, as indicated by President Bush's recent attention to the problem, policymakers cannot ignore the political costs of periodic crises related to increasing travel delays. It is our view that the impasse in reforming aviation infrastructure policy would be broken if experiments reveal that the flying public would realize large benefits from privatization.

Congress enacted legislation in 1996 to create a federal airport privatization demonstration program, but barriers to participation have discouraged significant experiments. As discussed in other chapters in this book, during the last several years countries such as Australia, New Zealand, and the United Kingdom have privatized their airports, and countries such as Canada and the United Kingdom have explored ways to enable private entities to provide (at least in part) their air traffic control services. We hope U.S. policymakers will intensify their efforts to encourage the private sector to participate in addressing growing concerns that the nation's air transportation system is inexorably headed toward longer delays and potential threats to safety.

In what follows, we provide institutional background on U.S. aviation infrastructure; assess the economic efficiency of current public policy toward airports, air travel security, and air traffic control; and outline the case—including experiments to produce hard evidence—for privatizing these services.

An Overview of U.S. Aviation Infrastructure and the Evolution of Current Policy

The federal government has shaped the development of aviation infrastructure through congressional funding of—and the FAA's allocation of those funds for—airports and air traffic control. It also has a major presence at airports through the Transportation Security Administration's screening of passengers and luggage. Different regulations and funding sources govern the operations of these services, so it is useful to discuss the evolution of current policy toward them separately.

Airports

The Civil Aeronautics Act of 1938 is notable for instituting economic regulation of fares, entry, and exit in the U.S. airline industry, but it also paved the way for federal funding of airports by authorizing funds to build additional airfields.[3] Previously, states and local governments had sole responsibility for airport planning and issued general obligation bonds that were supported by taxes to pay for runways, terminal construction, and improvements in these facilities. The Federal Airport Act of 1946 created an intergovernmental grant program, providing federal matching funds to states and local governments for airport projects. The program lasted until 1970 when it was replaced with the Airport Development Program, which increased federal funding for con-

3. Dilger (2003) provides a complete discussion of the major federal legislation toward airports and air traffic control.

struction and improvements at large public airports. Federal funding for airport projects is currently provided under the Airport Improvement Program (AIP), which provides grants to enhance public-use airport safety, capacity, security, and environmental concerns. AIP funds are drawn from the Airport and Airway Trust Fund, which is supported by excise taxes, fuel taxes, and other similar revenue sources, and are distributed to airports of all sizes by the FAA on the basis of national priorities.[4]

As shown later, the majority of AIP funds are allocated to airports that account for a small share of commercial enplanements. In addition, because the demand for AIP funds exceeds availability, the FAA typically apportions the funds into major entitlement categories such as primary, cargo, and general aviation. Any remaining funds are then distributed at the discretion of the FAA.

Airports continue to issue bonds to help pay for terminals and runways, and they cover bond payments for projects approved by the FAA with the passenger facility charge. Airports also meet expenses with revenues generated from parking fees, retail store rents, and advertising display charges. Finally, airports raise revenues by renting terminal facilities such as counters and gates to airlines and by charging landing fees based on an aircraft's weight subject to guidelines set by the FAA. Runway landing fees vary widely, but currently a typical fee is $2.00 per 1,000 pounds of weight. For example, landing fees for a Boeing 757-200 aircraft, with a maximum design landing weight of 198,000 pounds and a capacity of about 186 passengers, would be somewhat less than $3 a passenger for typical passenger loads. During the 1950s and 1960s, as a quid pro quo for airlines' agreeing to pay off billions of dollars in airport bonds for expansion projects, airlines obtained exclusive-use gate leases (that is, gates leased exclusively to one airline) at many large and midsize airports.

Airports and airlines either use a residual or compensatory charging system to establish rents, landing fees, and passenger facility charges.[5] Under a residual charging system, airlines pay the remaining costs of running the airport after commercial and nonairline sources of revenue are taken into account. The airlines guarantee that the level of charges and rents will enable the airport to break even. Under a compensatory charging system, the airlines

4. Currently, the trust fund is composed of revenue from a 7.5 percent ticket tax plus a fee of $3.30 per passenger for each flight segment flown, a fee of $14.50 per passenger for each international departure and arrival, a 6.25 percent cargo waybill tax, a 7.5 percent frequent flier tax on third parties (such as credit card companies) that sell frequent flier miles, and a fuel tax of 4.3 cents a gallon. As of 2007, the trust fund's uncommitted balance was $1.6 billion, a ten-year low and well below its uncommitted balance of $7.4 billion in 1999.

5. Graham (2004).

agree to pay charges that allow the airport to recover the costs of the facilities that the airlines occupy and use. The airport is responsible for covering the remaining costs such as parking and concessions. In practice, negotiations between airlines and large and midsize airports have not resulted in a clear preference for one system over the other. Some of the contracts detailing the charges airlines pay to airports contain "majority in interest" clauses that give the airlines signing the contract the right to approve certain capital expenditures, especially spending on terminals and gates.

Given a variety of funding sources, airports have generally been able to maintain their financial health even in the period after September 11, 2001, when the airline industry lost billions of dollars. To increase their airline tenants' operations, some airports (among them, Detroit, Philadelphia, San Francisco, and San Jose) have directly cut fees and charges or offered discounts to carriers that serve additional cities or expand existing service—or taken both steps.

Currently, more than 19,000 public and private airports operate in the United States, some 3,300 of which have been identified by the FAA's National Plan of Integrated Airport Systems as significant to national air transportation and therefore eligible to receive federal grants under AIP. Table 2-1 classifies these airports by size and presents their share of commercial enplanements and federal grants. Although the nation's large and medium hub airports serve 89 percent of the nation's passengers, they receive only 41 percent of federal airport grant dollars. The 31 large hub airports account for two-thirds of commercial air travelers, but only one new large hub airport has been constructed since 1973. Built in Denver in 1995, that airport has advantages that are difficult to replicate elsewhere—a flat, largely uninhabited site that is fewer than thirty miles from downtown. More than half of the nation's large hub airports are on sites that were chosen in the 1920s, 1930s, and 1940s and were later significantly expanded.[6] These airports and others built more recently have expanded available aircraft capacity by building new runways, but adding capacity in this fashion takes considerable time because airports must account for communities' input, especially their opposition to proposed projects. As of 1970, such projects also must satisfy Environmental Protection Agency environmental impact standards.

