Should Regional Airport Be Governed Privately or Publicly? : A Comparative Study of Japan and the UK

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1. Introduction

Recently airport privatization has become popular in the world. In Japan, Narita International Airport (Tokyo) was privatized on April 1, 2004, and will become fully privatized company near future. Kansai International Airport (Osaka) and Central Japan International Airport (Nagoya), these are the second and the third biggest airport in Japan, were set up as a joint-stock company.

However once we turned our eyes to Japanese regional airports, all of them are owned and operated by the state and/or local government. On the other hand, the UK's regional airports are mostly private ownership, either wholly or partially.

Why public ownership is common in Japan and private ownership is common in the UK? Which is the preferred governance system toward regional airport for the performance perspective? Then we set up comparative study about regional airport between Japan and the UK.

2. Japanese airports policy

As Table 1 shows Japanese airport is divided into four categories. The 1st category is for international air transport, the 2nd category is for major domestic air transport, the third category is for regional air transport, and the other category is a small airport for commuter airline and private aircraft, and for common use with the military. The 1st and the 2nd-a category airport is established and operated by Minister of Land, Infrastructure and Transportation (Except Narita, Kansai and Central Japan by each airport company). The 2nd-b category airport is established by Minister of Land, Infrastructure and Transportation, and operated by their local government. The 3rd category airport is established and operated by their local government. Total number of Japanese airport in 2007 is 96, of these 5 for the 1st category, 24 for the 2nd category, 53 for the 3rd category and 14 for the other category.

Funds for airport construction and development are mainly derived from Airport Improvement Special Account (AISA). AISA is a pooling system. Main Revenue source of AISA is aeronautical charges (landing fee and parking fee, etc.) from the 1st and the 2nd-a category airports. Total amount of AISA in 2007 is 4,130 million dollars and of 1,768 million dollars derived from aeronautical charges [1)] . On the other hand, AISA is distributed to all Japanese airports. That is to say, AISA is a scheme to funding regional airports by major airport's contribution.

Table 1 *Airport category in Japan*

		Establishment	Management	Usage	Number
1st category		Minister of Land, Infrastructure and Transportation (or each airport company)		International air transport	5
2nd category	a	Minister of Land, Infrastructure and Transportation		Major domestic air transport	24
	b	Minister of Land, Infrastructure and Transportation	Local Government		
3rd category		Local Government		Regional air transport	53
Others		Secretary of Ministry of Defence		For commuter airline and private aircraft Common use with the military, etc.	14

1） Calculated by 1dollar=120yen.

Traditionally Japanese Airport has been developing by "Airport Development Five-year Program (ADP)". Since the 3rd ADP (1976-80) put weight on regional airport, great numbers of new regional airports have been constructed. The 5th ADP (1986-90) advocated "one airport per one prefecture" doctrine. Actually 30 new airports have been constructed since 1980. However, in the current movement of cutting government expenditures, regional airport is under fire for over-construction and over-investment. At the present, many criticize that almost regional airports are suffering from under- utilization and many of them are far below their demand forecasting level.

In these context, Japanese airport development policy of nowadays shifts its emphasis from regional airports to international and/or domestic gateway airports (i.e. Narita/Tokyo, Haneda/Tokyo, Kansai/Osaka and Central Japan/Nagoya).

3. UK airports policy

The current air transport policy in the UK was created by the UK Government White Paper "The Future of Air Transport" issued in 2003. As illustrated in Fig.1, traffic to/from UK regional airports grows rapidly over the past two decades. Total number of passengers using UK regional airports has increased by 150% since 1990 [2] .
According to CAA (2005), reasons behind such a growth are [3] :

1) Rapid expansion of low-cost carriers (LCCs) stimulated by the liberalization of European air services from 1993.
2) Impacts of LCCs unlocking latent demand from passengers who were keen to travel from their local airport.
3) Great tendency toward privatization or commercialization of regional airports: making competitive pricing and seeking out new air services more actively.

