

# Key Findings of 2013 ATRS Global Airport Performance Benchmarking project



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# 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

Data

Airport  
Characteristics

Methodology

Efficiency & Cost

User Charge

# OBJECTIVE OF THE BENCHMARKING STUDY

- ❑ To provide a comprehensive, unbiased comparison of airport performance focusing on
  - **Productivity and Operating/Mgt Efficiency**
  - **Unit Cost Competitiveness**
  - **Airport User Charges**
- ❑ Our study **does not treat service quality differentials** across airports because of our research resource constraints





**2013 ATRS Global Airport Performance Benchmarking Project**

# **Airport Database**

# Airports Included in the 2012 Report

Canada (12)+US(65)      77 airports

Europe                      77 airports  
                                    17 airport groups

12 New

1 New

Asia Pacific                35 Asian airports  
                                    16 Oceania airports  
                                    9 airport groups

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**Total                              195 airports**  
    **26 airport groups**



# ATRS AIRPORT DATABASE, FY 2002-2011

- ❑ The ATRS Database contains historic information (since FY 2002) including financial data, traffic and capacity data for the major airports and airport groups in the following geographic regions:
  - **Asia Pacific including Oceania; Europe; North America**
  - Limited data on S. America and Africa
- ❑ The data in each continent is segregated into:
  - **Traffic statistics and composition**
  - **Airport characteristics** (runways, terminals, ownership form, etc)
  - **Aeronautical Activities and Revenue**
  - **Non-Aeronautical Activities and Revenue**
  - **Labor input and other Operating Expenses**
  - **Financial info obtained from Balance Sheets**
- ❑ Visit <http://www.atrsworld.org/Database.html> for more details and to purchase.



