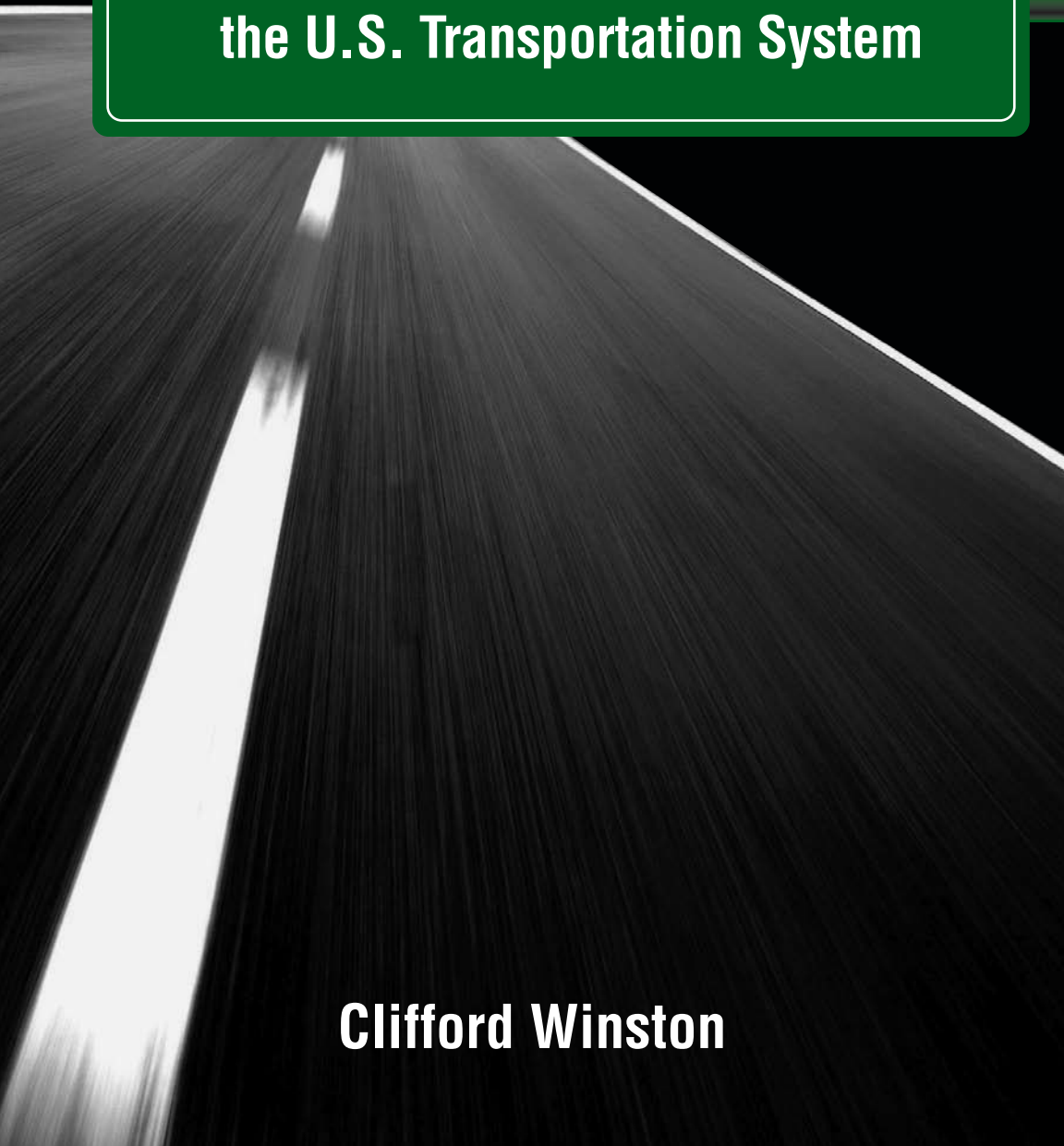
LAST EXIT

Privatization and Deregulation of the U.S. Transportation System



Clifford Winston

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1 Back to the Future to Improve U.S. Transportation

The philosophy of one century is the common sense of the next.

Henry Ward Beecher

From ocean voyages to flights into outer space, new ways of traveling generate excitement because they expand opportunities for travelers to visit faraway places and to reach their destinations faster. Today, Americans' interest in new travel options has been piqued by the possibility of high-speed rail service that exceeds 300 miles an hour and by supersonic air service that does little damage to the environment. At the same time, most travelers would be ecstatic if they could drive on well-maintained roads at posted speed limits during rush hours, fly on airplanes that arrived at their destinations on time, and commute on buses and subways that provided safe, reliable, and clean service. Instead they are frustrated by a variety of problems with the nation's transportation system and disillusioned with public officials who seem incapable of enacting policies that will improve their travel experiences.

Historically, the private sector developed and operated new modes of commercial passenger and freight transportation in the United States and built transportation equipment and infrastructure. Those accomplishments were brought about by some of the nation's greatest business leaders, who were attracted to the transportation sector. According to the Harvard Business School's compilation of 1,000 *Great American Business Leaders of the Twentieth Century,* encompassing twenty-one industry classifications, 102 were leaders of transportation service companies (airlines and railways) or transportation manufacturing companies (automobiles and aerospace).[1]

1. For the complete list, see www.hbs.edu/leadership/database.

Wright and Murphy (2009) compiled data indicating that by 1860 at least 7,000 private U.S. corporations had formed to operate bridges, canals, ferries, railroads, and roads. Total private capital investment in those transportation facilities and services amounted to roughly $3 billion (in 1860 dollars), a significant share of the gross domestic product (GDP).[2] Most government investment in transportation was in local bridges, roads, and, in some states, canals. Klein and Majewski (2006) report that cumulative private sector investment in turnpike construction from 1800 to 1830 in New England and Middle Atlantic states amounted to 6.2 percent of those states' 1830 GDP. By comparison, spending between 1956 and 1995 by all levels of government to build the Dwight D. Eisenhower National System of Interstate and Defense Highways amounted to 4.3 percent of 1996 GDP.

Over time, however, all levels of government became increasingly involved in regulating, and in some cases operating and owning, transportation modes and infrastructure. The trend culminated in the post–World War II period with the creation of the federal Interstate Highway System. In the late 1970s, as part of a broader movement away from government intervention in the economy, the pendulum began to swing back when Congress partially deregulated most intercity transportation services. Since then, policymakers have pursued "partnerships" with the private sector in an effort to raise funds to maintain highways and airports and to build new transportation infrastructure. In essence, the United States has been trying to find an optimal mix of public and private sector involvement in transportation since its founding.

Do the current problems with the transportation system suggest that the nation should find a new stable equilibrium that will persist indefinitely? The unequivocal answer in this book is yes—namely, by designing experiments, which if successful, could take the United States back to the future by privatizing and deregulating the vast majority of the transportation system and by reducing the government's primary role in this sector to mitigating externalities, such as emissions, and to enforcing the antitrust laws.

I am not prepared to unconditionally call for privatization and deregulation because such a major change in public policy is likely to create good and bad unintended consequences. Accordingly, I recommend trying the policy in a few places to see what happens before implementing it nationwide.

2. Wright and Murphy (2009) note that $1 billion was a significant amount of money in the first half of the nineteenth century. As a relative share of GDP, $1 billion in 1860 was worth approximately $3.2 trillion in 2007.

Policymakers should select transportation services in certain locales that are provided by the public sector, allow private firms to innovate in those services, and respond according to the results. By producing greater understanding of how market forces could allocate transportation resources, the experiments could guide widespread implementation of and justification for a new approach to transportation policy that could significantly improve the system's performance.

To be sure, it will take time and careful analysis for such a bold proposal to gain support among the public and policymakers and to be properly implemented. But addressing the anticipated political resistance and intellectual challenge to launching experiments will ultimately strengthen their design and improve their long-run chances for success. By developing an initial overview of the economic case for privatizing and deregulating the transportation system, I hope to show that fundamental policy reform is essential for ridding the system of its vast and intractable inefficiencies that have accumulated under decades of public sector management and control.

The Stakes: Transportation in the U.S. Economy

Automobiles and jet aircraft are commonly listed among the greatest human inventions of all time,[3] while the U.S. road system represents the nation's largest civilian public investment, valued at $2.4 trillion in 2006.[4]

These and other transportation inventions and investments have contributed significantly to U.S. economic growth by enabling firms to expand the size and scope of their markets. For example, if a more efficient road system enables a firm to serve regional markets as well as local ones, then the firm can improve its efficiency by realizing greater economies of scale, economies of scope (multiproduct production), and economies of multiplant operations. In addition, the improved road system can enable a firm to reduce its inventories because it receives faster and more reliable shipments of intermediate goods, to reduce its input costs, and to improve labor productivity by expanding its choice of workers and a worker's choice of employers. Households also gain by being better able to optimize their residential and workplace locations. And by reducing the costs of international trade, an improved road system further expands firms' markets and increases consumer welfare.

3. See, for example, www.greatachievements.org.
4. Bureau of Economic Analysis, U.S. Department of Commerce (www.bea.gov/).

