AN EMPIRICAL INVESTIGATION OF FINANCIAL AND OPERATIONAL EFFICIENCY OF PRIVATE VERSUS PUBLIC AIRPORTS

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ABSTRACT

The primary purpose of this paper is to compare efficiency of privatized and government owned airports. Although in the U.S. almost all of the airports used by commercial air carriers are owned and operated by the public sector, the trend towards airport privatization, especially in Western Europe, Asia, and Latin America, has stimulated new thinking in this regard both from the U.S. government, as well as businesses. As the privatization trend in the airport industry continues, airport managers are facing an increased pressure to find more cost-efficient ways of running their airports. Implementing improvement standards will become a necessity. Moreover, there is an increasing economic pressure on local governments to privatize

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airports. One important finding of this study is that government owned airports had better operating efficiency in terms of passengers per runway area, movements per gate, and movements per runway. On the other hand, privatized airports have higher financial efficiencies (revenue per passenger and revenue per landing).

HISTORY, TRENDS, AND ANALYSIS

Airport privatization means the infusion of capital by private sectors to gain partial or total control over an airport's activities and facilities. Many airports have been privatized worldwide since the trend of privatization was introduced. In 1987, the British government initiated the sale of its commercial airports under the Thatcher government. The government-owned British Airport Authority (BAA) was offered to the public for $2.5 billion. Currently, the BAA operates seven major airports in the UK and has generated profits ever since it was privatized. The company is listed on the London Stock Exchange and has a market capitalization exceeding $8 billion (Biederman, 1999).

Attracted by the positive results from the UK model, the trend of airport privatization occurred in other countries. Austrias Vienna Airport was listed on the Vienna Stock Exchange in 1992. Also, two Danish Airports were incorporated as Copenhagen Airports Ltd. and listed on the Copenhagen Stock Exchange in 1994. The private sector holds slightly less than 50 percent of the shares in either example (Poole, 2000a). However, the privatization of BAA has not been without its critics. These critics charge that the government converted a public asset into a regulated private monopoly that requires regular review and negotiation over the airport's charges to the airline. Privatization will not necessarily ensure that citizens get better service at lower cost than from the government (Vasigh, 2001). Service and cost are the result of the relationship between the regulatory controls, choice of markets to serve, market power, and productivity.

Another European airport being publicly traded is Italy's Aeroporti di Roma. Recently, the Italian Leonardo consortium won the bidding process to become the major shareholder of the airport (Airports International, 2000).

The Amsterdam Schipol Airport is preparing for an initial public offering of shares at the Amsterdam Stock Exchange. The Dutch government, the majority shareholder, is expected to decide shortly on this matter while the other shareholders, the cities of Amsterdam and Rotterdam, already agreed to sell their respective stakes (Airport World News, 2000). Schipol's strategic alliance with the German Flughafen Frankfurt/Main AG (FAG) is another example of an incorporated entity. Currently, all shares are still owned by the state and federal government. However, a share offer at the stock exchange is planned until the end of the decade (see Table A1). The FAG will be part of the consortium operating the new Berlin-Brandenburg Airport in Germany's capital, which will be

the first fully privatized airport in Germany after its expected completion in 2007.

In Toronto, Pearson's Third International Terminal, Trilliorn, was built by a private contractor. This is the first example of a privatized airport facility in North America. Canada's commercial airports are leased to non-private groups that operate independent of government in setting rates and financing expansion programs. In the U.S., while airline service itself has been freed of economic regulation and allowed to become a dynamic industry in 1978, the majority of U.S. airports have remained under government control. The first airport available for private investment was the Indianapolis International Airport, the nation's 44th largest airport in terms of total enplaned passengers (FAA, 1996). In October of 1995, the BAA took over the management of Indianapolis International Airport (Schwartz, 2000) promising to raise non-airline revenues by $32 million within the ten-year period of the contract. The goal was to achieve a 25 percent reduction on landing fees by increasing revenues and lowering costs while at the same time improving service quality. The contract was renegotiated in 1998 and extended until 2008, the longest term allowable under Indiana law. Costs per passenger were reduced from $6.70 to $3.70 and have increased very little since then. In spite of the rather moderate passenger growth rate of 3.5 percent, non-airline revenue income per passenger, minus expenses, more than doubled between 1994 and the end of 1999. Table A2 lists private participation in operation and management of North American commercial airports.

In contrast to Europe, Australia and a few Latin American countries privatization efforts of U.S. commercial airports had been limited to contract management. This approach avoids more aggressive forms of privatization such as long-term lease agreements or the selling of shares to private investors. Westchester Airport in New York State is another example of the use of a management contract as privatization method. After the airport was facing severe losses, the county government decided in 1977 to bid on a basis of five-year contracts. Under contract management, the airport has become solidly profitable showing net incomes of up to $3 million per year. Also, the Burbank-Glendale-Pasadena Airport Authority bid its management contract to Airport Group International (AGI) who has operated the airport since 1978.