Airport Security

Before the September 11 terrorist attacks, airlines were responsible for providing passenger screening, and the FAA was supposed to promulgate performance and training standards. The airlines hired roughly 19,500 screeners from private

6. Altshuler and Luberoff (2003).

Table 2-1. *Distribution of Federal Airport Grants, by Airport Size, 1996*

Airport type[a]	*Number of airports*	*Share of grants (percent)*	*Share of scheduled commercial enplanements (percent)*
Large hub	31	24	67
Medium hub	42	17	22
Small hub	70	18	7
Nonhub	272	15	3
General aviation, relievers, and other commercial service	2,981	27	0

Source: Altshuler and Luberoff (2003), from original data in U.S. General Accounting Office (1998).

a. A large hub handles at least 1 percent of national enplanements, a medium hub from 0.25 percent to 1.0 percent of enplanements, a small hub from 0.05 to 0.25 percent of enplanements. A nonhub has more than 10,000 annual enplanements but less than 0.05 percent of the national total. General aviation, reliever, and other commercial service airports do not provide regularly scheduled commercial flights, although some house air taxi services.

security companies to perform screening procedures at U.S. airports.[7] After the attacks, some have claimed that reliance on private screeners was disastrous, but it should be noted that the screeners were subject to government regulation. In any case, the Transportation Security Administration was created, and in February 2002 it assumed responsibility for screening at virtually all U.S. airports. By the end of 2002 TSA deployed a workforce that, accounting for temporary employees, had grown to more than 50,000 screeners.

Passengers pay $2.50 for each leg of their flight, up to a maximum of $10 per round trip, to help pay for security screening. Airlines then remit the fees to the TSA to support its annual budget of roughly $5.5 billion. To facilitate flexibility in staffing that can respond to changes in airline service, airports have been given the option to replace federal screeners with screeners from private companies. But private screeners are still overseen by federal employees and are required to be paid at least as much as federal ones and to have undergone the same training. Not surprisingly, only a handful of (small) airports have applied to the government to switch back to privately employed screeners.

In response to air travelers' complaints about the excessive delays created by TSA screening at major airports, a "registered traveler" program was initiated

7. U.S. Government Accountability Office (2005).

to create special, speedier airport security lines for people who are willing to pay an annual fee of $50 to $100 and undergo background checks. However, TSA has failed to implement the program nationwide; in fact, as the final draft of this paper is being written, the program is operational at only eight airports—Orlando, where it was pilot-tested; three major airports, New York Kennedy, Newark, and San Francisco; and four smaller airports. Airlines, such as Southwest and United, have tried to expedite screening at certain airports by building separate terminals to accommodate their passengers or instituting special security lines for travelers who are elite members of their frequent flier programs.

Air Traffic Control

Federal provision of air traffic control was spurred by a series of fatal midair collisions and thousands of near misses during the mid-1950s. Concerned that the negative publicity about air safety would sharply curtail passenger demand, aviation interests supported the creation of a centralized federal agency to oversee air traffic control and other safety issues. Thus, in an atmosphere of crisis, Congress passed the Federal Aviation Act of 1958, which gave responsibility for managing the nation's navigable airspace to the new Federal Aviation Agency (renamed the Federal Aviation Administration in 1967, when it was brought into the newly established Department of Transportation).

In practice, the FAA operates en route and terminal facilities to ensure that air travel is safe and to prevent the system from becoming congested. En route facilities include air route traffic control centers (ARTCCs) that provide air traffic control service to aircraft operating under instrument flight rules within controlled airspace.[8] Terminal facilities include radar towers at airports and terminal radar approach facilities (TRACONs) within a fifty-mile radius of an airport; both provide service to aircraft that are arriving, departing, and transiting the controlled airspace. Currently, the FAA system includes roughly 150 radar towers, thirty-five TRACONs, and twenty-one ARTCCs. The FAA is also responsible for hiring air traffic controllers and other air traffic control personnel and for supplying terminal and en route facilities with new equipment.

Air traffic control is supported by the Airport and Airway Trust fund as well as by general revenues. Commercial airlines pay for more than 90 percent of the costs of the system, while private business jets pay the small remaining share. In addition, the military provides as well as uses air traffic control.

8. ARTCCs may also assist with aircraft flying under visual flight rules.

Given that they account for two-thirds of all flights, the commercial airlines contend that they are overpaying for air traffic control services.

An ongoing challenge for the FAA has been to adopt and implement the latest technological advances to expand the airspace where planes can fly safely and to reduce controller error and aircraft encounters with dangerous weather that contribute to accidents. For example, during the early 1980s the FAA announced plans to develop an advanced automation system to provide flexible, computer-oriented air traffic control capable of handling greater traffic volumes at reduced manpower. The system also included significant improvements in detecting wind shear, the primary cause of several crashes, including two major ones in the 1980s.

Although some progress has certainly been made in implementing that system, ongoing assessments by the U.S. General Accounting Office (GAO) indicate that delays and inefficiencies have characterized its development.[9] Scheduled to be completed by 1991 for $12 billion, the fully upgraded system is more than a decade late, billions of dollars over budget, and still nowhere in sight. As of 2007, the cost of the modernization was expected to climb to $51 billion.

Moreover, by the time the FAA's upgrade is complete, the system will be approaching technological obsolescence. Air travel can become even safer and faster if air traffic control replaces its ground-based radar systems with more accurate and reliable satellite communications. The satellite-based system, known by the acronym ADS-B (automatic dependent surveillance-broadcast) would allow pilots and controllers to be cognizant of the planes in the vicinity as well as their speeds, headings, and flight numbers. Travel times would be reduced because pilots would be able to fly closer together and take the most direct routes to their destination using signals from global position satellites to navigate. Pilots would also be able to operate in cloudy weather much as they do on clear days. Radar is imprecise—it typically updates aircraft positions every 4.8 seconds, while ADS-B does it every second—and forces controllers to separate aircraft by several miles to avoid collisions. The FAA has recently proposed a rule for airlines to equip all aircraft operating in controlled airspace with ADS-B-compatible avionics by 2020.

Managing the next generation air traffic control system, referred to as NextGen, would be much simpler and less costly than managing the current system because it would require a few dozen facilities dispersed throughout the country. Much of the current system of radar towers, TRACONS, and en

9. The GAO issued a series of reports in the late 1990s that critically assessed the FAA's progress in modernizing the air traffic control system (GAO 1998a, 1999a, 1999b). More recent critical assessments include Dillingham (2003) and Mead (2003).

route centers would be eliminated. The remaining facilities would be consolidated and kept as a backup in case the satellite system faltered; they would also be used to help detect planes with defective ADS-B devices and planes whose pilots were trying to avoid detection.

