THE TAXATION OF AIR TRANSPORTATION

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Executive Summary

Air transportation is a crucial enabler of U.S. economic activity. It facilitates the movement of business personnel, serves as a key input into fast-growing industries such as tourism, and allows the vital interactions necessary to sustain many modern, high-technology, service industries. It performs a central role in meeting the evolving trading needs of the United States, as internationalization and globalization become increasingly important to the nation's economy.

In addition to its economic role, air transportation serves important social functions, not only meeting the access needs of remote, small communities, but also facilitating continuing contact between members of geographically dispersed families—an increasingly common feature of modern society.

The nature of air transportation, however, superficially makes it a convenient subject of indirect taxation. As a high-revenue (though not high-profit) sector with relatively few suppliers, aviation tax collection is inexpensive and convenient for the Treasury. And as an industry air transport is politically vulnerable, lacking any large voting block to protect its interests.

There is also an ingrained common perception, largely misplaced in the twenty-first century (after 25 years of economic deregulation and with the widespread availability of the services of low-cost air carriers), that taxation of air transportation constitutes a tax on a luxury good. This is simply not true. Today over 40 percent of airline trips are taken to visit friends and relatives and over 25 percent occur on low-cost carriers.

Nevertheless, over the years a plethora of taxes has been imposed on America's airlines, in addition to the generic corporate taxes levied in the United States. These taxes have risen substantially over time, creating a burden that has not been more broadly shared by U.S. industries. By 2000, the airline contribution to U.S. excise tax revenues had already climbed to 14 percent, up from just four percent in 1971. These special aviation taxes are imposing an excess burden on airlines and, ultimately, adversely affect not only the commercial viability of many carriers but also the vitality of the nation's economy and the social welfare of its citizens. This is not to say that the airlines should be exempt from contributing to an efficient taxation regime—rather, it is a matter of equity and structure.

Inappropriate taxes, either in terms of their magnitude or their form, can seriously distort the market for air transportation services. Because the demand for airline products is often derived from the final demands of society for goods and services, as well as from the desire for individuals to travel for leisure purposes or to meet friends and relatives, distortions to ticket prices have the potential of adversely affecting national output and the larger welfare of the country. In particular, they penalize those industries most reliant on high-speed, scheduled transportation—industries generally having the greatest potential to improve and sustain the nation's economic wellbeing.

The development of sound taxation policy must consider administrative features, downstream implications for production and consumption, and effects on various income groups and communities. While aviation taxes, at least on some criteria, do well regarding aspects of the first of these features, in that they are cheap and easy to administer, they fall short in virtually all respects in terms of both downstream efficiency and equity.

Truly efficient taxation minimizes distortion to the relative levels of consumption of different goods and services. Aviation taxation fails this test, wherein multiple forms and rates apply. Further, efficient taxes

are levied on final output, rather than on intermediate inputs such as transportation. Taxing an input yields unpredictable outcomes (i.e., "downstream effects") on final consumption and often creates perverse disincentives for the intermediate supplying industries.

Equity considerations entail the imposition of higher taxes on luxury goods and services that are consumed by wealthier people. But air transportation is now remarkably affordable and widely used by all strata of American society. One can also point to the considerable subsidies that Amtrak receives to carry passengers over routes that compete directly with the airlines. Since a large percentage of rail users are middle- and high-income, it seems perverse that Amtrak is heavily subsidized while airlines offering parallel services are being taxed.

Taxes are sometimes used as a form of social engineering to discourage consumption of socially undesirable products such as tobacco or alcohol. Again, however, the tax structure is hardly consistent. Someone paying $75 to an airline for a non-stop round-trip ticket pays an additional $25 in taxes and fees, and someone paying a base fare of $300 for a double-connection flight pays over $50 more. Contrast these rates of 35 percent and 27 percent respectively to the 18 percent federal excise tax on cigarettes and the 11 percent federal excise tax on whiskey.

Some taxes paid by the airline industry are seen as hypothecated user fees rather than general taxation, essentially intended to fund expanded airport capacity and air traffic control services. Airlines should pay for the facilities that they use. However, the taxes and their applications are tenuous in terms of reflecting a genuine charge for services provided by the taxing authority, and there is no mechanism that ensures that the resultant revenues are spent effectively. A comparison of taxes paid by commercial aviation with those paid by non-commercial aviation, relative to their respective use of the nation's airways, reveals considerable cross-subsidization enjoyed by the latter. Such cross-subsidies are not only highly inefficient but also inequitable, given the respective income levels of commercial and general aviation (GA) users.

Analysis of the downstream effects of aviation taxes on particular industries, regions, or groups of individuals is insightful. From a number of case studies it is clear that the current regime of aviation taxation damages the development of industries that make extensive use of air travel, and is having particularly adverse effects on some geographic regions.

In some cases, taxation limits the movement of individuals into markets by heightening the costs of transportation, the tourist industry being the most obvious case. Reducing the tax burden on those wishing to fly to Florida, for instance, would act as a stimulus to local travel-based industries, as well as having expenditure-multiplier implications. Scenario analysis indicates that removing the federal ticket tax could, depending on how travelers choose their services and routings, produce some 77,000 additional jobs in the state. Reducing or eliminating the passenger facility charge (PFC) or federal security surcharge could also yield powerful economic benefits. Removing the former could generate over 35,000 jobs.

Air transportation also serves the function of moving personnel around, and facilitates the more efficient conduct of business. High-tech industries make particularly extensive use of air transportation—its personnel flying about 60 percent more than equivalents in more traditional industries. Examination of high-tech activities in the National Capital Region around Washington, D.C., which have concentrated in the region in part due to good domestic and international airline access, suggests that the removal of the federal ticket tax would yield a sizeable increase in jobs.

There are also wider social costs associated with inappropriate taxation that are less easily quantified. One of these concerns safety. Air transportation has an enviable safety record, and any additional burden on fares or service quality leads to transfers to less safe transportation modes. Applying widely used parameters, the current federal security surcharge may be resulting in up to 100 additional annual road

fatalities at a cost between $99 million and $297 million in fatalities alone. The inclusion of injuries and property damage would inflate this toll.

The overall findings herein were well summarized in the conclusions of the Baliles Commission of 1993:

> *"We took very seriously our charge to examine tax policy and the many fees imposed on the industry. Although the Commission concluded that tax changes alone will not restore the industry to profitability, we believe there are several tax provisions that impede the ability of the industry to return to financial health. We believe those provisions violate reasonable principles of common sense and good public policy and we are of the opinion changes must be made to relieve the airline industry's unfair tax burden."*[1]

As the case studies show, high taxation on air travel produces deleterious social and economic outcomes, namely:

- reducing one or more aviation taxes would yield additional employment in regions especially dependent on aviation, such as tourism-rich Florida;

- the business community is adversely affected by high taxes, especially highly aviation-dependent industries such as high-tech and tourism; and

- for taxation on air travel to surpass materially taxation on other modes of intercity travel—specifically auto and rail—is inequitable and contrary to sound public policy.

The findings from our analysis suggest that, taken in the aggregate, the current aviation tax structure is causing measurable harm to the national economy. A more rational federal aviation tax regime—in scope, scale, and structure—would be far more likely to stimulate growth and employment in key sectors whose fate is closely tied to air services. While this should be of immediate interest to tourism- and high-tech-dependent communities and constituencies, it should also generate additional tax revenue for the General Fund of the Treasury as the growth of "ripple" industries accelerates, thereby benefiting society at large.

Against this background, the analysis in this study yields the following conclusions:

1. The existing taxation of U.S. airlines, while often administratively convenient and politically expedient, is not efficient, as it a tax on an intermediate service rather than on final consumption.

2. To fully reap the demonstrable economic benefits of commercial air transportation, airlines must be treated as economic assets rather than as a source of sumptuary taxation. Air travel should not be treated as a luxury good, but as a necessary and normal service consumed by all strata of society. While in the past airline travel may have largely been the prerogative of the wealthy, commercial air travel is now a mode of transportation used by ordinary people and should be taxed accordingly.

3. When considering the taxation of U.S. airlines, full cognizance should be taken of aviation's role in facilitating the nation's external trade. The U.S. economy is increasingly part of a global marketplace, and airlines are a major contributor to the nation's global competitive position. But the current regime of aviation taxation hinders the performance of U.S. airlines in larger international markets, ultimately hurting the U.S. trade balance and eroding overall U.S. revenues.

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[1] National ("Baliles") Commission to Ensure a Strong Competitive Airline Industry, 1993. *Change, Challenge and Competition*.

4. Airlines should pay the economic costs of resources that they consume and from which they directly benefit. The claim, however, that some elements of aviation taxation represent a "user charge" or "user fee" is difficult to substantiate. [This is true even in the case of fees for homeland security, ostensibly a federal function and one whose benefits accrue to citizens far beyond those aboard airplanes.] The taxes do not provide the incentives associated with fees nor do they act as indications of where capacity needs to be varied. Airlines often pay for items that are of no use to them. Airlines should pay directly for the inputs that they use and not pay arbitrary "user fees" that bear no relation to the economic costs involved. Similarly, the burden of taxation is not efficiently distributed between the various types of air transportation infrastructure users. Business aviation, which is used almost exclusively by high-income travelers, makes extensive use of aviation infrastructure and creates considerable congestion within the system. U.S. policymakers should reassess—indeed reallocate—the relative burdens of taxation on commercial aviation and business aviation, as well as public use, to ensure that the latter pays its fair, proportionate share.

5. Many twenty-first century industries, such as tourism and high-tech activities, rely disproportionately on air transportation. These are often the industries that enjoy high growth and will continue to contribute income and employment to the nation's economy. These industries make considerable use of air transportation and high levels of taxation impede their growth. The taxation of airlines should be designed so as not to stymie the potential of dynamic industries important to American prosperity.

6. When considering taxation of airlines, due account should be taken of the negative effects of diverting passengers to more dangerous forms of transportation.

After their initial imposition in the World War II era, aviation taxes later served to derive revenue from what was then—in the 1950s and 1960s—considered a luxury good. In the early 1970s, U.S. policymakers and airlines agreed on a new rationale for aviation taxes—to develop and maintain the nation's airport and airway infrastructure. But subsequent years added a patchwork of expanded taxes and fees, without commensurate expansion of aviation infrastructure. In the 1980s, 1990s, and early 2000s Congress and federal agencies levied new charges for everything from general U.S. deficit reduction, to homeland security, to environmental protection, to the subsidization of noncommercial airports and operations, along with pertinent inefficiencies in the relevant regulatory agencies.