In a conventional economic growth model where technological change raises the standard of living, transportation can be characterized as improving the technology firms use to produce and distribute their products and services. Indeed Krugman (2009) argues that the railroads contributed to a fundamental change in the U.S. economy—differentiating it into a farm belt and a manufacturing belt—by decreasing transportation costs. Transportation also promotes agglomeration economies that facilitate pooling labor and transferring information and ideas in metropolitan areas, which are additional sources of economic growth (Glaeser and Gottlieb 2009; Jones and Romer 2010). An inefficient urban transportation system results in sprawl that can limit agglomeration economies.

Unfortunately, a precise estimate of how much the U.S. transportation system contributes to the nation's economic growth is difficult to obtain. Denison (1985) constructed estimates of the determinants of growth and concluded that the gains from economies of scale, which as noted are largely facilitated by transportation, accounted for nearly 11 percent of the annual growth rate of national income in nonresidential business from 1929 to 1982. Some transportation case studies have found that metropolitan employment growth is promoted by greater airport activity (Brueckner 2003; Green 2006) and by additions to the highway capital stock (Duranton and Turner 2008).

Transportation's importance to the U.S. economy is more clearly indicated by its large share of economic activity, as measured by its share of GDP. As shown in table 1-1, in 2006 American consumers spent roughly $1.1 trillion commuting to work, traveling for pleasure, and buying and operating vehicles. Firms spent roughly $1 trillion shipping products to distribution centers and retail outlets, sending their employees to meet with customers and suppliers, and buying and operating vehicles (spending by firms on their employees' travel is included with consumers' transportation services). Local, state, and federal government spending on transportation infrastructure and services contributed $256 billion and upped total spending on transportation to more than $2.3 trillion, or roughly 17.5 percent of 2006 GDP.

Transportation also requires users to expend their time—a valuable commodity excluded from GDP. Table 1-1 indicates that in 2007 travelers spent roughly 175 billion hours in transit, and commodities shipped by surface and air freight absorbed 25.6 billion ton-days in transit. To convert those transit times into dollar figures, I assume that travelers value time at half their hourly wage (Small and Verhoef 2007 indicate that this is a reasonable assumption) and that shippers attach a cost of 7 percent of their shipments' value for each additional day spent in transit—a figure that is bounded by Winston and

Table 1-1. *Total Expenditures of Money and Time on Transportation in the United States*

Category	*Money expenditures (billions of 2006 $)*	*Time expenditures (billions of 2007 $)*
Consumers		
Motor vehicles and parts	$434.2	(175.61 billion hours multiplied by
Gasoline and oil	$318.6[a]	half of the hourly wage, $8.69)
Transportation services	$340.6	
Total	$1,093.4[b]	$762.8[c]
Firms		(25.6 billion ton-days multiplied
Shipping goods	$829.6	by the avg. value per ton of $1,213
Vehicles and maintenance	$179.7	discounted by 7% per day)
Total	$1,009.3[d]	$2,172.3[e]
Government		
Federal	$31.8	
State and local	$208.9	None
Defense	$14.8	
Total	$256.0[f]	
Grand total	$2,358.7	$2,935.1

a. To avoid double counting, gasoline and oil should be net of federal and state taxes, which support government spending on transportation. I could not verify that such taxes were excluded in consumer expenditures on gasoline and oil. If they were not, they amount to roughly $50 billion based on 2006 federal taxes and a weighted average of state taxes.

b. "Transportation services" includes both purchased urban commuting transportation as well as purchased intercity transportation, which includes business-related travel. Source: Bureau of Economic Analysis, National Income and Product Accounts, Table 2.3.5, *Personal Consumption Expenditures by Major Type of Product* (Q1 2008).

c. The time that people spend in transit is based on calculations of time in transit for short-distance trips and trips of more than fifty miles, both based on National Household Travel Survey (NHTS) 2001 data, the most recent year for which data are available. For short-distance trips, a constant breakdown of travel time per trip in minutes (for example, trips of 0–4 min, 5–9 min, and so forth) between 2001 and 2007 is assumed (based on evidence of this constant relationship between data published in 1995 and 2001). Total annual short-distance person trips for 2007 are estimated based on historical year-on-year percentage increases in these person trips per capita. To estimate the number of hours that travelers spend in single-day travel on short trips, I distribute that number of 2007 person trips by the breakdown (averaged between the 1995 and 2001 NHTS) of travel time per trip. Because the only data collected on long-distance passenger travel were published in 1995 and 2001, and because the 1995 and 2001 numbers are not directly comparable and a projected year-on-year growth rate cannot be calculated, it is necessary to assume that long-distance passenger trips grew at the same rate as short-distance person trips. It is then

(continued)

Table 1-1 *(continued)*

also necessary to assume that the ratio of passenger miles to passenger trips remained constant through 2007 in order to calculate person miles based on projections of growth in person trips. Furthermore, it is also necessary to assume that the same percentage breakdown of these long-distance trips by transportation mode holds from 1995 and 2001. For each of the transportation modes, person hours traveled are calculated assuming constant average speeds for each mode. Mode categories "water" and "other" are disregarded because average speeds are not obvious and their contribution to the total is minimal. Finally, to calculate the value of person hours traveled in total, for both short- and long-distance trips, total hours are multiplied by half of the average hourly wage based on a forty-hour workweek. Sources: National Household Travel Survey (1995 and 2001); Bureau of Transportation Statistics (BTS) Table 1-39, *Long Distance Travel in the U.S.* (2001); BTS American Travel Survey, *Travel in the United States,* Table 1 (1995); U.S. Census, Average Weekly Wage (2007).

d. The expenditures of firms on transportation are calculated based on components: expenditures on shipping goods, and expenditures related to vehicles and maintenance. Expenditures on shipping goods are calculated from BTS data on total freight transportation expenditures. The most recent year for which data on these expenditures are available at the time of writing is 2001. Year 2006 numbers are therefore a forward projection based on average historical year-on-year percentage growth rates adjusted for inflation. Expenditures on vehicles and maintenance are calculated from BTS data on total gross private domestic investment for 2006 and confirmed by similar data from BEA. Sources: BTS Table 3-7, *Passenger and Freight Transportation Expenditures* (2001); BTS Table 3-3a, *U.S. Gross Domestic Demand Attributed to Transportation Related Final Demand* (2006); BEA National Income and Product Accounts, Table 5.5.5, *Private Fixed Investment in Equipment and Software by Type* (2008).

e. Time expenditure in transportation for firms is based on calculations made for freight ton-miles by transportation mode from BTS data. Year 2005 is the most recent year for which freight ton–mile data are available; therefore historical average year-on-year percent increases were calculated between 1985 and 2005 in order to project forward to 2007. Average speeds based on freight transportation modes were assumed, taking into account wait times, especially important for rail and waterborne freight. For waterborne freight in particular, average speeds are segmented based on where the travel was conducted (open ocean, Great Lakes, and the like). Furthermore, the total number of hauls is calculated for waterborne freight based on average haul length, to which one additional day per haul is added to reflect wait times at port loading and unloading freight. Again, because data on average haul length were last published in 2005, a projection to 2006 is made using an average historical year-on-year percent increase. Across all modes, total ton-miles per day were calculated based on the assumed average speeds by mode and any added wait times. Using year 1993, 1997, and 2002 freight value data, a projection for total 2007 freight value is again made based on historical year-on-year percent increases. Average ton-value is constructed from this total freight value and total freight tonnage. Finally this average ton-value is discounted by 7 percent for every ton-day in transit. Sources: BTS Table 1-46b, *U.S. Ton Miles of Freight (BTS Special Tabulation)* (2005); BTS *Commercial Freight Activity in the United States by Mode of Transportation: 1993, 1997, 2002* (2002); BTS *Commodity Flow Survey* (1993, 1997, 2002); BTS Table 1-35, *Average Length of Haul, Domestic Freight and Passenger Modes* (2005).

f. Federal and state and local expenditures are a summation of government consumption expenditures for the following component categories; highways, air, water, and transit and railroad. Defense expenditures combine expenditures on transportation of materials and travel of persons. Sources: BTS Table 3-3a, *U.S. Gross Domestic Demand Attributed to Transportation Related Final Demand* (2006); BEA, National Economic Accounts, Table 3.15.5, *Government Consumption Expenditures and Gross Investment by Function* (2006).

Langer's (2006) daily discount rates for shipments of bulk and perishable commodities. The result is that transportation accounts for another $2.9 trillion in economic activity for a grand total of roughly $5 trillion![5]

Finally, transportation's influence extends beyond the nation's borders. In this era of globalization, international trade—whose share of U.S. GDP has grown to more than 15 percent—is facilitated by ocean and Great Lakes transportation and by trucks and railroads that carry freight to and from the nation's ports. International passenger and freight air traffic is intertwined with the domestic system. And as a major source of greenhouse gases, transportation is at the center of the global challenges presented by climate change.[6] The United States and other countries face the challenge of simultaneously reducing their emissions and improving the efficiency of their transportation systems to facilitate the projected growth in domestic and international trade and travel.

Certain government regulations and expenditures appear to single out transportation as the lifeblood of the U.S. economy. For instance, Congress passed the Railway Labor Act in 1926 and later amended it in 1936 to force airline and railroad workers to resolve labor disputes by engaging in arbitration instead of significantly disrupting interstate commerce by going on strike. The federal government's recent investments in transportation infrastructure and services have been a critical component of the American Recovery and Reinvestment Act of 2009 (popularly known as the stimulus bill) to spur the nation's growth. Against this background, it is useful to understand how the public sector came to manage, regulate, and operate so much of the system.