## Data Sources: FY 2002-2011

- ❑ 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

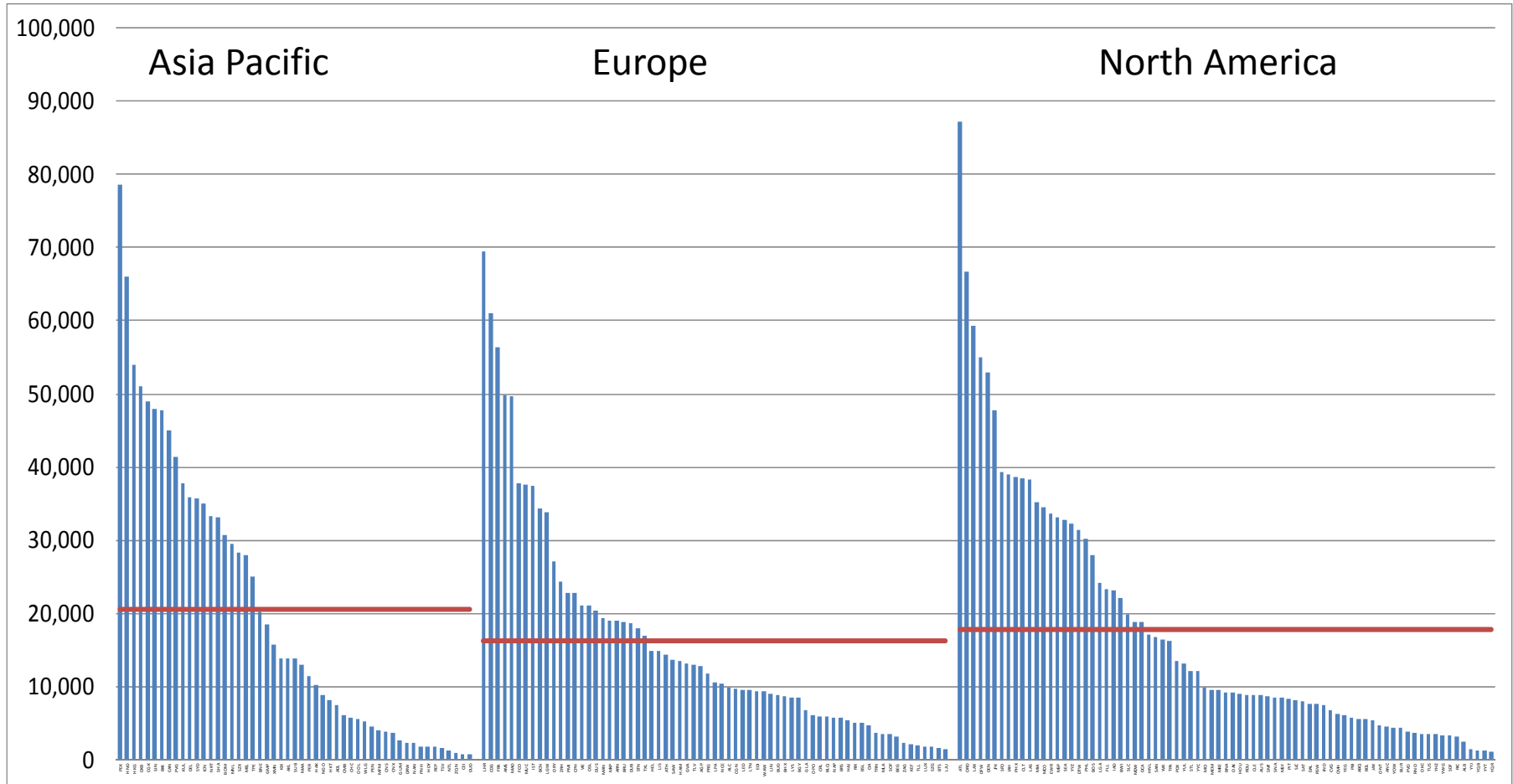


**2013 ATRS Global Airport Performance Benchmarking Project**

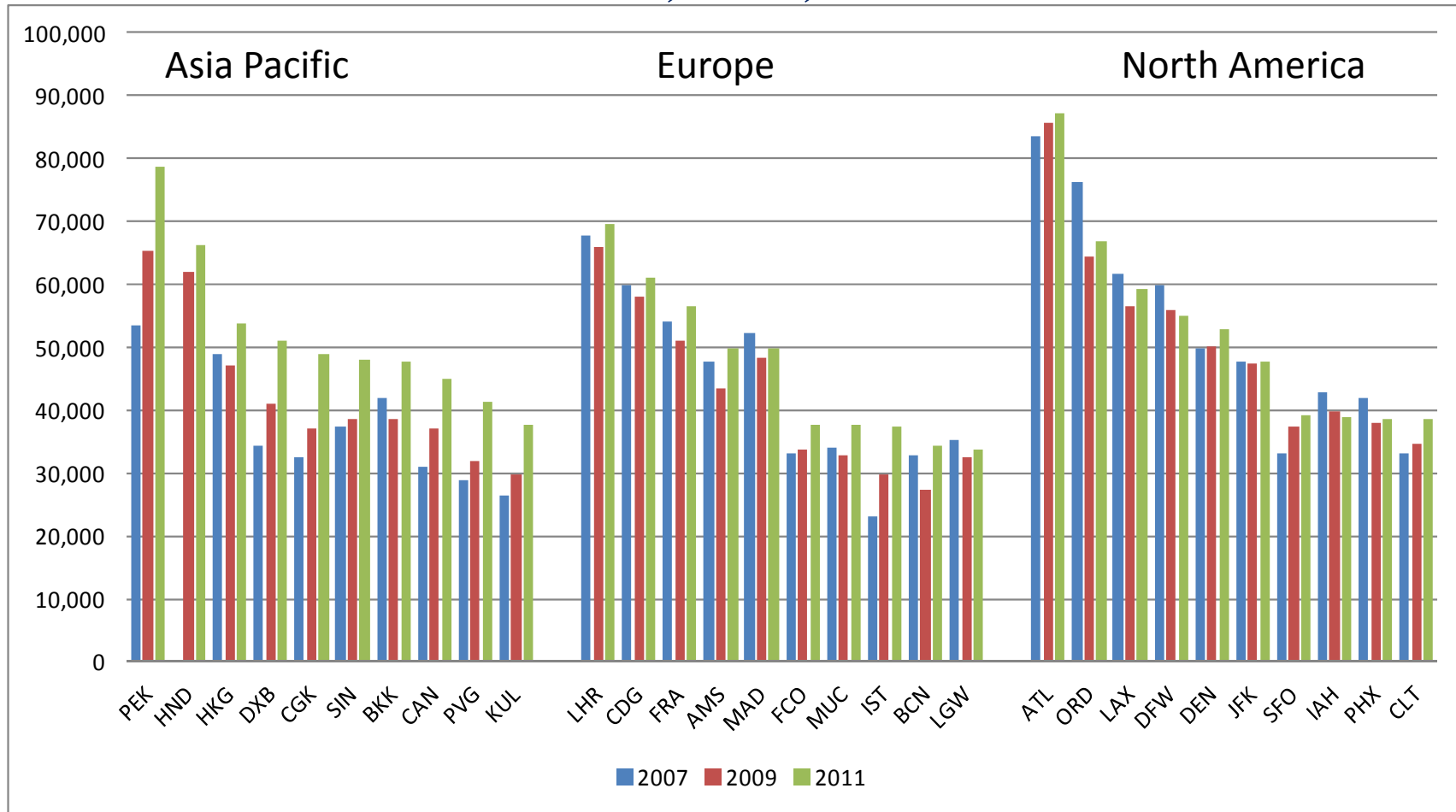
# **Airport Characteristics**



# PASSENGERS TRAFFIC, FY2011 (IN '000 PASSENGERS)

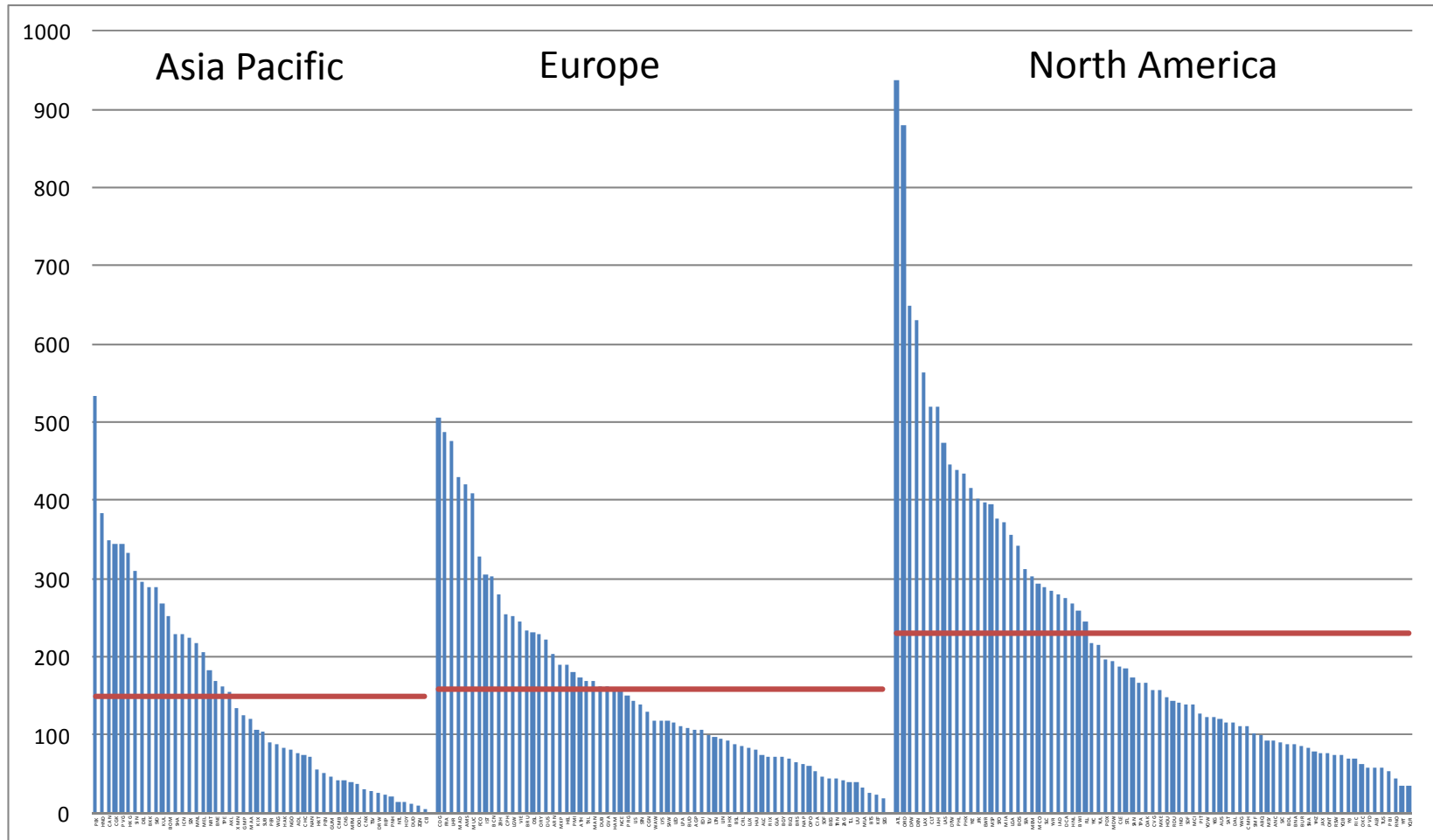


# PASSENGER TRAFFIC ('000)- TOP 10 AIRPORTS: FY 2007, 2009, 2011



# AIRCRAFT MOVEMENTS, FY 2010

## ('000 ATM)



Objective

Data

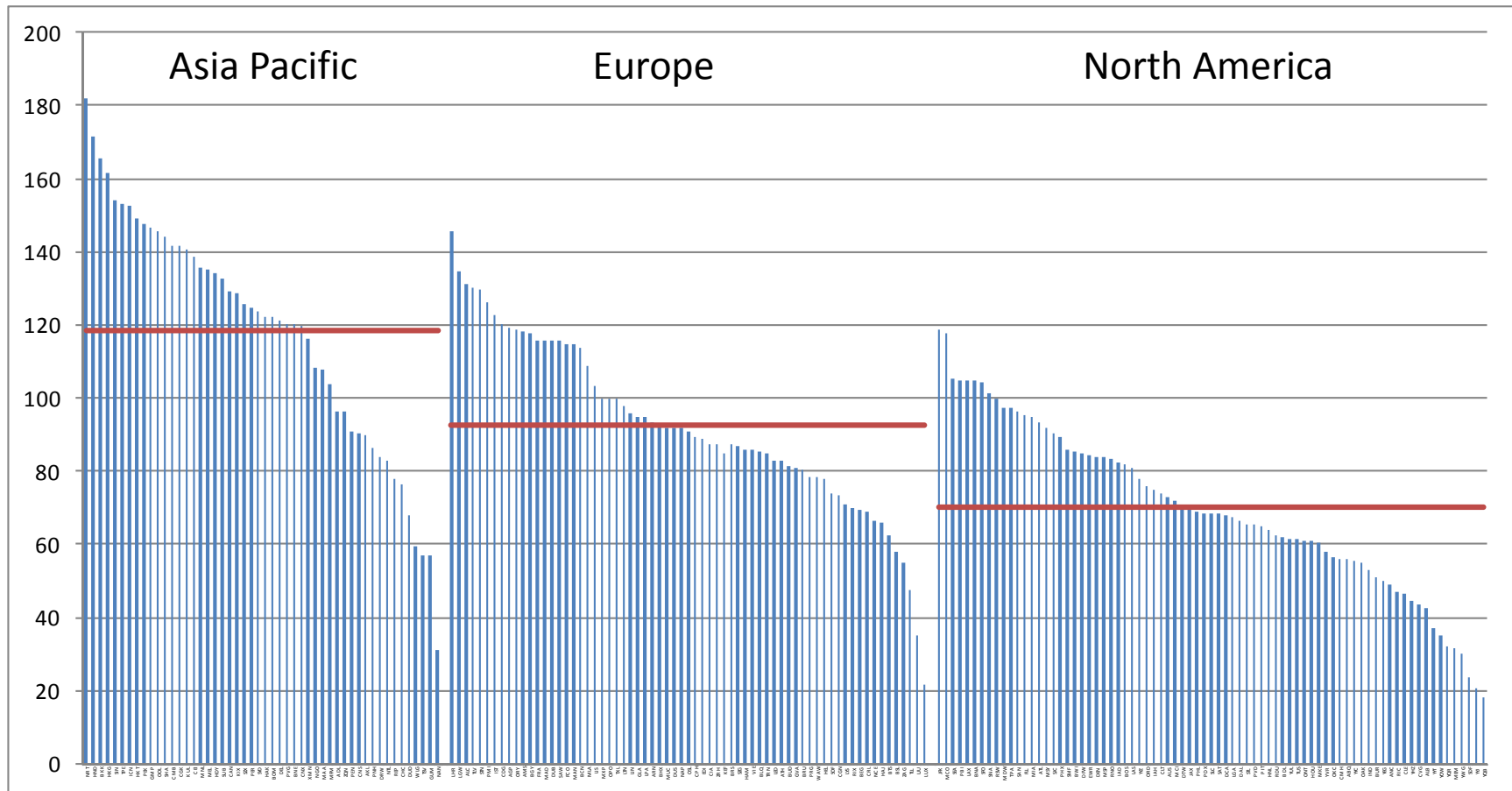
**Airport  
Characteristics**

Methodology

Efficiency & Cost

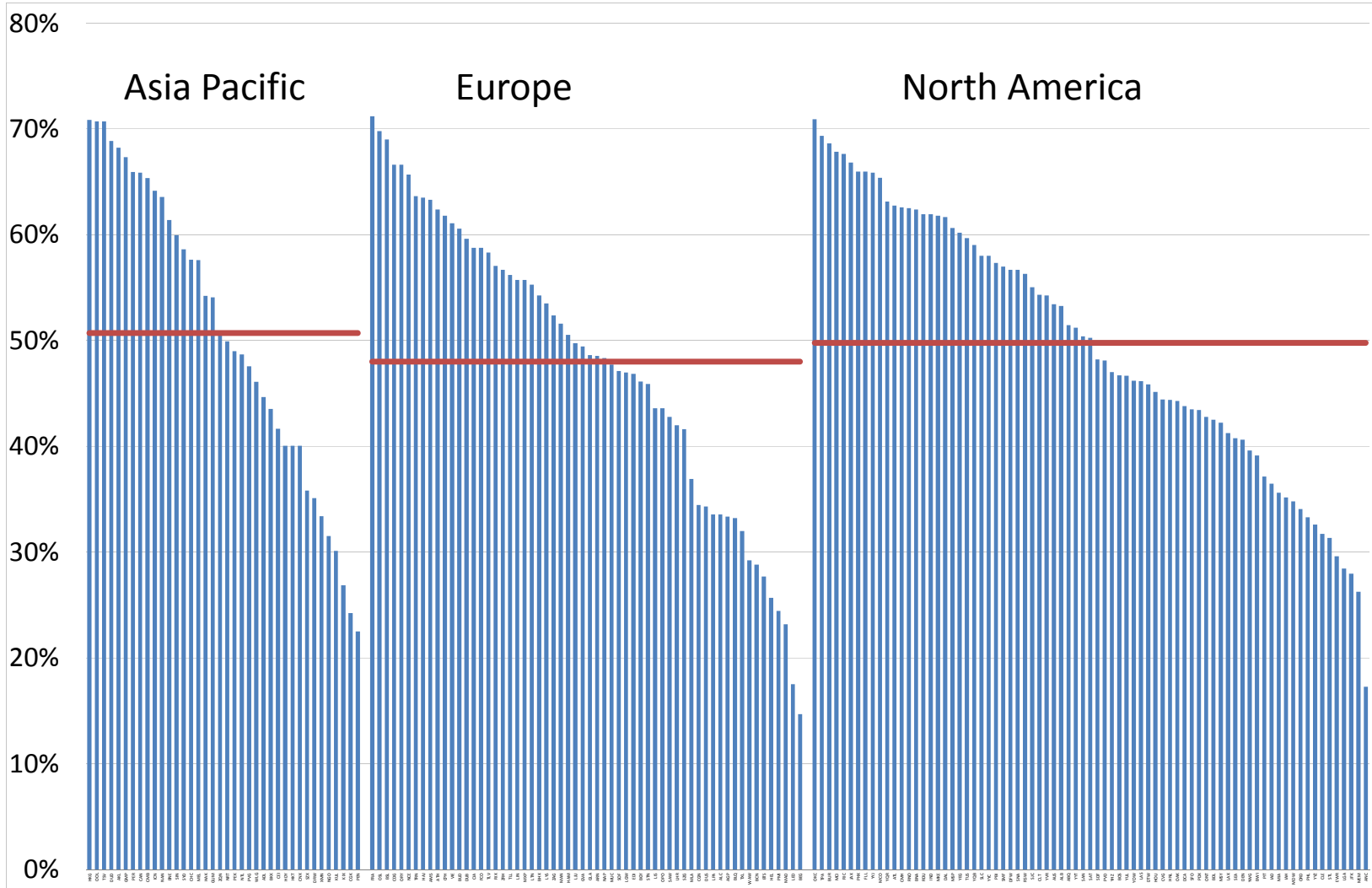
User Charge

# PASSENGERS PER AIRCRAFT MOVEMENTS, FY 2011





# % NON-AERO REVENUE, FY 2011





**2013 ATRS Global Airport Performance Benchmarking Project**

# Methodology

# AIRPORT PRODUCTIVITY INDEX

## Outputs

- Aircraft movement
- Passenger
- {Cargo tonnes}
- Non-aeronautical revenue output

## Inputs

- Labour
- Other non-capital (soft-cost) input
- [Runways, terminal size, # of gates]

Objective

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# METHODOLOGY: EFFICIENCY MEASUREMENT

## ❑ Variable Factor Productivity (VFP) Index

- Impossible - Total Factor Productivity (TFP) because of capital input cost accounting problem (comparable across different countries)

## ❑ Unit Operating Cost Competitiveness Index: Combines **VFP** and **Input Price Index**





# MULTILATERAL AGGREGATION METHOD

- This **multilateral output (input)** index procedure uses the following revenue (cost) shares to aggregate output (inputs)

$$\ln \frac{Y_i}{Y_j} = \sum \frac{R_{ki} + \bar{R}_k}{2} \ln \frac{Y_{ki}}{\tilde{Y}_k} - \sum \frac{R_{kj} + \bar{R}_k}{2} \ln \frac{Y_{kj}}{\tilde{Y}_k}$$

$$\ln \frac{X_i}{X_j} = \sum \frac{W_{ki} + \bar{W}_k}{2} \ln \frac{X_{ki}}{\tilde{X}_k} - \sum \frac{W_{kj} + \bar{W}_k}{2} \ln \frac{X_{kj}}{\tilde{X}_k}$$

Objective

Data

Airport  
Characteristics

Methodology

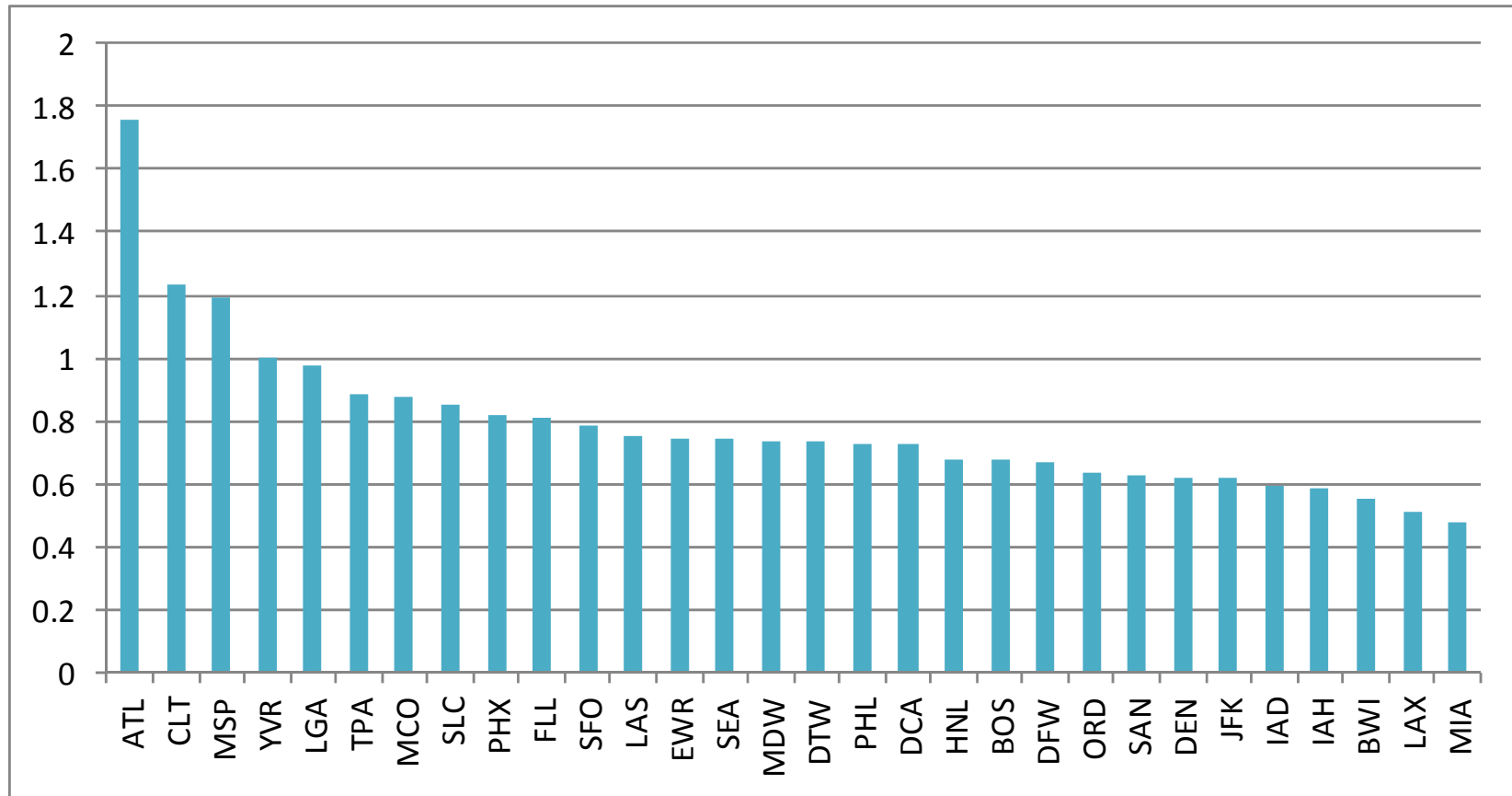
Efficiency & Cost

User Charge

# **GROSS** VARIABLE FACTOR PRODUCTIVITY (VFP)

## **NORTH AMERICA LARGE AIRPORTS**

(YVR=1.0), FY 2011



# 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) after removing effects of these Factors**

Objective

Data

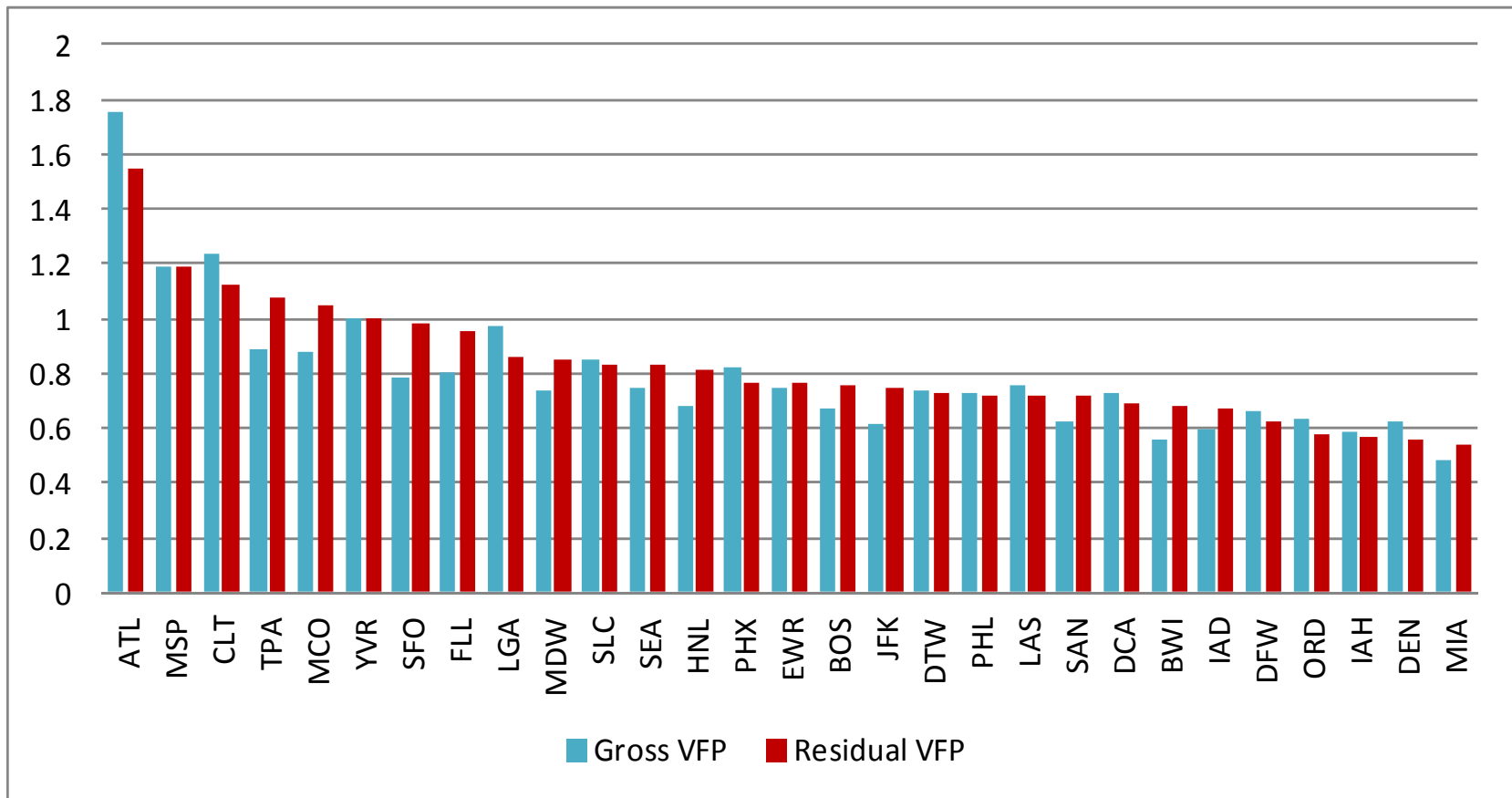
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# GROSS VARIABLE FACTOR PRODUCTIVITY VS RESIDUAL VFP: NORTH AMERICA (YVR=1.0), FY 2011





