

IARO Meeting, Washington, DC

19 October 2015

A Working Note on
Predicting Rail's Share of Airport Passenger
Ground Access Movements

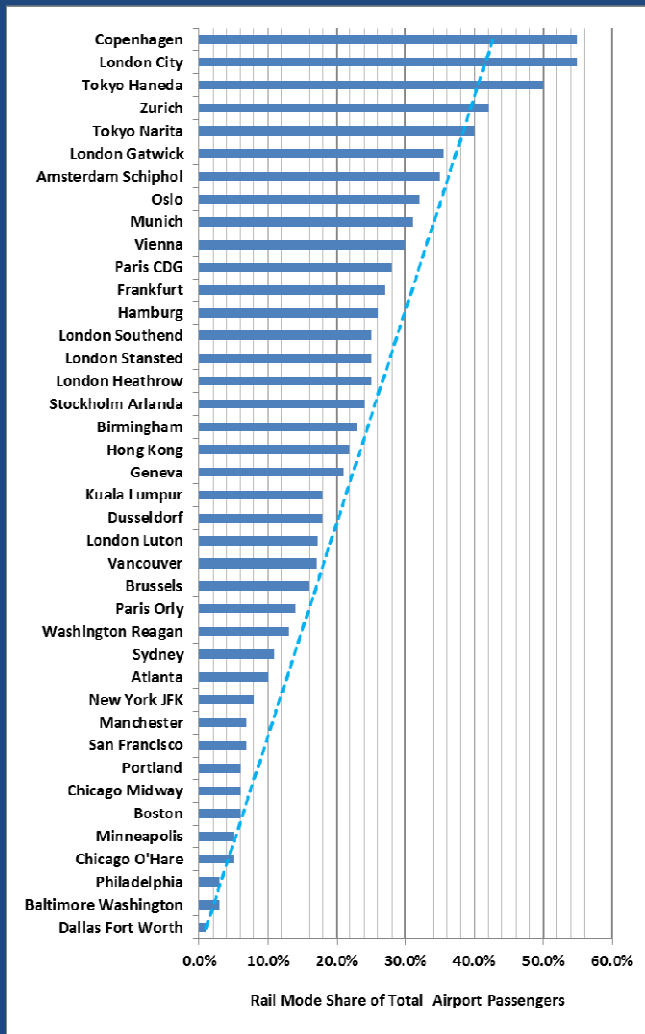
by

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Key Points

- Source: IARO (IARO Report 18.13) and others;
- Why is the airport rail mode share of ground access so different around the world?
- What makes Copenhagen so different from Dallas Worth?
- What factors bear on mode choice?
- Can it be reliably predicted from those factors?
- What models work? And how well?
- Issues – getting up to date mode share data; excluding transit passengers from those requiring ground access; comparing like with like (parity pricing); getting consistent data on travel times and costs; multi-airport cities; multiple rail links to one airport (e.g. Heathrow);