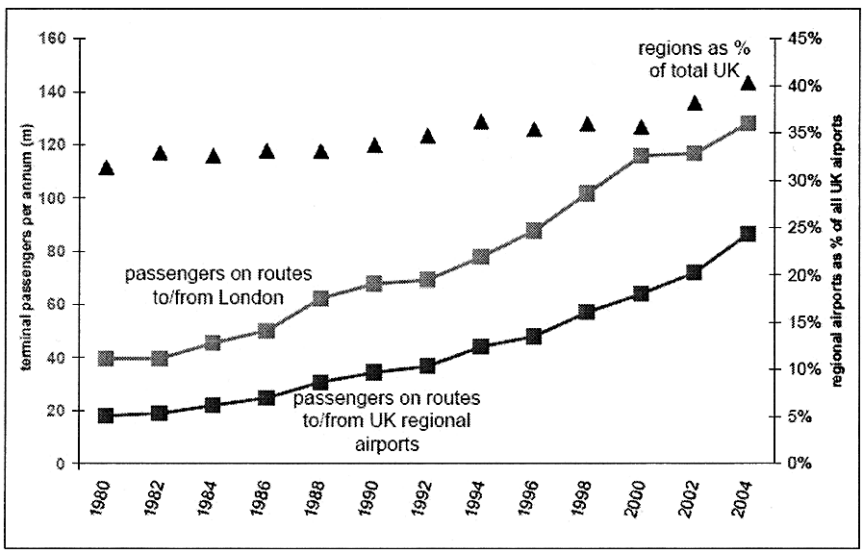
The UK is advanced country about promoting privatization since Thatcher Administration. BAAplc, which owns and operates Heathrow as one of European gateway airports [4] , might be the most famous privatization case in the world. The UK's regional airports are also mostly private ownership, either wholly or partially.

Table 2 shows privately owned airports in the UK. We can find many regional airports in the list. According to Department for Transport (2003) and CAA (2005), nowadays the great majority of airports in the UK have been shifted to commercial-oriented management except small local airports [5] . Department for Transport (2003) also argued

2) CAA (2005), p.ix.
3) CAA (2005), pp.ix-x.
4) BAAplc was taken over by The Ferrovial Consortium on June 2006.

that "The Government's role is primarily one of enabler and regulator..." [6] .

Figure 1 *Traffic at UK regional airports 1980–2004*



Source: CAA (2005), p.3.

Table 2 *Wholly or substantially privately owned airports in the UK*

Airport	Owners
Aberdeen, Edinburgh, Gatwick, Glasgow, Heathrow, Southampton, Stansted	BAA plc
Birmingham	Birmingham Airport Holdings Ltd (owned by 7 West Midlands District Councils 49%, Aer Rianta 24.125%, Macquarie Airports Group 24.125%, Employee Share Trust 2.75%)
Belfast International, Cardiff, Luton*	TBI plc * owned by Luton Borough Council but operated, managed and developed by TBI plc under a concession agreement.
Belfast City, Bristol*	Ferrovial * in joint venture with Macquarie Bank Group
Biggin Hill, Southend	Regional Airports Ltd
Blackpool	City Hopper Airports (Blackpool) Ltd 95%, Blackpool Borough Council 5%
Cambridge	Marshall of Cambridge Aerospace Ltd
Coventry	TUI
Kent International (Manston)	Planestation Group Plc
Liverpool, Doncaster Sheffield Sheffield City* Durham Tees Valley**	Peel Airports * Peel Airports 50%, Sheffield Business Park 50% ** Peel Airports 75%, five local authorities 25%
London City	Marketspur Ltd (the parent company is Sandford Ltd)
Newcastle	Copenhagen Airport 49%, seven local authorities 51%
Norwich	Omniport 80%, two local authorities 20%
Plymouth	Sutton Harbour Holdings plc (land leased from Plymouth City Council)
Glasgow Prestwick	Infratil Ltd

Source: CAA (2005), p.82.

4. DEA analysis

4.1. Sample and data gathering

Then we carry out DEA analysis to compare performance between Japanese and UK regional airport for the purpose of finding efficiency difference of public or private ownership (See Appendix about DEA for detail).