# ALTERNATIVE APPROACHES

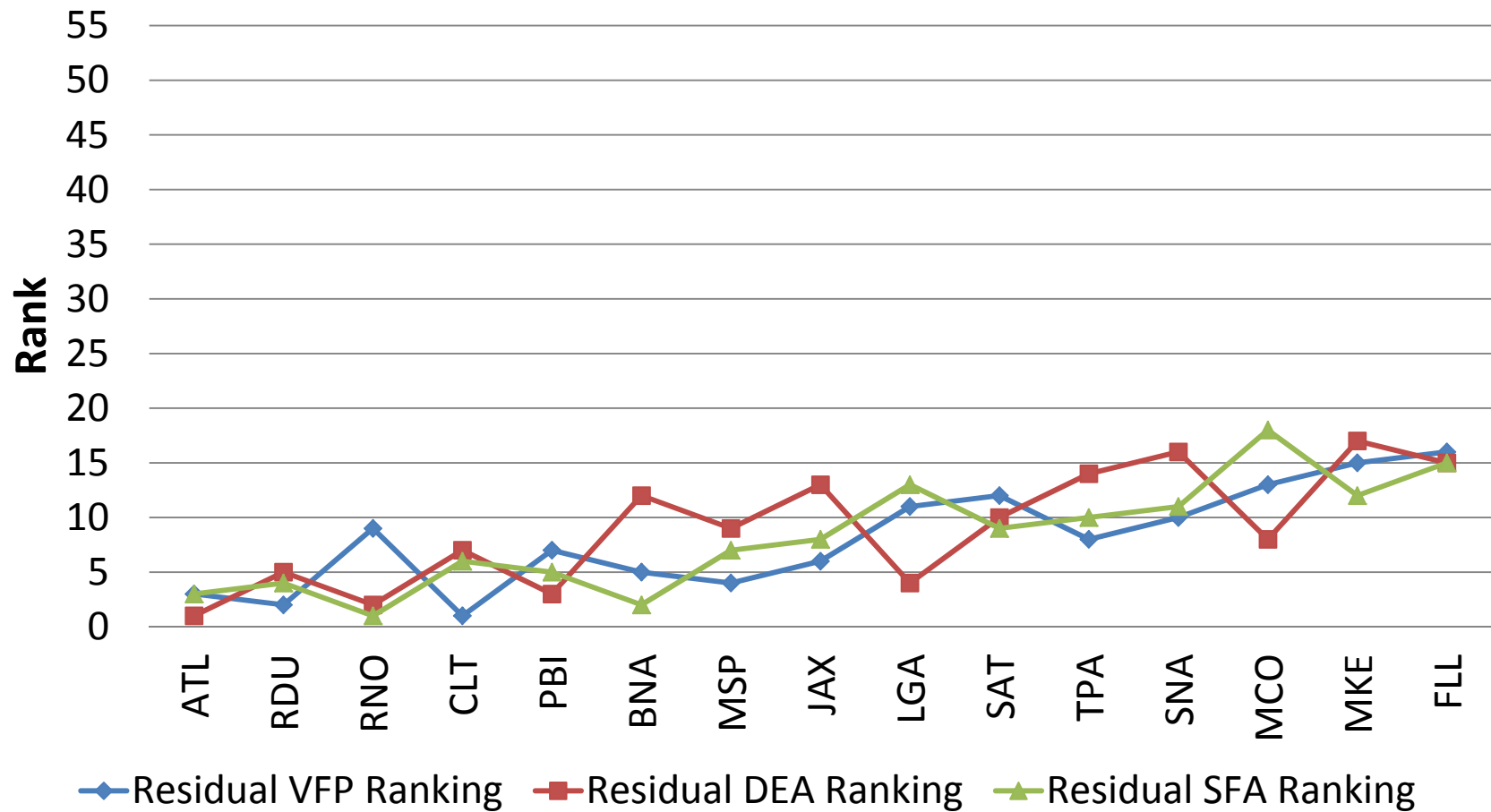
## □ We explored Alternative approaches:

- Data Envelopment Analysis (DEA)
- Econometric Cost Function Approach including Stochastic Frontier methods (SFA)

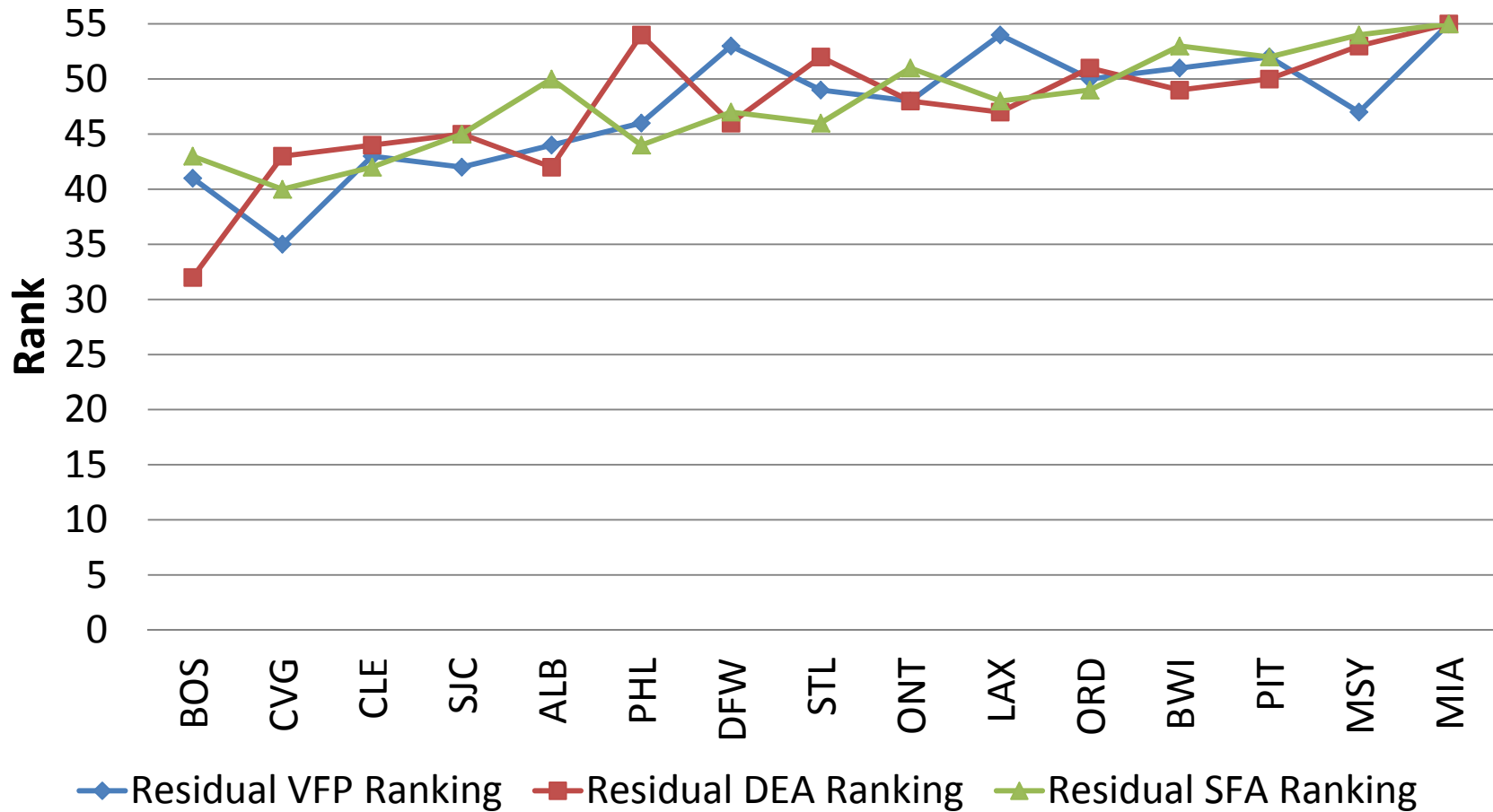
□ The rankings for **top and bottom ranked airports** are **consistent** despite using VFP, DEA or SFA.

**Note: Industry acceptance of our report using more advanced/sophisticated methods is one of our major concern**

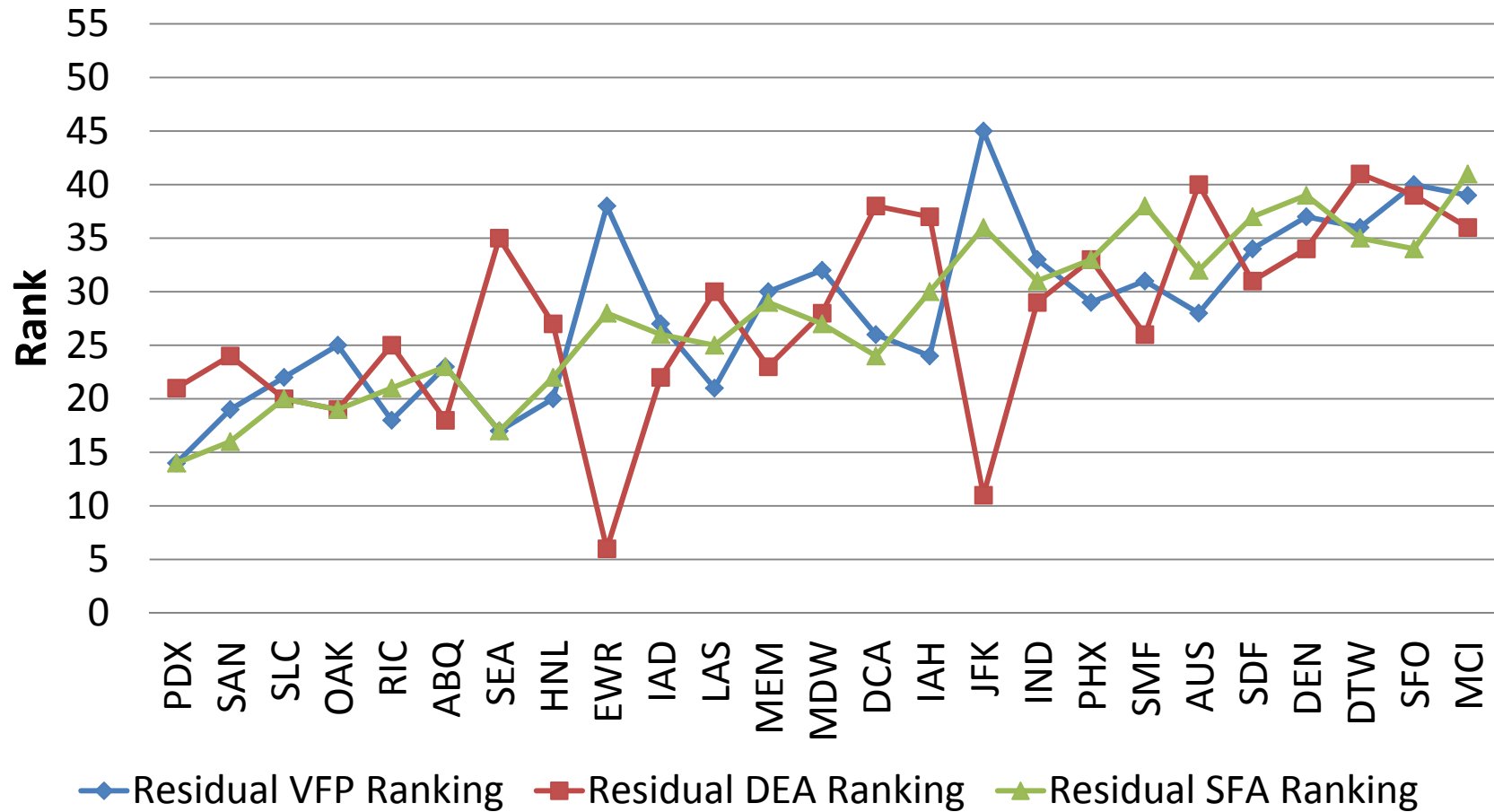
# RESIDUAL RANKING COMPARISON OF TOP 15 AIRPORTS IN US



# RESIDUAL RANKING COMPARISON OF BOTTOM 15 AIRPORTS IN US



# RESIDUAL RANKING COMPARISON OF MID-RANKED 15 AIRPORTS IN US



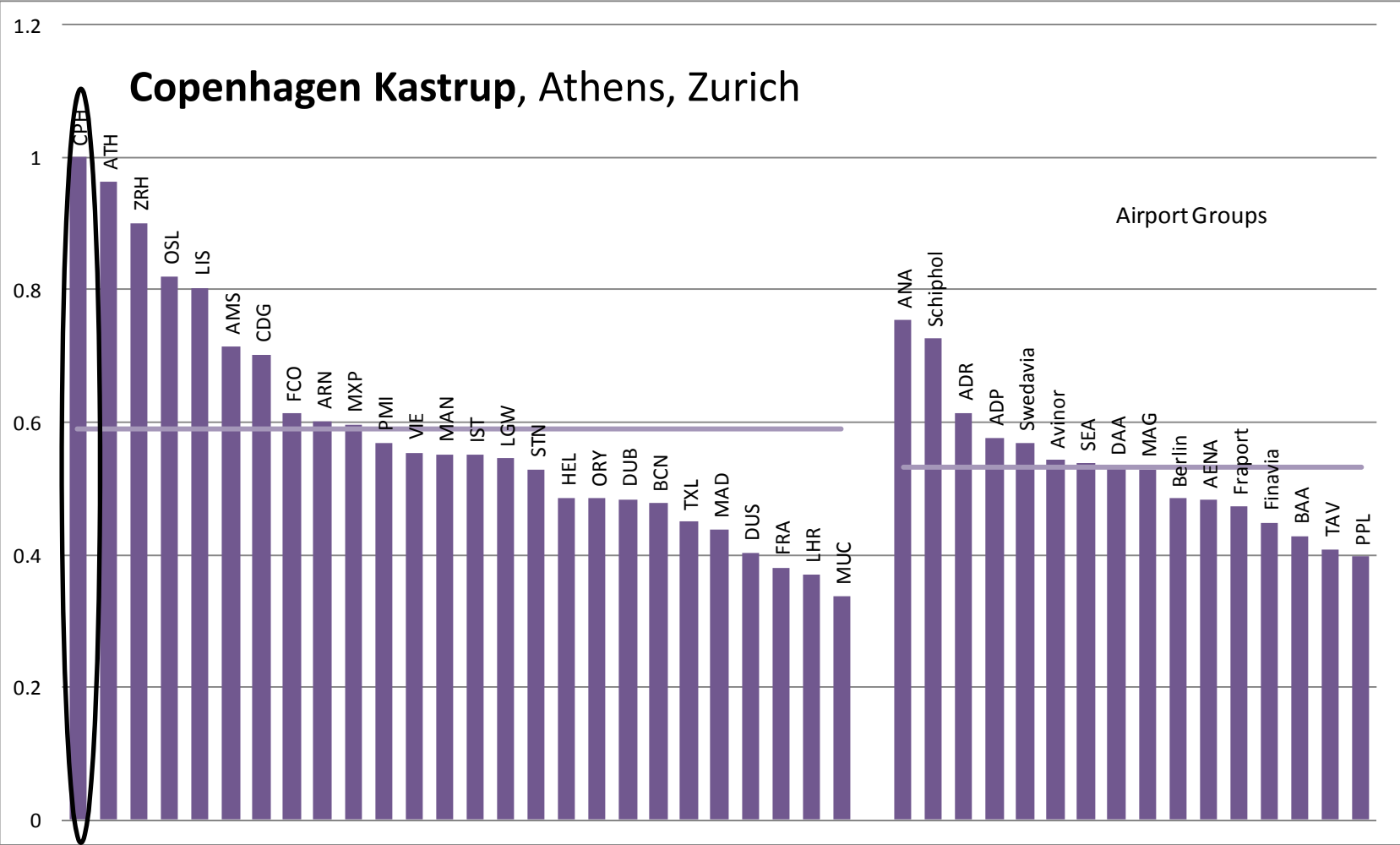


A photograph of an airport terminal interior. The scene is dominated by a large, multi-paned window that looks out onto an airfield. The ceiling is a complex, grid-like structure with recessed lighting. In the foreground, several people are silhouetted against the bright light from the window. A prominent directional sign is mounted on a stand in the middle ground. The sign is black with yellow and white text and arrows. It provides directions to gates M0-M1-M2 and M3-M4-M5, and also displays gate status information for 'Puertas Cerradas' (Closed Gates) at 01:29 and 30:59. The floor is highly reflective, showing clear reflections of the people and the sign. The overall atmosphere is one of a busy, modern airport environment.