Now that U.S. commercial aviation has entered a new phase of deregulation—indeed a new era of operation in this twenty-first century, it is time for the tax regime to do the same. The rationale for aviation taxation must be rethought and its structure modified accordingly, factoring in its economic relevance and the critical outcomes enumerated herein.

Introduction

Taxes serve a purpose. The U.S. government requires revenue to fulfill its numerous functions, and there is no reason why the air transportation sector should not, in an appropriate way, contribute to the national treasury. The crucial issue for the airlines (and the public more generally) is thus not taxation per se, but rather its level, structure, and impact. Because it is somewhat concentrated—which makes revenue-gathering relatively cheap for the collection agency—and often perceived as a provider of a luxury service, the airline industry is especially vulnerable to high levels of taxation.

These factors sub-optimally limit the growth of the air transportation, because ultimately taxes are either passed on in the form of higher fares and cargo rates or reduced levels of service, especially in a highly competitive environment. In the short term, particularly in today's marketplace for air services, the taxes are not passed on but rather absorbed by the airlines in the form of weakened financial results. Yet even when the airlines bear the immediate burden of taxation, businesses and individuals must adjust downward their levels of service, either in quantity or quality, to be able to absorb the tax.

Taxation invariably distorts markets. Therefore, a well-structured tax regime should minimize the distortions that it imposes downstream on the various sectors of the economy. In the context of airlines, these distortions take a number of forms:

- the taxation of airlines is disproportionately high, retards the industry's development vis-à-vis the overall growth in the economy, and limits its potential contribution to economic wellbeing;

- the level of taxation distorts competition with other transport service suppliers (e.g., differential taxation on rail versus air transportation on the northeast corridor routes);

- the structure of taxation imposes burdens further up the air-services value chain, thus imposing additional costs on the airlines and their customers;

- taxation influences the competitive position of domestic airlines versus international competitors in increasingly global air transport markets; and

- taxation disguised as government-imposed user charges results in: (i) services being supplied to the airlines in excess of the level the airlines would purchase in an open market ("gold plating"), (ii) those services being supplied inefficiently, or (iii) the masking of government obligations to serve unrelated public policy objectives (i.e., customs, border protection) under the guise of user "services."

In this context, this study aims to: analyze objectively the tax burden on U.S. commercial air transport; isolate items that may be reasonably seen as user fees or quasi-user fees and, where possible, comment on whether these lead to gold-plating; evaluate how the tax burden is distributed across the industry; and compare the burden of a pure tax with that found in competing transport sectors.

Using existing data sources and contemplating the dynamics of the situation, the study aims to determine if U.S. airlines are being inflicted with an excessive burden of taxation—either directly or through the larger supply chain—that ultimately harms social and economic welfare. In addition to analyzing the immediate financial impact of the tax structure on airlines, the work seeks to convert this impact into more concrete parameters, including: the number of potential passengers "priced" out of the market, examples of services that would be offered under an alternate tax structure, implications for international trade, and lost or foregone jobs in the airlines and associated industries.

Airlines as the Basis for Taxation

The theory of taxation

Taxation is inevitably a contentious issue. No one likes paying taxes. Taxes have led to wars, and are an ongoing issue for most sectors of the economy. But they are important as a means of financing government activities, providing public goods, and as a mechanism for bringing about social transfers to protect the less well-off in society. It is important, therefore, that the forms of taxes imposed serve the public interest rather than being arbitrary or capricious.

In considering the structure of the taxation regime, it is useful to put the aviation taxation system within the more general framework of taxation. One of the main problems encountered in the past when reviewing aviation taxes is that they were seldom assessed as an entity. Rather, marginal changes have been critiqued, or additional taxes commented upon. It is thus within general taxation principles that aviation taxes are initially examined here.

Taxation involves the compulsory transfers of monies from the general public (individuals and companies) to the government.[2] It takes a diversity of forms, but all affect consumption levels, profits, incentives and welfare distribution. Taxation can occur at any point in the circular flow of income (consumption, expenditure, investment, international trade), but where it lies and the form it takes affects the level, speed, and distribution of this flow between companies, households and government.[3]

Taxes on income and wealth are direct taxes, whereas those on consumption are indirect taxes. Aviation taxation is largely an indirect tax paid to the authorities by the provider of airline services, but the incidence of the taxation is borne more widely, as part of the burden is passed on to travelers and shippers. The amount passed on depends on the conditions of supply and demand in the relevant transport markets. During times of intense competition for budget-minded, Internet-empowered customers, such as the present, the economic incidence of the tax shifts principally to the airline, rather than the consumer.

When there are few economies of scale on the supply side and the market for a product is highly competitive, the incidence of any tax is largely pushed down to the consumer in the form of fewer services.[4] Any initial attempts by airlines to push up fares tend to be eroded by competitive pressures. If airlines cannot pass on the full burden, potential users of air services will find the available quantity and variety of services to be reduced, as some carriers leave the market and others adjust operations in light of the higher costs they now incur. This reality limits the welfare of individuals who wish to make trips and the economic vitality of industries that use air travel or air cargo as a significant input to production.

Accepting, however, that there may be valid macroeconomic reasons for taxation to provide public goods and, as part of necessary governance, the issue then becomes one of the types of taxes to use, their relative levels, and the nature of their application. The usual criteria for a "good" tax are that it should be administratively simple and cheap, efficient and equitable.

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[2] A government subsidy is strictly a negative tax.

[3] Simon, J. and Nobes, C. (1999) *Economics of Taxation: Principles, Policy and Practice*, New York, Prentice Hall.

[4] Technically, this is because the aggregate supply curve in these conditions is virtually horizontal.

Administrative simplicity

For some, a successful tax is simply one that raises more revenue than it costs to collect. This naive accountancy argument, however, says nothing about efficiency or equity in the actual collection of the tax. Administrative factors are considered important for several reasons, including the following:

- The assessment, administrative, policing, and collection activities associated with taxation can be costly, and there are problems in ensuring that these transaction costs are minimized. Administrative simplicity can be viewed as minimizing these costs of tax collection.

- There are often correlations between situations where costs of tax collection are low and the difficulties of gaining political acceptance are minimized; this generally occurs when the number of firms that directly pay the tax is small. There are relatively few U.S. airlines,[5] compared to software companies, construction, trucking, medical care, or car repair shops; hence, the administrative (and political) costs of tax imposition are small. Taxes on aviation services place much of the cost of collection and administration on the airlines, which have no votes in the determination of a tax. It is easy to see why fiscal authorities find airlines an attractive tax base.

- Administrative efficiency and long-term fiscal planning of the economy also entail having a good idea of the amount of revenue any tax will raise, and a continuity of income from taxes. This generally favors stable markets where demand does not fluctuate significantly over time. But recent demand for air transportation has been volatile with regard to systematic business-cycle effects and is regularly subjected to "system shocks" such as September 11, SARS, oil price variations, and the War in Iraq. The airlines themselves have difficulties in cost recovery and there has been a regular flow of bankruptcies in the industry.

  The pattern of post-deregulation returns shows airline revenues generally rising with time. A more detailed examination, however, shows considerable variations in this growth path even before the tragic events of September 11, 2001. In recent years, revenues have been falling. This poses particular problems from an administrative perspective because it has also been a period when additional taxes have been initiated and existing ones increased.

- There is also the issue of the "golden goose." The short-term revenue situation is not the only important consideration; a sound tax base also should exhibit long-term vitality. With respect to this criterion, a cursory review of U.S. airline profitability illustrates its unsuitability as a major source of stable tax income. The effects of business cycles are especially pronounced, and the low historical returns on capital reveal an industry lacking monopoly profit to extract for redistribution in the broader economy.

Economic efficiency

Efficiency in taxation policy is concerned with the implications for those who bear the burden of the tax—i.e., the downstream effect. Depending on the form of the taxation, extraction of monies by the state can reduce individual spending, curb corporate investment, distort relative prices, thwart innovation, and adversely affect international trade. Efficiency in taxation is, therefore, about minimizing distortion from the untaxed situation.[6]

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[5] The U.S. Department of Transportation lists about 150 major, national, large/medium regional and small certificated carriers.

[6] Traditionally a poll tax has been viewed as the most efficient form of taxation, because while it reduces spending it does not affect relative prices. It does, however, encounter problems of equity, because it is not progressive in impact.

As with administrative considerations, aviation taxes may pose problems for downstream efficiency:

- The basic notion underlying an excess burden is that raising a given sum of revenue by different forms of taxation, assuming equivalent collection costs, affects the costs to taxpayers in different ways. Ideally, this burden should be minimized. This is more easily done when the tax system is simple, and its various implications on different groups are transparent. One means of minimizing the excess burden of indirect taxation is to follow the "Ramsey Principle," whereby the tax rate is set according to the elasticity of demand for the items being taxed. If the quantity of the product demanded is highly price sensitive (highly elastic), then it should be taxed less than a product for which demand is much less elastic. It is clear from recent changes in consumption patterns and, in particular, the relative amount of income now spent on air travel as fares have fallen, that the demand for air service is, in the aggregate, quite sensitive to price levels.

- Taxation affects the relative prices of services and the competitive position of industries supplying similar types of service—namely automobile and railway transportation in the case of U.S. airlines. Taxes associated with car travel have generally not risen post-9/11. Whereas airlines are now responsible for the "September 11th fee" and the aviation security infrastructure fee (ASIF), both of which the current administration has attempted to increase more than once, drivers crossing into Canada or Mexico are not subjected to any such fees. Nor are they subjected to international departure or arrival taxes, immigration fees, customs fees, or agricultural inspection fees. And rather than being taxed, Amtrak received $40 billion (2003 prices) in federal subsidies between 1971 and 2002 and currently loses well over a billion dollars a year. The U.S. General Accounting Office (GAO) estimated that passengers in 2003 on such routes as Orlando-Los Angeles receive nearly $350 in subsidies per trip, while those traveling by train between Pontiac and Chicago are effectively subsidized on the order of $66.

- There are practical problems in raising target amounts of revenue. It is easier to forecast exactly how much will be raised by an indirect tax if demand for the product is inelastic. If the sales of a good or service do not fall much as a tax is imposed, or increased, it is comparatively easy to predict how much revenue will be collected. Because air travelers are price-sensitive and demand is heavily cyclical, the airline industry is not a predictable source of excise tax revenue.