In the Pacific Region, Australia has privatized the three busiest airports—Brisbane, Perth and Melbourne. The scheme was originally announced in 1994 and initiated in July 1997 as the Federal Airport Cooperation offered the sale of long-term leases (For, 1997). Each of these airports has considerable monopoly power and was subject to price regulation. These airports were sold for AU $3.337 billion (Cook, 1997). The majority of ownership of bidding companies had to be Australian. The Australia Pacific Airport Cooperation (APAC) won the bid for Melbourne in which the BAA holds a 25.1 percent stake. Brisbane, the fastest growing

airport, went to Brisbane Airport Corporation Ltd., in which Amsterdam Schipol Airport owns a 15 percent stake. Recently, the FAG has acquired an equity investment. Brisbane is the first overseas airport where FAG and its alliance partner, Schipol Group, work actively together (Going down under, 2000). The Airstralia Development Group, in which AGI, successor of the Lockheed Air Terminal Group, owns 16 percent, acquired Perth Airport. The Sydney Kingsford Smith International Airport was expected to be the most interesting target for privatization. Its privatization has been delayed due to a political dispute arising over an issue of noise problems. A further fifteen airports are to follow the privatization process once the process of privatizing the first three airports is completed successfully.

On the Asian continent, Malaysia was the first country to begin the process of airport privatization. Its Malaysian Airports Bhd (MAB) was offered to retail investors emitting 88 million shares at a price of RM 2.5. The second offering, directed to institutional investors, raised RM 275 million (Deals of the Year, 2000). The Airport Company operating all of Malaysias 37 airports plans to sell down further shares in the near future. Other privatization efforts are under way in various Asian countries. In Korea, the government-owned airport authority is in charge of privatization of the newly constructed Inchon Airport (Biederman, 1999). In addition, the Omani government is evaluating the privatization of two major airports. The Credit Swisse First Boston (CSFB) has been appointed as its financial advisor to manage the process and determine the best methodology to implement this process (Omani Government, 1999).

Latin America is no exception. The Mexican government plans to sell its fast growing Cancun Airport on the New York Stock Exchange. It is expected to general over $400 million in revenue. Grupo Aeroportuario del Sureste SA (Asur), who has been operating the airport as well as eight smaller Mexican airports since early 1998, is expected to retain 15 percent of the 85 percent being offered to the public, as well as operating control. The Asur consortium itself is composed of Copenhagen Airport A/S of Denmark, Groupe GTM SA of France, Spains Grupo Ferrovial and the construction concern Grupo Tribasa SA (Investors, 2000). In Chile, the Santiago International Arturio Benitez Airport was privatized by a 15-year management concession. Management was handed over as of January 1999 to an international consortium composed of Vancouver Airport Services, a construction group from Spain, and two Chilean companies. Argentina awarded a 30-year operating license to a consortium led by U.S. based Ogden Aviation Group for 33 of Argentines airports (Ogden Corporation News, 1999). The consortium pays about $5.13 billion over the contracts life and assumed responsibilities in February 1998. The contract mandated necessary investments in the renovation of the airports. However, the take-over was delayed by three months. The new consortium, as well as the prior airport operator, the Argentine Air Force, which is still in charge of Air Traffic Control (ATC), increased user charges as part of a cross

subsidization policy of the 28 airports that remain unprofitable. The airlines estimate a raise in their operating cost by 271 percent (Turbulent Dialog, 1999). In Table A3, we present a summary of recent airport privatization transaction statistics.

Airport Privatization Techniques

Five methods of privatization are contracting out, contract management, long-term lease, build-operate-transfer and full divesture and sale of shares.

Contracting Out. This method is the traditional tool to privatize state owned enterprises (SOEs) and to relinquish public control. It involves contracting out for the provision of selected services such as restaurants, parking, security services, cargo, baggage handling, and fueling services. Under this scheme governments retain the right to establish business policies and manage the airport.

Contract Management

The second tool for airport privatization involves the private sector in management contracts. The state retains the ownership and investment responsibilities. Only management and operations are handed over to the private sector. This privatization technique has been applied at the airports managed by the American division of the BAA, which are Indianapolis International Airport and Pittsburgh International Airport.

Long-term Lease

Under this method, the state can turn over operations and management, as well as investment responsibilities, to the private sector. Recent examples of this are the three Australian airports of Brisbane, Melbourne and Perth, Steward International Airport in the U.S., and airports in Argentina. This sector may also be in charge of financing the construction of the airport but has to return the object after the end of an agreed amount of time. The main objective for a government is to increase funding while at the same time transferring operational responsibilities.

Build-Operate-Transfer

BOT; or its variation of Build-Own-Operate-Transfer BOOT are commonly used technique for this option. This facilitates large new investments but still maintains government ownership and control. BOT projects to develop new airports have been underway in a few countries, the largest of which is Athens $2 billion project. BOT transactions are relatively complex and various financial and technical specifications are needed in order to be successful. The lack of private ownership might impose difficulties in raising and investing large amounts of capital from the private sector.