There are many previous works about airport performance study in the world. However as for Japanese airport, only Yoshida (2004) and Yoshida & Fujimoto (2004) can be found in foreign journals. The possible reason might be a difficulty of collecting financial statistics. As for the 1st and the 2nd-a category airports, the pooling system mentioned above preclude them from clearing up individual account, and as for the 2nd-b and the 3rd category airports, a lack of published financial statistics make us difficult to collect them. Actually, those two studies above-referenced doesn't use financial data.

A key feature of our study is adopting financial data as inputs and outputs for both Japanese and UK airports. Prime motivation of private airport is profit maximization, so that taking financial factors into consideration is very significant.

We adopt total 12 airports as a sample; 6 for Japanese regional airport and 6 for the UK regional airport. Facing difficulties of collecting financial statistics for both Japanese and the UK airports, our sample size become too small. Table 3 shows profile of all sample airports, picked out only traffic data. In General, Japanese airports are very sensitive about disclosing their finance outcome, so that we cannot expose them, but use them in

Table 3 *Profile of sample airports (Traffic data)*

Country		Passenger	Cargo tonnes	ATM	Runway length (m)
Japan	Odate-Noshiro	164,662	156	2,446	2000
	Akita	1,343,009	3,864	15,268	2500
	Noto	170,553	15	3,608	2000
	Nagoya	305,744	−	37,938	2740
	Kobe	2,738,143	25,956	20,440	2500
	Saga	273,808	10,811	8,732	2000
UK	Glasgow	8,781,700	8,748	97,000	2658
	Glasgow Prestwick	2,368,755	28,176	53,642	2987+1829
	Edinburgh	8,449,400	29,789	116,800	2560
	Aberdeen	2,868,300	4,164	91,900	1829
	Southampton	1,838,200	208	43,900	1723
	London Luton	9,149,628	23,745	107,894	2160

5) Small local airports owned by local authorities or by the Scottish Executive, or airports fell within Objective 1 and 2 Areas (Designated for the purposes of regional aid under European Community Law). Most of these airports are suffering from financial deficit, but are necessary for their local development.
6) Department for Transport (2003), p.17.

our DEA analysis. As for the data sources, concerning to Japanese airports, Ministry of Land, Infrastructure and Transport's website for their traffic data, and interviewing survey for their financial data is used. Concerning to the UK airports, BAAplc (2005), London Luton Airport Limited (2005a), (2005b) and other related website are used.

Japanese samples are all mainland airport (not in an isolated island). Akita belongs to the 2nd-b category, Odate-Noshiro, Noto, Kobe and Saga belong to the 3rd category, and Nagoya belongs to the other category airport. The UK's samples are all private airports (100% share is held by one or more private company). Glasgow, Glasgow Prestwick, Edinburgh and Aberdeen are in Scotland, and London Luton and Southampton are in the South East.

4.2. Inputs and outputs

Our dataset is composed of two inputs and two outputs. Runway length [7] and operating costs [8] are used as inputs variables. As for outputs variables, we use Work Load Units (WLU) and total revenue [9] . WLU is a concept of aggregation by the proportion of 1 passenger to be corresponded to 100 cargo kilogram[10] . If we introduce too many inputs and outputs variables to DEA calculation, almost all would be getting the best performer (i.e. scored 1.000), so we adopt WLU for the aggregation of passenger and cargo variables. The reason we don't adopt ATM as an output variable is that a congested airport (operated at full capacity) might be underestimated.

All data is in the year 2005, except financial data of Glasgow, Edinburgh, Aberdeen and Southampton for 2004, and Kobe's all data for 2006 (Kobe was opened in February 2006). DEA model is output-orientated CRS, calculated by DEAP-XP developed by Coelli (1996).