The Evolution of Public Sector Involvement

A capsule history of the major U.S. transportation modes and infrastructure suggests that all levels of government have tended to expand—and only recently partly withdraw—their control over transportation infrastructure and services in response to major economic problems. In general, government intervention in transportation increased because of exigent circumstances

5. To provide a fair comparison of this estimate with the value of all U.S. economic activity, one would need to estimate the value of time that individuals spend in all of their activities and include that figure in GDP.

6. Jack Short reports that the transport sector accounts for nearly one-quarter of global carbon dioxide emissions from fuel combustion and that this share is growing. See "Transport and Energy: The Challenge of Climate Change," *OECD Observer* (March 2008), pp. 20–21.

created by private firms' financial crises and not because of well-developed conceptual arguments that justified greater public sector involvement. In addition, as I note later, government regulations often contributed to those crises, and public officials made little effort to help private firms survive. In any event, I do not attempt to resolve whether government's greater role following the initial development of each component of the transportation system was justified, but I do develop the case that the system's evolution with greater public sector involvement has caused it to accumulate inefficiencies that will take decades to shed.

Roads

The first roads in the United States were built by private enterprises; the most important of these were turnpike companies that received a franchise from a state to build, operate, and maintain roads and bridges. State charters specified organizing procedures, capitalization, and par value of stock, and state legislatures set toll policies. During the nineteenth century more than 3,000 private companies operated toll roads.[7] Some of the turnpikes were macadamized or planked and employed grading on steep hills to aid travel for heavier (nonmotorized) vehicles.

States became more involved in roads as private turnpikes failed financially for various reasons, including generous state-granted toll exemptions, rigid toll rates, severe toll evasion problems (Klein and Fielding 1992), and overly optimistic forecasts of how long wooden planks would last (Klein and Majewski 1988). Federal involvement in the nation's roads can be traced to the U.S. Constitution, which gave Congress the power to establish post offices and post roads. The 1916 Rural Post Roads Act authorized federal grants to pay for up to half the costs of constructing rural roads used to deliver the mail. Initially, federal highway programs were financed entirely from general revenues. In 1932 the federal government imposed a tax on gasoline fuel, the revenue from which was formally earmarked for highway programs when the Highway Trust Fund was created in 1956 (Burch 1962). Major federal transportation legislation in later decades significantly increased the size of the trust fund and federal highway expenditures.[8] With few exceptions, federal funding programs have favored public ownership and operation, while

7. Klein and Majewski (2006) and Klein and Fielding (1992) provide concise histories of private toll roads.

8. Oregon passed the nation's first tax on gasoline, 1 cent a gallon, in 1919. Ten years later, all forty-eight states had imposed gasoline taxes that ranged from 1 to 3 cents a gallon.

interest groups representing state and local officials, such as the National Governors Association and the U.S. Conference of Mayors, have lobbied for increased flexibility in the use of those funds.

Airports

Private airports, some of which were owned by airlines, were the first airports in the United States. By 1912 twenty airports were in use throughout the country (Wells 1996). Municipally owned airports emerged in those communities that were eager to be connected with the rest of the country. During the Great Depression, private commercial airports experienced serious financial problems and were taken over by local or state governments. It is possible that some private commercial airports could have survived with temporary public assistance and that private airport competition could have developed as the demand for air travel grew in subsequent decades, but the Federal Aviation Administration prohibited private airports from offering commercial service after it was established in 1958 (see below).

The Civil Aeronautics Act of 1938 paved the way for federal funding of airports by authorizing funds to build additional airfields (Dilger 2003). Federal funding subsequently evolved and led to the creation of the Airport and Airway Trust Fund. The trust fund is composed of revenues from aviation excise taxes, fuel taxes, and other similar revenue sources and is used to finance the Federal Aviation Administration's Airport Improvement Program, which disburses funds to airports of all sizes.

Air Traffic Control

The first air traffic control system in the United States appears to have been developed in 1935 by the principal airlines using the Chicago, Cleveland, and Newark airports. The airlines agreed to coordinate monitoring of airline traffic between those cities and opened the first Airway Traffic Control Center in Newark, followed by the establishment of centers in Chicago and Cleveland.

Private air traffic control soon ceased because of the financial pressures brought on by the Great Depression. The federal government became involved with air traffic control in 1936, providing en route service, while municipal government authorities operated the towers at airports. In the wake of increasing air traffic and a well-publicized June 1956 midair collision between long-distance United Airlines and TWA flights over the Grand Canyon, Congress passed the Federal Aviation Act in 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 U.S. Department of Transportation). Financial support for the air traffic control system comes from airline ticket tax revenues that go into the Airport and Airway Trust Fund and from general revenues.

Urban Transit

The first urban rail systems in the United States—built by private companies in Boston in 1898 and in New York City in 1904—were given charters by those cities' governments to establish rights-of-way. Private companies also operated the first urban motor buses in the nation. Transit fares and routes were subject to regulation by local or state authorities.

The advent of the automobile put many transit operations under bankruptcy court supervision by the late 1920s. During the 1940s and 1950s, city governments gradually took over private intracity bus and rail systems as intense competition from the automobile accelerated the decline in transit ridership. But Pashigian (1976) and Hilton (1985), among others, argued that private operators could have succeeded (as they have in other countries) if regulatory constraints had not seriously hampered their financial performance. Pashigian concluded that regulation was simply an intervening step to facilitate public ownership. By the 1960s city officials called on the federal government to help support urban transit on the grounds that it would stimulate urban renewal. Thus the 1961 Housing Act and the 1964 Urban Mass Transportation Act gave cities money to buy most of the remaining private transit companies and signaled the start of major federal funding of bus and rail capital expenditures.

Taxis and Jitneys

Taxi and jitney service has always been provided by the private sector. Gas-powered taxicabs began operating in eastern U.S. cities at the beginning of the twentieth century. Regulation of taxicabs evolved from setting safety standards to governing fares, entry, routes, and schedules. Such regulations are not uniform throughout the country; in fact, twenty or so urban areas have deregulated taxi operations (Winston and Shirley 1998).

Jitneys occupy a niche between a taxi and a bus. They typically are small-capacity vehicles that follow a rough service route but can go out of their way to pick up and drop off passengers. Jitney service was first offered in the United States in Los Angeles in 1914. But jitneys never blossomed as a mode nationwide because regulations, often demanded by streetcar companies,

compromised service. Today jitneys operate in a handful of mainly inner-city areas, subject to regulations on fares and service.

Intercity Transportation

With the exception of Amtrak and Conrail, commercial U.S. railroads, motor carriers, buses, pipelines, airlines, and water carriers have been owned and operated by private firms, but over time they have been subject to varying degrees of federal and state economic regulation as dictated, in large part, by political forces. With the support of rail carriers and farmers, railroads were first regulated by the 1887 Interstate Commerce Act, ostensibly to prevent "destructive competition." Hilton (1966) argued that the act, which created the Interstate Commerce Commission (ICC), was in fact an incorrect response to the economic conditions of the time. In 1970 Amtrak was created as a public corporation to relieve freight railroads of unprofitable passenger service. Amtrak was expected to be financially self-sufficient within a few years of its inception and to operate as a private entity without subsidies, but nearly forty years later that expectation has not come close to materializing.

Spurred by strong lobbying by railroads fearful of growing motor carrier competition, Congress enacted the Motor Carrier Act in 1935 and gave the ICC authority to regulate truck rates and entry into markets. The Motor Carrier Act also authorized the ICC to regulate fares, routes, entry, and exit of interstate bus lines. Individual states had begun to regulate intrastate bus and trucking operations at least a decade before the 1935 federal act.

The nation's petroleum pipelines were subjected to ICC regulation in 1906, as a reaction to John D. Rockefeller's alleged use of them to monopolize the oil industry. In 1977 interstate regulation of petroleum pipelines was transferred to the Federal Energy Regulatory Commission (FERC). As the ICC's successor, the Surface Transportation Board regulates pipelines that provide interstate transportation of commodities other than oil, gas, or water, such as anhydrous ammonia and coal slurry.

During the airline industry's infancy, mail contracts enabled passenger service to be financially feasible; thus in the 1920s the postmaster general became the first regulator of the airlines. The major airlines suffered severe financial losses after President Franklin Roosevelt rescinded their airmail route authority when they were charged with colluding to monopolize the nation's airways. By the time any carrier started to show a profit, the entire industry had been brought under regulation by the 1938 Civil Aeronautics Act.

Government has intervened in water transportation, including private carriers of inland and ocean freight, port terminals and landside access, and

navigable waterways, as it has in other forms of transportation. The Transportation Act of 1940 gave the ICC regulatory authority over inland waterway carriers' rates and entry, while ocean carriers' rates and service have been determined since 1916 through rate conferences and agreements. Ports were originally developed by private investors—mainly shipping companies—but subject to regulation by local or regional authorities (Stevens 1999). Maintenance and expansion of navigable channels is performed by the Army Corps of Engineers. Expenditures on ports are supported by revenues, placed in a trust fund, that are generated by the Harbor Maintenance Tax.