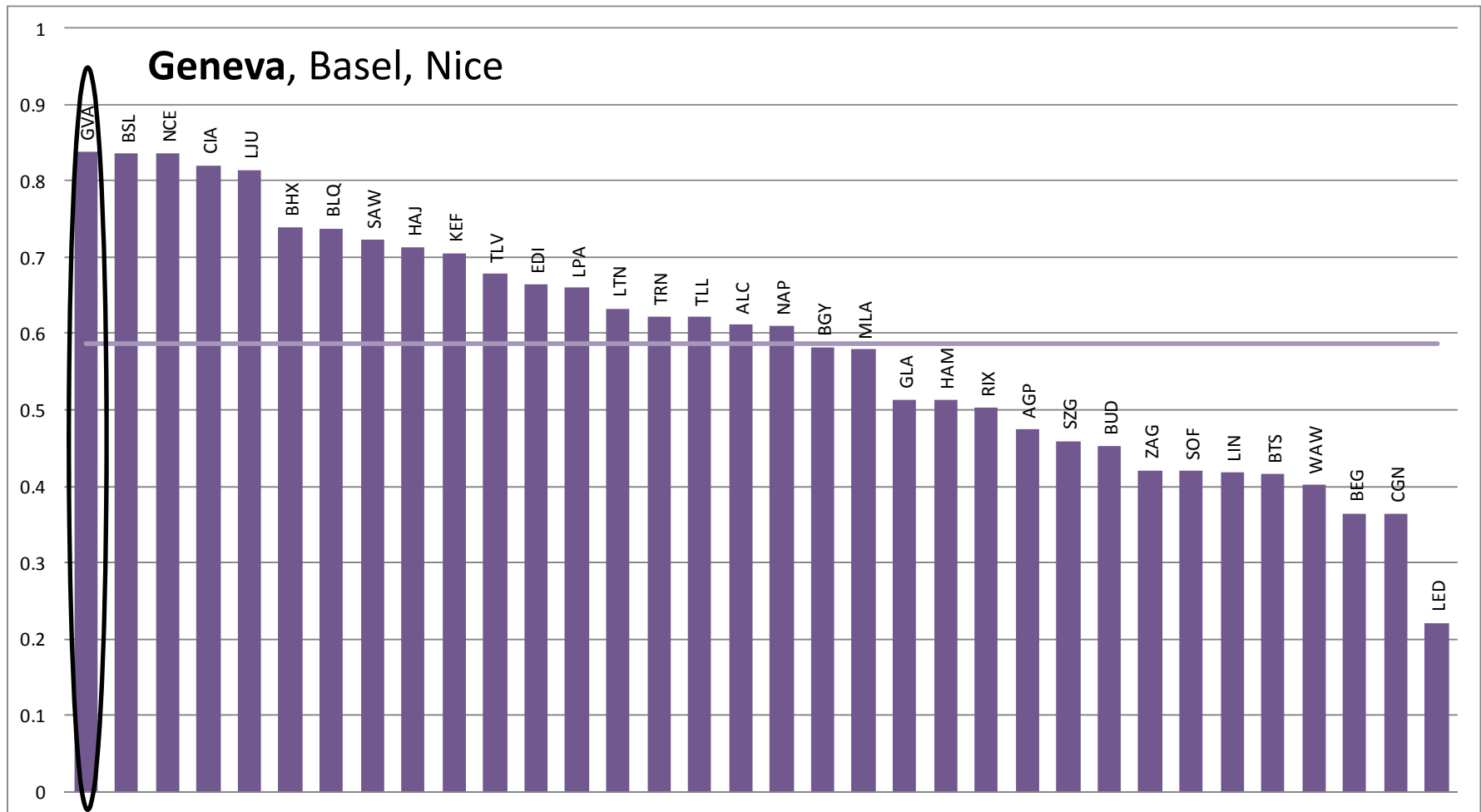
**2013 ATRS Airport Benchmarking**

# Key Results on Efficiency & Cost

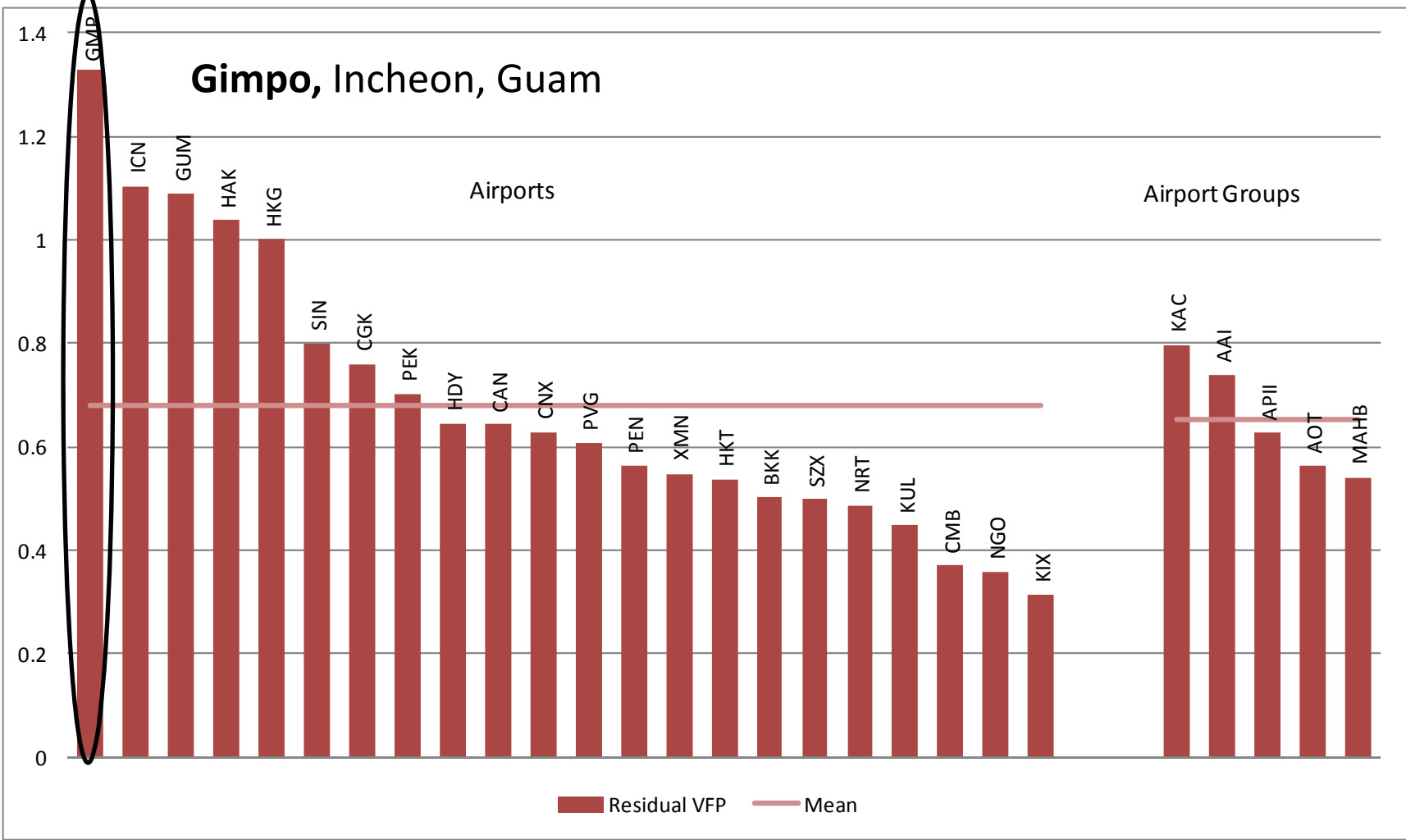
# RESIDUAL (NET) VARIABLE FACTOR PRODUCTIVITY (VFP): EUROPE LARGE AIRPORTS (CPH=1.0), FY 2011



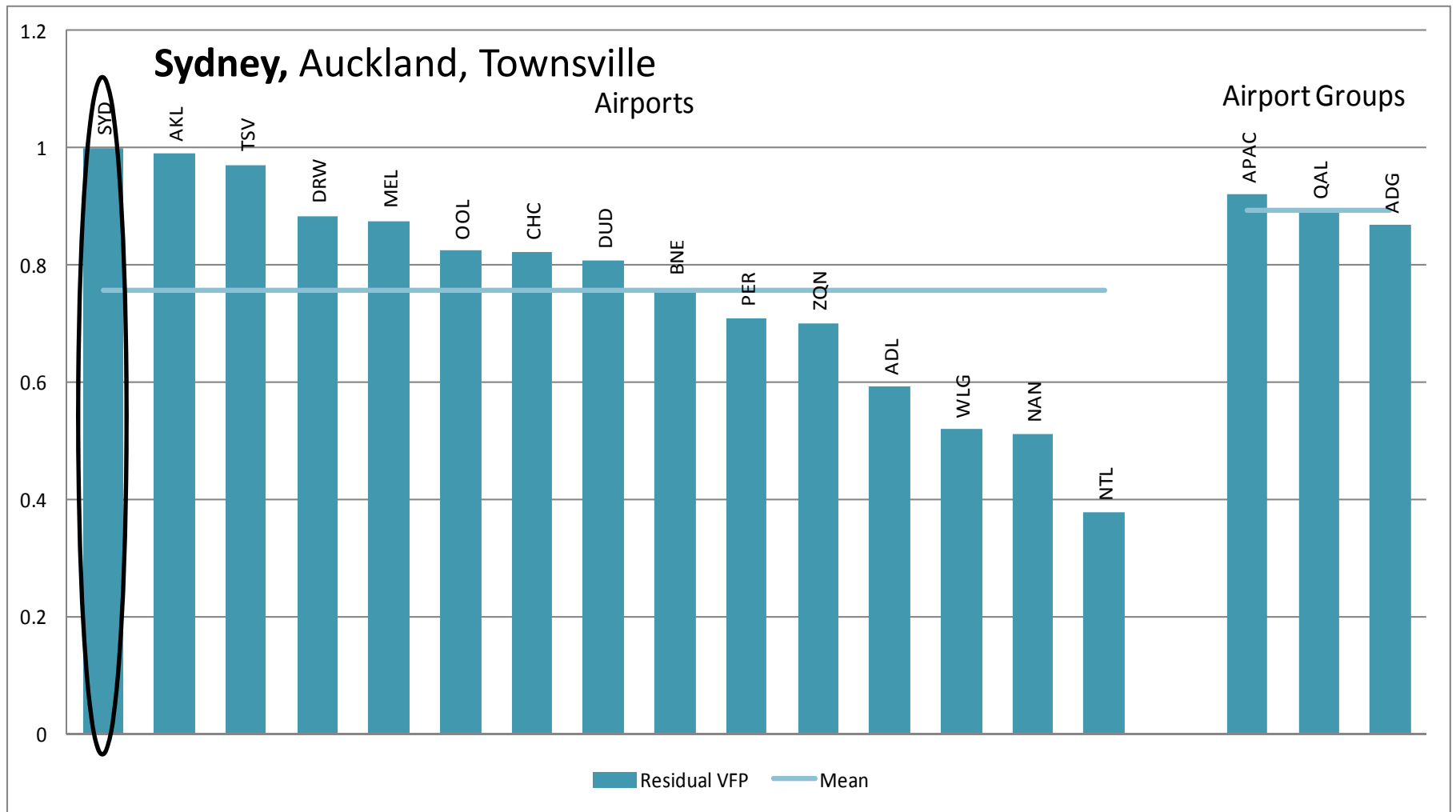
# RESIDUAL (NET) VARIABLE FACTOR PRODUCTIVITY (VFP): EUROPE SMALL & MEDIUM AIRPORTS (CPH=1.0), FY 2011



