Key Findings of 2011 ATRS Global Airport Performance Benchmarking Project

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Middle East: Paul Hooper
Outline

- Objective of the ATRS Benchmarking Study
- Airports Included and ATRS Database
- Some Characteristics of Sample Airports
- Methodology
- Key Results on Efficiency and Costs
- User Charge Comparisons
Objective of the Benchmarking Study

- To provide a comprehensive, unbiased comparison of airport performance focusing on:
  - Productivity and Operating/Mgt Efficiency
  - Unit Cost Competitiveness
  - Comparison of Airport Charge Levels

- Our study does not treat service quality differentials across airports
<table>
<thead>
<tr>
<th>Region</th>
<th>Number of Airports</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada-US</td>
<td>63 airports</td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>45 airports (2 New)</td>
<td>14 airport groups</td>
</tr>
<tr>
<td>Asia</td>
<td>32 airports (5 New)</td>
<td>5 airport groups</td>
</tr>
<tr>
<td>Oceania</td>
<td>9 airports</td>
<td></td>
</tr>
<tr>
<td>Latin America</td>
<td>7 airports (All New)</td>
<td></td>
</tr>
</tbody>
</table>

**Total** 156 airports  
19 airport groups
The ATRS Database

- The ATRS Database contains historic information (since FY 2001) including financial data, traffic and capacity data of the major airports and airport authorities (groups) in the following geographic regions:
  - Asia Pacific
  - Europe
  - North America and Latin America (non-financial data only)

- The data in each region is segregated into:
  - Airport Information (capacity, type of ownership etc)
  - Traffic
  - Aeronautical Revenue
  - Non-Aeronautical Revenue
  - Operating Expense
  - Balance Sheet
Data Sources: FY 2001-2009

- Airport’s Financial Statements, Annual Reports and direct data requests;
- US FAA, DOT statistics;
- Association of European Airlines (AEA) Statistics
- ICAO Digest of Statistics:
  - annual and monthly traffic data
  - annual financial data - not for all airports
- ACI; IATA
  - annual traffic statistics; capacity information; airport charges
  - general information surveys (Asia Pacific and Europe) occasional and not complete
- IMF and World Bank – various price indices including GDP deflators for service sectors and PPP
- US Census Bureau, Statistics Canada – regionally based Cost of Living Index
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Passengers Volume, 2009
(in ’000 passengers)

Asia Pacific
Europe
North America
Passenger Traffic - Top 10 Airports
(’000 passengers) :2009, 2007, 2005
Aircraft Movements, 2009 (’000 ATM)
Passengers per Aircraft Movements, 2009
Air Cargo Traffic, 2009
(‘000 metric tons)

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Air Cargo - Top 10 Airports (’000 metric tons)
2009, 2007, 2005

Metric Tonnes (’000)

Asia Pacific
Europe
North America

© Air Transport Research Society (ATRS)
% Non-Aero Revenue, 2009

Asia Pacific | Europe | North America

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**Methodology**

- Key Results on Efficiency and Costs
- User Charge Comparisons
Methodology: Efficiency Measurement

• **Variable Factor Productivity (VFP) Index**
  – Total Factor Productivity (TFP) - Impossible because of capital input cost accounting problem

• VFP is essentially the ratio of **total (aggregate)** output index divided by **total (aggregate)** variable input index, namely labor and soft cost input (total non-labor variable inputs).

• In fact, we compute VFP using the **multilateral index** procedure proposed by Caves, Christensen and Diewert (1982).
Multilateral Aggregation Method

• This multilateral index procedure uses cost shares (revenue shares) to aggregate inputs (outputs).

\[
\ln \frac{X_i}{X_j} = \sum \frac{W_{ki} + \bar{W}_k}{2} \ln \frac{X_{ki}}{\bar{X}_k} - \sum \frac{W_{kj} + \bar{W}_k}{2} \ln \frac{X_{kj}}{\bar{X}_k}
\]
## Airport Productivity Index

<table>
<thead>
<tr>
<th>Outputs</th>
<th>Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Aircraft movement</td>
<td>• Labour</td>
</tr>
<tr>
<td>• Passengers</td>
<td>• Other non-capital (soft cost) inputs</td>
</tr>
<tr>
<td>• Non-aeronautical revenues</td>
<td></td>
</tr>
</tbody>
</table>
Potential Reasons for the Measured Productivity (gross VFP) Differentials