From its inception, economic regulation compromised the efficiency of the intercity transportation system while producing few, if any, improvements. The 1950s system depicted by Meyer, Peck, Stenason, and Zwick (1959) consisted of railroads that provided poor service and earned a low rate of return, airlines that primarily served affluent travelers despite technological advances that substantially lowered the costs of air travel, and motor carriers that charged rates so high that many shippers found it less costly to operate their own trucking service. Intercity buses virtually disappeared from the transportation system. Scholars argued that the common source of the problems was regulation, and some twenty years later policymakers were persuaded to pass deregulation legislation, including the Airline Deregulation Act of 1978, the Motor Carrier Reform Act of 1980, the Staggers Rail Act of 1980, and the 1982 Bus Regulatory Reform Act. Those acts substantially (but not completely) deregulated the U.S. rail, motor carrier, airline, and bus industries.[9]

9. Air cargo regulations for entry, routes, and rates, which were adopted by the Civil Aeronautics Board in 1947, were dismantled by congressional legislation in November 1977. In 1992 FERC Order No. 636 (referred to as the Final Restructuring Rule) effectively unbundled natural gas pipelines to promote competition, but FERC still regulates rates. Shippers can obtain discounts by obtaining "interruptible" service (that is, a pipeline owner can stop service to a customer when demand is high under conditions specified by a contract). Shippers can also resell surplus pipeline capacity to other entities and negotiate rates for storage, hub, and transportation service. As part of the ICC Termination Act of 1995, the Surface Transportation Board was given authority to regulate inland water carriers subject to a "zone of reasonableness" in which a published tariff rate would be deemed reasonable. (Specifically, a tariff rate can be no more than 7.5 percent higher or 10 percent lower than it was one year earlier, subject to adjustments by the Producer Price Index.) Water carriers may also offer unregulated contract carriage rates. In contrast to the deregulatory actions in domestic transportation, international airline travel between the United States and some other countries is still subject to bilateral negotiations that regulate fares and service. Nearly 100 open-skies agreements have to a varying extent deregulated fares and services on routes between the United States and countries in the European Union and in other parts of the world. Fox and White (1997) point out that U.S. ocean freight vessels were regulated, protected from foreign competition, and subsidized. The 1998 Ocean Shipping Reform Act enables carriers to offer customer-specific shipping services differentiated by price and quality.

Regulation of urban transportation persists because federal deregulatory actions did not affect state or city regulations. But are such regulations justified? Are intercity and urban transportation sufficiently different from each other that the government should continue to be heavily involved with the urban system and its infrastructure? Or should the intercity transportation deregulation experiment be extended to privatize and deregulate more of the U.S. transportation system?

Privatization and Deregulation

Government intervened in a developing urban and intercity transportation system that faced different problems than it does today. Regardless of the justification for that intervention, most policymakers, transportation providers, and users have increasingly concluded that the performance of the current system is generally unsatisfactory and that government's traditional solution (reinforced by classic political pressure from interest groups) of spending our way out of the problems is not a viable option because the federal government and most state governments are facing severe fiscal pressures for the foreseeable future.

Privatization and deregulation may appear to be an extreme approach, especially given past problems with private provision of certain transportation services and infrastructure and current doubts about whether markets can be trusted to deliver essential services. At the same time, government failure in transportation has solidified inefficient practices that must be purged and has slowed technological advance that must be accelerated. Private firms may accomplish those goals if they are not constrained by the kinds of regulatory interventions that undermined their initial efforts to develop the system.

Potential Benefits

The essential goal of privatization and deregulation of the U.S. transportation system is to develop market-based institutions that are stimulated by competition to respond to customers' preferences, expand choices, minimize costs, and introduce innovative services and technologies. Privately owned enterprises selling services directly to the public are dependent on customer goodwill and in contrast to public sector providers less likely to have their operations shaped by special interests that substantially raise the cost of transportation to the general public.

The evidence I synthesize in subsequent chapters indicates that the annual efficiency costs associated with public ownership and (mis)management of

the system clearly exceed $100 billion, not including the costs of impediments to innovation and slow technological advance. Theoretical and limited empirical arguments suggest that privatization and deregulation could significantly eliminate current inefficiencies and spur innovations that are difficult to envision in the current environment, but the case would be much more persuasive if it were accompanied by evidence obtained from privatization experiments in the United States.

Experiments

Federal regulators obtained credible and ultimately influential advice to significantly withdraw their interventions in intercity transportation from evidence based on unregulated intrastate airline markets in California and Texas and deregulation of truck rates for certain commodities and from empirical studies indicating that intermodal (truck-rail and, in some cases, barge-rail) competition could discipline partially deregulated railroad rates for most commodities. In fact Derthick and Quirk (1985), Breyer (1982), and Levine (1981) argue that intercity transportation deregulation would not have occurred without such evidence.

In contrast, it has been argued that the existence of monopoly elements in urban transportation (public transit and urban highways), intercity highways, and aviation infrastructure (airports and air traffic control) prevents competition from developing and justifies government ownership—or at least regulation. Because evidence in the United States is not available to address this fundamental concern, policymakers and interested stakeholders should not embark on a privatization and deregulation policy without being persuaded that effective competition can develop in those transportation services to assuage concerns that privatization will simply create private monopolies.

Long-term experiments that are carefully conducted by policymakers and that allow the economic effects of privatization to fully develop could provide the essential evidence. Such experiments may be compelling to policymakers in this recessionary climate because they may lead to greater private sector involvement in transportation that could improve government budgets and lead to innovations that spur economic growth. For example, privatization of a major highway would be expected to create a monopoly. But the theory of dynamic monopoly suggests that Coasian bargaining between road users who are represented by a third party and a private highway authority could generate a competitive outcome that enables motorists to benefit from price and service packages that are aligned with their varying preferences for speed

and reliability. In the process government would obtain revenues from selling the highway and would be relieved of capital and maintenance expenses, while the private highway operator would have an economic incentive to introduce new technologies, which the public sector has not introduced, to improve traffic flows and safety.

The notion of privatization experiments is a metaphor because I am not suggesting that they would be controlled experiments; they are more akin to the Schumpeterian notion of creative destruction where private operators are given the opportunity to compete with each other to determine the most efficient production processes and innovative technologies that respond to travelers' and shippers' preferences. Accordingly, in a later chapter I identify the key features of specific locations where such experiments are likely to be feasible and where the benefits from privatization are most likely to be realized, thereby generating credible evidence that could help overcome the remaining political hurdles and contribute to a constructive change in transportation policy.

Political Reality

The deep recession that began in late 2007 has significantly reduced the public's and policymakers' confidence in markets and undoubtedly made it more difficult politically to privatize and deregulate the transportation system. Of course, the U.S. economy will eventually grow again for a sustained period, and memories of the recession's effects will start to fade. In addition several factors suggest it is important to look beyond the current political climate. First, as noted, the problems associated with the transportation system are primarily attributable to government failure, not market failure, and the public has become frustrated with the government's inability to improve the system. Second, the nation has been searching for the optimal mix of public and private participation in transportation for three centuries, and it is not going to accept the status quo as a long-run equilibrium. Third, political winds shift very quickly, as indicated by the public's growing concern that the Obama administration's intervention in the economy may be excessive. Fourth, budgetary pressures have made public officials more receptive to private sector participation in transportation, while the long-term effects of the recession have intensified officials' interest in private sector innovations in transportation and other areas of the economy that could spur the nation's growth.

To be sure, overcoming the status quo will be difficult when the costs of change are concentrated among powerful interest groups and the benefits

are likely to be broadly dispersed. The experiments that I am advocating are intended to build political support carefully by convincing transportation users, a critical interest group that is likely to be skeptical about privatization and deregulation, that they will be better off. For example, Schaller (2010) argues that a key lesson from New York City's failed effort to implement Mayor Michael Bloomberg's congestion pricing plan is that drivers must be convinced that highway tolls would make them better off. Policymakers could then overcome remaining interests, especially labor, by arguing that the status quo is not a viable option because the transportation system will only continue to get worse given the enormous fiscal deficits and that privatization and deregulation could relieve budgetary pressures and spur innovation and economic growth.

A Road Map

Readers may find it useful for me to summarize my theoretical perspective on the privatization debate and the evidence that I use to develop my argument. The public sector's involvement in the U.S. transportation system is often taken for granted, but, as noted, the private sector initially provided much of the nation's transportation services and facilities that promoted economic development and growth. For example, private ferries, railroads, trolleys, and toll roads (such as the Calistoga road) were central to the rapid development of Marin and Sonoma counties in the San Francisco Bay Area.[10] The fact that those operators fell prey to the business cycle or bad luck or planning was not, in itself, justification for a public takeover.

Indeed, the justification for government intervention and takeover of transportation during the past century is far from clear. One cannot make the case by simply pointing to alleged market failures, such as the existence of scale economies in transit operations, and claim that workable competition was not possible. In theory, market failures should be compared with government failures and how the consequences of each will evolve over time. Periodic financial failures by private firms are not necessarily bad if inefficient firms exit and are eventually replaced by firms that use more efficient production methods and up-to-date technologies. Public provision and regulation may cause greater social costs than are caused by private firms that are struggling financially. Moreover, such costs may be concealed from the public, the majority of whom do not realize the extent of increasing public sector

10. I am grateful to Randall Pozdena for this point.

inefficiencies and taxpayer subsidies. Indeed, the strongest justification for privatization may be that it can eliminate dynamic X-inefficiencies—steadily rising production costs and little innovation and technological advance.