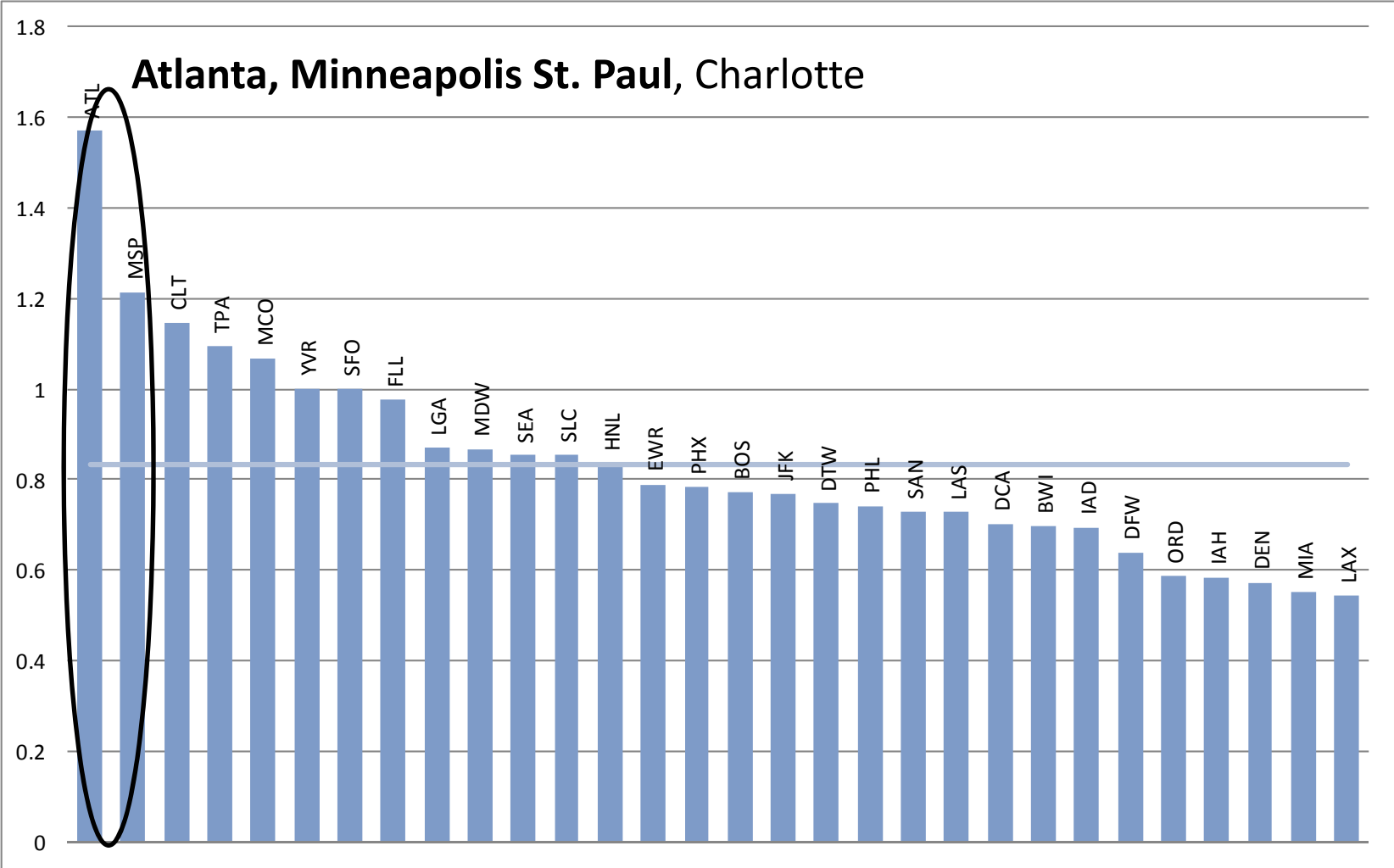
# RESIDUAL (NET) VARIABLE FACTOR PRODUCTIVITY (VFP): ASIA (HKG=1.0), FY 2011



# RESIDUAL (NET) VARIABLE FACTOR PRODUCTIVITY (VFP): OCEANIA (SYD=1.0), FY 2011

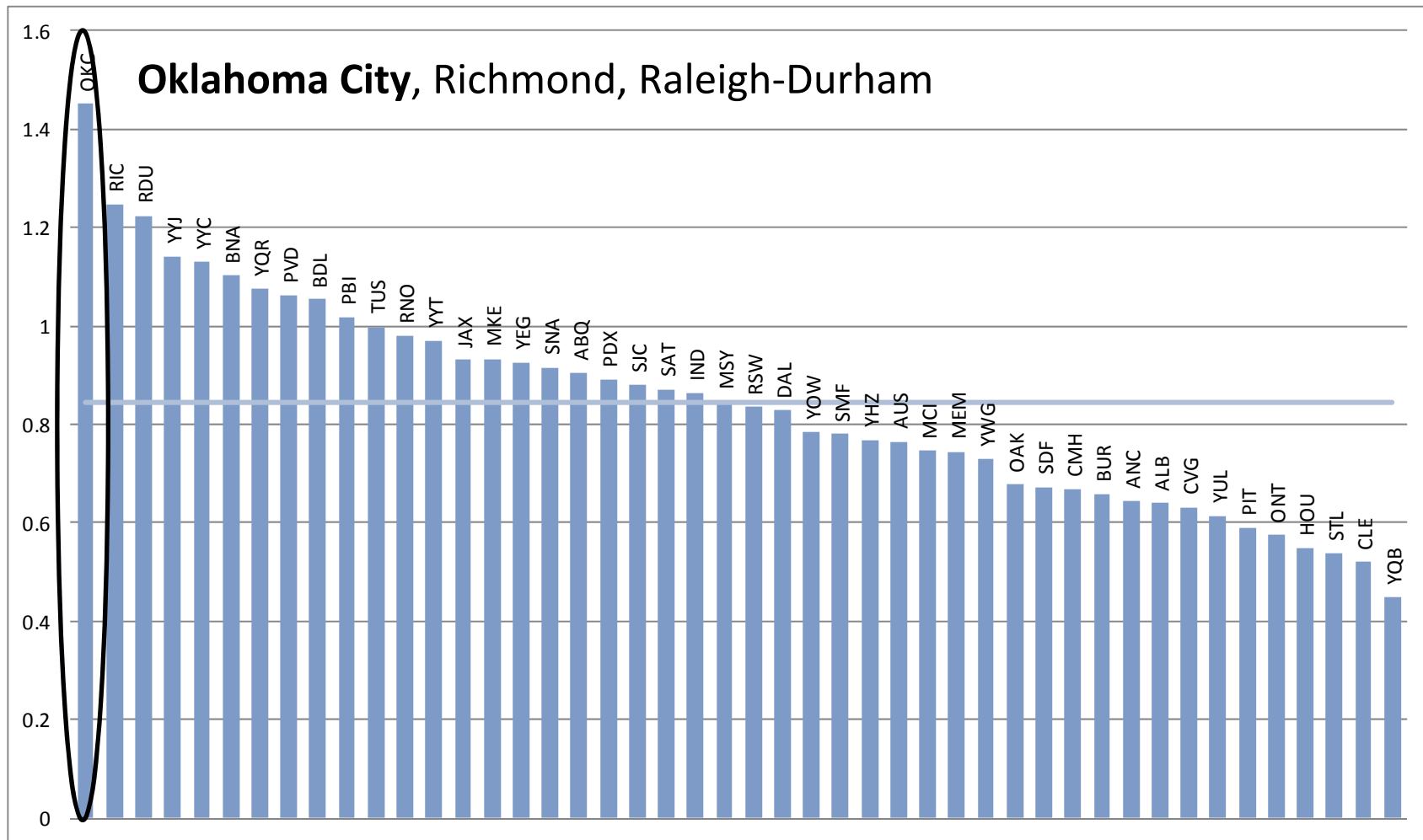


# RESIDUAL (NET) VARIABLE FACTOR PRODUCTIVITY (VFP): NORTH AMERICA LARGE AIRPORTS (YVR=1.0), FY 2011





# RESIDUAL (NET) VARIABLE FACTOR PRODUCTIVITY (VFP): N. AMERICA SMALL & MEDIUM AIRPORTS (YVR=1.0), FY 2011



# TOP EFFICIENCY PERFORMERS (2013)

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

## Asia Pacific:

- Asian Airports:
  - **Gimpo**, Incheon, Guam
- Oceania Airports:
  - **Sydney**, Auckland, Townsville



## Europe:

- Large Airports (> 15 million pax):
  - **Copenhagen Kastrup**, Athens, Zurich
- Small/Medium Airports (< 15 millions Pax):
  - **Geneva**, Basel, Nice



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# TOP EFFICIENCY PERFORMERS (2013)

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

## North America:

- Large Airports (> 15 million pax):
  - {Atlanta (Globally Most Efficient Airport)}
  - **Minneapolis St Paul**, Charlotte, Tampa
- Small/Medium Airports (< 15 millions Pax):
  - **Oklahoma City**, Richmond, Raleigh-Durham



## Global (10<sup>th</sup> Global Excellence Award)

- **Hartsfield-Jackson Atlanta International Airport**



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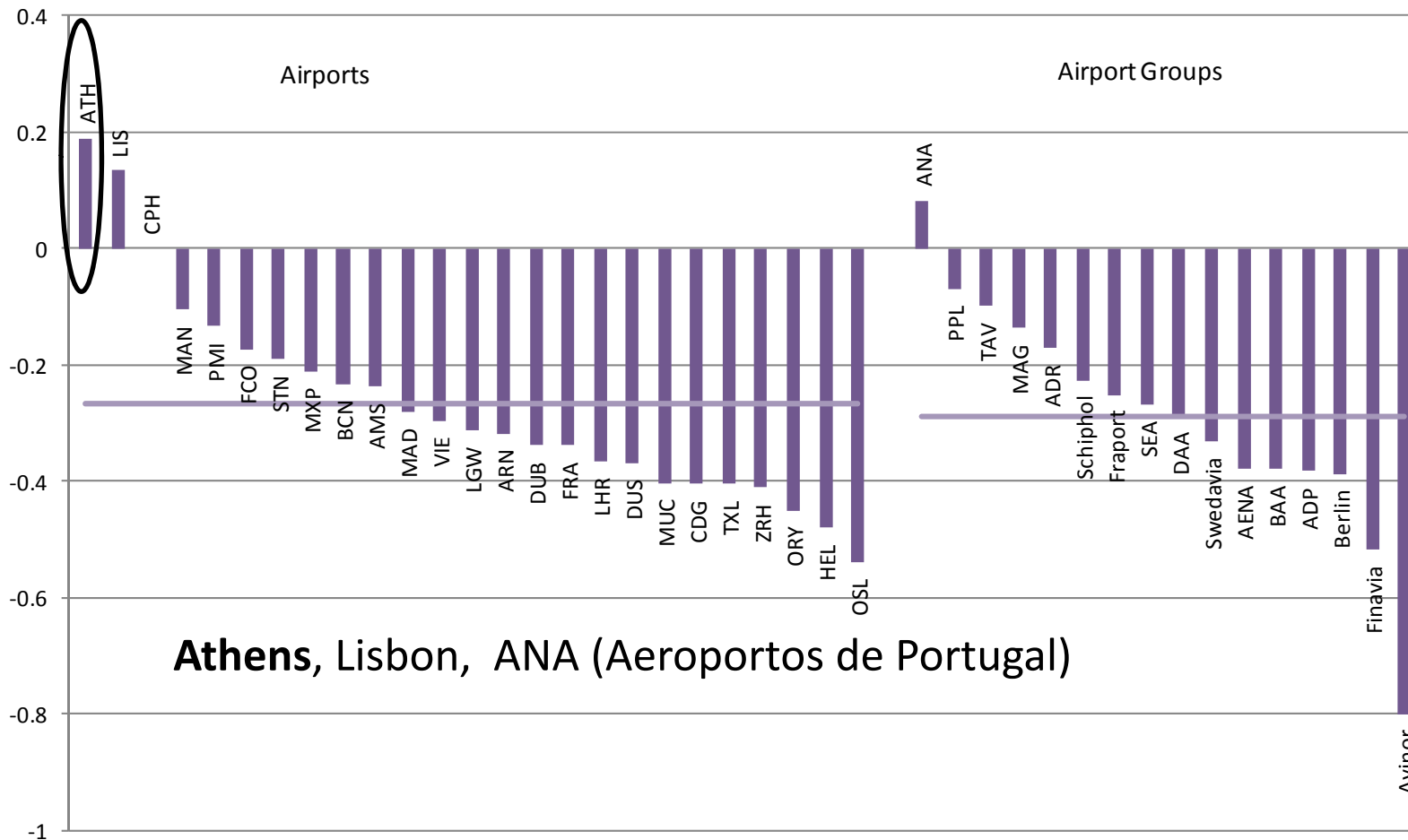
# PAST AIRPORT EFFICIENCY EXCELLENCE TOP PERFORMERS, 2008 - 2012

	2008	2009	2010	2011	2012
North America	Hartsfield-Jackson Atlanta International Airport	Hartsfield-Jackson Atlanta International Airport	Hartsfield-Jackson Atlanta International Airport	Hartsfield-Jackson Atlanta International Airport	Hartsfield-Jackson Atlanta International Airport
Europe	Copenhagen Kastrup International Airport	Copenhagen Kastrup International Airport	<u>Large Airport Category:</u> Oslo International Airport <u>Small/Medium Airport Category:</u> Geneva Cointrin International Airport	<u>Large Airport Category:</u> Oslo International Airport <u>Small/Medium Airport Category:</u> Copenhagen Kastrup International Airport <u>Small/Medium Airport Category:</u> Genève Aéroport	<u>Large Airport Category:</u> Copenhagen Kastrup International Airport <u>Small/Medium Airport Category:</u> Genève Aéroport
Asia-Pacific	Hong Kong International Airport	Hong Kong International Airport	<u>Large Airport Category:</u> Hong Kong International Airport <u>Small/Medium Airport Category:</u> Seoul Gimpo International Airport	<u>Asian Airport Excellence Award:</u> Hong Kong International Airport <u>Oceania Excellence Award:</u> Sydney Airport	<u>Asian Airport Excellence Award:</u> Seoul Gimpo International Airport <u>Oceania Excellence Award:</u> Sydney Airport