Key components of the system are moving forward and being tested in Alaska. The FAA reports that since satellite communications were first deployed in aircraft, the fatality rate for general aviation in Alaska has dropped roughly 40 percent.[10] The system's technology is also being used by UPS at its air cargo hub in Louisville, Kentucky. The FAA plans to switch from today's radar-based to satellite-based air traffic control, but the timetable, as outlined by the Joint Planning and Developing Office that is coordinating the effort, calls for NextGen to take twenty-five years to complete at a cost estimated to be at least $30 billion.[11]

In sum, the federal government has shaped the nation's aviation infrastructure through its long-term strategic planning and design, allocation of funds, project approval process, and specific policy guidelines on runway charges, air traffic control charges, and the like. We now consider how the government's highly interventionist role has affected the air transportation system's performance.

An Economic Assessment

The value that travelers place on air transportation reflects its convenience, price, and safety. In theory aviation infrastructure policy should enhance these attributes by efficiently reducing travel delays, facilitating greater airline competition, and using the most effective technology to keep flying safe. In practice, the evidence indicates that current policy could be significantly improved in all these areas.

Airport Performance

Airport policy encompasses charging aircraft for their use of the runways, investing in runways, leasing gates, and screening passengers and luggage. We draw on scholarly and anecdotal evidence to assess the efficiency of these policies.

10. Del Quentin Wilber, "Overhaul of Air Traffic System Nears Key Step," *Washington Post*, August 27, 2007.

11. Jennifer Oldham, "Nation's Air Traffic Control Again Nearing Obsolescence," *Los Angeles Times*, June 3, 2006; Barbara Peterson, "End of Flight Delays?" *Popular Mechanics*, August 2007.

RUNWAY PRICING. As noted, airports charge airlines landing fees that are based on the weight of the aircraft and that are consistent with the terms of the residual or compensatory contract that the parties negotiate. Generally, the fees do not vary by time of day in accordance with the volume of aircraft traffic. But congestion—which delays travel—does. Beginning with Levine and Carlin and Park, researchers have called for airports to reduce delays by replacing weight-based landing fees with efficient landing *and takeoff* tolls based on an aircraft's contribution to congestion.[12]

Weight-based landing fees were probably a reasonable way to allocate airport costs and raise revenue when airports were uncongested, but today, the principal cost that an aircraft imposes when it takes off or lands is that it delays other aircraft. (Runway damage caused by most aircraft is small.) Based on a sample of aircraft operations at thirty-one of the most congested airports in the United States, Morrison and Winston found that this delay can be substantial.[13] For example, the elasticity of average departure delay, defined as the percentage change in average departure delay caused by a 1 percent change in aircraft departures, is 2.9 for commercial carriers and 2.5 for general aviation. Thus, current weight-based landing fees, which charge large planes much more than they charge small planes but account for a small share of large planes' operating costs, have little effect on congestion because a plane waiting to take off or land is delayed at least the same amount of time by a small private plane as by a jumbo jet.[14]

We estimated that replacing weight-based landing fees with efficient marginal cost takeoff and landing tolls could generate nearly $6 billion (expressed in 2005 dollars) in annual benefits to the nation. Travelers reap $5.3 billion in reduced delay costs and carriers gain $1.8 billion from lower operating costs. Airports' substantial increase in net revenue from higher takeoff and landing fees is modestly exceeded by travelers' losses in consumer surplus. As discussed below, the redistribution from travelers to airports would be softened if efficient tolls were combined with efficient runway investment.

12. Levine (1969); Carlin and Park (1970).

13. Morrison and Winston (1989).

14. To be more precise, delay is affected by the type of lead and trailing aircraft (Ball, Donohue, and Hoffman 2006). If the lead aircraft is small, then the flight separation time for a heavy aircraft (that is, one with a maximum certified takeoff weight of 300,000 pounds or more) is 64 seconds and the flight separation time for a small aircraft is 80 seconds. These are roughly comparable. But if the lead aircraft is heavy, then the flight separation time for a small aircraft, 240 seconds, is much greater than the flight separation time for a heavy aircraft, 100 seconds.

Recently, some economists have raised doubts about the extent to which optimal airport pricing would reduce delays. Brueckner has pointed out that because an air carrier bears the cost of delay to itself, it should be charged only for delays it imposes on other carriers.[15] For example, a carrier with a 50 percent share of operations at an airport should be charged for one-half of the delay costs it creates—the delay incurred by other carriers—whereas the carrier's smaller (atomistic) competitors with a very small share of airport operations should be charged for all the delay they create because their delay is imposed virtually entirely on other carriers. Mayer and Sinai apply this idea to hub airports where dominant carriers cluster their operations to provide convenient connections for passengers (while nondominant carriers operate most of their flights at less-congested times); thus optimal tolls at hub airports should be small because most delay at hub airports is internalized.[16] However, Morrison and Winston find that setting optimal tolls along the lines suggested by Brueckner and by Mayer and Sinai would generate only a small welfare improvement over congestion tolls that assume atomistic behavior for two reasons.[17] First, a large fraction of delays is caused by commercial and commuter carriers and general aviation that behave atomistically (that is, there is more than twice as much external delay as internal delay). Second, the nature of carriers' (private) average costs and their (social) marginal costs, the two factors that account for the costs of congestion for a given level of traffic, means that the benefits from correctly charging carriers for contributing to congestion greatly exceed the costs of incorrectly charging them when their congestion has been internalized.

Instead of using the price mechanism at congested airports to curb delays efficiently, the FAA has instituted arbitrary quantity controls, namely, takeoff and landing slots, at some airports. Since 1969 limits—called slots—have been set on the number of takeoffs and landings per hour at New York LaGuardia, New York Kennedy, Washington Reagan National, and Chicago O'Hare airports. Although it is theoretically possible to design a slot system that has the same welfare properties as efficient tolls, no evidence exists that slot controls at U.S. airports have been designed optimally while evidence does exist that slots have tended to reduce competition and raise fares.[18]

Congress has acted in the past to eliminate slots, but the FAA has countered by imposing administrative controls in response to traffic growth. Recently, the FAA has dealt with congestion at O'Hare by getting hub carri-

15. Brueckner (2002).
16. Mayer and Sinai (2003).
17. Morrison and Winston (2007).
18. Morrison and Winston (2000).

ers together in a room and allowing American Airlines and United Airlines to agree to reduce flights, and it has proposed a new rule at New York LaGuardia that would discourage the use of small jets by imposing an average plane size of 105 to 122 seats for all gates at the airport. Both actions exemplify the FAA's preference for an (inefficient) administrative solution over a potentially efficient market solution.