- Airlines provide an intermediate input into a diverse range of other intermediate activities (business travel) and final consumption (leisure travel), and are a major transporter of high-value cargo. If deemed necessary to tax air services as a proxy for taxing final consumption, considerable care must be exercised to minimize distortions in the final marketplace.

Equity

Equity is inevitably subjective. This does not mean, however, that some broad, socially accepted principles are not normally applied when looking at who pays a tax.

- Normally, progressive taxes are favored, with higher-income groups absorbing the greatest burden. While air transportation was once a luxury item, technology changes of the 1960s and 1970s such as wide-bodied planes and jet engines—along with the managerial reforms that followed deregulation (i.e., hub-and-spoke operations, computerized reservation systems, low-cost carriers)—reduced costs and fares considerably. In 2003, over 70 percent of domestic U.S. passengers had access to low-cost carrier service, up from 30 percent a decade ago.

- In recent years, the long-standing link between national income and spending on air travel has fallen from 1.1 percent of gross domestic product (GDP) to 0.7 percent. This pattern is not one consistent

with air travel being a luxury good where consumption rises faster than or at the same pace as income, but rather reflects a more generic good that is part of everyday consumption by ordinary people. Indeed, in terms of income groupings, Amtrak clientele tend to be the wealthiest group of public transportation users. The percentage of Amtrak passengers with incomes below $20,000 per year is the lowest of any intercity mode of transportation and the percentage with incomes above $40,000 is the highest.

- Within the broad realm of social equity, there is also a general tendency to favor taxing items that are in some way seen as anti-social (e.g., tobacco, alcohol). In this context, former presidential advisor Lawrence Lindsey raised the following interesting question, "Federal taxes and fees now consume 25 percent of the cost of a low-priced [airline] ticket. That does not include the further tax burden on profits and wages that most businesses face. This tax compares with an 18 percent federal excise tax on cigarettes and an 11 percent federal excise tax on whiskey. Is air travel more a sin than alcohol or tobacco?"[7] If airlines provide a public bad akin to alcohol or tobacco, then such a rate of tax is justified, but few subscribe to this position.

Aviation taxation as a user charge

The links between tax revenues and their expenditure can take a number of different forms. The majority of U.S. tax revenues are not earmarked but rather are channeled into the Treasury or General Fund, to be used by various departments and agencies. The underlying idea is that this gives flexibility in the ways resources are used which can be important as part of larger macroeconomic fiscal policy. The system also provides government with the opportunity to transfer resources for efficiency or equity reasons between citizens, industries and regions as part of larger public policy.

User fees are often seen as payments for a government service that is used so widely that payments at the immediate point of consumption are not practical. In other cases, as with gasoline taxes, they are used as a proxy for consumption, because when motorized traffic first appeared direct collection of a road price involved high transactions costs with manual tollbooths. But a genuine user fee directly relates the costs of an activity to the fees that are collected. A critical issue is, therefore, the way in which the taxes are determined for this hypothecation. Such fees, because they are not direct prices, are generally very much a second-best means of paying for a facility.

The existing system of taxing U.S. aviation fails most of the criteria applied to an appropriate user fee, namely: (i) influence the user in such a way that the facility is used efficiently, (ii) provide guidance as to where capacity changes are needed, and (iii) generate revenue to finance additional capacity.

- Parts of the air traffic control system, such as FAA Flight Service Stations, are used almost exclusively by general aviation. General aviation constitutes about 70 percent of the operations handled by FAA control towers, and 40 percent of flights handled by centers, but contributes only two percent of Airport and Airway Trust Fund revenues. Overall, the revenues collected from general aviation fall far short of attributable costs imposed on the air traffic control system.

- Taxes on aviation are numerous and diverse, but they do not even approximate the opportunity costs of the resources used by airlines either in magnitude or in the specifics of individual services. The ticket tax and the segment tax were initially designed to pay for capital needs (e.g., runways, ATC equipment), but have evolved into a source of funding to cover the bulk of the FAA operating budget. The ticket tax is also driven by the state of supply and demand on any route rather than by factors

[7] *Wall Street Journal*, April 1, 2004.

such as distance, time or duration of travel, or phase of operation. The segment tax bears a closer relationship to the number of takeoffs and landings, the more resource-intensive phases of flight.

- The system offers no guidance as to where capacity is under pressure, and thus where additional investment is needed. The taxes on aviation do generate revenues but there is no mechanism to ensure they are funneled into appropriate capacity. There is a danger that with the lack of an immediate link between those paying the taxes and those spending them, expenditures have little connection with the tax preferences of the taxpayers.[8] There is, for example, the prospect of "gold plating," with those spending the tax revenues providing facilities in scale and quality that are well beyond those sought by the taxes payers. The problem is that those spending the tax revenues have no commercial incentive to provide low-cost capacity or to minimize cost. Indeed, scale and complexity may be an attraction for them. A recent GAO study of airport security highlights some of the intrinsic problems of ensuring that user-funded expenditures provide value for money.[9]

- One argument for aviation taxation is to finance the air traffic control system. Indeed, although there have been attempts at raids in the past, there is a clear mandate for earmarking specific revenues for this purpose. FAA efforts to modernize the air traffic control system over the years have not, however, been conspicuous by their success. In particular, there is evidence of a lack of ability for spending institutions to learn in the way that institutions more closely tied to markets do.[10]

- Treating taxes as user fees poses problems of macroeconomic management. Monies in large hypothecated accounts (such as the Airport and Airway Trust Fund) are often not spent in a manner consistent with commercial criteria. Often expenditures are governed more by macroeconomic policy considerations rather than by the requirements of the particular sector in question. On other occasions, funds are "raided" and spent elsewhere. Passenger facility charges, unlike the Airport and Airway Trust Fund, can be used to make payments for debt service or indebtedness incurred while carrying out a project, as well as to finance eligible airport-related projects. While a substantial portion of the revenues from these charges goes to making interest payments on bonds, the remainder is essentially a "prospective charge" on existing users to finance future improvements. The system also reflects a fundamental problem with the Airport and Airway Trust Fund; there is no mechanism that ensures costs are minimized.

Overall, the notion that aviation taxes represent user charges is thus a rather opaque one. As a recent Morrison and Winston study summarizes, "…the efficiency and quality of air travel has been compromised by the government's failure to provide efficient airport and ATC services and to set appropriate charges for them."[11]

International trade implications

Because competition is intense on many deregulated international routes, the commercial viability of carriers depends on their relative cost structures and the fares they can levy. Taxation forms part of this

[8] Unlike the funding of transit, the Airport Improvement Program does not allocate specific dollar amounts to projects; rather, funds are subjected to "place naming." FAA is directed to give priority to airports named in appropriation bill report language.

[9] U.S. Government Accountability Office (2004) *Aviation Security: Further Steps Needed to Strengthen the Security of Commercial Airport Perimeters and Access Controls*, GAO-04-728, Washington, DC.

[10] For example Haynes and Stough have documented the problems with the adoption of the microwave landing system; Haynes, K. and Stough, R. (2004) "The FAA and microwave landing systems." In K.J. Button, J. Lammersen-Baum and R. Stough (eds.) *Defining Aerospace Policy: Essays in Honor of Francis T. Hoban*, Ashgate, Aldershot.

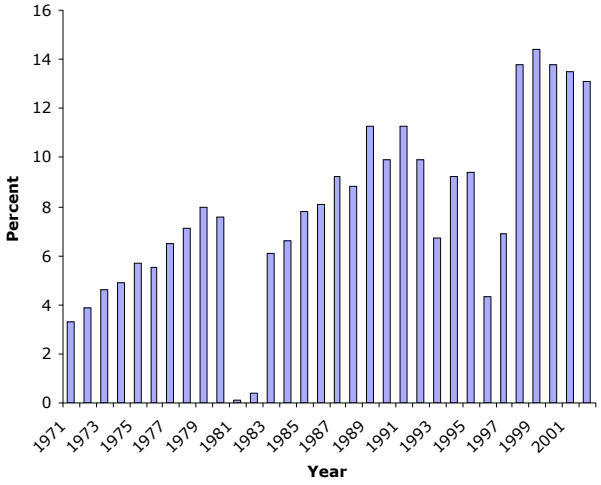
[11] Morrison, S.A. and Winston, C. (2003) *Fares and Taxes Paid By Business Travelers*, A Report to the National Business Travel Association, Washington, DC.

cost base. From a wider perspective, high levels of taxation on international transport not only impose a burden on the industries that pay them, but also act as a secondary form of non-tariff barrier, pushing up the costs of trade more generically.[12] While strict comparisons are somewhat data-prohibitive, we do know that air transport is heavily taxed in many countries, impeding international trade and U.S. growth.

Some broader issues

As described in Appendix A, the number and level of aviation taxes has risen considerably over time, both in absolute terms and relative to other forms of federal excise taxation (Figure 1).[13]

Figure 1. Aviation-related Excise Taxes Compared to Total Federal Excise Taxes



Source: Monthly Treasury Statements

The Airport and Airway Trust Fund began with $564 million in 1971, and airline-based taxes composed some 3.3 percent of all excise-tax receipts for that fiscal year. The proportion, except for a brief period in the mid-1980s, increased again to reach a peak in 1999, when it accounted for 14.4 percent of total excise taxes collected (even though the aggregate of all excise tax revenues also peaked in that year at $72.1 billion). Today, it constitutes over 13 percent of federal excise-tax revenues.

Where taxation is deployed primarily for revenue-collecting purposes,[14] policymakers should aim to minimize market distortions from its inevitable price and income effects. Equity considerations become more complex when account is taken of the ways in which the tax revenues are spent. Finally, there are a range of administrative issues centered about the collection and the administration of taxes.

Aviation taxation has clear merit from an administrative perspective – it is relatively easy for the authorities to collect and, because it is collected from a few companies, is largely hidden from voting public. In that sense it is a soft target for fiscal policy. Beyond that simplistic criterion, however, policymakers must consider equity and downstream efficiency. In general terms, there seems no reason to treat aviation taxes as a source of sumptuary taxation revenues. Air travel is now widespread and used by all strata of American society. It is important in the facilitation of social cohesion as families become more geographically dispersed and as globalization brings large numbers of permanent migrants and short-term workers into the country. Additionally, the International Civil Aviation Organization (ICAO)

[12] The International Civil Aviation Organization (ICAO) has historically tried to reduce aviation taxes for this very reason.

[13] Air Transport Association of America (ATA).

[14] Sumptuary taxation involves the funding of government expenditures on less socially valuable activities and luxuries.

has estimated that somewhere in the order of 30 percent to 40 percent of world trade by value is now moved by air transportation.