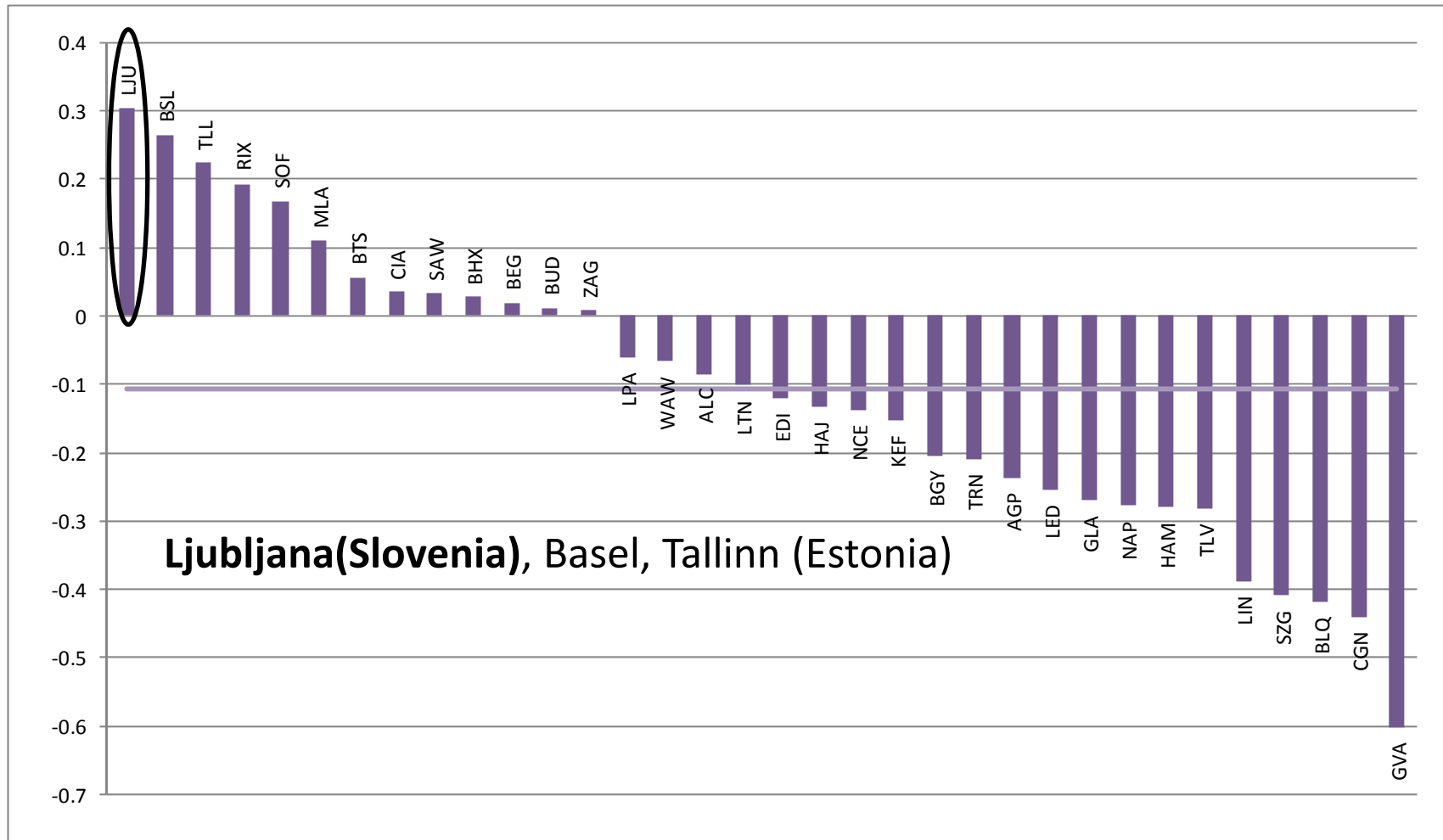
# COST COMPETITIVENESS = NET VFP AND INPUT PRICE EFFECT

## EUROPE - LARGE AIRPORTS (CPH=0.0)



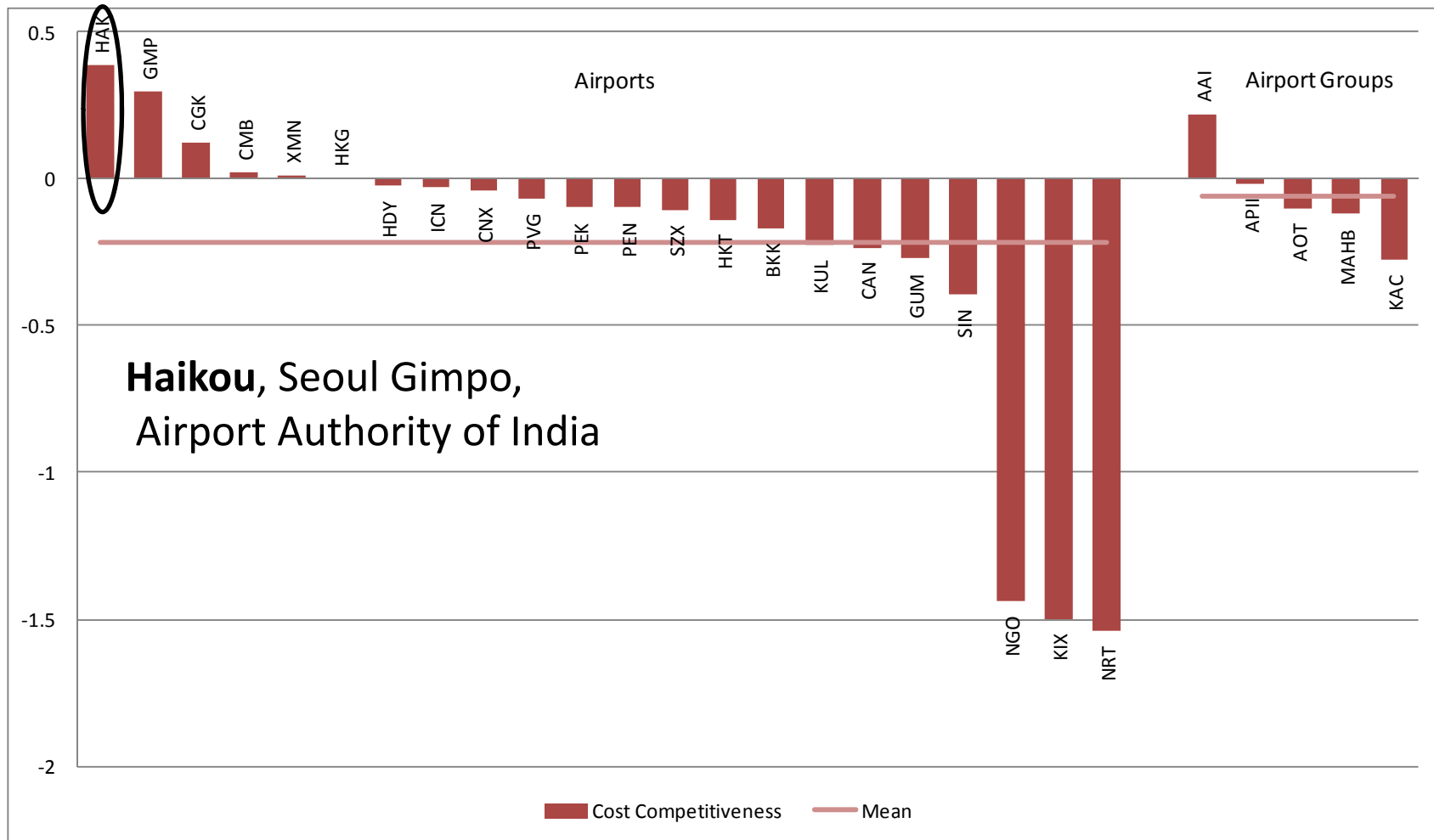
# COST COMPETITIVENESS = NET VFP AND INPUT PRICE EFFECT

## EUROPE - SMALL & MEDIUM AIRPORTS (CPH=0.0)



# COST COMPETITIVENESS = NET VFP AND INPUT PRICE EFFECT

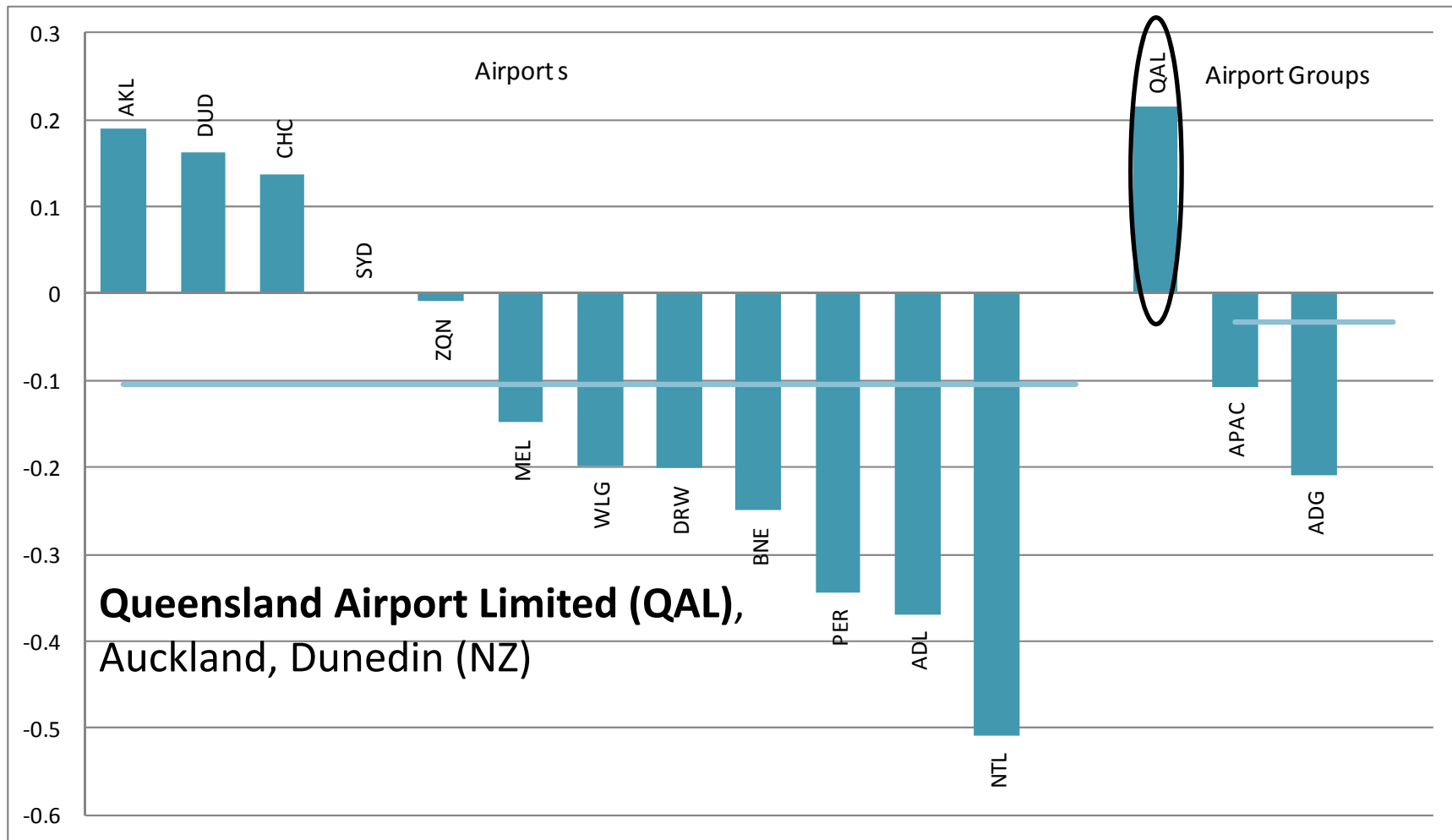
## ASIA (HKG=0.0) – THE HIGHER THE BETTER