RUNWAY INVESTMENT. During the past fifty years, public officials have attempted to keep up with growing demand for air travel primarily by building more runways at existing airports rather than by building additional large airports. But adding a runway is fraught with hurdles as airports must contend with community opposition and meet federal environmental impact standards. Indeed, the nation's thirty-one large hub airports, which account for the majority of delays, built just three new runways during the 1980s and six during the 1990s. In 1999 the Air Transport Association, representing major air carriers, and the National Air Traffic Controllers joined forces and called for "fifty miles of concrete"—the equivalent of twenty-five new runways—as an antidote to growing delays. Twelve runways have been christened since then, but the time and cost to build some of them simply cannot be justified. For example, Atlanta's new (fifth) runway has been nearly twenty-five years in the making, with an estimated cost of $1.3 billion; Boston's sixth runway was put into service at the end of 2006, thirty years after it was initially planned; and St. Louis's new runway cost $1.1 billion, while its value to travelers is being strongly questioned because the airport has excess capacity. The construction of taxiways has also been delayed. For example, Boston is scheduled to finish construction of a taxiway to reduce the danger of plane collisions in 2009—after a seven-year delay.

Runway investments often meet opposition when they are part of an airport's comprehensive plan to upgrade its facilities. For example, Los Angeles Airport (LAX) has been trying for more than a decade to develop a proposal acceptable to the surrounding residential community and the FAA that would involve building a new terminal and reconfiguring some of its runways. Chicago O'Hare has also been trying for many years to gain approval for an expansion plan that would lengthen and widen some of its runways and build new terminals and parking spaces for oversize jets and passenger jet bridges.

The impediments to building new runways should be of great concern because their potential benefits are huge. Morrison and Winston analyzed the situation where an airport owns land and is able to construct an additional runway measuring 10,000 feet by 150 feet.[19] Optimal runway capacity is

19. Morrison and Winston (1989).

reached when the marginal cost of an additional runway is equated with the marginal benefit of reduced delay. We found that a policy of efficient congestion tolls and optimal runway capacity could generate roughly $16 billion (2005 dollars) in annual benefits. Travelers would gain nearly $12 billion in reduced delays and also would pay lower fares because the expansion in runway capacity would reduce congestion to such an extent that, on average, landing fees would fall.[20] Carriers benefit from the lower operating costs from reduced delay, while airports' net revenues would fall slightly. But because airports are characterized by overall constant returns to scale, they would be financially self-sufficient under optimal pricing and investment.[21]

To be sure, our findings largely neglect the practical and political difficulties that many airports face when trying to expand their runway capacity. Nonetheless, the reductions in delays from additional runways at most major airports are so large and so important in softening the distributional effects of optimal pricing that federal policy has unquestionably compromised traveler and carrier welfare by helping to turn runway construction into a task that is measured in decades and billions of dollars.[22]

Federal grants under the Airport Improvement Program are used to reduce delays at airports; however, the program suffers from two inefficiencies. First, political forces cause federal funds to be distributed more broadly across airports than if they were allocated according to cost-benefit guidelines. Thus it is not surprising that table 2-1 suggests only a modest correlation between the airports that receive federal funds for projects that are primarily intended to reduce travel delays and the airports that experience the greatest delays. Second, efficient runway prices signal which airports will benefit most from additional runway investment. But the AIP program does not make decisions using this signal; instead it makes them subject to constraints on efficient runway investments just noted.

GATE UTILIZATION. Airport gates are classified as exclusive use (leased exclusively to one airline), preferential use (the airport operator may assign the

20. General aviation would face higher landing fees. But our model does not account for the greater flexibility that people who use general aviation have in their choice of airport and arrival and departure time; thus their loss is overstated.

21. Morrison (1983).

22. One federal agency, the Food and Drug Administration, recognized that the delays it imposed on the introduction of new drugs were generating large social costs. Accordingly, as part of the 1992 Prescription Drug User Fee Act, the FDA set user fees that were paid by pharmaceutical companies and used the revenues to hire additional new drug reviewers to improve the speed and efficiency of its reviews. In contrast, although the FAA has recently claimed that it is streamlining environmental reviews (see Benet Wilson, "FAA: Airport Capacity Improved with Boost in Runways Built," *Aviation Now*, September 26, 2006), it is not clear that the agency has expedited the construction of new runways.

gate temporarily to another carrier when it is not being used by the lessee), or common use (the airport authority makes all gate assignments). Gates available for use by new entrants consist of common-use gates, preferential-use gates that are made available by the airport authority, and exclusive-use gates that are made available by incumbent carriers. In a 1998 survey of forty-one major airports, the Air Transport Association found that 56 percent of the gates were exclusive use, 25 percent were preferential use, and 18 percent were common use, resulting in 25 percent of the gates' being available for use by new entrants.[23]

The prevalence of exclusive-use gates that are not made available to other carriers—a legacy of airline-airport contractual arrangements established during the 1950s and 1960s—makes it difficult for new entrants to provide service at several airports. Another problem facing nonincumbent carriers, especially at airports where most gates are exclusively leased, is that they must often sublet gates from incumbent carriers at nonpreferred times and at a higher cost than the incumbent pays.

In principle, an airport has a legal obligation to provide reasonable access to the facility. Policymakers, however, have yet to define precisely what *reasonable* means. Hence, some incumbents are able to prevent competitors from having access even to gates that are little used. For example, Delta offers just thirty-nine departures a day at Los Angeles, but still uses sixteen gates in two terminals.[24] Since 2002 JetBlue has expressed an interest in serving Chicago O'Hare, but subleasing a gate from another carrier was a difficult proposition because incumbents did not welcome the competition.[25] Finally, in 2006 JetBlue received federal authorization, which was needed because O'Hare is slot constrained, for four daily departures. In a few cases, airports have actually bought back and terminated long-term leases on their own gates. For example, the Maryland Aviation Administration agreed to pay US Airways $4.3 million to give up twenty-nine gates at Baltimore-Washington airport, enabling expansion by Southwest and AirTran.[26] And the Los Angeles Airport Commission voted to spend up to $154 million to take over several terminals at Los Angeles International Airport to free up aircraft parking spots for discount carriers and other airlines that had tried to add flights at the airport.[27]