4.3. Results

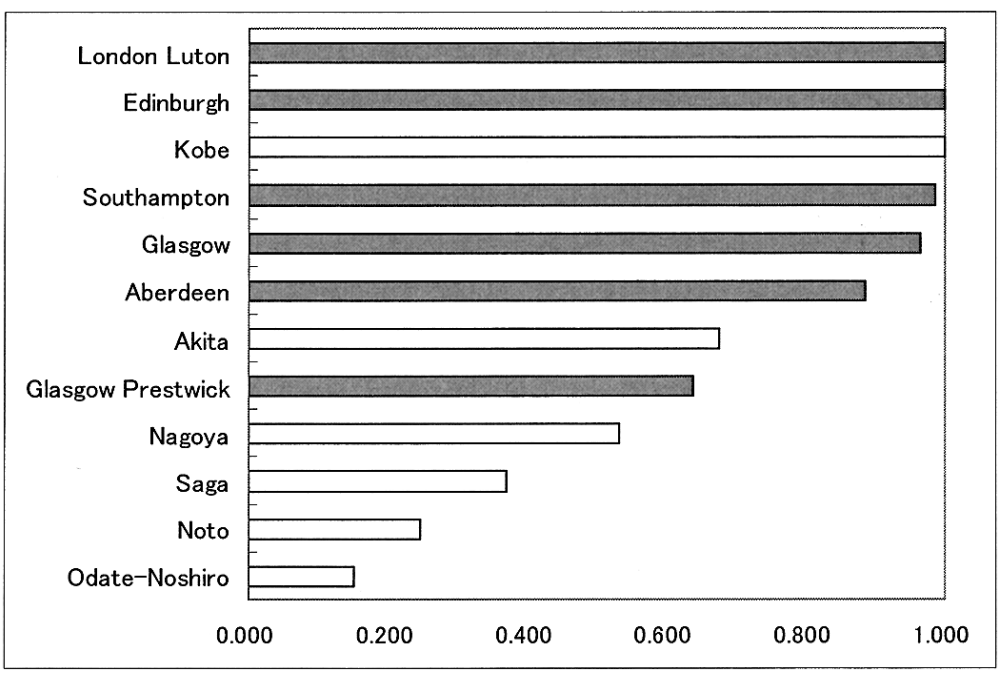
Table 4 shows the results of DEA analysis. DEA scored 1.000 means the best performer (i.e. on the Efficient Frontier). Sorting DEA score to an efficient order is shown in Figure 2. Gray bars correspond to the UK airport and white bars correspond to Japanese airport in Figure 2. Five out of the top six are the UK airports. Therefore, on our sample airports, we can find that the UK airports are relatively more efficient than Japanese airports.

7） On Glasgow Prestwick, we sum up their two runway's length.
8） Calculated by 1pound=240yen.
9） Calculated by 1pound=240yen.
10） See Doganis (1992) about WLU for detail.

Table 4 *DEA results*

Country	Airport	DEA score
Japan	Odate-Noshiro	0.151
	Akita	0.676
	Noto	0.245
	Nagoya	0.531
	Kobe	1.000
	Saga	0.370
UK	Glasgow	0.965
	Glasgow Prestwick	0.637
	Edinburgh	1.000
	Aberdeen	0.885
	Southampton	0.986
	London Luton	1.000

Figure 2 *DEA results (sorted by efficient order)*



5. Comparative study

Our DEA results also can be thought that, as for regional airport, a private ownership is more efficient than a public ownership. Then let us consider how the differences show up between Japanese public airports and the UK's private airports.

5.1. Aeronautical charges

Aeronautical charges in Japan consist of landing fee, parking fee and navigation fee. Landing fee of the 1st and the 2nd-a category airports are decided by the Government (except Narita, Kansai and Central Japan, which are decided at their operating company's discretion) [11] . As for the 2nd-b and the 3rd category airports, landing fee can be decided at the discretion of their municipal authorities[12] . Traditionally the Government has been setting provision of reducing landing fee for the 2nd-a category airports by 30% off. Following that almost of all of the 2nd-b and the 3rd category airports also reduce their landing fee to the same level of the 2nd-a category airports. Therefore landing fees of regional airports are all similar level in Japan, and all municipal authorities operating 2nd-b and the 3rd category airports have no incentive for their landing fees to set lower level toward other airports.

