Key Findings of 2012 ATRS Global Airport Performance Benchmarking Project

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Key Findings of 2012 ATRS Global Airport Performance Benchmarking project

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North America: Tae Oum, Bijan Vasigh, Jia Yan, Chunyan Yu
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

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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
Outline

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# Airports Included in the 2012 Report

<table>
<thead>
<tr>
<th>Region</th>
<th>Ports Included</th>
<th>Airport Groups</th>
<th>New Ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada-US</td>
<td>77 airports</td>
<td>16 airport groups</td>
<td>14 New</td>
</tr>
<tr>
<td>Europe</td>
<td>55 airports</td>
<td></td>
<td>11 New</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>9 airport groups, 35 Asian airports, 16 Oceania airports</td>
<td>3 New, 3 New, 7 New</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>183 airports</strong></td>
<td><strong>25 airport groups</strong></td>
<td><strong>35 New</strong></td>
</tr>
</tbody>
</table>
The ATRS Database

- The ATRS Database contains historic information (since FY 2002) 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

- The data in each regions is segregated into:
  - Airport Information (capacity, type of ownership etc)
  - Traffic
  - Aeronautical Revenue
  - Non-Aeronautical Revenue
  - Operating Expense
  - Balance Sheet

## Data Sources: FY 2002-2010

<table>
<thead>
<tr>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Airport’s Financial Statements, Annual Reports and direct data requests</strong></td>
</tr>
<tr>
<td><strong>US FAA, DOT statistics</strong></td>
</tr>
<tr>
<td><strong>Association of European Airlines (AEA) Statistics</strong></td>
</tr>
<tr>
<td><strong>ICAO Digest of Statistics:</strong></td>
</tr>
<tr>
<td>• annual and monthly traffic data</td>
</tr>
<tr>
<td>• annual financial data - not for all airports</td>
</tr>
<tr>
<td><strong>ACI, IATA</strong></td>
</tr>
<tr>
<td>• annual traffic statistics; capacity information; airport charges</td>
</tr>
<tr>
<td>• general information surveys (Asia Pacific and Europe) occasional and not complete</td>
</tr>
<tr>
<td><strong>IMF and World Bank</strong></td>
</tr>
<tr>
<td>• various price indices including GDP deflators for service sectors and PPP</td>
</tr>
<tr>
<td><strong>US Census Bureau, Statistics Canada</strong></td>
</tr>
<tr>
<td>• regionally based Cost of Living Index</td>
</tr>
</tbody>
</table>
Passengers Traffic, FY2010
(in ’000 passengers)
Passenger Traffic - Top 10 Airports
(‘000 passengers) : FY2006, 2008, 2010

Asia Pacific
Europe
North America

© Air Transport Research Society (ATRS)
Top and Bottom 3: Change in Passenger Traffic FY2009-10

Asia Pacific +8.6%
- REP +21.4%
- PVG +21.3%
- PEN +20.2%
- NRT -28.2%
- MFM -4.2%
- NTL -4.0%

Europe +3.4%
- ISG +74.7%
- LED +24.9%
- RIX +14.7%
- DUB -10.1%
- STN -6.9%
- BHX -5.8%

North America +1%
- YQB +34.3%
- MKE +23.9%
- YQR +9.6%
- CVG -24.9%
- PVD -10.5%
- ONT -8.8%
Aircraft Movements, FY2010 (’000 ATM)
Passengers per Aircraft Movements, FY2010
Air Cargo Traffic, FY2010
(’000 metric tons)

© Air Transport Research Society (ATRS)
Air Cargo - Top 10 Airports (’000 metric tons)
FY2006, 2008, 2010
% Non-Aero Revenue, 2010

Asia Pacific
Europe
North America

© Air Transport Research Society (ATRS)
## Outline

<table>
<thead>
<tr>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective of the ATRS Benchmarking Study</td>
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</tr>
<tr>
<td>Methodology</td>
</tr>
<tr>
<td>Key Results on Efficiency and Costs</td>
</tr>
<tr>
<td>User Charge Comparisons</td>
</tr>
</tbody>
</table>