23. Morrison and Winston (2000, p. 23).

24. Scott McCartney, "Fewer Travelers Routed through 'Hub' Airports," *Wall Street Journal*, February 14, 2006, p. D4.

25. Mark Skertic, " 'Jet Who' Has City Blues," *Chicago Tribune*, January 8, 2006.

26. Scott McCartney, "Airports Crack Down on Games," *Wall Street Journal*, June 7, 2005.

27. Jennifer Oldham, "Panel Acts to Control LAX Terminals," *Los Angeles Times*, January 9, 2007.

In one study, we found that fares are $4.4 billion (2005 dollars) higher annually because of the limited availability of gates at many major and mid-size airports.[28] The loss to travelers reflects the competitive disadvantages that new entrants face when they are unable to acquire gates or can acquire them only at nonpreferred times and locations or at excessive cost.[29]

Airport authorities as well as federal law have also reduced competition and raised fares by preventing carriers from serving certain airports. Perimeter rules prohibit airlines from offering flights that exceed 1,500 miles at LaGuardia airport and, with the exception of six cities, that exceed 1,250 miles at Reagan National airport.

Until 2006 the Wright Amendment prohibited airlines that use Love Field in Dallas from offering flights to cities other than those in Texas, Alabama, Arkansas, Kansas, Louisiana, Mississippi, Missouri, New Mexico, and Oklahoma. Currently, travelers can fly anywhere from Love on a single ticket provided their carrier first stops at one of the nine Wright Amendment states, and in 2014 all Wright Amendment restrictions will be eliminated. Consistent with the predictions of opponents of the Wright Amendment, the number of flights and passengers at Love Field has increased since the 2006 action loosened restrictions on carriers' service from that airport, and fares at both Dallas airports (Love and Dallas–Fort Worth) have declined.[30] In 2006 King County in Washington blocked proposals by Southwest and Alaska airlines to offer flights from Boeing Field, which undoubtedly would have lowered fares for certain flights from Seattle-Tacoma (Sea-Tac) airport.

Performance of Airport Security

An efficient airport security system allocates resources based on cost-benefit considerations—that is, expenditures are directed toward detecting and preventing the greatest threats to safety from materializing. Although we are not aware of a formal economic assessment of the Transportation Security Administration's passenger screening, the Department of Homeland Security, GAO, and TSA routinely test screeners' ability to intercept weapons smuggled through checkpoints. The results are poor. Both the GAO and Homeland Security found that screening was no more effective by April 2005

28. Morrison and Winston (2000).

29. Private entrepreneurs are not precluded by airport authorities from building gates and leasing or selling them to new entrants. But they are subject to the airport authority's determination of what constitutes a fair and reasonable charge for the use of a gate. This regulatory arrangement has apparently dissuaded private entities from building gates at airports where new entrants face difficulties in acquiring them.

30. Terry Maxon, "With Fewer Limits, Love Field Is Soaring," *Dallas Morning News*, September 29, 2007.

than before September 11, and in 2006 screeners failed twenty of TSA's twenty-two tests.[31]

It is also clear that current screening procedures are inefficient. The annual cost of TSA security includes its budget of $5.5 billion and the several billions of dollars in time costs incurred by passengers waiting to be screened. It is, of course, difficult to assess the benefits of TSA screening because we will never know of the terrorist attacks, if any, that screening has prevented. In any case, federal screeners have intercepted some seven million prohibited items, but only six hundred were firearms while the rest were nail scissors, penknives, and the like.[32] Instead of expending billions of dollars in time and money to confiscate firearms—almost all of which were probably intended for recreational use—it was far more cost effective to put bulletproof doors on cockpits, which the airline industry did for some $300 million to $500 million.

Other inefficiencies suggest that airports could obtain the current level of security at much lower cost. For example, the large costs associated with passengers' excessive waiting times at heavily used airports could be sharply reduced if the TSA implemented a registered traveler program with technology that expedited screening. Wait times would also be reduced efficiently if TSA's labor force were flexible and could be deployed in response to the peaking characteristics of air travel throughout the day and during certain times of year. TSA's large budget has come under fire for wasteful expenditures on inappropriate or outdated technology and a bloated labor force described by critics as "Thousands Standing Around." TSA was embarrassed when a graduate student exposed the uselessness of its boarding-pass identification check by developing a fake boarding pass that would enable an individual to pass through security and get to any airport gate. Conducting basic investigation and intelligence appears to be more cost effective than performing ID checks, maintaining secret databases, and instituting no-fly lists.[33]

A more fundamental concern is whether TSA should even exist. One alternative that is likely to be superior to the TSA on cost-benefit grounds is a variant of Israel's model, where a branch of law enforcement receives additional funding and is responsible for questioning and identifying suspicious passengers. Turning to the private sector, security firms have been able to provide effective and subtle security for millions of customers at high-risk facilities in the United States, such as casinos in Las Vegas and Atlantic City and

31. Becky Akers, "A Better Way than the TSA," *Christian Science Monitor*, March 21, 2007.

32. Anne Applebaum, "Airport Security's Grand Illusion," *Washington Post*, June 15, 2005, p. A25.

33. Randall Stross, "Theatre of the Absurd at the TSA," *New York Times*, December 17, 2006, p. 5.

major amusement parks. Private security firms could be hired at airports, not just to replace federal screeners with private screeners, but to develop security strategies and make safety investments to anticipate and respond to potential terrorist attacks without being constrained by the federal government's regulatory oversight. As noted, private screeners that were used before September 11 were regulated by the government. Indeed, it has been claimed that government bureaucracy has discouraged research and development of new innovative solutions to combat terrorism, causing a political disagreement over whether the government or the private sector should drive the development of security technology.[34]

Performance of Air Traffic Control

Today, the probability of dying in a commercial aviation crash is at an all-time low, following a dramatic improvement in safety during the past ten years.[35] FAA expenditures on air traffic control deserve some credit for the nation's excellent safety record.[36] But the FAA's inefficient pricing of and investment in the system and its slow adoption of the latest technology have exacerbated air travel delays. In addition, some observers in industry and academia caution that air transport safety could be threatened if the air traffic control system is not expeditiously upgraded so it can handle the expected growth in traffic over the next decade.