Full Divestiture and Sale of Shares

The fourth option is transferring the ownership of the airport along with management and investment responsibilities. A common model for this type of privatization is Build-Own-Operate (BOO), where the private sector is responsible for current investments and financing the instruction of the airport. This can be achieved by permitting full or partial divestiture. Commonly used means for implementing this option are buyouts, public offering of shares, and flotation of stock via capital markets. This approach sanctions the government to generate additional revenues for itself while transferring operational responsibilities to the private sector. The sale of ownership limits possibilities of future state or government intervention. The most known example of this privatization option is selling BAA shares to the private sector. Also, the privatization of Vienna International Airport, Copenhagen, and Vancouver's Pearson International Airport all illustrate the use of this technique. However, this technique requires the existence of well-developed capital markets. Needless to say, in most developing countries this tool may not be used because of their thin capital market.

The FAA Airport Privatization Pilot Program

U.S. Congress enacted legislation creating the Airport Privatization Pilot Program in October of 1996. The Pilot Program provides an opportunity to test the potential benefits of privatization to increase funding for airports, lower operating costs and improve airport management and customer service. This program was established to experiment with the effects of privatization among U.S. airports by exempting five airports from the anti-diversion provisions implemented in the Airport and Airway Improvement Act of 1982 (Utt, 1999). The program eliminates the no-profit rule for the new owner or lessee, and it eliminates the grant-payback requirement. The application process must be initiated by either submitting a preliminary or a final application. In the former application process, the public sponsors should identify objectives of the privatization, a description of the process, a timetable for finding a private operator, and financial statements. In the application, airports anticipating privatization under the pilot program have to specify terms and conditions of the lease or sale agreement with a private entity (FAA News, 2000).

A major barrier for the participation in the FAA Pilot Program is the requirement that a city or state must obtain the approval of airlines representing 65 percent of the landed weight at the airport. In the case of many major hub airports, 65 percent of the landed weight represents a single airline. Thus, the dominant carrier is awarded veto power over privatization efforts. The difficulty in finding necessary majority consensus among airlines serving an airport under the FAA Pilot Program is a likely reason why so few airports have so far applied for participation (Utt, 1999).

On March 22, 2000, the FAA approved the privatization of Stewart International Airport (SIA). Stewart's application process had to overcome a number of obstacles. Its major airlines could not reach an agreement with New York State on the use of lease-revenue proceeds for general governmental purposes and rejected an application proposal already made in 1998. The airport currently has scheduled passenger service, but has experienced up to 25 percent decline in passengers (Airport World News, 2000). National Express PLC, a UK-based company that owns two regional airports in England, was awarded a 99-year lease contract from the Department of Transportation (DOT). Thus, SIA became the first U.S. airport to be fully privatized and the first participant in the FAA project (Reason Public Policy Institute, 2002). National Express, a formerly public company privatized under the Thatcher government, is planning to launch a redesign in conjunction with a local real estate development company in order to market the airport to airlines and related businesses. To date, Stewart Airport is the only privatization to be finalized.

The second airport to apply for participation in the Pilot Project was Niagara Falls International Airport (NFIA). Its final application to participate in the program was submitted to the FAA in June 2000. On January 30, 2001, Niagara Frontier Transportation Authority (NFTA), which has been operating the airport under a joint agreement with the U.S. military, reached a 99-year, longterm, lease agreement with Cintra Concesiones de Infraestructuras de Transporte, S.A. (NFTA, 2001). In 2001, Niagara International operated at a loss of $1 million a year.

However, the FAA ultimately rejected the privatization of NFIA as a result of the projected economic impacts of the events of September 11, 2001. Revised projections completed by the investors indicated that the airport would not have been profitable for many years. As a result, funds available for improvements to the airport were substantially reduced or eliminated. As such, one of the goals of airport privatization could not have been met thereby necessitating the FAA's decision (Rimmer, 2002). According to the NFTA, Cintra Niagara would have been responsible for covering all operating costs and had agreed to invest a minimum guaranteed commitment of $10.1 million in the NFIA, which could only have been spent on marketing, promotion, master planning and capital improvements. Additional amounts were expected to be spent over the term of the contract (NFTA, 2001).

A further applicant to fill a slot among the five pilot airports is Brown Field Airport in California, located about 25 miles south of San Diego. The airport had formerly been a World War II training site and handles a small amount of general aviation air traffic (Schwarz, 2000). Under the pilot privatization program, Brown Airfield is supposed to be developed into a world-class cargo port named San Diego Air Commerce Center (SANDACC). SANDACC, together with a local developer and the Diversified Asset Management Group (DAMG), which was founded in

1994, will focus on worldwide airport investment opportunities. Over a 10-year horizon, New York-based DAMG plans to invest $1 billion into the project. According to estimates of the company, the all cargo airport is supposed to employ nearly 12,000 people and generate more than $750 million in economic benefits to the San Diego area (Gersten, 1999). In a memorandum of understanding with the City of San Diego, members of the Brown Field Aviation Park project team (such as DAMG) agreed to operate the airport under a 50-year lease contract with full payments due upon the sale of bonds to finance the project (World Trade, 1999).

The fourth airport to apply for privatization under the pilot program is Rafael Hernandez Airport in Puerto Rico. A preliminary application was filed on December 20, 1999 (Airport Privatization, 2000). The Puerto Rico Port Authority has recently selected a team including Frankfurt Airport, Raytheon, and a local firm to win the bid for a long-term lease agreement. FAA approval is still pending and expected to be granted by the end of the year (Poole, 2000b).