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Airport Productivity Index

Outputs
- Aircraft movement
- Passenger
- Non-aeronautical revenue
- Cargo

Inputs
- Labour
- Other non-capital (soft-cost) input

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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).

\[
\ln \frac{X_i}{X_j} = \sum \frac{W_{ki} + \bar{W}_k}{2} \ln \frac{X_{ki}}{\bar{X}_k} - \sum \frac{W_{kj} + \bar{W}_k}{2} \ln \frac{X_{kj}}{\bar{X}_k}
\]
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
- 2010 Iceland volcano ash cloud (For European airports)

We compute residual (Net) variable factor productivity (RVFP) measures after removing effects of these Factors
# Regression Models

## Asia Pacific

<table>
<thead>
<tr>
<th></th>
<th>Coefficients</th>
<th>Standard Error</th>
<th>t Stat</th>
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</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-2.050</td>
<td>1.325</td>
<td>-1.55</td>
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<tr>
<td>% Non-Aeronautical</td>
<td>0.530</td>
<td>0.113</td>
<td>4.69</td>
</tr>
<tr>
<td>% International</td>
<td>-0.011</td>
<td>0.007</td>
<td>-1.45</td>
</tr>
<tr>
<td>% Cargo</td>
<td>0.048</td>
<td>0.019</td>
<td>2.53</td>
</tr>
<tr>
<td>Capacity Constraint</td>
<td>0.140</td>
<td>0.076</td>
<td>1.84</td>
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<tr>
<td>Aircraft Size</td>
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<td>Airport Size</td>
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<td>0.969</td>
<td>0.069</td>
<td>13.96</td>
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<td>0.039</td>
<td>0.098</td>
<td>0.39</td>
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<tr>
<td>2009</td>
<td>0.016</td>
<td>0.097</td>
<td>0.16</td>
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<td>R Square</td>
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## Europe

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<tr>
<td>Intercept</td>
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<td>% Non-Aeronautical</td>
<td>0.673</td>
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<td>% Cargo</td>
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<td>0.053</td>
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<td>-1.160</td>
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<td>-0.350</td>
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<td>2003</td>
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Regression Model

North America

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<th>Coefficients</th>
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<tr>
<td>Intercept</td>
<td>0.346</td>
<td>0.945</td>
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<tr>
<td>% Non-Aeronautical</td>
<td>0.561</td>
<td>0.105</td>
<td>5.360</td>
</tr>
<tr>
<td>% Connecting Traffic</td>
<td>0.045</td>
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<tr>
<td>% International</td>
<td>-0.016</td>
<td>0.005</td>
<td>-3.190</td>
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<tr>
<td>% Cargo</td>
<td>-0.033</td>
<td>0.023</td>
<td>-1.440</td>
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<td>Capacity Constraint</td>
<td>0.111</td>
<td>0.075</td>
<td>1.490</td>
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<td>Aircraft Size</td>
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<td>-4.210</td>
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<td>1.780</td>
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<tr>
<td>2010</td>
<td>-0.006</td>
<td>0.031</td>
<td>-0.190</td>
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<td>2009</td>
<td>0.019</td>
<td>0.027</td>
<td>0.690</td>
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<tr>
<td>2008</td>
<td>-0.029</td>
<td>0.027</td>
<td>-1.080</td>
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<tr>
<td>2007</td>
<td>-0.010</td>
<td>0.025</td>
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<tr>
<td>2006</td>
<td>-0.013</td>
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<td>2005</td>
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Gross Variable Factor Productivity vs. Residual Variable Factor Productivity

Asia (HKG=1.0), 2010

© Air Transport Research Society (ATRS)
Residual (Net) Variable Factor Productivity: (after removing factors beyond managerial control) : Asia (HKG=1.0)
Residual (Net) Variable Factor Productivity