Of course, the relative costs and benefits of public and private sector provision of transportation must be resolved empirically. I rely on the available scholarly assessments of the performance of the various components of the U.S. system, retrospective assessments of the effects of U.S. intercity deregulation, and assessments of the hypothetical effects of privatization and deregulation of transportation in the United States and the actual effects of privatization and deregulation of transportation in foreign countries. My focus is primarily on economic efficiency—resource allocation within the transportation system—rather than social efficiency, which considers, for example, the broader effects of the system on the environment. But I do comment on such issues when appropriate. My focus on efficiency implies that I believe that the transportation system per se should not be compromised to improve the quality of life for the working or nonworking poor. Instead, the system should be as efficient as possible, and social goals such as improving the mobility of poor citizens should be accomplished efficiently by, for example, instituting a voucher system.

I stress that far more scholarly evidence exists on the performance of the current U.S. transportation system under public management and the effects of partial deregulation than on the hypothetical effects of privatization in the United States and on the actual effects of privatization and deregulation in other countries. In addition, the extent of the evidence varies greatly by mode and the type of infrastructure (for example, airlines and airports have been thoroughly studied, while inland barge transportation and ports have received little scholarly attention).

I round out some of the scholarly evidence with anecdotal and descriptive evidence from the media and government reports. But because the existing empirical evidence is still incomplete, I conclude my journey by calling for experiments to fill in critical gaps in our knowledge of the effects of privatization and deregulation to help resolve the debate.

Along the way my argument is developed in two parts. In the first part, I motivate the case for privatization and deregulation by analyzing the U.S. transportation system's inefficiencies and by arguing that political and institutional constraints on introducing efficient reforms have enabled those inefficiencies to persist and grow. Major inefficiencies arise from residual regulation of intercity transportation and from public ownership and management of urban transportation and aviation infrastructure.

In the second part, I discuss the evidence indicating that privatization and deregulation could raise national welfare and explain the role of experiments. I indicate why deregulation of intercity transportation, despite constraints on private firms, was successful and outline a theoretical framework for assessing the economic effects of privatizing and deregulating the remaining parts of the transportation system. Based on academic simulation studies and transportation privatization experiments in foreign countries, I enrich the theory with the available empirical evidence. Unfortunately, the absence of privatized transportation services and infrastructure in the United States means that researchers have not had a good "laboratory" to develop persuasive evidence on the likely economic effects of privatization and deregulation. Accordingly, I outline political and economic considerations to guide experiments that would generate actual evidence of the effects of the policy on the performance of the U.S. transportation system. Based on the arguments advanced in the preceding chapters, I expect that the evidence will be quite positive and that top-level leadership will use it for outreach and public education to achieve a constructive long-term policy change that places greater reliance on the private sector to provide an essential input into Americans' work and recreation.

5 *Airports and Air Traffic Control*

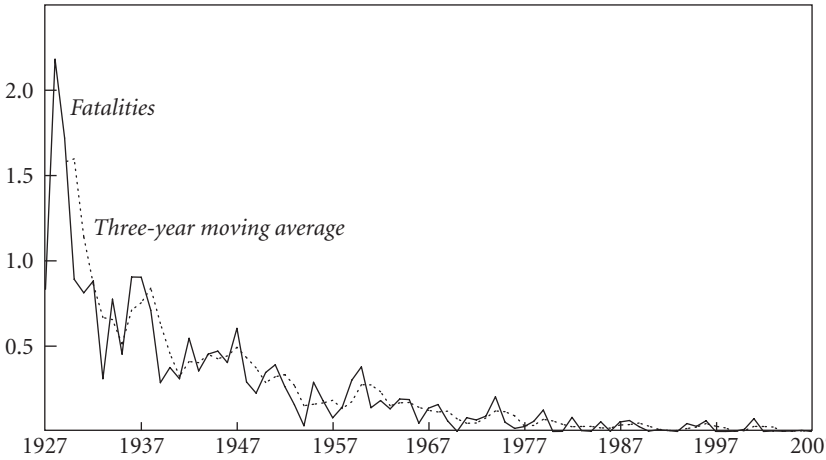
The first commercial plane flight in the United States, an eighteen-mile run of the St. Petersburg-Tampa Airboat Line that carried one paying passenger, took place in 1914. Federal Aviation Administration (FAA) domestic forecasts indicate that by 2014 annual airline passenger enplanements will reach roughly 1 billion.[1]

Efficient, technologically up-to-date aviation infrastructure—airports and air traffic control—is essential for moving air travelers safely and quickly from their origins to their destinations. Responsibility for basic aeronautical services in the United States—including terminals, gates, taxiing areas, and runways—lies with local governments that operate airports either directly, as in the case of small airports, or through airport authorities, as in the case of many medium and large airports. The federal Transportation Security Administration (TSA) is responsible for airport security, and the FAA provides air traffic control. In 2004 FAA's air traffic control function was reorganized into the Air Traffic Organization (ATO), a "performance-based" organization that, in contrast to a "rules-based" organization, focuses on serving its customers instead of on following detailed procedures. Nonetheless, the ATO remains an agency within a civil aviation administration that is funded by annual budget appropriations from Congress.

How has aviation infrastructure performed? As shown in figure 5-1, the chance of a passenger dying in a commercial airline accident has steadily declined since air travel began and has become very small during the past few decades. Of course, airlines have a strong financial incentive to maintain safe operations, so it is not clear whether market forces or public infrastructure

1. This chapter draws on and extends Morrison and Winston (2008a).

Figure 5-1. *Passenger Fatalities per Million Aircraft Miles*



Source: Air Transport Association.

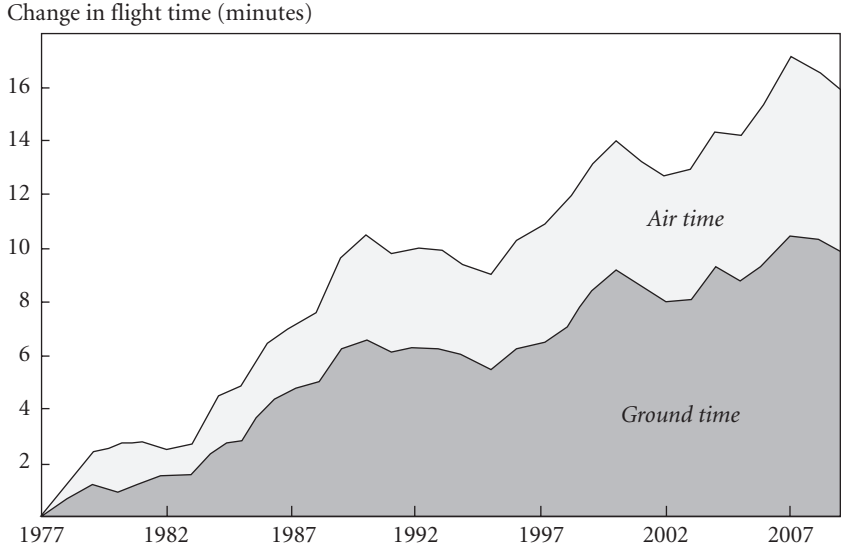
Note: All data reflect systemwide scheduled service performed by U.S. air carriers, including major and commuter carriers, of both passenger and cargo flights operating under 14 CFR Part 121 of Air Carrier Certification. Fatalities include passengers and crew members, but not persons on the ground.

spending and regulations deserve most of the credit for the safety of air travel in the United States.

During the past decade, air travelers have become increasingly concerned 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-flight delays and earlier airport arrivals for security screening were estimated to cost passengers and airlines in the United States at least $40 billion in 2005.[2] As shown in figure 5-2, travel times

2. 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. The figure also does not include baggage handling delays. 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 to passengers of $25 billion. This figure does not include the loss to airlines from the reduction in passenger volume at airports that is attributable to passenger and baggage screening.

Figure 5-2. *Air Travel Delays*



Source: U.S. Department of Transportation, Service Segment Data and Schedule T-100, Data Bank 28DS, Domestic Segment Data. Data for 2009 are through October.

have been increasing for the past three decades. But the problem is becoming so severe that at least one major airline carrier, Air Canada, is offering delay insurance, which pays for lodging and even airfare on rival carriers in the event that it cancels a flight or a traveler misses a connection because of its actions.[3]

In my 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.

3. Scott McCartney, "Letting Fliers Buy Protection against Delays," *Wall Street Journal,* May 20, 2008.

Some observers believe that delays would be reduced if the nation invested more money in building new airports and in upgrading air traffic control technology. Such spending could be economically justified, but its returns would be compromised by the system's vast inefficiencies. Delays should be reduced primarily by efficient pricing of and investment in aviation infrastructure.

Overview of U.S. Aviation Infrastructure and Current Policy

When air travel began in this country, airports were privately owned, often by airlines. Smaller airports continue to be privately owned, but the FAA prohibits private airports from offering commercial service because it may adversely affect the national aviation system. The prohibition is lifted only for those airports that have been approved to participate in a very limited number of privatization experiments that I note in a later chapter.