Equally, the taxation of intermediate goods and services such as air travel is not in line with sound principles of taxation. The notion that aviation taxes form user charges is to be examined in more detail, but generally the rationale for taxation as a user charge does not seem applicable in the case of airlines.

The Downstream Effects of Aviation Taxation

Air transportation and economic development

Transportation is recognized as a major facilitator of national economic growth, vital for the creation and sustainability of social and political networks. Locally, the availability and quality of transportation affects the growth of regional and urban economies, and transportation regularly emerges as one of the key factors that influence the location of firms. Air transportation plays an important role in modern just-in-time logistics, providing a rapid and reliable means of moving cargo, personnel, and documentation that facilitate the supply chain. It also helps maintain fluidity in labor markets, allowing workers, when moving to new locations, to retain contact with their families and friends.

Air transportation has taken on many of the roles formerly served by surface transportation modes, and added new functions and services. As summarized a few years ago by the National Commission to Ensure a Strong Competitive Airline Industry, "The air transportation system has become essential to economic progress for the citizens and businesses of the nation," but it also concluded, "Tax policies often have had a major and adverse effect on the [airline] industry."[15]

One of the most immediate ways of gaining insight into the societal importance of air transport is to consider the benefits of quality air transport services for local economies. The impacts of air transportation are regularly demonstrated in the analysis done to justify the building or expansion of an airport, or when secondary construction is undertaken, for example, to improve road access to an airport. Since it is not the airport itself that provides transport services, the analysis allows assessment of the importance of air services to the local communities.

Quantitatively, the economic impact of access to quality air transportation depends largely on the time frame examined and on the geographical space under review. In broad terms, airports have four potential economic impacts of varying duration and spatial coverage, including:

- *Primary effects*. These are the benefits to a region derived from the construction or expansion of an airport to allow for more air services—the design of the facility, the building of the runways, the construction of the terminals and hangars, and the installation of air traffic navigation systems. These effects represent one-time injections of expenditure into the local economy with associated employment in industries involved in airport planning, construction and development.

- *Secondary effects*. These are local economic benefits of running and operating air services—employment in maintaining the airport and handling the aircraft, cargo, and passengers. These secondary effects can be extremely important to local employment, income, and tax revenue.

- *Tertiary effects*. These stem from the stimulus to a local economy resulting from firms and individuals having air services at their disposal. These differ for those living in hub cities, compared with those on a spoke or having no major carrier. Airline hubs generally offer more direct flights favored by business travelers. But the airline hub can also benefit those residing in spoke cities because a hub-and-spoke structure offers more service to more communities than a competing point-to-point network. Given that over half of the 15,000 U.S. city pairs served by a major carrier have less than one passenger per day, such interconnectivity is critical to domestic transportation flows.

[15] National Commission to Ensure a Strong Competitive Airline Industry, *Change, Challenge and Competition*, August 1993.

- *Perpetuity effects*. These reflect the fact that new forms of economic growth, once started in a region, becomes self-sustaining and may accelerate. Availability of good air transportation links can change the entire economic structure of a region. Florida's transformation from a principally agriculture-based economy to one with a large and profitable tourist sector is one such example, as are some of the high-tech clusters that emerged. Although this type of dynamic economic impact of air services is the most difficult to quantify, it is among the most important.

Case Study 1: High-Tech Employment in the National Capital Region

Air transportation is crucial to many U.S. industries in facilitating trade and commerce across geographic areas. The U.S. economy is becoming more service-driven and less reliant on traditional manufacturing, and the migration to a service economy includes the proliferation of high-tech activities. The Armington Index,[16] often used in industrial analysis, categorizes a wide range of geographical mobile industries employing skilled workers by extracting them from the North American Industry Classification System (NAICS). It includes, among others, elements of: electronic equipment including computers; instruments and related products; business, engineering and management services; transportation services; hotels and motels; insurance carriers, agents, brokers and services; legal services, educational services; financial services; repair services; and communications. On this basis, about 90 percent of the jobs are in metropolitan areas, the vast majority of which are concentrated in fewer than 60 metropolitan statistical areas (MSA).

The changing structure of the U.S. economy has brought with it modifications in demands for air transportation services. These newer industries are more footloose, both within the U.S. and internationally, and personnel make greater use of air transportation when conducting business. Some have estimated that high-tech workers fly 60 percent more than comparable employees in the traditional manufacturing, processing, and extractive industries.[17] One reason for this phenomenon is the range of domestic and international markets served by high-tech industries. Numerous studies suggest that air transportation can act as a catalyst for high-tech—and high-income—employment.

Surveys of U.S. and foreign high-tech companies, reinforced by econometric analyses of geographical patterns of high-tech employment growth, have shown access to high-quality air service to be a major factor in determining where to locate.[18] Hubs, because of the extensive range of destinations they link, seem particularly attractive to this type of business. Indeed, analysis of the United States by Button and others indicates that the presence of an air hub can add as many as 12,000 high-tech jobs to a regional economy.[19] International air services, too, are becoming increasingly important as facilitators of high-tech growth in a global environment. Additional destinations and frequencies have attracted high-tech employment to hub cities.[20]

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[16] Armington, C. (1986) *The Changing Geography of New Economy Business.* In J. Rees (ed.) Technology Regions and Policy, Totowa, New Jersey.

[17] Simat Hellieson & Eichner, Inc. (1986) *Economic Impacts of the Dulles International Airport,* Washington.

[18] The availability of suitable labor, not unexpectedly, dominates business location decisions, but air transportation generally ranks as the second or third most important consideration – see Button, K.J. (2004) *Wings Over Europe: Towards an Efficient European Air Transport System,* Ashgate, Aldershot.

[19] Button, K.J., Lall, S., Stough, R. and Trice, M. (1999) "High-technology Employment and Hub Airports," *Journal of Air Transport Management*, 5: 53-59.

[20] Button, K.J. and Taylor, S.Y. (2000) "International Air Transportation and Economic Development," *Journal of Air Transport Management*, 6: 209–222.

The National Capital Region

Employing a narrower definition of the high-tech sector than the Armington Index, the National Capital Region—the D.C., suburban Maryland, and northern Virginia—boasts significant high-tech employment across a range of sectors that rely on air transportation to retain ties with markets and suppliers (Table 1).

Table 1. Employees in Private-Sector High-Tech Activities in the Washington MSA (in thousands)

Year	High-Tech Manufacturing	Telecom	Software And Systems	Engineering and Management	High-Tech Employment	**Total Private Employment**	**Percent of High-Tech**
1990	21.6	38.7	62.5	105.5	228.3	**1,733.1**	**9.7**
1991	21.2	39.7	59.8	105.7	226.4	**1,668.1**	**9.9**
1992	19.5	39.7	65.6	107.4	232.2	**1,657.0**	**10.1**
1993	18.9	37.4	66.9	112.1	235.3	**1,695.2**	**10.1**
1994	19.7	37.0	65.8	113.5	236.0	**1,750.7**	**9.9**
1995	20.5	39.9	70.6	116.3	247.3	**1,794.8**	**10.3**
1996	20.4	41.8	74.3	118.7	255.2	**1,831.8**	**10.5**
1997	22.6	44.7	83.2	121.4	271.9	**1,899.7**	**10.9**
1998	23.6	46.7	94.0	128.1	292.4	**1,968.4**	**11.5**
1999	21.9	50.3	108.6	136.7	317.5	**2,054.3**	**12.0**
2000	23.0	61.1	120.6	144.7	349.4	**2,160.1**	**12.7**
2001	22.2	65.3	121.7	151.7	360.9	**2,185.0**	**12.9**
2002	20.1	57.3	120.0	153.7	351.1	**2,186.2**	**12.5**
2003	18.8	53.3	124.1	156.2	352.4	**2,196.7**	**12.5**

Source: U.S. Bureau of Labor Statistics

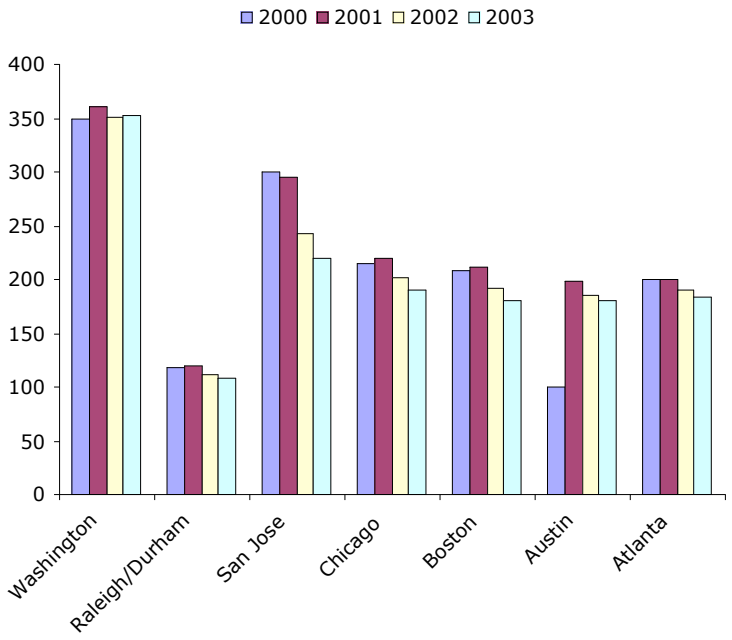
The region is one of the largest in terms of U.S. high-tech employment (Figure 2). Additionally the region is a major tourist attraction with about 12 million leisure visitors descending on Washington annually. This sector also relies heavily on air transportation services.

The region's three major airports[21] have grown considerably in recent years and offer a wide array of destinations served by global network carriers and low-cost domestic operators. Collectively, with 34 million origin-destination (O&D) passengers, the region was the fifth-largest source of domestic air travelers in 2003 among cities with multi-airport capacity. Analysis of Baltimore-Washington International Airport's catchment area indicates that airline access generated some $6.5 billion for the Maryland economy in 2000, much of it in high-tech-related activities. The total number of jobs directly or indirectly supported by air transport in the area was estimated at 97,000. Analysis of Washington Dulles and Reagan National, using a slightly different criterion, indicates that air services contributed about $9.5 billion in revenue and 162,000 jobs for the airports' catchment areas in 2002.[22]

[21] Washington Dulles International Airport (IAD), Baltimore-Washington International Airport (BWI), and Ronald Reagan Washington National Airport (DCA).