New Orleans Lakefront Airport captured the last of the five available slots to apply for participation in the FAA Pilot Privatization Program. About 93 percent of the air traffic at Lakefront Airport is general aviation, yet the facility is also able to accommodate aircraft up to a size of a Boeing 757. The privatization effort was initiated in February 2000 as the Orleans Levee Board, owner and operator of the airport, retained the services of Infrastructure Management Group (IMG) to manage the privatization process. For 2001, the airport expects to face a current deficit of $340,000 and operating costs exceeding two million dollars. By privatizing the airport, the board hopes to turn the airport into profitability (Stuart, 2001). Currently, the proposals of two companies—TBI Airport Management and American Airports Corporation—have been under review by the FAA. TBIs parent company (TBI PLC) acquired Airport Group International in 1999 and operates airports in various countries. American Airport Corporation, a subsidiary of American Golf Corporation, manages and operates several general aviation airports in the U.S. The lease contract would run for 50 years and is assumed to generate revenues of between $3 million and $10 million over the first 10 years.

DATA AND METHODOLOGY

We compiled detailed information on fifteen airports, both public and private, published in several different reports. These specific airports were chosen based upon their similarity in hub size. Financial data for BAA airports are obtained from the financial report published by the airport. These particular airports were chosen because they reflect the most prominent privatized airports in England. They are Heathrow (LHR), Gatwick (LGW), Stanstead (STN), Glasgow (GLA), Edinburgh (EDI), Aberdeen (ABZ) and Southampton (SOU). Similar data for the U.S. was

taken from the Compliance Activity Tracking System (CATS), which are provided by the FAA. These particular airports were chosen because they represent the top eight of the top thirty largest airports in the U.S. They are Atlanta Hartsfield (ATL), Chicago O'Hare International (ORD), Dallas/Fort Worth International (DFW), Denver International (DEN), Detroit Metro Wayne (DTW), Los Angeles International (LAX), Newark International (EWR) and San Francisco International (SFO).

In addition, operational data for BAA are provided by Civil Aviation Authority (CAA) of the United Kingdom and data for the U.S. were obtained from the Aviation and Aerospace Almanac of the corresponding year. Financial data include operating costs, profits, and revenues. Operational data consists of a number of annual movements and passenger and cargo statistics. Data used in this analysis include: airport gates (G; American Association of Airport Executives, 1994-2000), number of annual enplaned passengers (PAX), Purchase price of airport (PP), purchase price per enplaned passenger per year (PPAX), runway capacity (RWY; AirNav, 2002). The results of assessing airport operations are an important benchmarking tool, which can be applied for many different purposes such as external and internal comparison and airport valuation modeling.

There are several methods for measuring airport performance; however, four common methods are ratio analysis, regression analysis, data envelopment analysis (DEA) and total factor productivity (TFP). The empirical study for this research is based on the first two.

Ratio Analysis

This technique is one of the first mechanisms that can be used in the airport industry for measuring airport performance.

Regression Analysis

This approach basically measures the relationship between several exogenous variables and their impacts on airport productivity, efficiency, and profitability. One of the problems associated with regression analysis is that several factors, such as capital assets, are hard to measure.

Data Envelopment Analysis (DEA)

An alternative method available for situations in which outputs are not easily defined is the DEA. This procedure applies linear programming in which multiple inputs and multiple outputs are converted into a scalar measure of relative productive efficiency. In a DEA analysis we assume there are a finite number of airports to be evaluated. In the production process, an airport uses several different inputs to produce its outputs (Martine & Roman, 2001). Additional advantages of DEA are its ability to benchmark members of the efficient set used to effect these evaluations and

identify these sources of inefficiency, and its ability to identify sources of inefficiency in each input and output (Cooper, Seiford & Tone, 2002).

Total Factor Productivity (TFP)

This method measures productivity of all inputs involved in the production process, which allows for measuring cost-efficiency and cost-effectiveness (difference being in the selection of the measure of output). It is also possible to examine economies of scale and density as well as investigate the impact of variations of input and output prices on an airport's performance (Gillen & Lall, 1997). TFP allows us to distinguish productivity differences in airports that arise from economies of scale as opposed to those differences resulting from managerial performance.

EMPIRICAL RESULTS

The achievement of efficiency depends on the framework of competition and regulation in which the privatized airport operates. Privatization enhances economic efficiency if it sharpens corporate incentive to cut costs and improve productivity (Vasigh & Haririan, 1996). This research investigates if there is any superiority of private ownership over public airports.

The purpose of this study is to compare efficiency of privatized and government owned airports. The British airports, owned by BAA, are used as a sample of the privatized airports. The sample includes three London airports: LHR, LGW, and STN, as well as GLA, EDI, ABZ, and SOU. The sample of the non-privatized airports consist of the U.S. airports ATL, ORD, DFW, DEN, DTW, LAX, EWR, and SFO. The sample airports are compared in two areas of efficiency—operating and financial. Some of the limitations of this comparison are economics of scope, pricing strategy, framework of regulation, and business objectives which all vary considerably among private and state-owned airports. Monopoly power could create economies or diseconomies of scope (Bailey & Friedlaen, 1982).