For the most part, 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. The federal government also has a major presence at airports through the TSA's screening of passengers and luggage. Different regulations and funding sources govern the operations of those 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.[4] 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 those 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 by the Airport Development Program, which increased federal funding for construction and improvements at large pubic airports. Since the passage of the Airport and Airway Improvement Act of 1982, federal funding for airport

4. Dilger (2003) provides a complete discussion of the major federal legislation related to airports and air traffic control.

projects that seek to enhance airport safety, capacity, security, and the environment are provided under the Airport Improvement Program (AIP). AIP funds are drawn from the Airport and Airway Trust Fund, consisting of revenues from aviation excise taxes, fuel taxes, and other sources, and distributed by the FAA to airports of all sizes on the basis of congressional priorities.[5]

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 use the passenger facility charge to cover some bond payments for projects approved by the FAA.[6] 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 use either a residual or a compensatory charging system to establish rents and landing fees (Graham 2004). Passenger facility charges are localized and spent at the airport's discretion. 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.

5. 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. At the end of fiscal year 2008 the trust fund's uncommitted balance was $1.4 billion—well below its uncommitted balance of $7.3 billion in 2001—and it was expected to fall further in the following years, possibly even to run out.

6. Congress is currently considering legislation that would increase passenger facility charges from $4.50 to $7 a passenger to generate an additional $1.1 billion in revenue for airports.

The airlines guarantee that the level of charges and rents will enable the airport to break even. Under a compensatory charging system, the airlines 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. In addition airport operations do not appear to be affected by the choice of charging system. Some of the contracts detailing the charges airlines pay to airports contain "majority in interest" clauses that give the airlines signing long-term lease agreements the right to approve certain capital expenditures, especially spending on terminals and gates.

Given a variety of funding sources, airports—in contrast to airlines—have generally been able to maintain their financial health even in the period after September 11, 2001, and in subsequent periods characterized by skyrocketing fuel bills and a deep recession. To maintain their airline tenants' operations, some airports (among them, Boston, 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.

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 the AIP. Table 5-1 classifies those airports by size and presents their share of commercial enplanements and federal grants, which are assessed later in the chapter along with other data on the allocation of AIP funds. The thirty-one large hub airports account for more than 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, or 1940s and were later significantly expanded (Altshuler and Luberoff 2003). Those 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. Since 1970 such projects also must satisfy Environmental Protection Agency environmental impact standards.

Table 5-1. *Distribution of Federal Airport Grants, by Airport Size, 2000*

Airport type[a]	*Number of airports*	*Share of grants (percent)*	*Share of scheduled commercial enplanements (percent)*
Large hub	31	24	70
Medium hub	35	15	19
Small hub	71	15	8
Nonhub	282	19	3
General aviation, relievers, and other commercial service	2,981	28	0

Source: U.S. General Accounting Office (2002), Federal Aviation Administration (2000).

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.

Airport Security

Before the September 11, 2001, terrorist attacks, airlines were responsible for providing passenger screening, and the FAA was responsible for promulgating performance and training standards. The airlines hired roughly 19,500 screeners from private security companies to perform screening procedures at U.S. airports (GAO 2005a).

After the attacks, some observers claimed that reliance on private screeners was disastrous, but it should be noted that the screeners were subject to government regulations. In addition, it is fair to say that the public got what it perceived to be the level of safety that it wanted. In any case, the Transportation Security Administration was initially created as part of the Department of Transportation and in February 2002 it assumed responsibility for screening at virtually all U.S. airports; in November 2002 it was folded into the newly created Department of Homeland Security. By the end of 2002 the 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 a round trip, to help pay for security screening. Airlines then remit the fees to the TSA to help support its annual budget of roughly $5.5 billion.[7] To

7. The fiscal year 2011 budget proposal for the Department of Homeland Security includes a $1 increase in each passenger's security fee.

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 use 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 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, the TSA has balked at Congress's direction to conduct background checks on registered traveler applicants and to provide expedited screening to those who passed. That undercut the potential value that the three approved registered traveler companies offered to members, and caused Clear, the largest provider, to enter bankruptcy. Its new owners and another entrant have announced their intention to relaunch security-screening lanes by the fall of 2010. Airlines, such as American and United, have tried to expedite screening at certain airports by instituting special security lines for travelers who are elite members of their frequent flier programs.

Air Traffic Control

The scope of federal provision of air traffic control was expanded 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 larger 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 enhanced 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, or DOT).

In practice the FAA operates facilities to ensure that air travel is safe and to prevent the system from becoming congested both along the flight route and near airport terminals. 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

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

aircraft that are arriving, departing, and transiting the controlled airspace. The FAA system includes roughly one hundred and fifty 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.

The FAA and its programs are 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 for most of the small remaining share. In addition, the military provides as well as uses air traffic control. Given that commercial airlines account for only two-thirds of all flights, they contend that they are overpaying for air traffic control services.

The FAA funds research and development to improve air travel safety and efficiency, but an ongoing challenge for the agency 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, both of which 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, its development has been characterized by delays and inefficiencies.[9] Scheduled to be completed by 1991 for $12 billion, the fully upgraded system is almost two decades 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 (current dollars).

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 as NextGen (for Next Generation) would allow pilots and controllers to be cognizant of other planes in the vicinity as well as their speeds, headings, and flight numbers. Travel times would be reduced because planes

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

would be able to fly closer together and take the most direct routes to their destinations using signals from global position satellites to navigate. In addition, NextGen would provide real-time information about wind conditions to facilitate optimal altitudes and routings, save fuel, and increase throughput. Finally, pilots would be able to operate in cloudy and foggy weather much as they do on clear days. Radar is imprecise—it typically updates aircraft positions every 4.8 seconds and forces controllers to separate aircraft by several miles to avoid collisions. In contrast, the automatic dependent surveillance broadcast (a key component of NextGen known by the acronym ADS-B) updates positions every second. The FAA has recently proposed a rule for airlines and business jets to equip all aircraft operating in controlled airspace with ADS-B-compatible avionics by 2020.

NextGen could also increase throughput at airports by making it feasible to provide short-haul service on 3,000 foot runways because certain aircraft types (such as planes carrying no more than 100 passengers) would be able to follow precise independent approach and departure paths in a metropolitan area's terminal airspace. Such aircraft could use underutilized short runways at major hubs and serve reliever airports in the same metropolitan area as a congested hub airport.

Because the NextGen system would require only a few dozen facilities dispersed throughout the country, managing that system would be much simpler and less costly than managing the current system. Much of the current system of radar towers, TRACONS, and en route centers would be eliminated. The remaining facilities would be consolidated, with some providing backup capabilities in case of a major system failure. By replacing most radars with ADS-B equipment on planes, along with ground-based equipment, thousands of costly-to-maintain radars and other ground-based navigation aids could be retired.

Key components of the system are moving forward, after having been tested in Alaska. Although Alaska is not representative of most flying conditions, the FAA reports that since ADS-B satellite navigation was 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 for commercial airline flights across the Gulf of Mexico, by helicopters serving Gulf oil platforms, by UPS at its air cargo hub in Louisville, Kentucky, and by Alaska Airlines for flights into and out of Seattle airport. US Airways will engage

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

in a trial in 2010 in the Northeast corridor airspace, when part of its fleet is equipped with ADS-B. Southwest Airlines is the first airline to commit to upgrading its entire fleet to use satellite-based navigation approaches to airports. The FAA plans to switch completely from today's radar-based to satellite-based air traffic control—that is, to replace the system it has been working on for more than twenty years but has not fully completed. However, 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 of 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. I now consider how the government's pervasive presence 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 those 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 should be reformed to make greater progress toward achieving all of those goals.

Performance of Airports

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

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,

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. In fact, the $30 billion figure may seriously underestimate the cost of NextGen. As reported by the Associated Press, "Air Traffic Upgrade Costs Seen Ballooning," February 7, 2008, Calvin L. Scovel III, inspector general for the U.S. Department of Transportation, indicated that the system's software development alone could cost more than $50 billion.

the fees do not vary by time of day. But congestion—which delays travelers—does, in accordance with the volume of aircraft traffic. Beginning with Levine (1969) and Carlin and Park (1970), 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.

Weight-based landing fees were probably a reasonable way to allocate airport costs and raise revenue when airports were not severely congested, but today the principal cost that an aircraft imposes when it takes off or lands is the delay it imposes on 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 (1989) found that this delay can be substantial. 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.[12]

Morrison and Winston modeled airport users' demand and the relationship between airport operations and delay and estimated that replacing weight-based landing fees with efficient marginal-cost takeoff and landing tolls could generate significant annual net benefits to the nation. Travelers would reap $5.3 billion in reduced delay costs, and carriers would gain $1.8 billion from lower operating costs. And although airports would gain substantial revenue from higher takeoff and landing fees, that gain would be modestly exceeded by travelers' losses in consumer surplus as airlines pass on the cost of the tolls in higher ticket prices. That difference would partly offset the gains to travelers and carriers, resulting in net benefits of nearly $6 billion (expressed in 2005 dollars). As discussed below, the redistribution from travelers to airports would be softened if efficient tolls were combined with efficient runway investment.

12. 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. Those times are 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 Brueckner (2002) raised doubts about the extent to which optimal airport pricing would reduce delays. In the case of highway travel, efficient tolls charge motorists for the delay they cause all motorists. But in the case of air travel, a given American Airlines flight, for example, may delay another American Airlines flight. It could be argued that American Airlines' operations take that delay into account, or "internalize" the delay.[13] Thus, American should be charged only for the delays it imposes on other carriers. If American has a 50 percent share of operations at an airport, it should be charged for one-half of the delay costs it creates—the delay imposed on 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 (2003) 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.