[22] Metropolitan Washington Airports Authority (2002) *Regional Economic Impact*, MWAA, Washington and Fuller, S.S. (2002) *The Economic Impact of Washington Dulles International Airport*, Center for Regional Analysis, Fairfax.

Figure 2. High-Tech Jobs (000) in Metropolitan Regions



Source: U.S. Bureau of Labor Statistics

High airfares inevitably act as a drag on the growth of income and employment in any region. To assess the implications of the taxes now imposed on airlines, it is assumed that 22 percent (7.48 million) of the region's 34 million O&D passengers are business travelers. The extent to which lower airline fares would influence the local high-tech market depends on the fraction of business travelers who work in that sector. Following the statistics offered earlier, if high-tech personnel travel 1.5 times as often by air as other industries and they constitute 12.5 percent of the region's work force, then about 1.40 million trips are made by the high-sector annually.

As discussed in Appendix B, business air travel is relatively price-inelastic, at least in the short term, and an elasticity of –0.9 is assumed.[23] Given the East Coast location of the region, many flights compete considerably with rail, the automobile, and a plethora of direct air services. Assuming a $300 business fare with no connections, a 50 percent reduction in federal ticket taxes would reduce ticket prices by 3.25 percent. With a demand elasticity of –0.9, this tax reduction could increase air trips by high-tech employees by about 41,000 per annum, fueling a sizeable job impact on the region's high-tech sector.

Case Study 2: Florida Tourism

As incomes rise, the demographics of population change, and work practices evolve, so leisure activities become more important. As a result, the U.S. economy enjoys a robust tourism industry. In 2001, the United States received over 121 million visitors, the vast majority coming by air. U.S. Department of Commerce data show that 4.3-5.3 million people were employed in the U.S. tourist industry in 1997, up from 3.7-4.4 million in 1992. This sector accounted for 4.7-5.6 percent of GDP and had been growing annually at 6.6 percent since 1992. The National Parks, for example, generate about $10 billion a year ($22 billion if other recreational sites are included) and contribute some 200,000 jobs to the economy.

[23] This elasticity estimate, higher than often used, encapsulates the ability or willingness of business travelers to trade air service for fare. Essentially, the business traveler has a wide selection of airlines and airports in the region from which to choose.

Tourism is inextricably tied up with air transportation. Globally air transportation is the most widely used mode for tourist travel.

Tourism is a major industry in Florida both in terms of domestic tourism and from international visitations.[24] There has been a sea change in the economy of the state over the past 25 years as tourism has produced a shift away from agriculture. The tourist industry employed 870,100 people in 2002 (over 12 percent of the state's non-agriculture labor force) and contributed 20 percent of the state's sales tax revenue. The majority of those visiting Florida for recreational reasons have traditionally traveled by air (Table 2), although the terrorist events of September 11, 2001, produced a slight downturn in 2002. Airlines also carried the majority of business travelers.

Table 2. Annual Visitors to Florida by Mode of Transportation

	1998	1999	2000	2001	2002
Air visitors	27,082,875	32,017,000	38,122,000	37,312,000	36,059,000
Leisure	70%	n.a.	72.4%	74.2%	n.a.
Business	30%	n.a.	27.4%	25.8%	n.a.
Auto visitors	21,615,861	26,847,000	34,601,000	32,152,000	39,567,000
Total visitors	48,698,736	58,864,000	72,723,000	69,464.000	75,627,000
Percentage by air	**55.6%**	**54.4%**	**52.5%**	**53.7%**	**47.7%**

Source: Visit Florida

The aviation industry itself generates a significant amount of direct income for Florida through the provision of scheduled and charter passenger services and cargo operations, as well as indirectly through support services (e.g., air traffic control). These jobs tend to be relatively high-income. Table 3 offers some indication of the scale of these activities. Essentially the sector is responsible for some 58,000 jobs in the state, generating $2,517 million of income. This does not allow for any multiplier effects regarding the expenditure of the income.

Table 3. Employment and Wages in Florida's Aviation Sector (2002)

	Employees	Average Annual Wage	Total Payroll (in millions)
Air transportation	37,946	$46,872	$1,778.6
Scheduled passenger services	31,467	$49,163	$1,547.0
Scheduled freight services	2,137	$36,108	$77.2
Chartered passenger services	2,572	$39,178	$100.8
Chartered freight services	493	$48,278	$23.8
Other air services	1,277	$23,392	$29.9
Support activities	16,864	$38.772	$653.9
Air traffic control	2,725	$83,499	$227.5
Other airport operations	8,673	$26,692	$231.5
Other support services	5,466	$35,638	$194.8
Flight training	3,051	$27,710	$84.5
Total air transportation-related	57,861	$43,501	$2,517.0

Source: U.S. Bureau of Labor Statistics

[24] Baker, K.G. (2000) *The Benefits and Costs of Tourism to Florida*, Florida TaxWatch.

Tourists arriving by air contribute to the Florida economy not only through their expenditures on air transportation, but also through spending on hotels, car rentals, meals, and entertainment. The data for 2001 is seen in Table 4. This provides a larger multiplicand for the income and employment ripple effects through the state's economy.

Table 4. Expenditure per Day of Visitors to Florida by Mode of Transportation

Air Traveler		Auto Travelers	
Transportation	$57.70	Transportation	$14.30
Food	$32.50	Food	$21.00
Room	$27.50	Room	$23.50
Shopping	$17.60	Shopping	$16.40
Entertainment	$17.90	Entertainment	$16.00
Miscellaneous	$6.20	Miscellaneous	$4.40
Expenditure per day	$159.30		$95.60

Source: Visit Florida, 2001 *Florida Visitor Study*

Air transport and the Florida economy

Vacation and other leisure travelers are far more price-sensitive than business travelers (See Appendix B). The available data regarding the Florida tourist industry can be combined with what we know about the sensitivity of air travel to fares and, *ipso facto*, to aviation taxes.

In 2001—the most recent period for which wide-ranging data covering expenditure and air travel is available—37,312,000 tourists arrived in Florida by air, spending an average of $159.30 per day over a 5.3-night stay. This gives a total income of $31.5 billion associated directly with the travel industry.[25] Application of a multiplier yields the full importance to the Florida economy. Regional Economic Models Inc. (REMI) analysis of Florida indicates a multiplier of about 1.35. Another study by Impact Analysis for Planning (IMPLAN) uses a somewhat lower multiplier. For our purposes a multiplier of 1.3 is used to give a total direct and indirect income associated with tourism of $41 million.

To convert this income data into job equivalents, it is assumed that the average income for a travel-related employee[26] in 2001 was $45,000 and for a non-travel, non-agriculture employee in 2001 was $35,000. This is compared to actual figures of $42,866 and $32,035 respectively in 1999 and is thus a conservative estimate regarding the employment multiplier effect.[27]

To test the sensitivity of this situation to a reduction in aviation taxation, assumptions are necessary regarding the elasticities of demand. Many studies have adopted elasticities of between -1.5 and -1.7 for leisure travel; here, a conservative figure of -1.5 is used. Business travel, which constituted about 20 percent of air trips in 2001, is less sensitive to airfare variations. An elasticity of –0.9 is thus adopted.

[25] This figure may be seen as somewhat conservative compared to the $56.3 billion found in a Wilbur Smith Associates study of the state's airports. The Wilbur Smith Study did, however, include military and general aviation airports.

[26] This category effectively embraces tourism-related jobs.

[27] Because this number forms part of the denominator in the calculations, an over-valuation will reduce the potential employment impact of lower aviation taxes.

To make use of the elasticity in looking at taxation effects, it is necessary to represent any tax change as a percentage of the total ticket price. Since there is no breakdown of journey trips (direct or indirect) a number of alternatives are explored. A similar approach is used regarding the average fare that is paid. This may be considered high for leisure routes, but because the proportional effects of most taxes fall with the fare level, this will in effect dampen any estimate of the implications of fare reductions.

The number of direct, single-connection, and multiple-connection trips is not known. For simplicity the scenarios explored assume that all trips are of a single type for a particular tax change. It is a relatively simple matter to adjust the outcomes to allow for different proportions by trip category. Finally, a lower airfare resulting from reduced taxes on airlines not only will generate new traffic, but also will divert some traffic from alternative modes. Simply focusing on air travel provides a gross impact figure.

To estimate a net impact, it is necessary to consider the cross-elasticity of demand between auto travel and air travel. Data on this is sparse except for short-distance trips where substitution is more likely. The studies that do exist indicate cross-elasticities between air and automobile of about -0.3 for short-trips.[28] While much of the visitor traffic into Florida is medium and long distance, this parameter is used here for both leisure and business travel, even though it is likely to inject downward bias into the positive effects of any aviation tax change.[29] A number of possible scenarios regarding aviation taxation reform are set out in Table 5. The output is in terms of the number of jobs that could be created in Florida if various reforms were made to the taxes paid by U.S. airlines and their customers.[30]

Table 5. Potential Employment Benefits for Florida from Modifying Taxes on Air Travel

Scenario 1. Abolish the PFC, assuming all trips involve a $300 non-stop round trip with maximum PFC.
- 40,160 jobs gained via more air travel: 28,981 direct in travel-related industries and 11,179 indirect through multiplier effects
- 4,600 jobs lost via fewer auto visitors: 3,320 direct in travel-related industries and 1,280 indirect through multiplier effects
- Net employment gain: 35,560 jobs

Scenario 2. Reduce PFC by 50 percent, assuming all trips involve a $200 single connection round trip with maximum PFC.
- 60,239 jobs gained via more air travel: 43,471 direct in travel-related industries and 16,768 indirect through multiplier effects
- 6,900 jobs lost via fewer auto visitors: 4,980 direct in travel-related industries and 1,920 indirect through multiplier effects
- Net employment gain: 53,339 jobs

Scenario 3. Eliminate the September 11th fee, assuming all trips involve a $200 one-stop round trip with maximum PFC.
- 67,066 jobs gained via more air travel: 48,398 direct in travel-related industries and 18,668 indirect through multiplier effects
- 7,682 jobs lost via fewer auto visitors: 5,544 direct in travel-related industries and 2,138 indirect through multiplier effects
- Net employment gain: 59,384 jobs

Note: Analysis of U.S. DOT data for 2002 indicates that the average fare paid by travelers into Florida fell between $200 and $300.

[28] There are limited Amtrak services to Florida and the mode is not considered in the calculations.