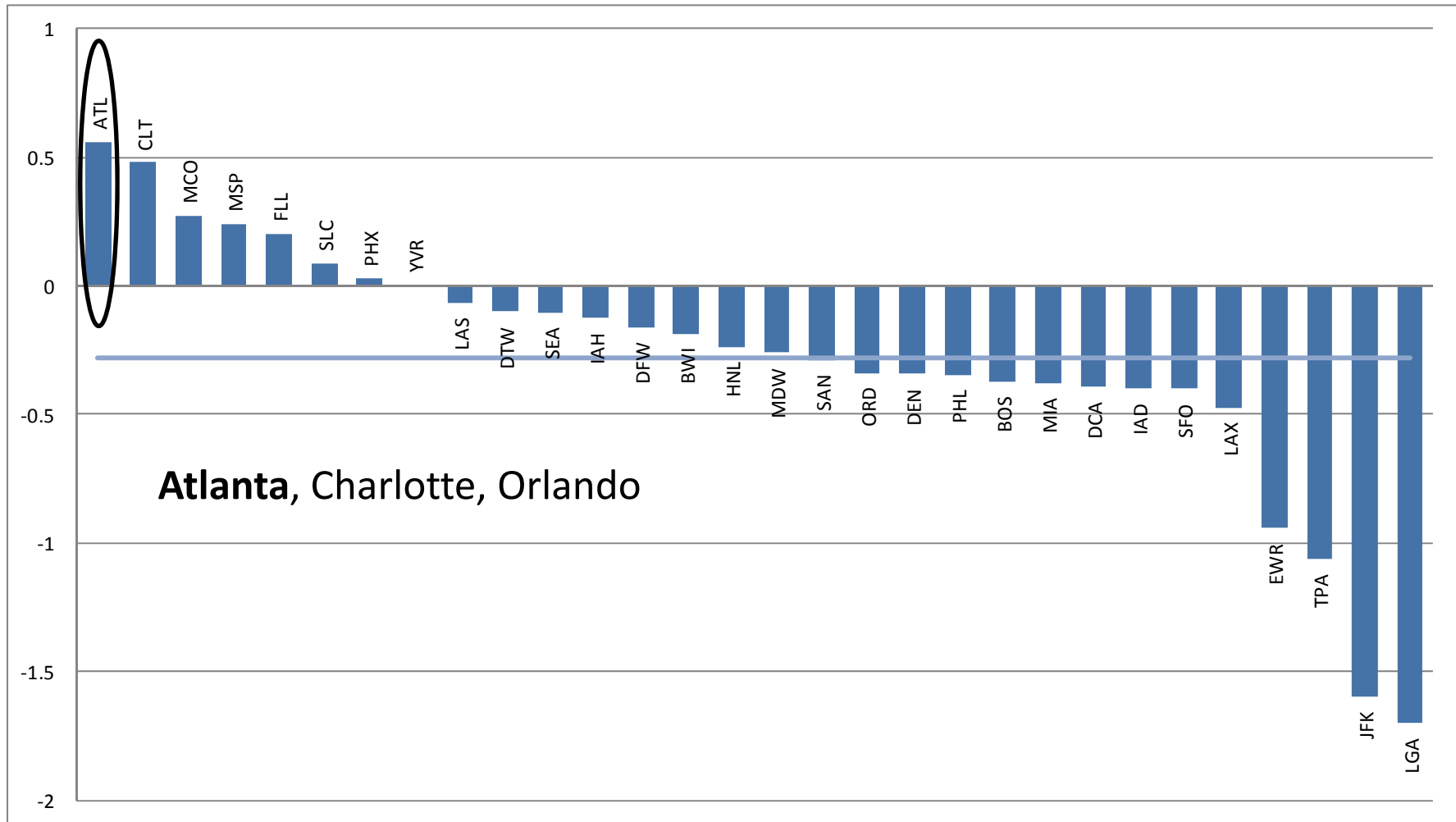
# COST COMPETITIVENESS = NET VFP AND INPUT PRICE EFFECT

## OCEANIA (SYD=0.0)



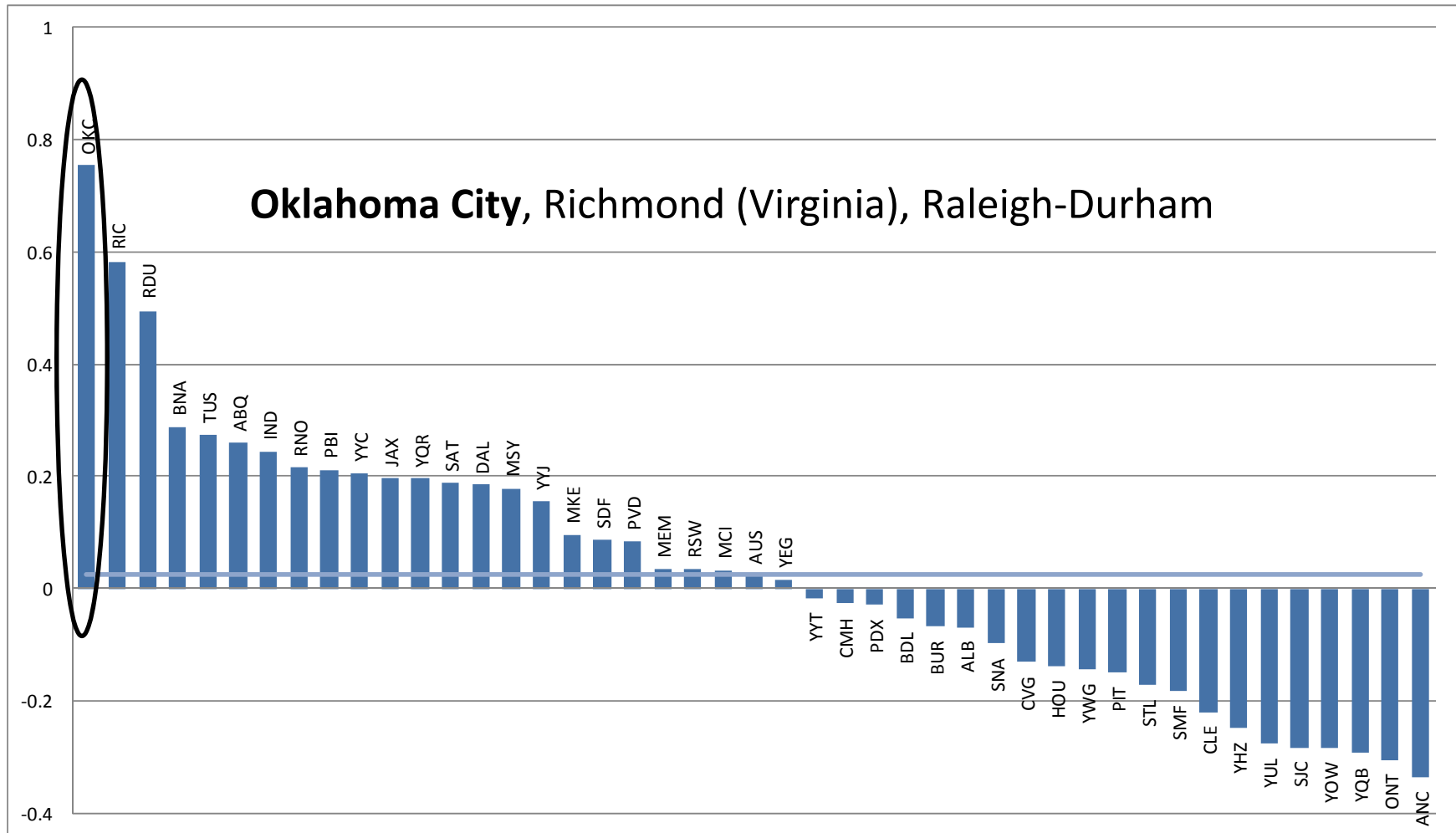
# COST COMPETITIVENESS = NET VFP AND INPUT PRICE EFFECT

## N. AMERICA - LARGE AIRPORTS (YVR=0.0)



# COST COMPETITIVENESS: = NET VFP AND INPUT PRICE EFFECT

## N. AMERICA - SMALL & MEDIUM AIRPORTS (YVR=0.0)

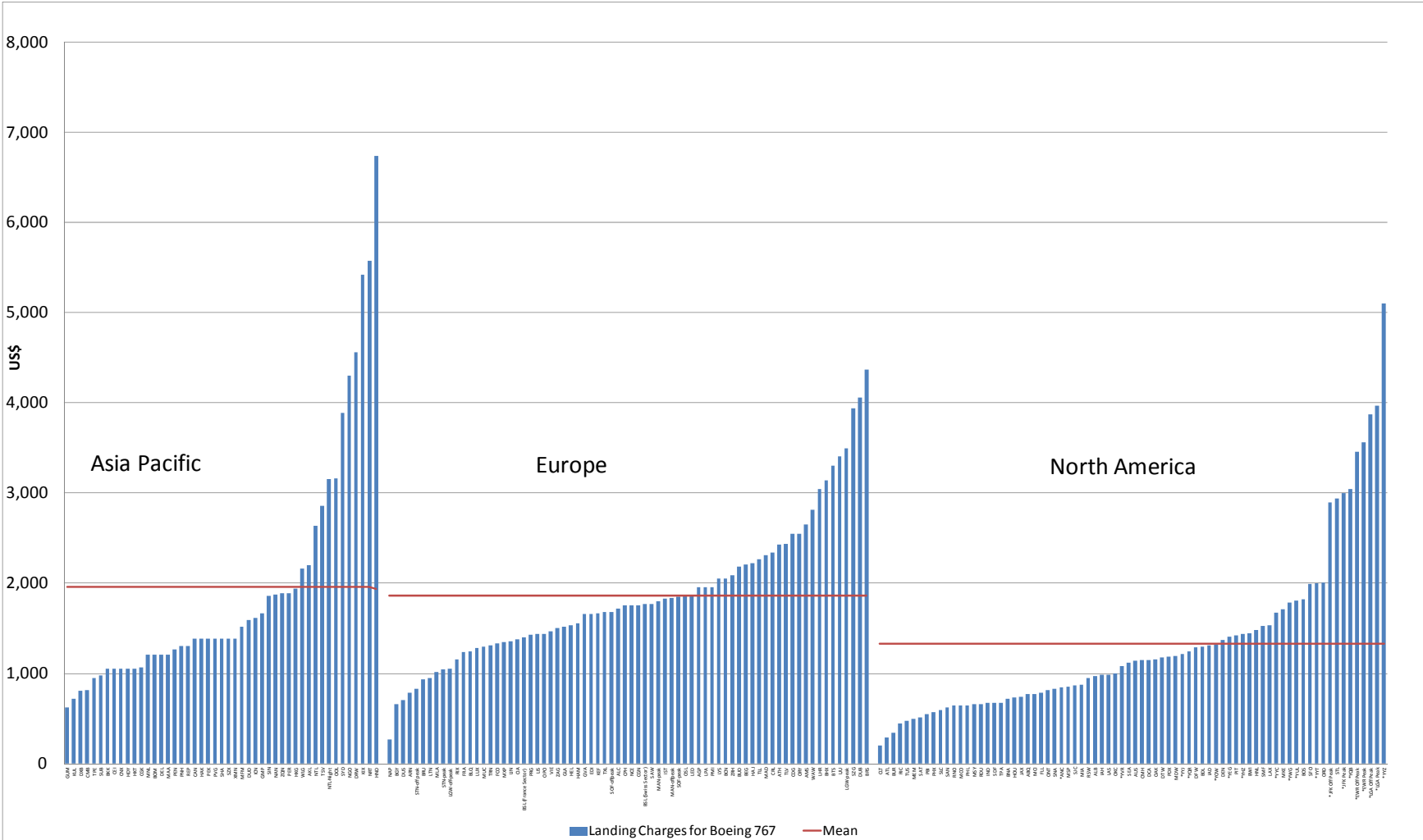


A photograph of an airport terminal interior. The scene is dominated by a large, multi-paned window that looks out onto an airfield. The ceiling is a complex, grid-like structure with recessed lighting. In the foreground, several people are silhouetted against the bright light from the window. A prominent directional sign is mounted on a stand in the middle ground. The sign is black with yellow and white text. It has two rows of arrows pointing left and right, with corresponding gate numbers and times. The floor is highly reflective, showing clear reflections of the people and the sign. The overall atmosphere is one of a busy, modern airport.