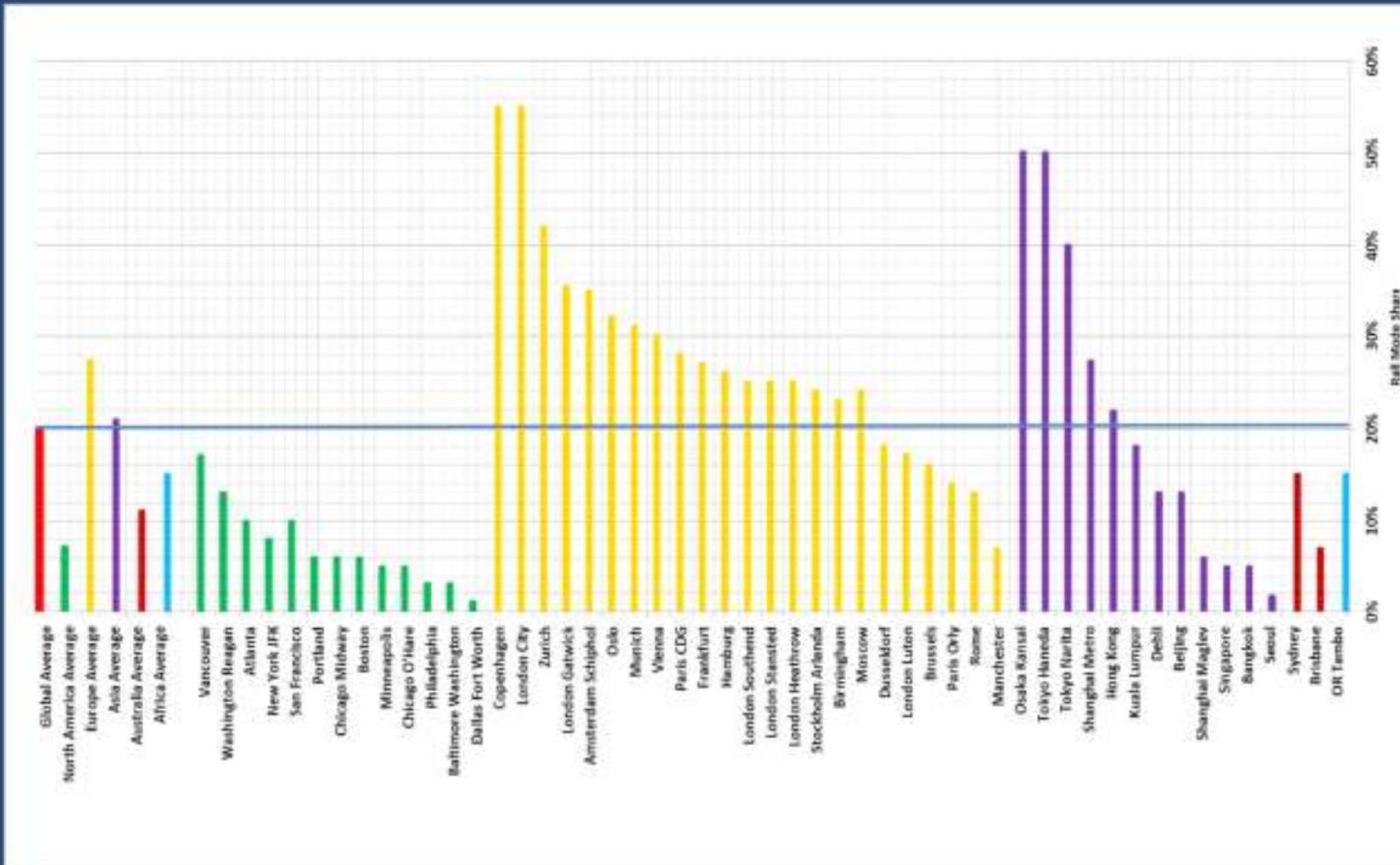


Key Points

- European Airport Rail links attract both the highest and highest average mode shares;
- Followed by Asia and then Africa and Australia;
- North American Airport Rail links especially US airports attract the lowest average and virtually all the lowest mode shares;
- But within every continent there is major variability in modes share to rail;
- European airports generally lie above the global average mode share;

Conclusion:

European travellers generally have a bias towards rail transport. US travellers much less so i.e. culture is important



Sources Transportation Associates analysis based on data originally assembled by IARO (IARO Report 18.13: Forecasting Air-Rail Author: Paul Le Blond), GARA and internet research

Predicting Rail's Share of Airport Passenger Movements

IARO Reanalysed
Mode Share to Rail for 51 Airport Rail links on 5 Continents

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Multi-Factor Linear Regression Factors

Selected as likely to be influential and data available:

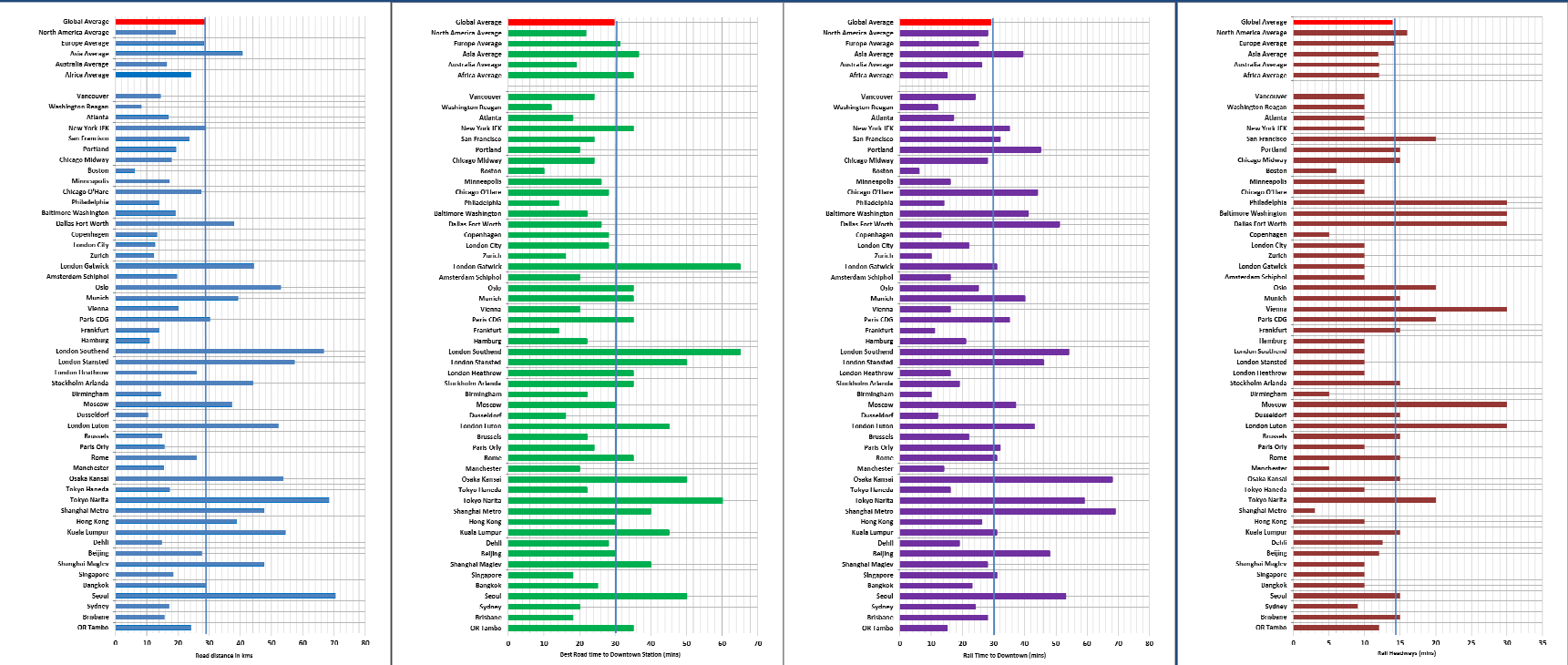
- Road distance to Common Downtown location (kms);
- Best Road Time to Common Downtown Location (mins);
- Worst Road Time to Common Downtown Location (mins);
- Rail Time to a Common Downtown location (mins);
- Rail Headway (mins);
- Taxi Fare - Parity Price in 2014 USD;
- Airport Parking (best available price for parking for 24 hours short stay at airport) in USD 2014 parity currency;
- Rail Fare - Parity Cost in 2014 USD.

Airport Rail Links Considered

- [Africa](#) - OR Tambo;
- [Australia](#) - Brisbane; Sydney
- [Asia](#) - Seoul; Bangkok; Singapore; Shanghai Maglev; Beijing; Delhi; Kuala Lumpur; Hong Kong; Shanghai Metro; Tokyo Narita; Tokyo Haneda; Osaka Kansai;
- [Europe](#) - Manchester; Rome; Paris Orly; Brussels; London Luton; Dusseldorf; Moscow; Birmingham; Stockholm Arlanda; London Heathrow; London Stansted; London Southend; Hamburg; Frankfurt; Paris CDG; Vienna; Munich; Oslo; Amsterdam Schiphol; London Gatwick; Zurich; London City; Copenhagen;
- [North America](#) - Dallas Fort Worth; Baltimore -Washington; Philadelphia; Chicago O'Hare; Minneapolis; Boston; Chicago Midway; Portland; San Francisco; New York JFK; Atlanta; Washington Reagan; Vancouver

Key Points

- All factors highly variable in all continents;
- US airports closer to downtown on average than European or Asian;
- US Airport Rail links competitive on average with Global Averages for Rail Time and Service Headway.