On the other hand, in the UK, different airport can adopt different approaches about their aeronautical charges[13] . In Europe, including the UK, large amount of LCCs have entered in the air transport market since air transport liberalization and their traffic volume has been growing rapidly. According to Department for Transport (2003), LCCs (they say it 'no-frills') has expanded from carrying under 8 million passengers a year in 1998 to 35 million in 2002, and a projected 47 million in 2003[14] . For example, London Luton Airport's 82% of their total passengers carried by LCCs[15] .

However, in contrast with the UK, assuming that the definition of LCC would be non-hub operation and using secondary airport, there is no LCCs in Japan. Although several new carriers have emerged in Japanese domestic air market since deregulation in 1986, they are called not "LCCs" but merely "newcomers".

We are likely to think that LCCs stimulate competition among regional airport and hence regional airports have a large incentive to reduce their landing fee. If that assumption have justness, it would be difficult for Japanese regional airports to compete with each other and to make drastic reduction of their landing fees.

However Papatheodoroua & Lei (2006) and Warnock-Smith & Potter (2005) reject this assumption. Papatheodoroua & Lei (2006) found out by their empirical study, LCC are not the only way forward for regional airports and charter flights have the largest impact on airport aeronautical revenue[16] . Furthermore Warnock-Smith & Potter (2005) found out by their interview-based survey to LCCs about their airport choice factors, that landing fees may not be the most significant factor (fourth ranked factor) in the low-cost operation of a route[17] .

11) Airports for common use with the military are also decided their landing fee by the Government.
12) Navigation fee is set by the Government for all Japanese airports.
13) CAA (2005), p.83.
14) Department for Transport (2003), p.54.
15) Official website (http://www.london-luton.co.uk/en/content/4/214/key-facts.html).
16) Papatheodoroua & Lei (2006), p.51.

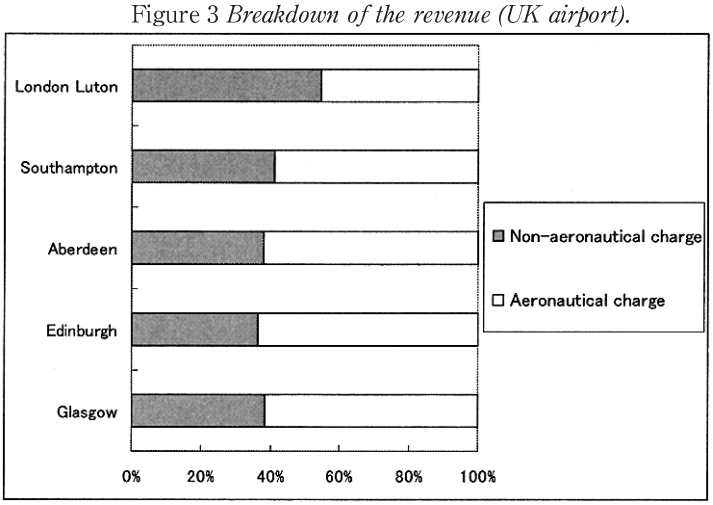
Therefore Japanese regional airport, even if they doesn't faced on LCC's stimulation, also have enough potential to set competitive landing fee and to compete each other.

5.2. Commercial activity

In all Japanese regional airports their passenger terminal is owned and operated by different organizations. Most of them are joint-stock company mostly invested by their local public authorities. Therefore in Japanese regional airports, aeronautical activities and non-aeronautical activities are operated by completely separated bodies.

On the other hand, the UK's private airport manages aeronautical and non-aeronautical activities by a single unit. Figure 3 shows breakdown of the revenue of the sample UK airports. We can find that nearly (or over) 40% of their total revenue derived from their non-aeronautical activities. CAA (2005) maintains that developing commercial activities by airport operating company stimulates their traffic performances (it is called "virtuous circle") [18] .