Operating efficiency is assessed with ratios that reflect combinations of inputs and outputs. The number of gates and the area of runways (in square meters) at each airport are used as measures of input. The number of gates for the BAA airports was estimated using the number of aircraft stands in each airport. Number of passenger throughput and number of the aircraft movements are used as measures of output. Operating efficiency ratios, that is, passengers per gate, passengers per runway area, movements per gate and movements per runway area, are presented in Table 1. Table 1 presents the means of the ratios for all airports in each sampleprivatized and non-privatized. The last column provides t-statistics of the difference. Mean ratios for two types of ownership are tested to see whether there is any difference in operating efficiency. In this comparison t-test is used. T-

statistics of the difference for the means with critical value are compared at 98 percent confidence interval. For all ratios in question, except passengers per gate, there is a statistically significant difference in ratios for government and privately owned airports. Hence, government owned airports had better operating efficiency in passengers per runway area (see Figure 3), movements per gate, and movements per runway (see Figure 2).

Financial efficiency is studied through the comparison of the mean ratios of revenue per gate, revenue per runway (figure 4), cost per runway (figure 6), and cost per gate. This comparison is for two independent and unrelated samples of state owned enterprise airports and private ones. The t-statistics for the first three ratios suggest that there is a statistically significant difference between two types of enterprises at the 98 percent confidence interval. For these three ratios, public enterprises had better financial efficiency than their private counterparts (see Table 2).

Another method to assess efficiency used in the research is the multivariable regression. There are four regression functions derivedone for operational and three for financial efficiency. The operations efficiency function considers passengers per runway ratio as a dependent variable and operational revenue, cost and ownership as independent variables. Ownership is a dummy variable, which indicates if the airport is private or state owned. The first financial efficiency function uses a revenue/cost ratio (see Figure 1) as the dependent variable. Number of passengers, aircraft movements (operations), gates, area of runways, and ownership are used as independent variables. The second function for financial efficiency includes revenue per passenger ratio (see Figure 5) as a dependent variable and number of aircraft movements, gates, runways, and ownership as independent variables. In the third financial efficiency function, cost per runway is the dependent variable, and operating revenue, number of passengers, and ownership are independent variables. For privatized airports, cost per runway is lower than that for public airports. The number of passengers per runway is also higher for public airports as compared to privatized airports (based on our samples). The results of the multivariable regression are shown in Table 3. The last column provides adjusted R^2.

Table 1. Univariate Test of Operational Efficiency of Government versus Private Airports

Ratio	Government Owned Airports	Privately Owned Airports	T-Statistics of Difference
Number of annual enplaned passengers/ Airport Gates	218,869	163,776	-1.68
Number of annual enplaned passengers/Runway Capacity	36.22	16.88	-3.39
Movements/Gate	6,053	3,538	-75.91
Movements/Runway	0.985976057	0.254008829	-6.95

Table 2. Univariate Test of Financial Efficiency of Government versus Private Airports

Ratio	Government Owned Airports	Privately Owned Airports	T-Statistics of Difference
Revenue/Gate	2,955,101	2,006,063	-3.60
Revenue/Runway	462	189	-11.30
Cost/Gate	1,473,646	1,242,548	-1.51
Cost/Runway	233	117	-5.74

	1996	1997	1998
US	3.08	3.70	3.83
UK	1.39	1.40	1.50

Figure 1: Revenue-Cost Ratios: U.S. , U.K. Airports Comparison

	1996	1997	1998
US	0.97	0.99	1.00
UK	0.21	0.22	0.23

Figure 2: Landing per Runway: U.S. , U.K. Airports Comparison
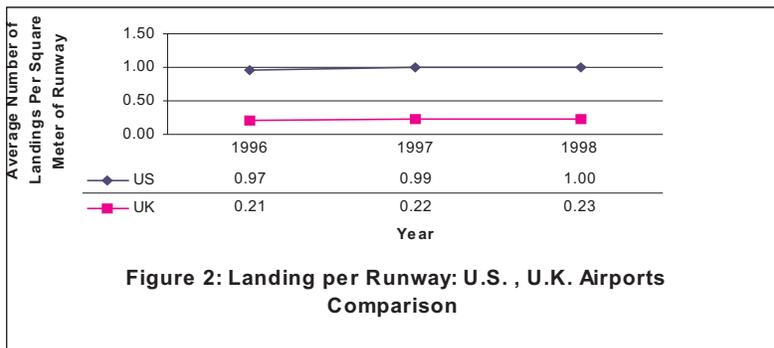
Table 3. Multivariable Regression of Government versus Private Airports