**2013 ATRS Airport Benchmarking**

# User Charge Comparison

# LANDING CHARGES FOR BOEING 767-400, 2012 (IN US\$)



Objective

Data

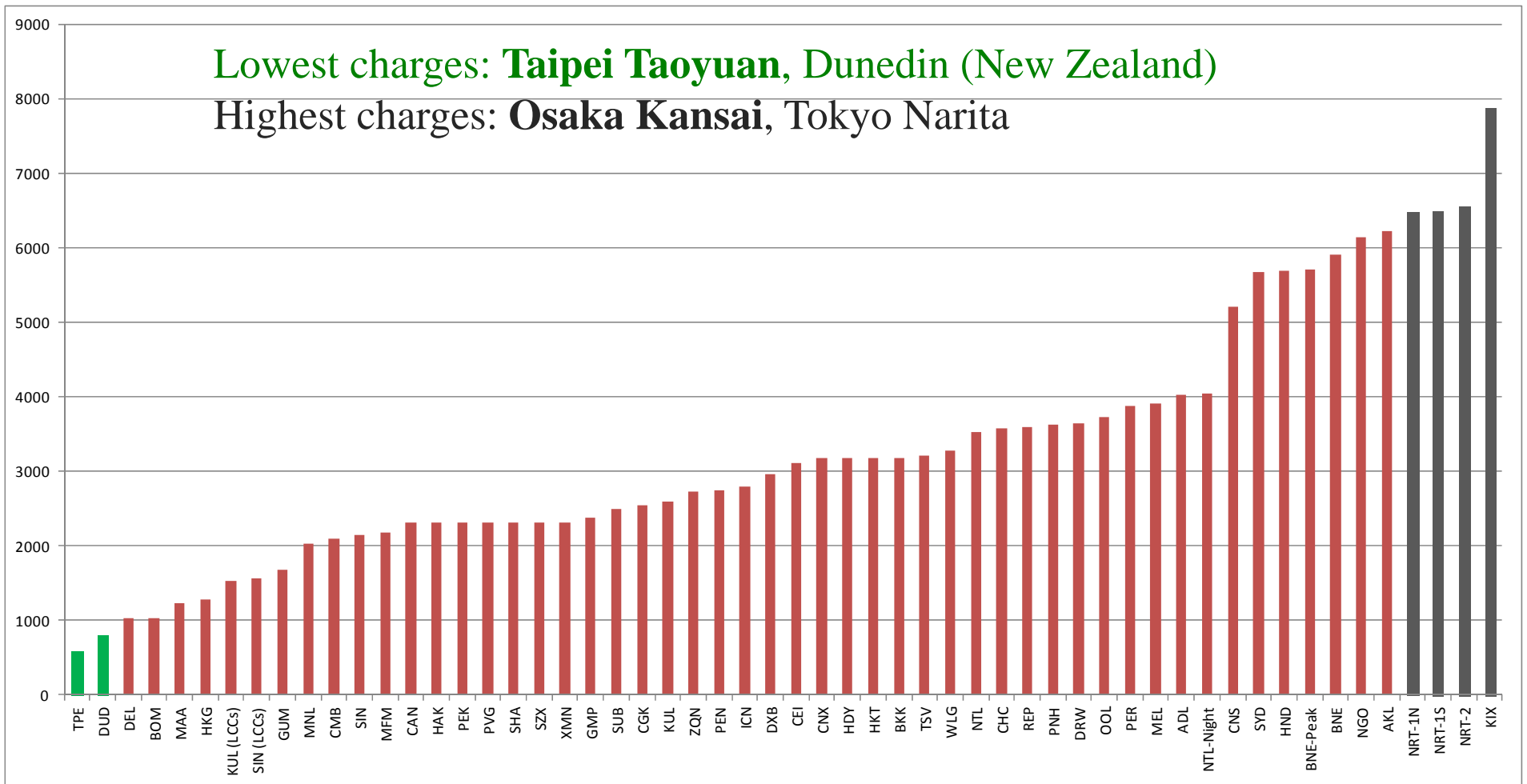
Airport  
Characteristics

Methodology

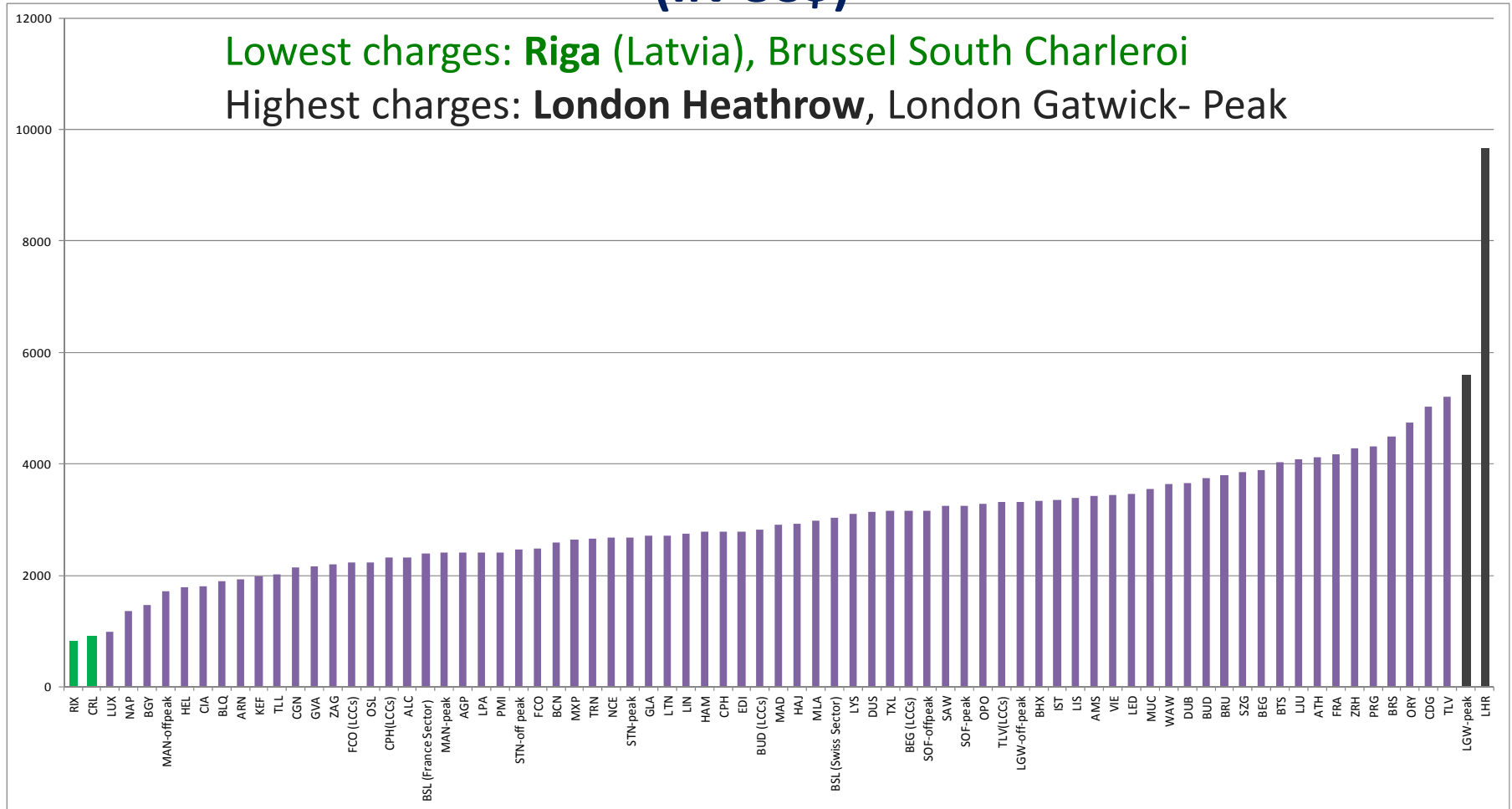
Efficiency & Cost

User Charge

# ASIA PACIFIC: COMBINED LANDING AND PASSENGER CHARGES FOR BOEING 737-800, 2012 (IN US\$)

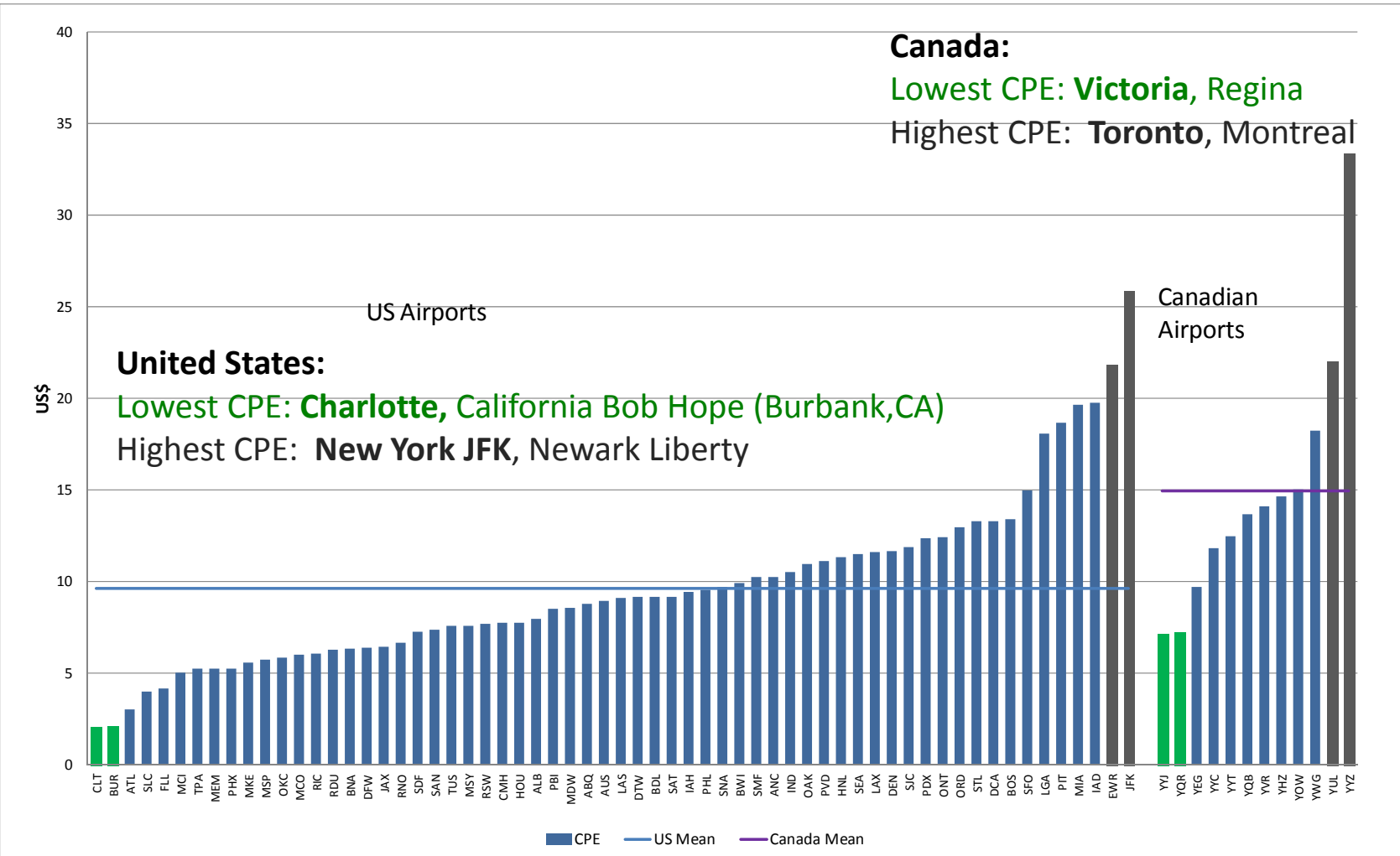


# EUROPE: COMBINED LANDING AND PASSENGER CHARGES FOR BOEING 737-800, 2012 (IN US\$)

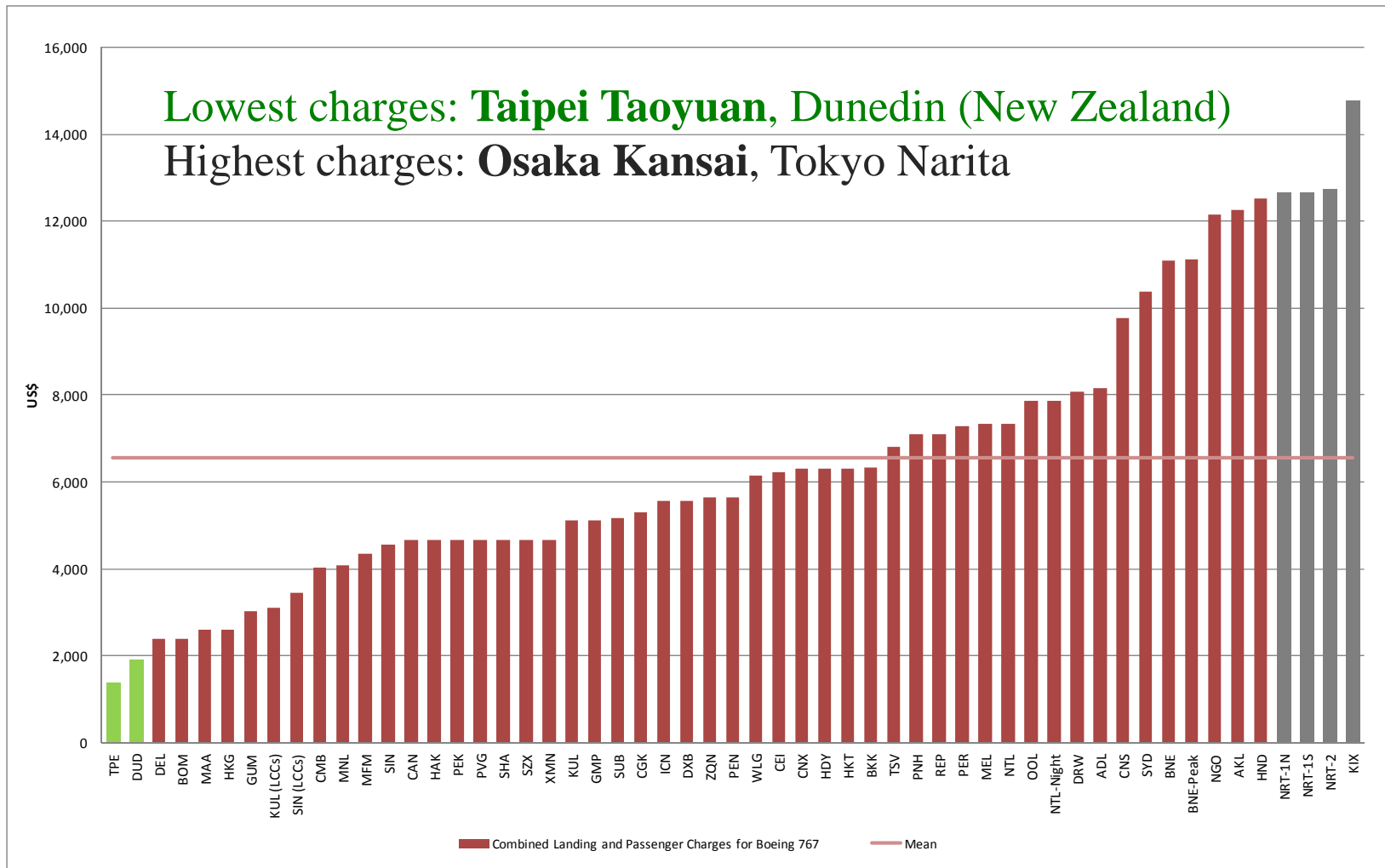




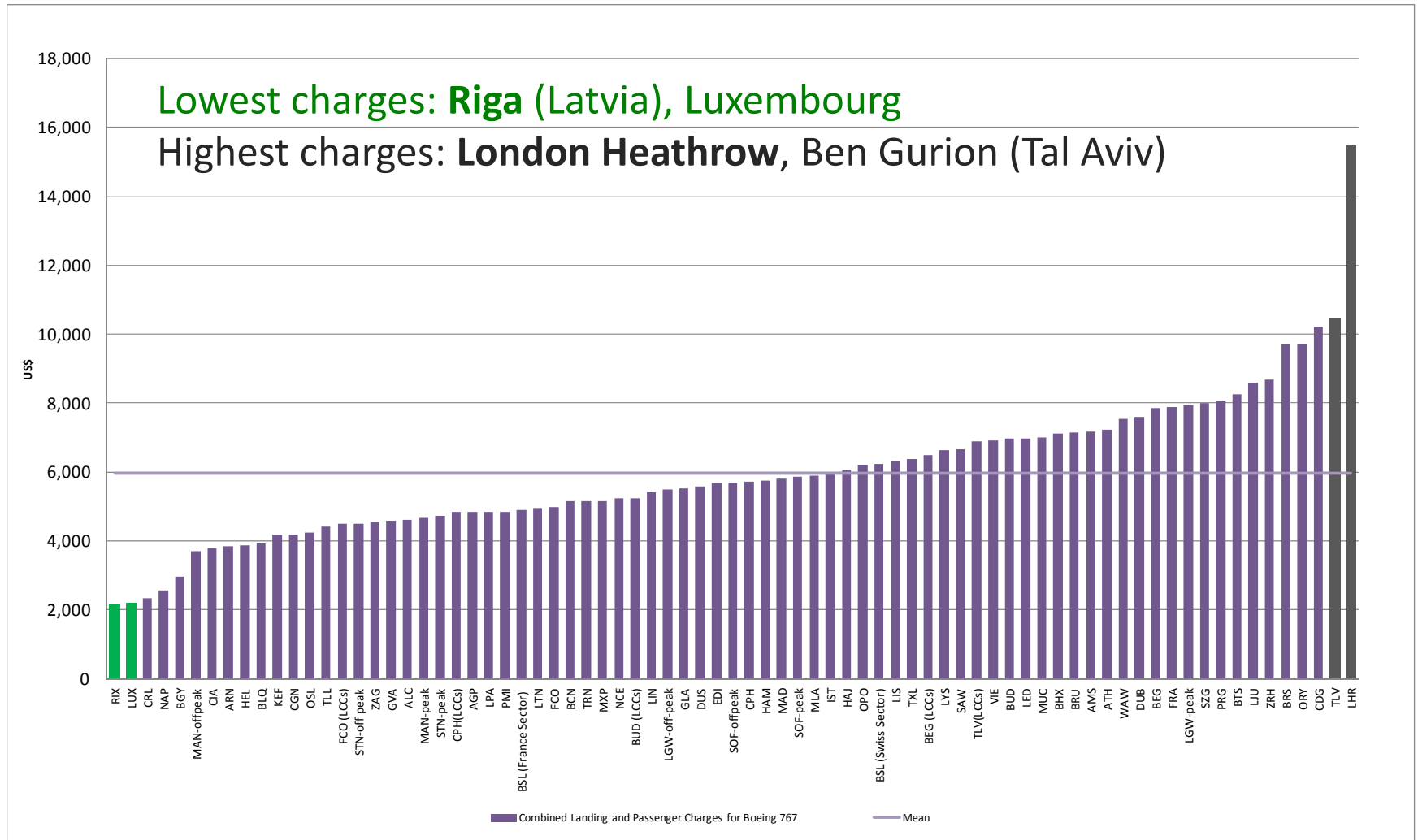
# NORTH AMERICA: COST PER ENPLANED PASSENGER, 2011 (IN US\$)



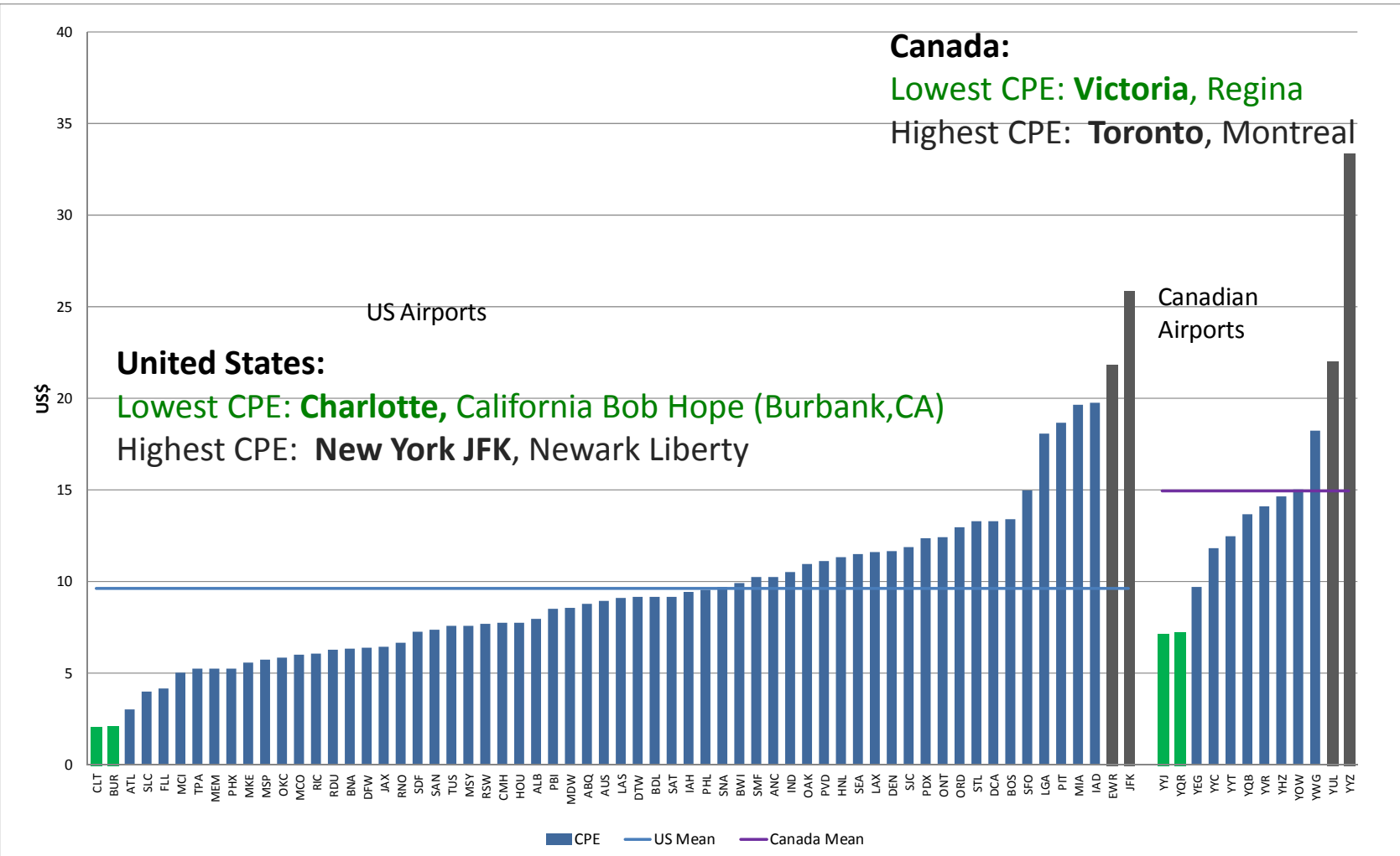
# ASIA PACIFIC: COMBINED LANDING AND PASSENGER CHARGES FOR BOEING 767, 2012 (IN US\$)



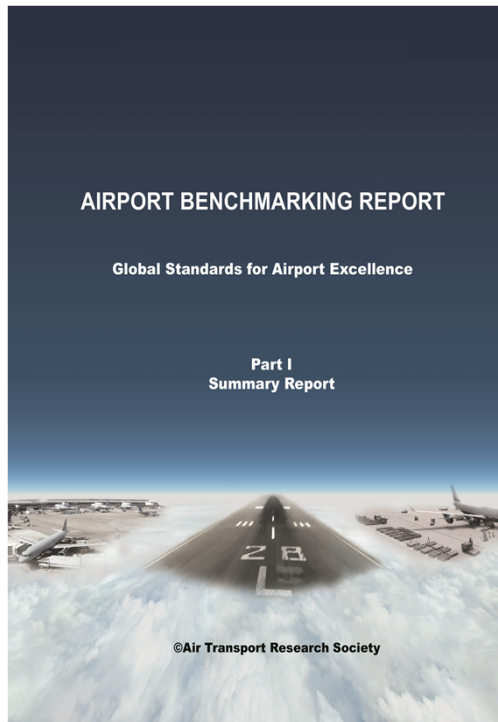
# EUROPE: COMBINED LANDING AND PASSENGER CHARGES FOR BOEING 767, 2012 (IN US\$)



# NORTH AMERICA: COST PER ENPLANED PASSENGER, 2011 (IN US\$)



# 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](http://www.atrsworld.org)
- ❑ **Report sale finances our annual benchmarking research project**

# *Thank You*

*2014 ATRS World Conference  
(Bordeaux, France, end of June,  
2014)*