[29] The main states of origin for U.S. visitors to Florida using automobile were Georgia, Alabama and Ohio, and for air it was New York, New Jersey and Illinois. But 7.6 percent of visitors came from overseas and thus have very limited prospects for mode switching. The calculations assume that those switching modes will take on similar spending characteristics as those who already fly. Actually, they are likely to spend less. Given the arithmetic involved, this may be seen as introducing and upward bias into the beneficial job effects of lower aviation taxes, but this should not be large.

[30] This does assume that the tax savings are all passed on to the consumer. This may be a very strong assumption in the short term if airlines, as in the tax holiday of 2003, tend to retain most of the benefit themselves in the form of higher base fares. But if the market is fully competitive, in the longer term much of the gain will be eroded by competition and new entry. How much is then passed to consumers in the form of lower fares depends on the slope of the market supply curve. Since entry to the air transportation market is extremely unfettered, there are no serious infrastructure constraints in Florida, and the airline market is deregulated, it is assumed that the demand curve is, after an initial period of friction, virtually horizontal over the relevant range. Thus, the consumer will benefit almost entirely from the tax reduction. The improved services that come from greater supply may also induce an outward shift in demand, providing an additional stimulus to the market.

Case Study 3: Modal Comparison

Examination of the tax burden on the airline industry requires a point of reference. In this section, passenger airline taxation is compared to the taxation levels of competitive modes of transportation, namely auto and rail.

The distortionary effects of tax policy are especially harmful to the U.S. economy when their implementation disrupts normal competition between industries. The airline industry is highly competitive with both trains and cars for intercity travel. Travelers, regardless of trip purpose, select their mode of transport based on a number of factors, including price, convenience, time, and comfort. The final price of travel includes the associated taxes and fees, creating a bias in the market toward auto and rail as opposed to air travel. Additionally, high taxes can result in diminished service levels or no service at all by putting downward pressure on yields and thus reducing profitability. This hurts consumers by making travel less convenient and more time consuming.

The travel markets reviewed (see Table 6, are short-haul routes, in which rail and auto constitute viable, if not attractive, alternatives to air travel. Examining the post-9/11 decline in airline traffic helps illustrate this point; an additional segment fee (the federal security surcharge) along with increased security hassles led to disproportionate declines in short-haul air traffic and diversion to auto travel.[31]

One carrier in particular has been very vocal in its efforts to illustrate the impact of high aviation taxes and fees on service levels. In the summer of 2002, WestJet, a low-fare and low-cost Canadian airline, ran a promotion offering "a ridiculous $3 one way fare for seats on two short-haul routes: Calgary-Edmonton (154 miles) and Hamilton-Ottawa (258 miles). After factoring in taxes and fees, a prospective customer buying a $6 round-trip base fare ultimately paid $89 and $82, respectively, for the two markets after taxes and fees were included. As noted in a press release, WestJet wanted "to clearly show the impact these extra charges have on the wallets of Canadians" and commented that "these ridiculous taxes and fees charged to customers are discouraging people from choosing air travel as a mode of transportation on the ultra-short haul routes, and we hope Canadians will join us to voice their opinion on this situation."[32]

By transferring revenue away from air carriers to the government, high taxes and fees curtail route profitability. Carriers are faced with the prospect of passing tax and fee increases to their customers and/or absorbing them. Given the increasingly elastic nature of air travel, price increases tend to cause market demand to shrink while cost increases negatively impact the bottom line. WestJet specifically cited taxes and fees as the reason behind its decision to reduce service levels between Calgary and Edmonton in October 2002, and its complete withdrawal of service from both Sault Ste. Marie and

[31] Taxation affects the relative consumption of goods and services, and with this comes downstream effects. Any additional cost associated with air transportation, for example, can divert passengers to a more dangerous form of travel, especially on relatively short trips where the automobile alternative entails a high traffic volume. Early studies of U.S. airline deregulation and its consequences for automobile safety suggested that modal transfers resulting from lower air fares saved between 90 and 145 lives a year on the roads. More recent evidence indicates that the imposition of higher security taxes on air passengers is having a detrimental effect on the overall safety of U.S. travel. Applying conservative assumptions, Rossiter and Dresner (2004, "The impact of the September 11th security fee and passenger wait time on traffic diversion and highway safety," *Journal of Air Transport Management*, 10: 283-291) estimate that the federal security surcharge diverted about 2.1 million U.S. passengers to the automobile in 2002, and the 10-minute security check an additional 6.8 million. The result is that an additional 33 to 99 extra lives are lost per annum dependent on exact set of assumptions adopted. For decision-making purposes, it is often necessary to place an economic value of the reduced statistical risk of a fatal accident. There are several ways in which this can be done and none are without their limitations, but DOT does use a standard value for the prevention of a statistical road fatality of $3 million (U.S. Department of Transportation (2000) Departmental Guidance: Treatment of Value of Life in Preparing Economic Evaluations). Applying this to the extra fatalities that occur as the result of modal transfers from airlines to roads as the result of the federal security surcharge suggests a national cost of between $99 million and $297 million per annum.

[32] "WestJet News Release: Ridiculous Fares, Ridiculous Fees," June 20, 2002.

Sudbury in September 2003. WestJet commented that these decisions were partly "a result of the continuous increase in taxes and fees that are being imposed on Canadian travelers by the Government of Canada and other agencies."

Table 6 reveals the inequitable tax rates facing the competing modes of intercity travel. The taxation incurred by air travel is substantially higher than that of auto or rail transit, both in percentage terms and in the sheer number of dollars paid.

Table 6. Comparison of Taxes vs. Total Trip Cost by Mode

	Chicago-Detroit			**Los Angeles-Las Vegas**			**Philadelphia-Pittsburgh**		
	Cost to Consumers	Federal Taxes	Share of Total Cost	Cost to Consumers	Federal Taxes	Share of Total Cost	Cost to Consumers	Federal Taxes	Share of Total Cost
Rail[33]	$46.00	$0.00	0%	$190.00	$0.00	0%	$78.00	$0.00	0%
Auto[34]	$166.18	$3.13	2%	$161.62	$3.07	2%	$191.52	$4.31	2%
Air[35]	$156.68	$29.72	19%	$110.98	$26.53	24%	$389.60	$45.97	12%

Airline tax rates vary according to the itinerary, since many taxes and fees are imposed per segment. This type of taxation disproportionately affects lower airfares and multi-stop trips. For instance, taxes on the Los Angeles-Las Vegas market, primarily a leisure market, compose 24 percent of the total airfare, while taxes on the business-oriented Philadelphia-Pittsburgh market make up only 12 percent of a ticket.

Intercity rail transit has no tax burden at all. In fact, there are substantial ongoing subsidies offered by the federal government to Amtrak, further distorting the market for intercity travel. Taxation on auto travel is relatively minor, as most highways are free of tolls. As a result, the total tax burden for drivers and passengers is far lower than that of air travelers. To further illustrate the inequitable tax burden facing air travelers, compare a family of four on a leisure trip from Los Angeles to Las Vegas. While the taxation of auto travel—assessed per vehicle rather than per passenger—remains at $3.07, the taxation of air travel increases four-fold, from $26.53 to $106.12.

[33] Fares are the cheapest available mid-week Amtrak fares as of November 3, 2004, for purchase seven days in advance.

[34] The trip cost is estimated using the Internal Revenue Service's 2003 mileage rate of $0.36 per mile.

[35] Taxes on air travel are computed using the average fare paid in 2003, per the U.S. Department of Transportation. For simplicity, only non-stop flights are included, leading to a conservative estimate of the tax burden.

Conclusions

The nature of air transportation superficially makes it a convenient subject of indirect taxation. As a high-revenue (though not high-profit) sector with relatively few suppliers, tax collection is relatively inexpensive and convenient for the Treasury. And as an industry air transport is politically vulnerable, lacking any large voting block to protect its interests.

There is also an ingrained common perception, largely misplaced today—after 25 years of economic deregulation and with the widespread availability of the services of low-cost air carriers—that taxation of air transportation constitutes a tax on a luxury good. This is simply not true. Today over 40 percent of airline trips are taken to visit friends and relatives and over 25 percent occur on low-cost carriers.

Nevertheless, over the years a veritable kitchen sink of taxes has been imposed on America's airlines, in addition to the generic corporate taxes levied in the United States. These taxes have risen substantially over time, creating a burden that has not been more broadly shared by U.S. industries. By 2000, the airline contribution to U.S. excise tax revenues had climbed to 14 percent, up from just four percent in 1971. These special aviation taxes are imposing an excess burden on airlines and, ultimately, adversely affect not only the commercial viability of many carriers but also the vitality of the nation's economy and the social welfare of its citizens. This is not to say that the airlines should be exempt from contributing to an efficient taxation regime—rather, it is a matter of equity and structure.

The overall findings herein were well summarized in the conclusions of the Baliles Commission of 1993:

> *"We took very seriously our charge to examine tax policy and the many fees imposed on the industry. Although the Commission concluded that tax changes alone will not restore the industry to profitability, we believe there are several tax provisions that impede the ability of the industry to return to financial health. We believe those provisions violate reasonable principles of common sense and good public policy and we are of the opinion changes must be made to relieve the airline industry's unfair tax burden."*[36]

As the case studies show, high taxation on air travel produces deleterious social and economic outcomes, namely:

- reducing one or more aviation taxes would yield additional employment in regions especially dependent on aviation, such as tourism-rich Florida;
- the business community is adversely affected by high taxes, especially highly aviation-dependent industries such as high-tech and tourism; and
- for taxation on air travel to surpass materially taxation on other modes of intercity travel—specifically auto and rail—is inequitable and contrary to sound public policy.

The findings from this paper suggest that, taken in the aggregate, the current aviation tax structure is causing measurable harm to the national economy. A more rational federal aviation tax regime—in scope, scale, and structure—would be far more likely to stimulate growth and employment in key sectors whose fate is closely tied to air services. While this should be of immediate interest to tourism- and high-tech-dependent communities and constituencies, it should also generate additional tax revenue—to help offset reduced aviation tax revenue—for the General Fund of the Treasury as the growth of "ripple" industries accelerates.

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[36] National ("Baliles") Commission to Ensure a Strong Competitive Airline Industry (1993) *Change, Challenge and Competition*, US Printing Office, Washington.