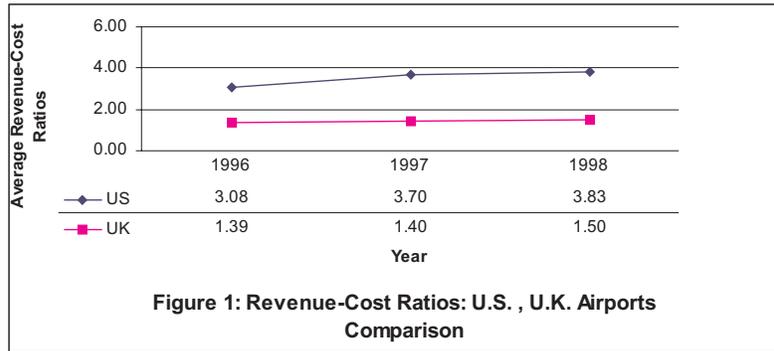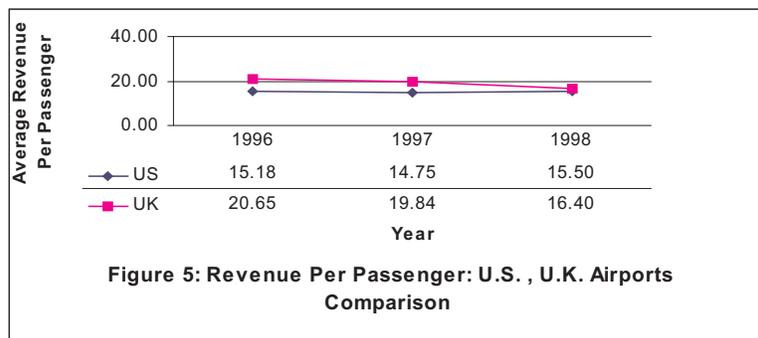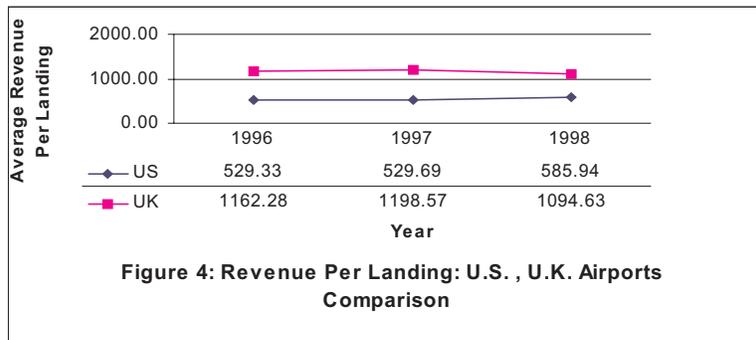| Dependent Variable	Intercept	Passengers	Operations	Gates	Runways	Ownership*	Revenue	Cost	Adjusted R^2
				Independent Variables					
Revenue/Cost	3.50	4.09^*10^{-8}	-2.73^*10^{-6}	0.0025^{**}	-1.40^*10^{-6}	-1.40	-	-	0.21
Revenue/Passengers	27.81	-	-2.82^*10^{-5}	0.070	3.43^*10^{-6**}	-14.06	-	-	0.34
Passenger/Runway	24.07	-	-	-	-	-13.88	-3.49^*10^{-9**}	6.97^*10^{-8}	0.32
Cost/Runway	22.12	1.60^*10^{-6}	-	-	-	-17.48	-7.27^*10^{-8}	-	0.71

*Dummy Variable (1 = Private, 0 = State owned) **Independent variable has t-statistics below 1.7

	1996	1997	1998
US	34.94	36.53	37.94
UK	13.31	14.35	15.55

Figure 3: Passenger per Runway: U.S. , U.K. Airports Comparison

	1996	1997	1998
US	529.33	529.69	585.94
UK	1162.28	1198.57	1094.63

Figure 4: Revenue Per Landing: U.S. , U.K. Airports Comparison

	1996	1997	1998
US	15.18	14.75	15.50
UK	20.65	19.84	16.40

Figure 5: Revenue Per Passenger: U.S. , U.K. Airports Comparison
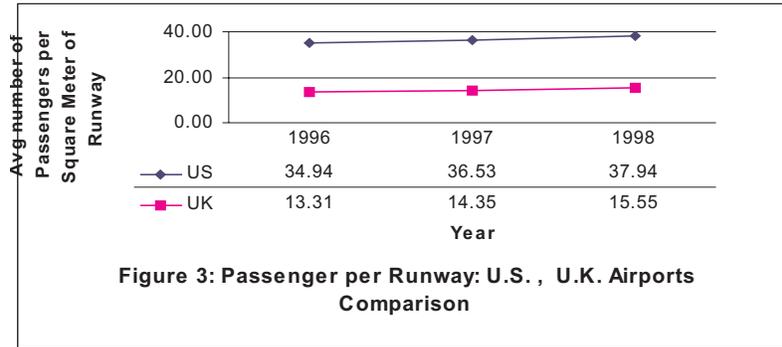
CONCLUSION

Our study demonstrates that cost per landing and cost per passengers of BAA airports are higher than the sample of U.S. airports. The empirical results regarding operational efficiency reflect the statistically different ratios for government versus privatized airports. Countries that have privatized airports generally impose some form of price regulation or landing fees. The UK has allowed a form of market-based pricing by permitting airports to charge airlines higher landing fees during peak traffic times. Hence, privatization is not successful for insuring that citizens get the services they require from government at lower cost. Revenue per passenger and revenue per landing for privatized airports of UK is higher than the sample of non-privatized airports. The Reason Foundation, a privatization advocate, points to labor productivity growth at airports in the UK as evidence of private airports ability to operate more efficiently. However, private airports' monopoly power could also be a source of increase in revenue and profit. Profitability is the result of the relationship between the regulatory controls, choice of market to serve, market power, and productivity.