PRICING. The relevant consideration in pricing air traffic control services is the marginal cost that a given flight imposes on the air traffic control system, including delay costs to other users. The cost clearly increases with the volume of traffic in a controller's airspace. Because the ticket tax is based on a percentage of the price of a given flight that may or may not vary with the time of day and, incidentally, with airspace congestion, it does not force a plane to account for the delays it imposes on other aircraft. In addition, because of the intensity of airline competition, real average fares have declined over time; thus, the ticket tax is not a stable source of revenue.

As air traffic controllers try to manage congested airspace near airports, delays may take the form of slower air speeds, indirect routings, suboptimal altitudes, and the like. Unscheduled aircraft (general aviation) may cause greater delays than scheduled aircraft cause because of unpredictable peaks in

34. Dan Luzadder, "Airports, Tech Firms in Holding Pattern on New Security Systems," *Travel Weekly*, November 8, 2006.

35. In 1997 there was one fatal crash in the United States for every 2 million departures. After ten years of improvement in air safety, that ratio in 2006 was one fatal crash for every 4.5 million departures.

36. Morrison and Winston (2008).

their demand for airspace, especially near airports, and because general aviation prefers altitude approach levels that create additional complexity for controllers. These costs are also not reflected in the ticket tax.

We are not aware of any studies that quantify the welfare effects of replacing current air traffic control charges based on the ticket tax with appropriately measured marginal-cost user fees. The Congressional Budget Office reports rough estimates of the marginal cost of services provided by air traffic control.[37] But because of data limitations, these estimates are based on the unrealistic assumption that all air traffic control facilities are optimized. Investment in these facilities, however, has not been optimal. Under efficient (marginal-cost) pricing and investment, it is likely that air traffic control operations would be designed so that they exhaust any scale economies and fully cover costs.

A fundamental problem in determining efficient charges for air traffic control services is that the FAA has had historic difficulties in establishing its costs for these services. In fact, Russell Chew, the former head of the FAA's Air Traffic Organization, which operates the air traffic system, acknowledged that after extensive work by analysts, "an understanding of air traffic control costs is only now just coming."[38] In any case, we expect the efficiency gains from marginal-cost pricing, as reflected in reduced delay for travelers and lower operating costs for carriers, would be significant given that the ticket tax bears little relationship to the costs that an aircraft imposes on the system and on other aircraft and does little to discourage planes from using airspace near airports during congested periods. In addition, marginal-cost user fees would generate revenues that cover the costs of air traffic control services.

The expiration on September 30, 2007, of the taxes and fees that support the U.S. Airport and Airway Trust Fund and the trust fund's reauthorization provide an opportunity for the FAA and Congress to reconsider how the air traffic control system should be funded. Not surprisingly, input is being provided by the system's users. Commercial airlines support user fees, instead of the ticket tax, because they believe that under this pricing scheme they will pay less for their use of air traffic control services and business jets will pay more. The private- and corporate-jet owners prefer a fuel tax and argue that they should not pay higher fees because they cost the FAA less to handle than do the commercial airlines. Instead of mediating the debate, the FAA should focus on how current pricing inefficiencies are contributing to travel delays and develop a cost-based pricing scheme. As of January 2008, Congress had been unable to

37. Congressional Budget Office (1992).

38. Matthew L. Wald, "FAA Seeks New Source of Revenue in User Fees," *New York Times*, March 7, 2006.

agree on a measure that would reauthorize the trust fund. Frustrated by these delays, Transportation Secretary Mary Peters had begun to encourage congested airports to adopt congestion pricing.

INVESTMENT. As noted, the FAA hires air traffic controllers and other air traffic control personnel and supplies terminal and en route facilities with new equipment. Personnel and equipment tend to be added to those parts of the system where traffic levels exceed a threshold. The FAA's allocation of funds is also influenced by airlines, airports, trade associations, and members of Congress, a process that may compromise the efficiency of FAA investments.

Morrison and Winston document at least one way that FAA investments could be improved.[39] Compared with the current allocation, we find that allocating expenditures at towers and TRACONs to airports where travelers incur the most costly delays would generate more than $1 billion in annual time savings to air travelers and cost savings to airlines. Under the current allocation, smaller airports get a disproportionately large share of funds, an allocation that appears to be zealously protected by representatives of the districts where the airports are located. For example, Oster and Strong point out that when the Air Traffic Organization proposed in February 2005 to close control towers between midnight and 5:00 a.m. at forty-eight lightly used airports, U.S. representatives from the airports' districts strongly opposed the action without even considering whether the tower services were needed or even used.[40]

TECHNOLOGY ADOPTION. The FAA could also reduce delays by expeditiously implementing technologies that have the capability of expanding navigable airspace around airports and en route. We have indicated that the FAA has yet to fully adopt the air traffic control technology that was envisioned when the advanced automated system was initiated during the early 1980s. Worse, the technology is no longer state of the art. By enabling pilots to be less dependent on controllers and to choose the most efficient altitude, routing, and speed for their trip, the NextGen satellite-based system could reduce air travel times and carrier operating costs, especially those related to fuel, and handle more traffic while maintaining, if not improving upon, the nation's outstanding air transportation safety record. In fact, the NextGen system would facilitate the first significant change from the air traffic routes established in the 1920s when the government was developing airmail service. Today's pilots, while flying at much higher altitudes than they did several decades ago, still follow the same routes.

39. Morrison and Winston (2008).
40. Oster and Strong (2006).

Unfortunately, the delays that the FAA has experienced with implementing experimental satellite-based systems suggest that NextGen will take more than the projected twenty-five years to become fully operational and that the current system may eventually have to impose additional delays on aircraft to handle growing traffic volumes safely. The GAO has concluded that the FAA has failed to provide the expertise to make the transition to NextGen and has urged it to seek assistance from a third party.[41] In addition, because the old equipment continues to consume vast amounts of money for operations and maintenance, it will need to be shut down to implement new navigational procedures. Eventually, all the facilities associated with the current system will be eliminated or consolidated as NextGen is managed and operated with fewer and more technologically up-to-date facilities. Such disinvestment and consolidation will undoubtedly face political resistance that slows the implementation of NextGen because members of Congress will attempt to keep navigational aids and jobs in their districts.[42]

Institutional and Political Constraints on Reform

Although many travelers and some policymakers are painfully aware of the suboptimal service provided by U.S. aviation infrastructure facilities, regulations and political forces have made it extremely difficult for would-be reformers to rid the system of its major inefficiencies. At the heart of the problem is the FAA, which lacks organizational independence and is prevented to a significant extent by Congress and the administration from using its resources—and from encouraging airports to use theirs—more efficiently.