Against this background, the analysis in this study yields the following conclusions:

1. The existing taxation of U.S. airlines, while often administratively convenient and politically expedient, is not efficient, as it is a tax on an intermediate service rather than on final consumption.
2. To fully reap the demonstrable economic benefits of commercial air transportation, airlines must be treated as economic assets rather than as a source of sumptuary taxation. Air travel should not be treated as a luxury good, but as a necessary and normal service consumed by all strata of society. While in the past, airline travel may have largely been the prerogative of the wealthy, commercial air travel is now a mode of transportation used by ordinary people and should be taxed accordingly.
3. When considering the taxation of U.S. airlines, full cognizance should be taken of aviation's role in facilitating the nation's external trade. The U.S. economy is increasingly part of a global marketplace, and airlines are a major contributor to the nation's global competitive position. But the current regime of aviation taxation hinders the performance of U.S. airlines in larger international markets, ultimately hurting the U.S. trade balance and eroding overall U.S. revenues.
4. Airlines should pay the economic costs of resources that they consume. The claim, however, that some elements of aviation taxation represent a "user charge" or "user fee" is difficult to substantiate. The taxes do not provide the incentives associated with fees nor do they act as indications of where capacity needs to be varied. Airlines often pay for items that are of no use to them. Airlines should pay directly for the inputs that they use and not pay arbitrary "user fees" that bear no relation to the economic costs involved. Similarly, the burden of taxation is not efficiently distributed between the various types of air transportation infrastructure users. General aviation, which is used almost exclusively by high-income travelers, makes extensive use of aviation infrastructure and creates considerable congestion within the system. U.S. policymakers should reassess—indeed reallocate—the relative burdens of taxation on commercial aviation and general aviation, as well as public use, to ensure that the latter pays its fair, proportionate share.
5. Many twenty-first century industries, such as tourism and high-tech activities, rely disproportionately upon air transportation. These are often the industries that enjoy high growth and will continue to contribute income and employment to the nation's economy. These industries make considerable use of air transportation and high levels of taxation impede their growth. The taxation of airlines should be designed so as not to stymie the potential of dynamic industries important to American prosperity.
6. When considering taxation of airlines, due account should be taken of the negative effects of diverting passengers to more dangerous forms of transportation.

After their initial imposition in the World War II era, aviation taxes later served to derive revenue from what was then—in the 1950s and 1960s, considered a luxury good. In the early 1970s, U.S. policymakers and airlines agreed on a new rationale for aviation taxes – to develop and maintain the nation's airport and airway infrastructure. But subsequent years added a patchwork of expanded taxes and fees, without commensurate expansion of aviation infrastructure. In the 1980s, 1990s, and early 2000s, Congress and federal agencies levied new charges for everything from general U.S. deficit reduction, to homeland security, to environmental protection, to the subsidization of noncommercial airports and operations, along with pertinent inefficiencies in the relevant regulatory agencies.

Now that U.S. commercial aviation has entered a new phase of deregulation – indeed a new era of operation in this twenty-first century, it is time for the tax regime to do the same. The rationale for aviation taxation must be rethought and its structure modified accordingly, factoring in its economic relevance and the critical outcomes enumerated herein.

APPENDIX A: Air Transportation Taxes in the United States

Structure of U.S. aviation taxes and fees

Much of the current structure of aviation taxation in the United States dates back to the passage of the Airport and Airway Development Act and the Airport and Airway Revenue Act of 1970. Air traffic had been growing rapidly and the forecasters anticipated continued growth. These acts aimed to provide a more solid basis for the financing of the nation's air transportation infrastructure. The Airport and Airway Development Act authorized federal funds for airport development over five years and for acquiring, establishing, and improving air-navigation facilities.

The Airport and Airway Trust Fund was established to be financed by the collection of aviation-related excise taxes, including the existing tax on aviation fuel (which dated back to the Revenue Act of 1932) and passenger tickets (dating back to the Revenue Act of 1941) the revenues from which had gone into the General Fund. New taxes were introduced on international passenger tickets, cargo waybills, and annual aircraft registration.

The Airport Improvement Act of 1982 came in as the Trust Fund had run its course and funds could no longer be transferred to it.[37] The 1982 Act re-established the Fund and placed money in it. It allowed expenditures for operating and maintaining air-navigation facilities and, in addition, for carrying through noise-compatibility programs. In 1990 the Omnibus Budget Reconciliation Act increased excise taxes on the movement of passengers and cargo, and for non-commercial jet fuel. The 1997 Taxpayers Relief Act extended aviation-related excise taxes for 10 years to provide a stable source of funding for the Trust Fund, and the tax structure for passengers and cargo was modified and made more complex by, for example, combining flight-segment fees with fare-based taxes. Taxes were added on sales of frequent flyer miles by airlines to credit card companies and other companies that provide miles as an incentive to their customers. Of conceptual importance, the aviation fuel-tax revenue was removed from the General Fund and instead deposited to the Airport and Airway Trust Fund.

Throughout the 1990s there were some adjustments to tax rates, but the system substantively remained unchanged until the enactment of the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century ("AIR-21") in 2000. This legislation ensured that revenues going into the Airport and Airway Trust Fund would be used for the purposes intended.[38] It increased the tax revenue flows available and increased the maximum that could be spent annually on a large airport. It also gave guaranteed funding to general aviation airports. The events of September 11, 2001, affected the Trust Fund in the sense that airlines under the Air Transportation Safety and System Stabilization Act of 2001 could postpone payments for a defined period.

Levels of taxation

There are thus currently four main taxes and fees levied on domestic airfares: the federal ticket tax, the federal flight-segment tax, the passenger facility charge, and the federal security service fee. These are described in greater detail below. Since the federal ticket and flight-segment taxes are essentially two components of one tax, they are described together.

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[37] Kirk, R.S. (2003) *Airport Improvement Program*, Congressional Research Services, Washington.

[38] There had been efforts in the 1990s (i.e., LAX) to divert AIP monies to fund general municipal projects.

Federal ticket tax and flight-segment tax

The federal ticket tax and the federal flight-segment tax are paid into the Airport and Airway Trust Fund. This trust fund finances congressional appropriations to cover "those obligations of the U.S.….which are attributable to planning, research and development, construction, or operation and maintenance of air traffic control, air navigation, communications, or supporting services for the airway system" (from the Internal Revenue Code of 1986). Together they accounted for $6.3 billion in 2002, or 62 percent of the total revenue of the Trust Fund.

The federal ticket tax (FTT) is equal to 7.5 percent of the base fare. The federal segment tax (FST) was $3 per flight-segment in 2002 and 2003 (Internal Revenue Code of 1986). A built-in inflation adjustment raised the segment tax to $3.10 in 2004 and $3.20 in 2005.[39]

Passenger Facility Charge

The Passenger Facility Charge (PFC) was instituted as a means for assisting airports with air carrier service to "finance eligible airport-related projects, including making payments for debt service." It is imposed by individual airports to supplement funds available from Airport Improvement Program (AIP) grants to assist in airport development and expansion.

Over time more airports have imposed the PFC and there has been a general drift upward in the fee that they elect to charge. Table A-1 summarizes relevant statistics for changes in the PFC for 1993, 2002 and 2003, together with the number of airports levying them. There are local and regional variations in the levels. PFCs are collected by airlines at the time a ticket is purchased and the funds that are raised are transferred directly to the appropriate airports. PFCs have provided a steadily rising flow of revenue for the airports that levy them since their introduction.

Table A-1. Passenger Facility Charge Collections

Year	Number of Collecting Airports	PFC Amount $1.00	$2.00	$3.00	$4.50
1993	89	0.0%	1.1%	98.9%	n.a.
2002	311	0.3%	0.0%	57.9%	41.8%
2003	341	0.3%	0.0%	44.7%	55.0%

Source: Federal Aviation Administration

Federal security service fee

The federal security service fee (FSSF) or "September 11th Fee," created under the 2001 Aviation and Transportation Security Act, is the most recently charge and was a direct reaction to the events of September 11, 2001. The legislation authorized a $2.50 tax per enplanement, limited to a maximum of two segments per one-way trip. Consequently, the highest possible security fee paid by a passenger on a domestic round-trip ticket is $10. Collection of the security service fee began February 1, 2002.

[39] Several exemptions (i.e., designated "rural airports") exist. While there are 3,885 designated rural airports, carrying about 0.2 percent of total passengers, most do not receive any significant levels of air carrier traffic and represent only about 0.17 percent of all passengers in the U.S. Conversely, special taxes exist for Alaska/Hawaii arrivals and departures.

Other taxes

Numerous other taxes support the Airport and Airway Trust Fund, including the international arrival tax, the international departure tax, and federal aviation fuel taxes. At the more local level, individual states levy taxes, often considerable, on such things as fuel. Florida, for example, levels a $0.069 per gallon tax, Hawaii a $0.01 per gallon tax, and Colorado a $0.04 per gallon tax, on jet fuel. Some of these revenues are used as matches to be combined with monies from federal government grants as part of the AIP. There may also be taxes levied on airport facilities themselves (e.g., car parks).

Additionally, foreign nations impose taxes and fees on U.S. carriers engaged in international operations. These can be numerous and varied, but do not apply to domestic travel. In most cases they apply to services rather than airlines and are thus paid by both the foreign carrier and the U.S. carrier that serve a particular route. The burden of taxation on airlines also includes traditional corporate taxes—amounting to about $5.4 billion in 2000[40]—and numerous local taxes on fuel, property, sales, and franchises. The Air Transport Association estimated that in 2000 these amounted to an additional $1.5 billion.

Overall level of taxation on airlines

Because many of the taxes paid by airlines are neither related to flight lengths nor directly to other convenient physical parameters it is difficult to identify the "average tax burden" that confronts any airline and, ultimately, any passenger.[41] The effective tax rates vary according to the nature of the passenger's itinerary and base fare. The burden is heaviest on those making shorter trips involving multiple connections. The result of the current structure of aviation-related taxes is that a flow of funds from a diversity of such taxes goes into the Airport and Airway Trust Fund and are then spent on a variety of airport and airway items. Strictly the revenues go into the General Fund and are then transferred to the Trust Fund. The Airport and Airway Trust Fund covers 100 percent of Federal Aviation Administration (FAA) airport grants-in-aid; facilities and equipment; and research, engineering, and development. It also helps support over 75 percent of FAA's operations and maintenance budget.

[40] Corporate taxes may impose undue burdens, during periods of profitability, on a cyclical industry such as airlines. In 1998, for example, the then Alternative Minimum Tax resulted in United Airlines paying taxes of 8.6 percent on profits of $1.2 billion; without it, the tax burden would have been 3.8 percent.

[41] A recent study for the National Business Travel Association does provide an average figure for business air travel in the U.S. that suggests taxes formed 8 percent of the business class fare in 1989 and 14 percent of that fare in 2002 – a 90 percent increase.