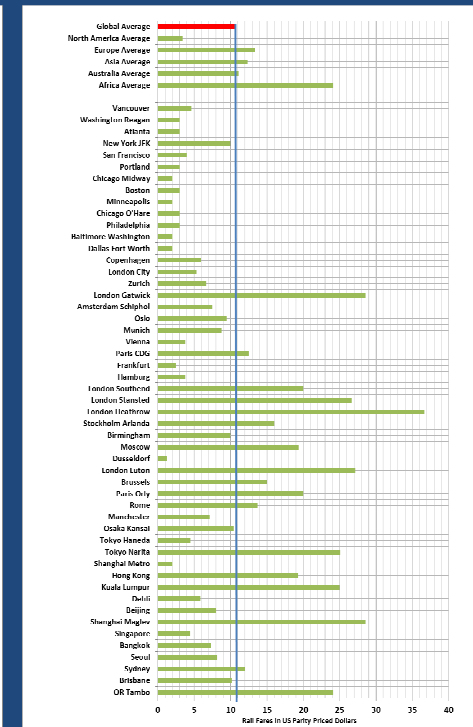
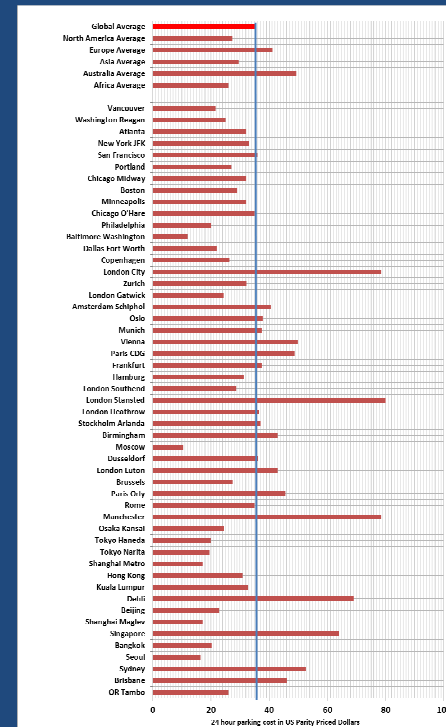


Predicting Rail's Share of Airport Passenger Movements

Road Distance and Travel Time; Rail Travel Times and Headways

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- All costs US\$2014 Parity Priced)
- Highly variable on all dimensions on all continents;