Factors Beyond Managerial Control:

– Airport size (Scale of aggregate output)
– Average aircraft size using the airport
– Share of international traffic
– Share of air cargo traffic
– Extent of capacity shortage - congestion delay
– Connecting/transfer ratio

We compute ‘residual (Net) variable factor productivity (RVFP) measures after removing effects of these Factors
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- **Key Results on Efficiency and Costs**
- User Charge Comparisons
Gross Variable Factor Productivity (VFP)
Oceania (SYD=1.0), 2009
Gross Variable Factor Productivity (VFP)
Asia (HKG=1.0), 2009
Gross Variable Factor Productivity (VFP)
Europe (CPH=1.0), 2009

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Gross Variable Factor Productivity (VFP)
North America (YVR=1.0), 2009
## Past Airport Efficiency Excellence Top Performers, 2006-2010

<table>
<thead>
<tr>
<th>Region</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>Hartsfield-Jackson Atlanta International Airport</td>
<td>Hartsfield-Jackson Atlanta International Airport</td>
<td>Hartsfield-Jackson Atlanta International Airport</td>
<td>Hartsfield-Jackson Atlanta International Airport</td>
<td>Large Airport Category Hartsfield-Jackson Atlanta International Airport Small/Medium Airport Category Raleigh-Durham International Airport</td>
</tr>
<tr>
<td>Europe</td>
<td>Copenhagen Kastrup International Airport</td>
<td>Oslo International Airport</td>
<td>Copenhagen Kastrup International Airport</td>
<td>Copenhagen Kastrup International Airport</td>
<td>Large Airport Category Oslo International Airport Small/Medium Airport Category Genève Aéroport</td>
</tr>
<tr>
<td>Asia-Pacific</td>
<td>Incheon International Airport</td>
<td>Hong Kong International Airport</td>
<td>Hong Kong International Airport</td>
<td>Hong Kong International Airport</td>
<td>Large Airport Category Hong Kong International Airport Small/Medium Airport Category Seoul Gimpo International Airport</td>
</tr>
</tbody>
</table>

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Gross VFP Vs Residual (Net) VFP (after removing factors beyond managerial control): Oceania (SYD=1.0)

- After removing factors beyond managerial control such as capacity constraint, average aircraft size, % international traffic, etc, CHC’s relative performance in term of Net VFP improved significantly.
Residual (Net) Variable Factor Productivity: Asia (HKG=1.0)
Residual (Net) Variable Factor Productivity: Europe (CPH=1.0)
Residual (Net) Variable Factor Productivity:
N. America – Passengers > 15 million (YVR=1.0)
Residual (Net) Variable Factor Productivity:
N. America – Passengers < 15 million (YVR=1.0)
Top Efficiency Performers (2011)
(based on Net VFP index=operating/management efficiency)

Asia Pacific:
- Oceania Airports: Sydney, Christchurch
- Asian Airports: Hong Kong, Singapore

Europe:
- Large Airports (> 15 million pax): Copenhagen and Oslo
- Small/Medium Airports (< 15 millions Pax): Geneva, Reykjavik-Keflavik

North America (Canada/US):
- Large Airports (> 15 million pax): Atlanta, Minneapolis/St Paul
- Small/Medium Airports (< 15 millions Pax): Raleigh-Durham, Reno
Oslo is more efficient in terms of **Labor Productivity**. The figure implies that CPH handles most of the airport operation in-house as compared with OSL.

- **CPH** is more efficient in terms of **Soft-Cost Input Productivity**. (soft cost = operating expenses-labor cost, divided by SC input price index)
- Despite the difference in their business strategy, both airports achieved same level of operating efficiency.