APPENDIX B: Taxation and Demand for Air Travel

Airfares

The 1978 Airline Deregulation Act considerably changed the ways in which airlines set their fares. Rather than there being a single cost-based coach fare set by regulators with a premium being charged for first class, airlines were given the freedom to set prices so as to meet market conditions. The removal of market-entry constraints meant that fare setting was now done in a highly competitive, market environment. The result of this was a significant reduction in the average fares, albeit with some variation according to route length and service class.

Facilitated by the advent of computer reservation systems, deregulation also saw the introduction of "yield management" by many carriers, using information gained from bookings to maximize revenue per flight. More recent widespread adoption of the Internet has seen a significant increase in electronic ticketing and the expansion of traditional ticket distribution channels.[42] This ticketing method considerably reduces costs for the airlines, but also makes it much easier for passengers to look for the cheapest type of ticket commensurate with their travel needs.

International fares in contrast, remained relatively tightly controlled, despite official initiatives from 1979, being set administratively under bilateral air service agreements with partner countries. The gradual move to Open Skies regimes from the early 1990s has removed, largely within a web of liberalized bilateral agreements, this type of barrier to fare setting, and also to market entry, and the majority of international routes served by U.S. airlines are now within competitive markets.

These changes, while demonstrably beneficial to U.S. citizens, complicate analysis, management and public policy considerably. For example, the move away from regulated, rate-of-return regulation removed any guarantee of a stable income flow that would allow for a steady stream of tax revenues. The move toward Internet distribution and the subsequent increase in pricing transparency has transferred more pricing power to customers and has reduced the market power of airlines and removed one mechanism that allowed them to recover costs.

The performance of the U.S. airline industry

The airline industry provides inputs into a variety of other activities – including business, leisure and visiting family. The demand for air transportation is de facto a derived demand. In the short-term the demand for airline services is thus sensitive to the demands for these final activities. This in particular makes it highly sensitive to trade-cycle effects. In addition, it is a highly competitive industry. The nature of this competition and its intensity is reflected in the relative frequency of entry and exit of airlines. It also extends across several dimensions including direct competition on many routes, and indirect competition between the networks of services offered by carriers and the multiplicity of indirect routings that exist between cities.

The financial situation of airlines and its taxation implications

As a generalization, the greater the degree of market power that an individual enterprise has, the easier it is for it to pass at least part of the tax on to its customers. In a highly competitive market with few scale economies, however, you ultimately get higher prices and lower (or poorer quality) output as a result of

[42] National Commission to Ensure Consumer Information and Choice in the Airline Industry (2002) *Travel Information Systems in the 21st Century*, Washington.

imposing a tax. In the airlines' case, in the short-term individual carriers may try to absorb part of the tax to retain a competitive edge. But with all carriers doing this, and in the absence of any significant profits at the outset, inevitably some carriers will leave the market.[43] The reality of Chapter 11 means that creditors also suffer in practice.

The removal or reduction of a tax from a competitive market with no entry or exit barriers has the opposite effect. Lowering of taxes may initially see airlines trying to earn economic profits but this merely attracts new capacity (either from incumbents expanding services or from new entrants) with the result that fares are forced down again to cost and the level of service for potential passengers rises.

The 1978 Airline Deregulation Act removed fare controls and allowed airlines conforming to safety, environmental and other social criteria to provide service. The result is that the U.S. market is a highly competitive network business. Not only do many direct routes have a number of suppliers but there is also competition from connecting services offered via hubs. On shorter-haul routes, air service competes with the automobile and rail, with Amtrak also offering subsidized competition in a limited number of corridors. Air cargo suppliers not only compete with each other but also with railroads and trucks in some segments of their markets.

Historically, U.S. airlines have cumulatively lost several billion dollars. The operating margins for the industry have varied but the average return is well below that expected of an industry with the characteristics of air transportation. As with any industry, variability in the quality of management is accompanied by disparities in the financial performance of individual suppliers. The financial picture of U.S. airlines, however, reflects more of an industry-wide issue than one of a set of individual managerial failures. In a competitive market such as air transportation there is an acute sensitivity to prices of inputs and to the adverse implications of imposing an excess burden on suppliers. Under those commercial circumstances, one can safely conclude that increased taxation will worsen the financial results of the collective supplier community – in this case, the U.S. airline industry.

Elasticities of demand

To conduct any assessment of the effects of taxation on the financial condition of airlines, and on the economy more generally, one must have insight into the effects that taxes have on the demand for air services. The fare elasticity of demand for air travel indicates the sensitivity of revenue to the level of fare being charged.[44] Specifically it looks at the proportional change in the number of units sold against a proportional change in unit price. "Unit" price elasticity means that a 10 percent rise in price results in a 10 percent fall in units sold – thus, a neutral effect on revenues. When the demand is inelastic, the marginal revenue effect associated with any price fall is negative; conversely, if the segment of a demand curve is fare elastic it means that any reduction in fare will lead to an increase in total revenue.

There are various ways of calculating the fare elasticities of demand, and the task of estimation is far from easy. There are estimates of arc elasticities that look at a discrete change in a fare level and there are point elasticities that focus on a marginal change.[45] The elasticities may be calculated using time series data for a single carrier or market, in which case the underlying assumption is that the result is a short-run

[43] In strict theory, since all firms would be identical this is a purely random process, but different managerial abilities, different local markets, and other factors affect which firms perish in real life.

[44] Oum, T.H., Waters, W.G. and Yong, J-S. (1992) "Concepts of Price Elasticities of Transport Demand and Recent Empirical Estimates: An Interpretive Survey," *Journal of Transport Economics and Policy,* 26: 139-169.

[45] The arc elasticity is the most commonly calculated and used parameter. It is easy to estimate, but does assume that the elasticity is the same irrespective of the fare level or size of the change in fare level. An arc elasticity is a reasonable approximation when examining marginal changes in particular aviation taxes, but would be not be appropriate if, for instance, one were considering removing all taxes from a $100 fare.

elasticity, whereas cross-section calculations of the implications of a particular fare change across several markets at a point bin time offer estimates of long-run elasticities.

Elasticity parameter estimates may be sensitive to the type of calculation procedure used and to the way in which other factors influencing demand are treated. The use of yield management by airlines, whereby there is no single fare charged in a cabin, adds to the complexity of calculation. Given these caveats, many have attempted to quantify the price elasticities of demand for domestic air travel, North American travel more generally, and international traffic to and from the United States. Some of the results are reported in Table B-1.[46]

While no single figure emerges from these studies that can be isolated as the "representative" fare elasticity, some general conclusions can be drawn. First, there is a distinction between the fare elasticities for business and non-business air travel with the latter being generally higher. This is a pattern also seen, as one might expect, in terms of the type of fare being paid. This conforms to the intuition that vacation travelers have more flexibility in their actions (destinations, flight times), whereas business trips are often taken at short notice. Second, the estimates of the elasticities are sensitive to the length of service. Shorter routes generally exhibit higher fare elasticities, in part because other modes of transportation become viable options. There appears to be very little difference between U.S. and Canadian markets.

[46] The full survey of the literature produced over 300 fare-elasticity estimates of various forms. There has been limited work on the revealed elasticities at the competitive route level, but evidence from that between American and United at their Chicago hub indicates levels of between –1.8 and infinity. See in particular, Brons, M., Pels, E., Nijkamp, P. and Rietveld, P. (2002) "Price Elasticities of Demand for Passenger Air Travel: A Meta-Analysis," *Journal of Air Transport Management*, 8: 165-175 and Gillen, D.W., Morrison, W.G. and Stewart, C. (2002) *Air Travel Demand Elasticities: Concepts, Issues and Measurement,* Department of Finance, Ottawa.

Table B-1. Fare Elasticities Found in North American Studies

Study (Publication Year)	Focus of Study	Values
Oum, Zhang & Zhang (1993)*	United and American Airlines hubs	-1.58 – -2.34
Oum, Waters & Yong (1992) †	Trip purpose (business/non-business)	-1.15 – -1.52
	Mixed or unknown	-0.76 – -4.51
Oum, Gillen & Noble (1986)*	First class	-0.58 – -0.82
	Standard economy	-1.23 – -1.36
	Discount economy	-1.50 – -1.98
Royal Commission	Business travel	-1.57 – -3.51
On National Passenger	Non-business travel	-4.38 – -4.50
Transportation (1992)**	Short trip (under 500 miles)	-1.16 – -2.70
	Long trip (over 500 miles)	-1.34 – -2.56
Apogee Research Inc (1994)*	Business travel	-0.59
	Non-business travel	-0.38
Morrison & Winston (1985)*	Nonbusiness	-0.86
Abrahams (1983)*	Transcontinental	-1.81
	Florida vacation city pairs	-1.98
	Hawaiian-West Coast city pairs	-1.68
	Eastern medium-haul city pairs	-1.22
Ippolito (1981)*	440-mile trip (one-way)	-0.53
	830-mile trip (one-way)	-1.00
Straszheim (1978)††	First class	-0.65
	Economy, peak period	-1.92
	Economy, average	-1.48
	Economy, standard	-1.12
	Economy, promotional	-2.74
	Economy, high discount	-1.82
De Vany (1983)*	280-mile trip (one-way)	–0.78
	400-mile trip (one-way)	-1.02
	650-mile trip (one-way)	-1.07
	1500-mile trip (one-way)	-1.14
	2500-mile trip (one-way)	-1.17
Gillen, Morrison & Stewart	Long-haul international business	-0.26
(2002)†¥	Long-haul international leisure	-0.99
	Long-haul domestic business	-1.15
	Long-haul domestic leisure	-1.52
	Short/medium-haul business	-1.39
Brons, Pels, Nijkamp & Rietveld (2002)†¥	Meta analysis of 204 studies	-1.15
Pickrell (1984)*	Short routes	-2.00
	Business travel	-1.00 – -1.50
Bhadra (2003)*	Less than 250 miles	-0.67
	250-499 miles	-0.56
	500-749 miles	-0.74
	750-999 miles	-1.45
	1000-1249 miles	-1.82
	1250-1499 miles	-0.85
	1500-1749 miles	-1.08
	1750-1999 miles	-0.84
	2000-2249 miles	-1.06
	2250-2499 miles	-1.38
	2500-3000 miles	-0.86

Notes: * U.S. data, ** Canadian data, † synthesis of previous studies, †† North Atlantic data, ¥ from various international studies

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