Special interest politics has also thwarted efforts to reform aviation infrastructure policy. Joseph Stiglitz described his efforts, as part of the Clinton administration, to institute peak-period pricing for air traffic control only to find reform blocked by owners of corporate jets and small planes who opposed higher user fees.[43] The FAA and commercial airlines appear to support replacing the expired ticket tax with user fees—although commercial airlines are opposed to congestion pricing. In any case, the current funding mechanism is supported by the potent National Business Aviation Association and the National Air Traffic Controllers Association; hence, a compromise that falls far

41. "FAA Urged to Seek Help with NGATS," *Flight International*, August 1, 2006.

42. David Hughes, "FAA Accelerates Performance-Based Navigation, Outlines Mandates," *Aviation Week*, July 30, 2006; Dick Armey, "Fixing the Air Traffic Mess," *Wall Street Journal*, August 20, 2007.

43. Stiglitz (1998).

short of marginal-cost pricing is likely to emerge.[44] Both associations fear that any user fee is the first step to taking air traffic control out of the congressional funding process and privatizing it. Political pressure applied by air transport interests including members of Congress is the primary cause of misallocated FAA expenditures among traffic control facilities and is also behind the inertia preventing the elimination and consolidation of these facilities to implement the NextGen system.

Turning to airports, a problem with introducing congestion pricing is that existing residual and compensatory contracts between airline tenants and their airport landlords would have to be abrogated and an acceptable framework for determining all airport charges would have to be instituted. Efficient expansion of airport runway capacity is impeded by regulatory hurdles imposed by the Environmental Protection Agency and by opposition from the local community; "majority in interest" clauses permit incumbent airlines to block construction of new terminals and gates that could enable new entrants to serve the airport; and TSA's shortcomings can be partly traced to the political objective of Congress and the Department of Homeland Security to convince an anxious public that they are doing something to combat terrorism, even if their efforts are wasting resources.

Finally, the FAA, TSA, and local airport authorities are constrained by the inflexibility, shortsightedness, and conflicts that characterize most regulatory agencies and are entangled in a decisionmaking process with diffuse accountability.[45] Hence, technological advances that could improve airport and air traffic control services require an excessive amount of time and resources to be implemented, which reduces productivity in the air transportation sector.

Building the Case for Privatization

Given the vast and growing inefficiencies in the aviation infrastructure, our view is that policymakers should question the wisdom of allowing public sector airport authorities and a federal air traffic control system to continue to provide aviation services, especially when there is little indication that the efficiency of air travel will significantly improve in this institutional environment. Accordingly, we believe policymakers should explore whether privatizing airports and air traffic control could enhance the efficiency of the air transportation system.

44. Laura Meckler, "Collision Course: Why Big Airlines Are Starting a Fight with Business Jets," *Wall Street Journal*, June 1, 2006, p. A1; David Esler, "Controllers Don't Like Them Either," *Aviation Now*, May 23, 2006.

45. Winston (2006).

Political resistance to such dramatic institutional change is great. As noted, the very interests that oppose efficient pricing of air traffic control fear that it will lead to privatization. Thus, political support for privatization must be built carefully and strengthened by favorable experimental evidence of its economic effects. Here we briefly outline the conceptual case for privatizing airports and air traffic control, its likely economic effects, and important considerations in designing experiments to provide evidence of these effects.

Privatizing Airports

The central tenet of airport privatization is that travelers will experience fewer delays and airline competition will increase if airports are forced to compete with each other to attract passengers and airline service. To be sure, airport competition already exists to some extent as airports located in adjacent metropolitan areas compete for passengers through their location and the airlines that serve them. Examples of competing airports include Oakland, San Francisco, and San Jose in northern California; Boston, Manchester, New Hampshire, Providence, and Hartford in New England; Los Angeles, Orange County, and Long Beach in southern California; and Washington (Reagan), Baltimore (BWI), and northern Virginia (Dulles) in the Middle Atlantic region. In addition, satellite airports could expand and provide competition in certain major metropolitan areas; examples are Palmdale airport (Los Angeles), Stewart airport (New York City), and Gary, Indiana, airport (Chicago). The potential for competition also has been demonstrated by airports that have tried to induce carriers to offer new service or expand existing service and by airports that have lost carriers that are dissatisfied with their facilities and performance.[46] And competition among airports in different metropolitan areas even exists. For example, LAX is spending $1.2 billion to build ten new gates at an extension of its international terminal to remain competitive with San Francisco for overseas traffic.[47]

In principle, privatization would make unrestricted airport competition a reality by giving airports the freedom and incentive to compete for passengers and carriers by efficiently producing a level of service that its users value. Skeptics may counter that privatization would enable some airports to become

46. Airlines' dissatisfaction with airport facilities and performance is understated because airlines may be unable to serve an alternative airport in the metropolitan area (for example, although Southwest Airlines wanted to abandon service at Seattle-Tacoma airport, it was barred from offering service at Boeing Field).

47. Steve Hymon, "Council OKs 10 New Gates at LAX," *Los Angeles Times*, August 16, 2007.

monopolies, which would charge excessive prices for and have little incentive to provide high-quality services. But the economic conditions under which an airport would have monopoly power are not clear. A fundamental constraint on any airport's exercising monopoly power—even if it is the only airport serving an outlying area—is that the airport will still have to be efficiently integrated into a carrier's entire network. Thus, if an airport sets monopoly charges, an airline may not find it optimal to include the airport in its spoke routes. Or in the process of determining the routes that it will serve, an airline may be able to play off monopoly (spoke) airports against each other to reduce charges.[48]

We would expect private airports to introduce some form of rational pricing to make efficient use of available taxiing areas and runway capacity, to make efficient investments in terminals and runways to reduce delays, and to allow access to any carrier that is willing to pay the cost of using its facilities.[49] Privatized airports would also be able to allocate their resources for security toward the greatest threats to safety. To this end, they would have the choice of whether the government or the private sector provides their security without any constraints on private sector provision. In addition, airports would be free to coordinate and share their security strategies with each other. Similar to other profit-maximizing entities in the private sector, airports would have a strong financial incentive to ensure that their security is efficient and minimizes passenger and carrier inconvenience. As noted, the private sector has had considerable experience and success in providing security for facilities such as theme parks, gambling casinos, and the like.