Oceania (SYD=1.0)
Residual (Net) Variable Factor Productivity:
Europe – Passengers > 15 million (CPH=1.0)
Residual (Net) Variable Factor Productivity:

Europe – Passengers < 15 million (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 (2012)

(based on Net VFP index=operating/management efficiency)

**Asia Pacific:**
- **Asian Airports:**
  - Gimpo, Incheon, Hong Kong
- **Oceania Airports:**
  - Sydney, Queenstown

**Europe:**
- **Large Airports (> 15 million pax):**
  - Copenhagen, Oslo, Zurich
- **Small/Medium Airports (< 15 millions Pax):**
  - Geneva, Nice, Edinburgh

**North America (Canada/US):**
- **Large Airports (> 15 million pax):**
  - Atlanta, Charlotte, Minneapolis/St Paul
- **Small/Medium Airports (< 15 millions Pax):**
  - Raleigh-Durham, Richmond, Oklahoma City

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Top Efficiency Performers (2012)
(based on Net VFP index=operating/management efficiency)

Asian Airport Category:

Gimpo International Airport

<table>
<thead>
<tr>
<th></th>
<th>GMP</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour Productivity (HKG=1.0)</td>
<td>0.538</td>
<td>0.343</td>
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<tr>
<td>Soft Cost Productivity (HKG=1.0)</td>
<td>1.240</td>
<td>0.963</td>
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<tr>
<td>Residual VFP (HKG=1.0)</td>
<td>1.133</td>
<td>0.631</td>
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</tbody>
</table>

Runner up: Incheon International Airport
Top Efficiency Performers (2012)
(based on Net VFP index=operating/management efficiency)

Oceania Airport Category:

**Sydney Airport**

<table>
<thead>
<tr>
<th></th>
<th>SYD</th>
<th>Mean</th>
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</thead>
<tbody>
<tr>
<td>Labour Productivity</td>
<td>1.000</td>
<td>0.548</td>
</tr>
<tr>
<td>Soft Cost Productivity</td>
<td>1.000</td>
<td>0.684</td>
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<tr>
<td>Residual VFP</td>
<td>1.000</td>
<td>0.695</td>
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Runner up: Queenstown Airport
Top Efficiency Performers (2012)
(based on Net VFP index=operating/management efficiency)

Europe Large Airports (> 15 million pax) Category:

**Copenhagen Airport Kastrup**

<table>
<thead>
<tr>
<th></th>
<th>CPH</th>
<th>Mean</th>
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</thead>
<tbody>
<tr>
<td>Labour Productivity</td>
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<td>1.263</td>
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<tr>
<td>Soft Cost Productivity</td>
<td>1.000</td>
<td>0.439</td>
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<tr>
<td>Residual VFP</td>
<td>1.000</td>
<td>0.660</td>
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</tbody>
</table>

Runner up: Oslo Airport

© Air Transport Research Society (ATRS)
Top Efficiency Performers (2012)
(based on Net VFP index=operating/management efficiency)

Europe Small/Medium Airports (< 15 million pax) Category:

Genève Aéroport

<table>
<thead>
<tr>
<th></th>
<th>GVA</th>
<th>Mean</th>
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<tbody>
<tr>
<td>Labour Productivity (CPH=1.0)</td>
<td>1.375</td>
<td>1.263</td>
</tr>
<tr>
<td>Soft Cost Productivity (CPH=1.0)</td>
<td>0.580</td>
<td>0.439</td>
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<tr>
<td>Residual VFP (CPH=1.0)</td>
<td>0.844</td>
<td>0.541</td>
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</tbody>
</table>

Runner up: Nice Cote D’Azur Airport
Top Efficiency Performers (2012)
(based on Net VFP index=operating/management efficiency)