Of course, the fully efficient charges at congested airports would raise political problems because carriers with smaller market shares would pay higher charges than carriers with larger market shares would pay, or they may be forced to abandon the airport. However, those issues appear to be moot because Morrison and Winston (2007) find that the large welfare improvement from setting congestion tolls that assume atomistic behavior would increase only modestly if optimal tolls were set along the lines suggested by Brueckner and by Mayer and Sinai. The reasons are that 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), and that 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

13. Daniel (1995) empirically explored the extent to which an airline's internalization of delay costs affected its pattern of operations.

LaGuardia, New York Kennedy, Washington Reagan National, and Chicago O'Hare airports. Slots are now also in effect at Newark Liberty Airport. 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, whereas evidence does exist that slots have tended to reduce competition and raise fares (Morrison and Winston 2000).[14]

Congress has acted in the past to eliminate slots, but the FAA has countered by imposing administrative controls in response to traffic growth. For example, the FAA has dealt with congestion at O'Hare by getting hub carriers 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, which was eventually withdrawn, 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-oriented solution.

In the summer of 2007 air travel delays—a large fraction of which emanate from the New York area airports—reached record heights and inconvenienced millions of travelers. Under the leadership of then Transportation Secretary Mary Peters and Assistant Secretary Tyler Duvall, the department tried to introduce efficient pricing policies to reduce airport congestion but encountered strong—and ultimately successful—opposition from airlines, airport authorities, and certain members of Congress.

One new federal policy allows airports to charge higher landing fees during peak periods; that change to federal airport rates and charges policy went into effect in 2008 (the federal appeals court recently rejected a challenge by the airline industry to this policy).[15] Secretary Peters' proposal to auction off some takeoff and landing slots at New York Kennedy, LaGuardia, and Newark airports met with even stronger opposition. The airlines preferred to have airports cap the total number of flights during peak hours to reduce congestion—of course, competition would also be reduced and fares increased.

14. I am not aware of evidence that slots produce benefits in reduced delays that offset their costs. Whalen and others (2008) suggest that an auction system with well-defined property rights could be used to efficiently allocate slots to air carriers.

15. Levine (2007) points out legal and other issues that have to be addressed to implement airport congestion pricing successfully. These include providing no exemptions for foreign carriers and general aviation, addressing the monopoly airport problem where it exists, and using the revenues from congestion pricing to expand airport capacity but not for other unrelated purposes.

Because policy toward the New York area airports is likely to set the tone for policy toward other congested airports, the dispute between the administration and key stakeholders intensified and the auction proposal was blocked in federal court. The new secretary of transportation, Ray LaHood, cancelled the proposal in May 2009, claiming to still be serious about tackling congestion in the region and planning to seek input from stakeholders about the best ways to move forward. The opposition to the department's laudable efforts under Secretaries Peters and Duvall is indicative of the obstacles to trying to implement efficient policies in publicly owned transportation facilities.

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. Any effort to build new large airports would encounter significant logistical, financial, and political challenges, but even adding a new runway is fraught with hurdles because 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. More than a dozen runways have been christened since then, but the time and cost to build some of them have been excessive. For example, it took Atlanta nearly twenty-five years and an estimated cost of $1.3 billion to have its new (fifth) runway; 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 questionable because the airport now has excess capacity (partly because TWA's airline assets were acquired by American Airlines). The construction of taxiways has also been delayed. For example, after a seven-year delay, Boston was scheduled to finish construction of a taxiway in 2009 to reduce the danger of plane collisions.

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 decades to gain approval for an expansion plan that would add two new runways, lengthen and widen some

of its existing runways, and build new passenger terminals and parking spaces for oversize jets and passenger jet bridges. The plan was expected to alleviate delays caused by O'Hare's intersecting runways and vulnerability to winds from the southwest. O'Hare finally succeeded in moving ahead with a $15 billion expansion plan; but after overcoming delays, in part because homes had to be demolished and a cemetery had to be moved, the city enraged United Airlines and American Airlines and jeopardized the project by recently announcing that it planned to raise terminal rents and landing fees.[16]

The impediments to building new runways efficiently should be of great concern because their potential benefits are huge. Morrison and Winston (1989) analyzed the situation where an airport owns land and is able to construct an additional runway measuring 10,000 feet by 150 feet. Optimal runway capacity is reached when the marginal cost of an additional runway is equated with the marginal benefit of reduced delay. Morrison and Winston 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.[17] 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 (Morrison 1983).

To be sure, Morrison and Winston's findings largely neglect the practical and political difficulties that many airports face when trying to expand their runway capacity. That said, airports that have recently opened a new runway are providing very favorable reports—for example, Chicago O'Hare's new runway in 2008 is claimed to have reduced average airport delays from twenty-four minutes to sixteen.[18] In sum, 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

16. Julie Johnsson and John Hilkevitch, "United, American Threaten to Call Off O'Hare Expansion Talks," *Chicago Tribune,* February 10, 2010.

17. General aviation would face higher landing fees. But the Morrison-Winston 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.

18. Scott McCartney, "How a New Runway at O'Hare Makes Travel Easier for All," *Wall Street Journal,* July 22, 2009. To be sure, the reported delay savings attributable to a new runway may capture other factors, such as airlines' reductions in flights as a result of lower demand, which affect delays.

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.[19]

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 they would be if they were allocated according to cost-benefit guidelines. In fiscal year 2009 the 100 largest metropolitan airports, which account for 84 percent of airline passengers, received only 37 percent of AIP funds.[20] Given that the nation's large and medium hub airports serve 89 percent of the nation's passengers and receive only 39 percent of federal airport grant dollars, table 5-1 also suggests 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. It is particularly striking that 28 percent of the grants go to small airports that are likely to process a small number of daily operations and that do not offer commercial service by regularly scheduled carriers.[21] The AIP program has also not been immune to earmarking that has occurred in highway spending. An obvious example is the newly renamed but little-used John Murtha Johnstown-Cambria County Airport, for which the late representative John Murtha of Pennsylvania secured at least $150 million during the past decade.

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 and Airport Access. Airport gates are classified as exclusive use (leased exclusively to one airline), preferential use (the

19. 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 FAA has expedited the construction of new runways.

20. The figures are from Brookings Metropolitan Center calculations based on data from the FAA Airport Improvement Program.

21. Chase Davis, "Tiny Iowa Airports Take Off with Millions in FAA Grants," *Des Moines Register,* June 4, 2008, reports that since 2007, 42 percent of Iowa's AIP grants have gone to airports that provide no commercial service and that process fewer than fifty takeoffs and landings a day.

airport operator may assign the 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 available for use by new entrants (Morrison and Winston 2000, p. 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 LAX but still uses sixteen gates in two terminals.[22] 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.[23] Finally, in 2006 JetBlue received federal authorization, which was needed because O'Hare is slot constrained, for four daily departures. Virgin America has faced obstacles in developing its U.S. network because it has been unable to serve Newark airport, expand its operations at New York Kennedy airport, or establish service at O'Hare.[24]

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

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

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

24. Susan Stellin, "Seeking a Place at Airports," *New York Times,* January 26, 2010.

AirTran.[25] And the Los Angeles Airport Commission voted to spend up to $154 million to take over several terminals at LAX to free up aircraft parking spots for discount carriers and other airlines that had tried to add flights at the airport.[26]

Morrison and Winston (2000) found that, all else equal, fares are $4.4 billion (2005 dollars) higher annually because of the limited availability of gates at many major and midsize airports. 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.[27]

Finally, commercial carriers' access can be delayed and even blocked at existing airports by regulatory proceedings. In 2006 Southwest Airlines proposed to offer flights at Boeing Field in Washington State, but after receiving input from various stakeholders, including policymakers who were concerned about how Southwest's service would affect Alaska Airlines, King County officials blocked the proposal. Horizon Air and Allegiant Air have proposed to fly passengers from Paine Field, located thirty miles north of Seattle. But federal environmental reviews have already delayed commercial service for a few years, and local residents who oppose flights could use the process to delay service even longer. Such examples indicate that commercial air carriers may encounter obstacles to serving private airports even if commercial service is no longer prohibited at those airports.

Performance of Airport Security

An efficient airport security system allocates resources based on costs and benefits by directing expenditures toward detecting the greatest threats to safety and preventing them from materializing. Although I am not aware of a formal economic assessment of the Transportation Security Administration's passenger screening, the Department of Homeland Security, GAO, and the TSA routinely test screeners' ability to intercept weapons smuggled through checkpoints. The results have been poor. Both GAO and Homeland

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

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

27. 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.

Security found that screening was no more effective by April 2005 than before September 11, and in 2006 screeners failed twenty of the TSA's twenty-two tests.[28] GAO (2008) reported that covert tests through June 2007 conducted by the TSA's Office of Inspection (OI) identified vulnerabilities in the commercial aviation system at airports of all sizes. But the TSA apparently lacks a systematic process to ensure that the OI's recommendations are appropriately incorporated to improve airport security.

Current screening procedures are also inefficient. The annual cost of TSA security includes its budget of $5.5 billion, several billions of dollars in time costs incurred by passengers waiting to be screened, and $1.1 billion in lost revenue to airlines from reduced passenger volume at major airports (Blalock, Kadiyali, and Simon 2007). GAO (2009a) reports that the TSA spent more than $800 million on new air passenger screening technology between 2002 and 2008 but has not used any of it.