Generally, we would expect efficiencies to accrue to the traveling public as airlines and airports develop their buyer-seller relationship without governmental interference or contractual mandates. In a more competitive environment, airlines would be more forthcoming about their preferences of the types of airport services that would reduce operating costs and improve service to passengers, while airports would have an incentive to respond to these preferences and introduce new services. It is, of course, difficult to predict what service innovations airports might offer. But deregulation of the U.S.

48. As shown in Grimm and Winston (2000), an analogous situation occurs in rail freight transportation when an industrial firm is served by one railroad but can draw on alternative origins served by alternative railroads to receive a product. Such geographic competition has enabled shipping firms to negotiate lower rail rates.

49. Although private airports would still have to contend with environmental regulations and local opposition to their investments, we would expect them to be more aggressive and resourceful than public airports have been in overcoming these potential obstacles.

intercity transportation system has demonstrated that consumers have substantially gained from pricing and service innovations that are introduced when firms are exposed to a more competitive environment.[50]

Although we expect privatization to have positive economic effects, we also recognize that uncertainties exist about how to manage the transition to private airports and how airport competition will evolve. Thus, we believe it is imperative for policymakers to design privatization experiments before proceeding with the policy. In 1996 Congress enacted legislation creating an airport privatization pilot program. But a major barrier for participation in the program was the requirement that a city or state had to obtain the approval of airlines representing 65 percent of the landed weight at the airport. In many cases involving hub airports, this enabled one airline to have veto power over privatization efforts.

Policymakers must be more committed to designing useful privatization experiments, especially because interest in these experiments among investors and cities is starting to develop. For example, private equity firms such as Goldman Sachs are raising billions of dollars for infrastructure investments including airports, while the City of Chicago has filed a preliminary application with the FAA to include Midway Airport in a pilot privatization program. Accordingly, policymakers should convene meetings with potential investors, airport authorities, and other major stakeholders for guidance on how to conduct airport privatization experiments.

We envision that several issues must—but can—be resolved. First, airport competition should be encouraged to develop by selling each airport in a given metropolitan area to a distinct owner. Airports serving the London metropolitan area, Heathrow, Gatwick, and Stansted, were sold to the same owner, raising concerns about the effectiveness of privatized airport service. Second, private airports should be able to finance themselves with user charges and without tax-exempt debt financing. Third, local and state governments should be able to reap sufficient financial benefits from the sale of U.S. airports but be prohibited from imposing residual regulations as a condition of a sale. Finally, policymakers must ensure that entities do not have legal grounds for blocking privatization.

Although these and undoubtedly other issues pose major challenges to formulating experiments and transitioning to a privatized system, policymakers must persevere because it is clear that they do not have the option of standing still and hoping that public airports improve their performance.

50. Morrison and Winston (1999).

Air Traffic Control

The Clinton administration recognized that the nation's air traffic control system was inadequate to meet the growth in airline traffic and sought to "corporatize" it by spinning off air traffic control operations as an independent government corporation that would be financed by user fees and be able to borrow money from capital markets. Although Congress did not support the effort, the justification for it—and an even stronger reform, privatization—is more valid than ever.[51]

In a comparison of the U.S. Air Traffic Organization with Nav Canada, a private sector air traffic control corporation established in 1996 and financed by publicly traded debt, Oster and Strong concluded that the ATO was disadvantaged by a disconnect between its source of funds and costs, the poor performance of its capital investment programs, and a lack of organizational independence that would enable it to take steps to improve its performance. The authors concluded that Nav Canada was able to overcome these problems while maintaining a high level of air safety in Canada by having the main stakeholders and users determine user fees subject to legal requirements that limit charges to full cost recovery, by undertaking modest projects that could be efficiently managed, and by having complete freedom to allocate resources and consolidate facilities when necessary.[52]

Generally, we would expect that a privatized air traffic control system would introduce some form of rational pricing for its services, allocate resources to address the greatest risks to safety and the major sources of delay, and adopt the latest and most effective technology in a timely fashion. As in the case of airport privatization, we would also expect that travelers would gain from service improvements as airlines and the control system provider develop their buyer-seller relationship. The evidence provided by Canada's privatization experiment suggests that the United States could realize significant benefits from a privatized traffic control system.

Accordingly, U.S. policymakers should explore ways to overcome the political opposition that has blocked previous efforts to reform the nation's air traffic control. An incremental approach could include an agreement to conduct an experiment to privatize the nation's air traffic control system. As in the air-

51. See Stiglitz (1998) on the congressional response to the corporatization proposal.

52. Oster and Strong (2006). Another recent study compared commercialized provision of air traffic control (including but not limited to Nav Canada) with the ATO's provision and found that under commercialization, safety was enhanced or unaffected, modernization of technology was greatly improved, and users benefited from improved service quality. At the same time, costs were reduced and financial stability was maintained (MBS Ottawa 2006).

port case, key stakeholders must be consulted and critical features of the experiment must be pinned down—including the selection of a private air traffic control corporation; the contractual framework within which airlines and the provider would negotiate prices and service; and the oversight role, if any, for the federal government. While formidable, the challenges to resolving these matters should not obscure the motivation for or impede the implementation of this vital experiment.

Final Comments

As shown in figure 2-1, during the past thirty years airline travel times have been characterized by cycles of sharp increases followed by modest decreases. Growth in travel times and delays have spurred promises from the FAA to address the problem; however, declines caused by recessions in the early 1980s and 1990s and by the September 11, 2001, terrorist attacks have changed the FAA's focus. On net, delays continue to mount, the flying public accepts the inconvenience without calling for a change in policy, and the performance of the nation's aviation infrastructure worsens. At some point, however, the level of delays—not the increase—may generate a public outcry that cannot be silenced by an external shock.

We have argued that travel delays are a manifestation of inefficient pricing and investment policies and the slow adoption of state-of-the-art technology by public airports and a federally managed air traffic control system. Given little reason to believe that policymakers have the determination to overcome regulatory obstacles and given the existence of political forces that preclude the introduction of efficient policies, we have argued that the private sector represents the best hope for improving aviation infrastructure. But we have also recognized that such major institutional change should not proceed without hard evidence that it will benefit the public. Thus, we have called for the federal government to initiate privatization experiments, which we expect would produce favorable evidence that strengthens the case for a change in policy.

During the past decade, periodic interest among U.S. policymakers in privatization and the implementation of it abroad have provided some hope that the policy may eventually receive consideration in the United States. With the growing realization among public officials and the public that the U.S. air transportation system is being severely compromised by its infrastructure, it appears inevitable that privatization will be thoroughly—and justifiably—explored.

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