N. America Large Airports (> 15 million pax) Category:

### Hartsfield-Jackson Atlanta International Airport

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Labour Productivity (YVR=1.0)</td>
<td>1.546</td>
<td>0.553</td>
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<tr>
<td>Soft Cost Productivity (YVR=1.0)</td>
<td>1.481</td>
<td>0.875</td>
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<tr>
<td>Residual VFP (YVR=1.0)</td>
<td>1.251</td>
<td>0.712</td>
</tr>
</tbody>
</table>

Runner up: Charlotte Douglas International Airport
Top Efficiency Performers (2012)
(based on Net VFP index=operating/management efficiency)

N. America Small/Medium Airports (< 15 million pax) Category:

**Raleigh-Durham International Airport**

<table>
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<td>Labour Productivity (YVR=1.0)</td>
<td>0.594</td>
<td>0.553</td>
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<td>Soft Cost Productivity(YVR=1.0)</td>
<td>1.308</td>
<td>0.875</td>
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<tr>
<td>Residual VFP (YVR=1.0)</td>
<td>1.210</td>
<td>0.712</td>
</tr>
</tbody>
</table>

Runner up: Richmond International Airport

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Cost Competitiveness: = Net VFP and Input Price Effect

Asia (HKG=0.0) – the higher the better
Cost Competitiveness = Net VFP and Input Price Effect

Oceania (SYD=0.0) - the higher the better
Cost Competitiveness = Net VFP and Input Prices Effect
Europe – Passengers > 15 million (CPH=0.0)
Cost Competitiveness = Net VFP and Input Prices Effect

Europe – Passengers < 15 million (CPH=0.0)
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:**
  - Queenstown, Dunedin
- **Asia:**
  - Airports Authority of India, Jakarta Soekarno-Hatta

Europe:

- **Large Airports (> 15 million Pax):**
  - Istanbul Ataturk, Athens
- **Small/Med Airports (< 15 million Pax):**
  - Tallinn, Riga

N. America:

- **Large Airports (> 15 million Pax):**
  - Charlotte, Atlanta
- **Small/Med Airports (< 15 million Pax):**
  - Richmond, Raleigh-Durham

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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, 2011 (in US$)

© Air Transport Research Society (ATRS)
Asia Pacific: Landing Charge for Airbus 320, 2011 (in US$)
Europe: Landing Charge for Airbus 320, 2011 (in US$)
North America: Landing Charge for Airbus 320, 2011 (in US$)

Landing Charges for Airbus 320
Mean

© Air Transport Research Society (ATRS)
Summary – Landing/Takeoff Charges for Airbus 320, 2011

Asia-Pacific:
- Highest charges: Tokyo Haneda, Sydney
- Lowest charges: Kuala Lumpur, Guam

Europe:
- Highest charges: London Gatwick-peak, London Heathrow
- Lowest charges: Stockholm, Malta

North America:
- Highest charges: Toronto, LaGuardia
- Lowest charges: Charlotte, Atlanta
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 Boeing 767, 2011 (in US$)
Europe: Combined Landing and Passenger Charge for Boeing 767, 2011 (in US$)
Summary – Combined Landing and Passenger Charges (Boeing 767)

Asia-Pacific:
- Highest charges: Nadi (Fiji), Kansai
- Lowest charges: Kuala Lumpur Low Cost Carrier Terminal, Dunedin (New Zealand)

Europe:
- Highest charges: London Heathrow, Ben Gurion (Tel Aviv)
- Lowest charges: Riga, Luxembourg
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: Cost per Enplaned Passenger, 2010 (in US$)
Summary – Cost per Enplaned Passenger (CPE)

United States:

• Highest CPE: New York JFK, Newark Liberty
• Lowest CPE: Bob Hope, Dallas Love Field

Canada

• Highest CPE: Toronto, Montreal
• Lowest CPE: Victoria, Regina,
ATRS Airport Benchmarking Report

- The ATRS Global Airport Performance Benchmarking Report: 3 volumes, over 600 pages of valuable data and analysis.

- Can be purchased by visiting www.atrsworld.org

- Report sale finances our annual benchmarking research project

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