It is, of course, difficult to assess the benefits of TSA screening because we do not know of any terrorist attacks that screening has prevented. In any case, federal screeners have intercepted some 7 million prohibited items, but only six hundred were firearms while the rest were nail scissors, penknives, and the like.[29] Those findings are consistent with many critics' assessment of the TSA's first-generation passenger and bag screening: it could stop most amateurs but not anyone seriously committed to bringing weapons or some type of explosive onto a plane. In December 2009 a Nigerian man succeeded in bringing explosive chemicals onto a Detroit-bound Northwest Airlines flight only to be foiled in his attempt to blow up the plane by his own incompetence and passengers' actions. Homeland Security Secretary Janet Napolitano said the man was properly screened before getting on the flight to Detroit from Amsterdam.

The recent incident has illustrated the inefficiencies of expending billions of dollars in time and money to confiscate firearms—almost all of which were probably intended for recreational use—and of using Federal Air Marshals. Stewart and Mueller (2008) conclude that it was far more cost-effective to put bulletproof doors on cockpits, which the airline industry did for some $300 million to $500 million.

Moreover, the incident suggests the importance of taking a risk-based approach toward security that would be better targeted toward keeping

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

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

dangerous people off airplanes.[30] To that end, greater efforts should be made to classify travelers according to their risk to airline passengers' safety. Lower-risk people would belong to a "trusted traveler" program and even supply fingerprints and other biometric data stored on smart chips to move quickly through security. Higher-risk people would be placed on an expanded list based on background investigations and intelligence work and would be subject to more intensive screening and, if necessary, to a full body search.[31] More rapid introduction of technologically advanced screening technologies would enhance the approach. For example, body-scanning technologies are more effective than metal detectors are at spotting potentially dangerous objects and substances and can do so with minimal radiation exposure. But the TSA has been very slow to introduce full-body scanners and they are just starting to be deployed.

A fundamental concern is whether the 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 identifying and questioning suspicious passengers. Initially the enforcement branch could be used at some selected airports, and its responsibilities and funding could be expanded if this strategy was determined to be superior to using the TSA.

Private security firms that are not subject to federal regulations 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 major amusement parks such as Disney World. 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—actions that private sector airport screeners did not take before September 11 when they were regulated by the government. Such firms could also be bonded, giving them strong financial incentives to provide effective security, and could interact with government law enforcement agencies as necessary.

It has also been claimed that government bureaucracy has discouraged research and development of new innovative solutions to combat terrorism,

30. Robert Poole, "Are We Going to Get Serious about Aviation Security?" (Los Angeles: Reason Foundation, December 29, 2009).

31. After a review of security at international airports following the attempt to blow up a jetliner bound for Detroit, President Obama approved using an intelligence-based security system to identify passengers who could have links to terrorism; see Jeff Zeleny, "Security Check System for Flights to U.S. to Be Altered," *New York Times,* April 1, 2010.

causing a political disagreement over whether the government or the private sector should drive the development of security technology.[32]

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.[33] FAA expenditures on air traffic control deserve some credit for the nation's improved safety record (Morrison and Winston 2008b); 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 to 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 air space 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 their demand for airspace, especially near airports, and because general aviation prefers altitude approach levels that create additional complexity for controllers. Those costs are also not reflected in the ticket tax.

I am 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 (1992) reports rough estimates of the marginal cost of services provided by air traffic control. But because of data limitations, those estimates are based on the unrealistic assumption that all air traffic control facilities are optimized. Investment

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

33. 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.

in those facilities, however, has not been optimal. Under efficient (marginal-cost) pricing and investment, air traffic control operations would likely 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 their costs. 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."[34] In any case, I 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 Airways Trust Fund and the trust fund's reauthorization provided an opportunity for the FAA and Congress to reconsider how the air traffic control system should be funded. Not surprisingly, input has been 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 that 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. Of course, general aviation planes that operate off-peak (for example, "weekend warriors" as opposed to business travelers) would pay little under congestion pricing for airspace. 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 this chapter is being completed, the FAA reauthorization bill has not been passed by Congress—funding has been provided by a series of short-term extensions—and the draft legislation that the House of Representatives and the Senate have crafted offer no improvements in the efficiency with which air traffic control is funded.

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

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

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 (2008b) document at least one way that FAA investments could be improved. Compared with the current allocation, they find that allocating expenditures to towers and TRACONs serving 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 (2006) 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. legislators from the airports' districts strongly opposed the action without considering whether the tower services were needed or even used.

Robyn (2007) finds that, despite the FAA's investments to modernize air traffic control technology, controller productivity (as measured by instrument-flight-rule operations per controller) has not improved during the past twenty-five years, and production costs have grown significantly. Productivity could have improved if many of the routine tasks that controllers perform were performed by new hardware and software. For example, it is possible and desirable to automate the handoff of a flight from one sector to another, especially because this task accounts for a large share of all air-to-ground communications.

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. I 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 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.

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.[35] Calvin L. Scovel III (2008), the inspector general of the DOT, has identified concerns that the FAA is not properly organized to manage or execute a multibillion-dollar effort. Scovel recently told a congressional panel that the En Route Automation Modernization computer system, a critical underpinning of NextGen, has run into serious problems that will delay deployment of the new air traffic control system.[36]

Finally, all the facilities associated with the current system will eventually 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 current navigational aids and jobs in their districts.[37]

Summary and Conclusions

Air travelers in the United States have never been safer—and they have never suffered such long delays on their flights. As summarized in table 5-2, inefficient pricing and investment policies toward airports and air traffic control have significantly contributed to delays that are costly to travelers and carriers.[38] Travelers and carriers are also harmed by federal agencies' slow adoption of technologies and practices to improve security and air traffic control, while other inefficient airport policies have reduced competition and raised fares.

Despite air transportation's strong safety record, Representative James Oberstar, chairman of the House Transportation Committee, has recently criticized the FAA for allowing a "carrier-favorable, cozy relationship" to set in—raising concerns that the agency may be compromising safety. Such

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

36. Joan Lowy, "Problems Plague New Air Traffic Control Computers," *Associated Press,* April 22, 2010.

37. 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.

38. Inclement weather, which policymakers cannot control, also contributes to travelers' delays. But its effect interacts with carriers' operations, airports' runway capacities, and the like.

Table 5-2. *Aviation Infrastructure Policies and Their Inefficiencies*

Policy	*Inefficiency*
Airport runway pricing	Weight-based landing fees undercharge aircraft for their contribution to delays during peak periods, increasing travelers'delay costs and airlines' operating costs.
Airport slot controls to limit operations	Slot controls have tended to reduce competition and raise fares.
Airport runway investment	Regulatory hurdles significantly increase the time and cost to build new runways and extend existing runways, which could reduce delays.
Airport gate utilization	Limited availability of gates reduces competition and raises fares.
Airport security	Screening procedures could be implemented at much lower cost and cause travelers much shorter delays.
Air traffic control pricing	The ticket tax does not vary with air space congestion; thus aircraft are undercharged for their contribution to delays, which increase travelers' delay costs and airlines' operating costs.
Air traffic control investments	Funds for air traffic control facilities are not allocated to minimize delay costs, which forfeits potential savings to travelers and carriers.
Air traffic control technology adoption	The FAA does not adopt new technologies in an efficient, expeditious manner, thus increasing the costs of the system and preventing users from incurring lower delay costs.

Source: Author.

concerns are greatly exaggerated, especially because the market and the liability system provide strong incentives for air carriers to behave in a socially beneficial manner. In addition, because the airlines and aircraft manufacturers know far more about aircraft technology and airline operations than the FAA does, FAA air safety regulations do not appear to be indispensable.[39] If privatization of aviation infrastructure would not compromise air safety, it would be worthwhile to explore whether it could reduce the inefficiencies of the national aviation system.

39. Dominic Gates, "FAA Lets Aerospace Firms Certify Safety of Their Products," *Seattle Times,* September 2, 2008, reports on a new regulatory program where certain manufacturers have been approved by the FAA to self-certify the safety of their products.

LAST EXIT

In *Last Exit* Clifford Winston reminds us that transportation services and infrastructure in the United States were originally introduced by private firms. The case for subsequent public ownership and management of the system was weak, in his view, and here he assesses the case for privatization and deregulation to greatly improve Americans' satisfaction with their transportation systems.

"A half-century of economics research, much of it from Brookings, convincingly shows that deregulation of transportation services delivered enormous benefits. *Last Exit* argues persuasively that these benefits are limited by continuing public provision of infrastructure and regulation or public provision of some services. Clifford Winston proposes experiments in private provision of airports, highways, and urban passenger transportation, and more efficient usage pricing for infrastructure, to test the strong theoretical case for increasing the scope of privatization and deregulation. These provocative but measured proposals provide the agenda for a serious national debate on the next steps in reforming transportation policy."—**Roger Noll,** Stanford University

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"Winston pulls together the first comprehensive accounting of the many inefficiencies that arise from current public policies in transportation. The bill—amounting to $100 billion per year plus reduced innovation—will hopefully stimulate some of the experiments he advocates with increased private provision of transportation."—**Tony Gomez-Ibanez,** Harvard University

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