REFERENCES

AirNav, LLC. (n.d.). AirNav.com. Retrieved February, 2002 from http://www.airmav.com/airports/

Airports International. (2000). Vol. 33, no. 7, p. 10.

Airport Privatization Pilot Program. (2000, Feb 24). Department of Transportation, Federal Register, 65, 37.

Airport World, News, (2000, June-July). Vol.5, iss. 3, 7

American Association of Airport Executives. (2000). Rates and Charges Survey, 1994-2000.

Bailey, E. & Friedlaen, E. (1982, September). Market Structure and Multipurpose Industries: A Review Article. *Journal of Economics*.

Biederman, D. (1999, January 25). When oh when U.S.A.?. *Traffic World*. Washington, DC.

Cook, B. (1997, September/October). Australia: On top of Privatization. Airport Magazine. (on-line). Available:
http://www.airportnet.org/depts/publications/airmags/Am91097/Australia.htm

Cooper, W., Seiford, M., & Tone, K. (2002). Data Envelopment Analysis. *Klumer Academic Publishers*

Deals of the Year. (2000, February). *Asia Money*. London.

FAA News. (2000, March 21). *Fact sheetStewart International Airport privatization*. Federal Aviation Administration.

Federal Aviation Administration. (1996). *Statistical handbook of aviation*. Federal Aviation Administration.

For, P. (1997, June 27). *Price regulation of airports*.

Gersten, A. (1999, June 30). U.S. airport privatization works, exec tells Congress. *Air Cargo News*.

Gillen, D & Lall, A. (1997). Developing measures of airport productivity and performance: an application of Data Envelopment Analysis. *Transportation Research E*, 33, No.4, 261-273.

Going down under: Frankfurt Airport Company acquires Strategic Stake in Brisbane International Airport. (2000, September 25). *Financial Times*.

Investors to get a play on Cancun, Mexicos fast growth. (2000, September 8). *The Wall Street Journal*, A.15

Martin, J.C., and Roman, C. (2001). An application of DEA to measure the efficiency of Spanish Airports. *Journal of Air Transport Management*, 7, 149-157.

New Orleans Lakefront Airport. (on-line). Available: www.lakefrontairport.com

NFTA. (2001). Available: www.nfta.com/news

Ogden Corporation, News, (on-line) Available: http:// www.Invertir.com/news/nr3821.html

Omani Government appoints CSFB for airport privatization. (1999, September). *Air Finances Journal*.

Parker, D. (1999, May). The performance of BAA before and after privatization: A DEA study. *Journal of Transport Economics and Policy*, 33, Part 2, 133-146

Poole Jr., R.W. (2000a, January). Another reason for airport privatization. *Ideas on Liberty*. Irvington-on-Hudson.

Poole, Jr., R.W. (2000b, August 24). Comments on airport privatization. *Reason Public Policy Institute*. (on-line). Available: http://www.rppi.org

Publication of the Niagara Frontier Transportation Authority (NFTA). (on-line). Available: www.nfta.com/news

Schwartz, A.C. (2000 Summer). BAA means business. *Air Transport World*, 50, iss. 6, 8

Schwarz, B. (2000, April). Where cargo is king. *Transportation & Distribution*. Cleveland.

Stuart, S. (2001, March 14). The firms vie for operation of Lakefront Airport. *New Orleans City Business*.

Turbulent Dialog. (1999, February). *Air Transport Review* 36 (2), 63-64.

Utt, R.D. (1999, June 4). FAA reauthorization: Time to chart a course for privatizing airports. *The Heritage Foundation* No. 1289,

Vasigh, B., & Haririan, M. (1996). Airport privatization. *Journal of Economics and Finance* 20, (3), 89-95

World Trade, Circulation 93, 799, (1999, July 10). Irvine, CA.

APPENDIX

Table A1. Airport Privatization Transactions Anticipated in 2001

Airport	Purchaser	Percentage	Date
Amsterdam Schipol Airport	Public Flotation	75.8%	Oct 2001
Frankfurt Airport (Fraport AG)	Public Flotation	Pending	Mid 2001
Airport Authority of Thailand	Pending	Pending	End 2001

Sources:

Fraport, A.G., (2000, November 9). Frankfort Airport Company Completes DM26.5 Million Procurement Project for Uzbekistan. Press release.
Available: www.fraport.com/en/press/pressindex.html

Fraport, A.G. (2001, February 14). Lima Partners Take Over Perus Main Airport. Press release. Available: www.fraport.com/en/press/pressindex.html

The Heritage Foundation Backgrounder, No. 1289. (2001). *Airport World Privatization News 5(6)*, 6.

Hochtief buy of Hamburg airport approved by Hamburg City Council (2000, October 13). Financial Times.