Figure 3 *Breakdown of the revenue (UK airport).*



Then, to investigate the effect for managing aeronautical and non-aeronautical activities as a unit operation, we calculate DEA over again on the condition of each sample airport's operating costs and total revenue variables to be added the cost and the revenue of each terminal operate company. The other conditions are all same as our former analysis in the section 4. The result is shown in Table 5. We can find that 3 out of 6 airports can improve their performance by combined their aeronautical and non-aeronautical activities.

Stated above, these terminal operate companies are invested mostly by their local public authorities, we can estimate that they contain an operating inefficiencies. However

17) Warnock-Smith & Potter (2005), p.389.
18) CAA (2005), p.xvii.

we can find if combining aeronautical and non-aeronautical activities to the single entity Japanese regional airports would partly improve their performance.

Table 5 *DEA score in the case of separate or unit operation*

Airport	DEA score	
	Separate operation	Unit operation
Odate-Noshiro	0.151	0.159
Akita	0.676	0.513
Noto	0.245	0.439
Nagoya	0.531	0.843
Kobe	1.000	1.000
Saga	0.370	0.179

6. Conclusions

In this study we examined the efficiency differences between public and private ownership airport by comparing Japanese public regional airports and private regional airports in the UK. The DEA result shows, in our sample airports, the UK airports are relatively more efficient than Japanese airports. In the consequence of considering the differences of both private and public airport from the point of aeronautical charges and commercial activity, we can find that Japanese regional airport, even if they doesn't faced on LCC's stimulation, also have enough potential to set competitive landing fee and to compete each other, and that if combining aeronautical and non-aeronautical activities to the single entity in Japanese regional airports, they would partly improve their operating performance.

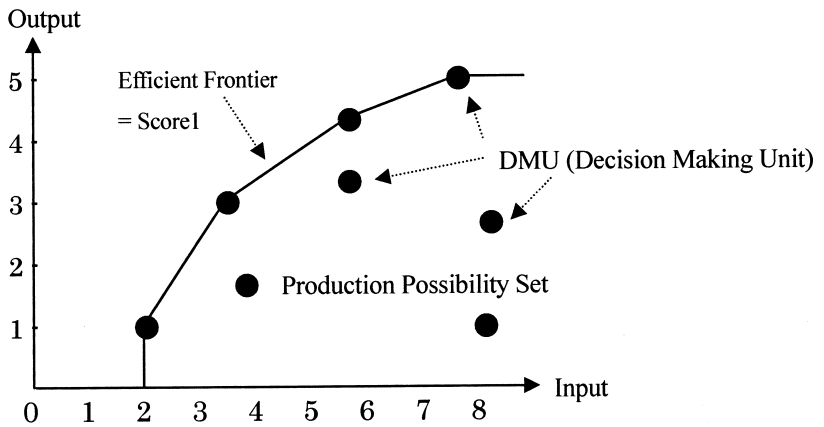
In our interviewing survey to some Japanese regional airport administrator, someone stated that it was difficult for the private sector to operate regional airports because of the necessary special skills and techniques involved. However in order to meet saving national and/or local finance and an effective utilization of regional airports, regional airports also must be operated on a commercial basis. To do so, airport privatization is one of the effective solutions for Japanese regional airports.

Appendix: Data Envelopment Analysis

DEA is the method which evaluates technical efficiency defined as a ratio like output/input using linear programs. DEA provides a scalar measure of relative efficiency by comparing the efficiency achieved by a decision making unit (DMU) with the efficiency obtained by similar DMUs. The line connecting the most efficient DMUs is called "effi-

cient frontier" which envelops inefficient DMUs. In general, DMUs on the frontier is defined as score 1, the other is scored in proportion to distance from the frontier (see Figure A-1).

Figure A-1 *Concept of DEA*



One of the advantages of DEA is that one does not need to specify any production functions so that only the observed data is relied upon. Another advantage of DEA is that it is possible to measure activities which is not cost minimized; such as non profit organizations or government activities. On the other hand, drawback of DEA is that the result is changeable according to total amount of variables, and any samples standing out from the others change the form of frontier. However, DEA appears to have an advantage to evaluate airport which has multiple inputs or outputs.

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