<table>
<thead>
<tr>
<th></th>
<th>CPH</th>
<th>OSL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labour Productivity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output/Employee</td>
<td>1.00</td>
<td>4.31</td>
</tr>
<tr>
<td>Passenger/Employee</td>
<td>1.00</td>
<td>3.96</td>
</tr>
<tr>
<td>WLU/Employee</td>
<td>1.00</td>
<td>3.57</td>
</tr>
<tr>
<td><strong>Soft Cost Productivity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output/Soft Cost</td>
<td>1.00</td>
<td>0.41</td>
</tr>
<tr>
<td>Passenger/Soft Cost</td>
<td>1.00</td>
<td>0.38</td>
</tr>
<tr>
<td>WLU/Soft Cost</td>
<td>1.00</td>
<td>0.34</td>
</tr>
</tbody>
</table>
Cost Competitiveness = Net VFP and Input Price Effect
Oceania (SYD=0.0) - the higher the better
Cost Competitiveness: = Net VFP and Input Price Effect
Asia (HKG=0.0) – the higher the better
Cost Competitiveness = Net VFP and Input Prices Effect
Europe (CPH=0.0) - the higher the better
Cost Competitiveness = Net VFP and Input Price Effect

N. America – Passengers > 15 million (YVR=0.0)
Cost Competitiveness = Net VFP and Input Price Effect
N. America – Passengers < 15 million (YVR=0.0)
Top Unit Cost Competitiveness Performers

- **Asia-Pacific:**
  - Oceania: *Christchurch*, Sydney
  - Asia: *Haikou*, AOT (Airport Authority of Thailand), APII (Angkasa Pura II, Indonesian Group)

- **Europe:**
  - *Polish Airports*, Reykjavik-Keflavik, Tallinn

- **N. America:**
  - Large Airports (> 15 million Pax): *Atlanta*, Charlotte, Tampa
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Landing Charges: Basis for computing

- Assumptions:
  - (Use of signatory airlines)
  - Passenger aircraft
  - Peak and off-peak charges separately treated
  - International flights
  - Some airports have summer/winter rates – these are averaged
  - Assumed 2 hours aircraft parking

- Exclusion: Tax, Noise charges, lighting surcharge
Landing Charges for Boeing 767-400, 2010 (in US$)
Asia Pacific: Landing Charge for Airbus 320, 2010 (in US$)
Europe: Landing Charge for Airbus 320, 2010 (in US$)
North America: Landing Charge for Airbus 320, 2010 (in US$)
Summary – Landing/Takeoff Charges (Airbus 320)

- **Asia-Pacific Results:**
  - Highest charges: Haneda, Kansai, Narita
  - Lowest charges: Kuala Lumpur, Bangkok, Cairns

- **European Results:**
  - Highest charges: London Gatwick peak, Dusseldorf, Dublin
  - Lowest charges: Riga (Latvia), Stockholm, Malta

- **North American Results:**
  - Highest charges: Toronto, LaGuardia, St. Louis
  - Lowest charges: Charlotte, Nashville, Raleigh-Durham,
Combined Landing and Passenger Charges

Given that it is difficult to separate landing and passenger charges for some airports, the *combined landing and passenger charge* may reflect a better picture.
Asia Pacific: Combined Landing and Passenger Charge for Airbus 320, 2010 (in US$)
Europe: Combined Landing and Passenger Charge for Airbus 320, 2010 (in US$)
Summary – Combined Landing and Passenger Charges (Airbus 320)

- Asia-Pacific Results:
  - Highest charges: Kansai, Nagoya, Narita
  - Lowest charges: Kuala Lumpur Low Cost Carrier Terminal, Chennai (India), Mumbai (India)

- European Results:
  - Highest charges: London Heathrow, Prague (Czech Rep.), Paris Orly
  - Lowest charges: Brussels South Charleroi, Riga (Latvia), Manchester (Off-Peak)
Cost per Enplanement for Airlines (CPE)

• For N. American airports, the data allows us to compute *Cost per enplanement (CPE).*

• CPE = *sum of landing fees, terminal arrival fee, rents and utilities, terminal apron charges/tiedowns, and passengers other aeronautical payments to airports divided by enplaned passengers*
North America: Total Charges per Enplaned Passenger, 2009 (in US$)

United States

Canada
Summary – Cost per Enplaned Passenger (CPE)

North American Results:

- Highest charges: Toronto, New York JFK, Newark
- Lowest charges: Charlotte, Atlanta, Salt Lake City
ATRS Airport Benchmarking Report

- The ATRS Global Airport Performance Benchmarking Report: 3 volumes, over 500 pages of valuable data and analysis
- Can be purchased by visiting www.atrsworld.org
- Report sale finances our annual benchmarking research project
Thank You

2012 ATRS World Conference
(Taiwan in late June, 2012)