Stewart International Airport. (1999, January 8). Final Application under the Airport Privatization Pilot Program to the NYSDOT.
Available: http://www.stewartairport.com/links.html

Thailand to Delay Privatization of Some State Enterprises. (2002, August 1). *Xinua News Agency*. Retrieved from http://www.xinhuanet.com/english/index.htm

Utt, R.D. (1999, June 4). FAA reauthorization: Time to Chart a course for privatizing airports.

Table A2. Private Involvement in Airport Management

Contract Type Company	Management Contract	Lease Contract/Ownership
Lockheed Air Terminal/ Airport Group International/ TBI Plc.[1]	Albany, NY Burbank, CA Atlanta (International Concourse) Toronto (Terminal 3) (Canada)	Belfast (Ireland) Cardiff (UK) Stockholm-Skavsta (Sweden) Orlando Sanford (USA) Santa Cruz (Bolivia) Cochabamba (Bolivia) La Paz (Bolivia) **Minority Holdings:** Perth (Australia) 16% Northern Territory 20% Hobart 30% London-Luton (25%)
American Port Services[2]	White Plains/Westchester, NY Branson Airport, MI Republic, NY Tweed New Haven Regional, CN Teterboro, NJ Atlantic City, NJ	
National Express[3]		Stewart Intl., NY East Midlands Airport (UK) Bournemouth (UK)
	Indianapolis Intl., IN	London Heathrow (UK)
BAA, Plc.[4]	Harrisburg, PA Mauritius, Partly (retail/catering) Boston Logan, MA Newark NJ Pittsburgh, PA (also consulting)5	London Gatwick (UK) Stanstead (UK) Glasgow (UK) Edinburgh (UK) Aberdeen (UK) South Hampton (UK) Melbourne (Australia) Launceston Airport (Australia) (as part of the APAC consortium, 15.1% share). Naples, Italy

Table A3. Airport Privatization Transactions, Cost and Activities (1997-2001)

Country	*Airport*	*Purchaser*	*Percentage Purchased*	*Sales Date*	*Number of annual enplaned passengers (in millions)*	*Purchase Price (million US$)*
Australia	Adelaide	Manchester	100	March 1998	1.8	238
	Brisbane	Schipol	100	July 1997	5.1	1,100
	Canberra	Local Consortium	100	March 1998	0.9	44
	Coolangata	Manchester	100	March 1998	1.0	70
	Hobart	AGI (TGI PLC)	100	March 1998	0.5	24
	Launceston	BAA	100	March 1998	0.3	11
	Melbourne	BAA	100	July 1997	6.7	1,100
	Perth	AGI (TGI PLC)	100	Juy 1997	2.2	495
Argentina[6]		Ogden/SEA Milan	100	February 1998	7.8	1,400
Bolivia[7]	La Paz	AGI (TGI PLC)	N/A	March 1997	1.2	N/A
	Santa Cruz					
	Cochabamba					
Germany	Dusseldorf	Hochteif/ Aer Rianta	50	January 1998	7.5	208
	Hamburg International	Hochteif/ Aer Rianta	36	October 2000	9.5	256
Greece[8]	Athens Intl. Airport S.A.	Hochteif/ Aer R. /Fraport	45	March 2001	N/A	1,833
Italy	Naples	BAA	70	August 1997	1.5	32
	Rome	Public Flotation	45	July 1997	11.9	344
Mexico[9]		Copenhagen	15	November 1998	4.7	116
Malaysia Airports Holdings[10]		Public Offering	28	November 1999	32.7	130
New Zealand	Auckland	Public Flotation	52	July 1998	3.4	232
	Wellington	Infratil	66	August 1998	1.6	49
Peru	Lima Jorge Chavez Intl.	Fraport/Bechtel/ Cosapi	43	February 2001	2.2	6.4
South Africa		Aeroporti di Roma	20	March 1998	8.1	165
UK	Birmingham	Aer Rianta	40	March 1997	2.7	58
USA[11]	Stewart International	National Express	100	September 2000	0.3	35

[1] TBI Plc. acquired Airport Group International (AGI) in September 1999 for a price of L190 million.

[2] In March 1997, American Port Services (APS) bought the majority of Johnson Controls airport and fleet maintenance. In 1998, Associated British Ports, Plc., purchased ASP.

[3] Information provided on company homepage (www.nationalexpressgroup.co.uk) as of Dec 6, 2000.

[4] Based on information publicly provided on BAA homepage (www.BAA.co.uk) as of December 6, 2000.

[5] BAA has been awarded a contract for Pittsburgh Airport, to review the current cargo business and international passenger routes and to develop strategic plans to maximize the full potential of the airport.

[6] 30-year concession for 33 airports. The purchase price is based upon the present value of guaranteed annual rent payments of $171.1 million.

[7] La Paz, Santa Cruz, and Cochabamba were offered for a 25-year concession with annual payments to be made. AGI bid 20.8% of gross revenues.

[8] 30 year concession under a BOT scheme.

[9] 50-year concession for nine airports in the southeast. (including Cancun).

[10] MAHB has a 30 year management contract for 36 of Malaysia's airports, as well as a 50-year lease agreement for Kuala Lumpur International Airport.

[11] 99-year lease contract under the FAA pilot privatization program.