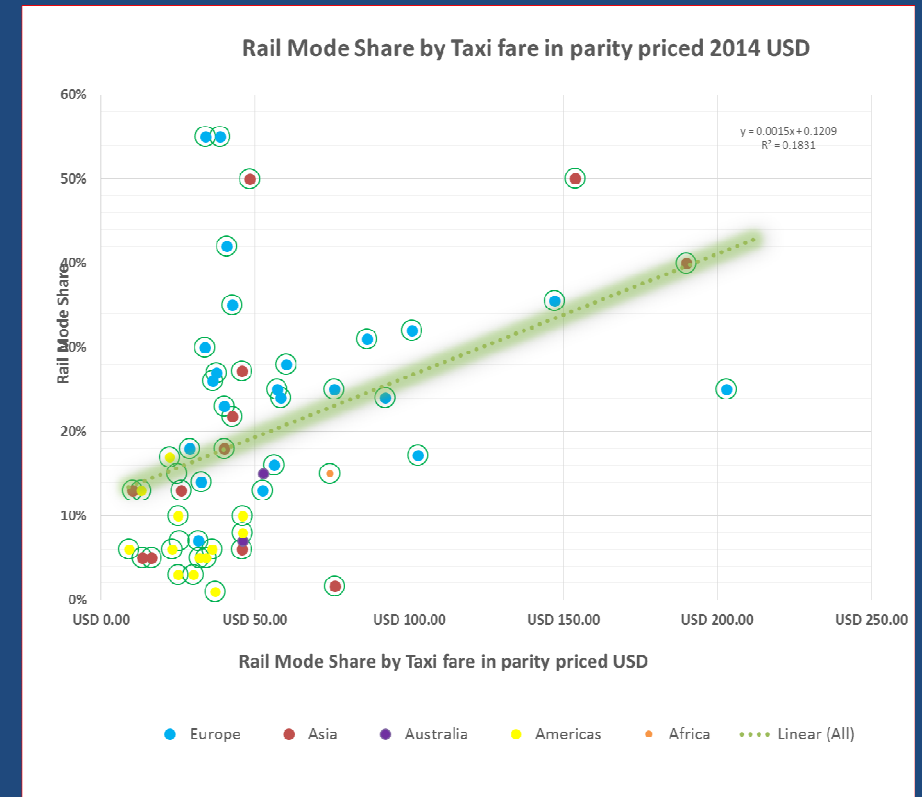
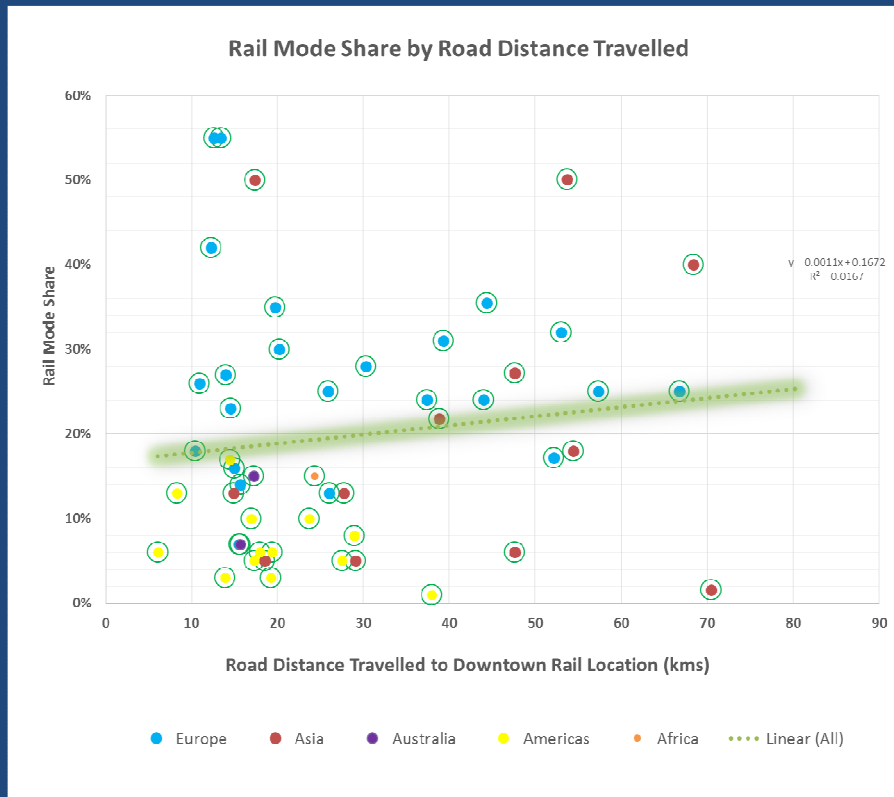


Factor	One way Taxi to Downtown Location	24 hr parking	One way Rail fare to Downtown Location
Africa	USD 74.4	USD 25.9	USD 24.1
Australia Average	USD 25.0	USD 49.3	USD 11.1
Asia Average	USD 59.0	USD 29.5	USD 12.4
Europe Average	USD 66.2	USD 41.1	USD 13.4
Nth America Average	USD 29.1	USD 27.4	USD 3.4
Global average	USD 53.6	USD 34.9	USD 10.7

Predicting Rail's Share of Airport Passenger Movements

Taxi, Parking and Rail Costs

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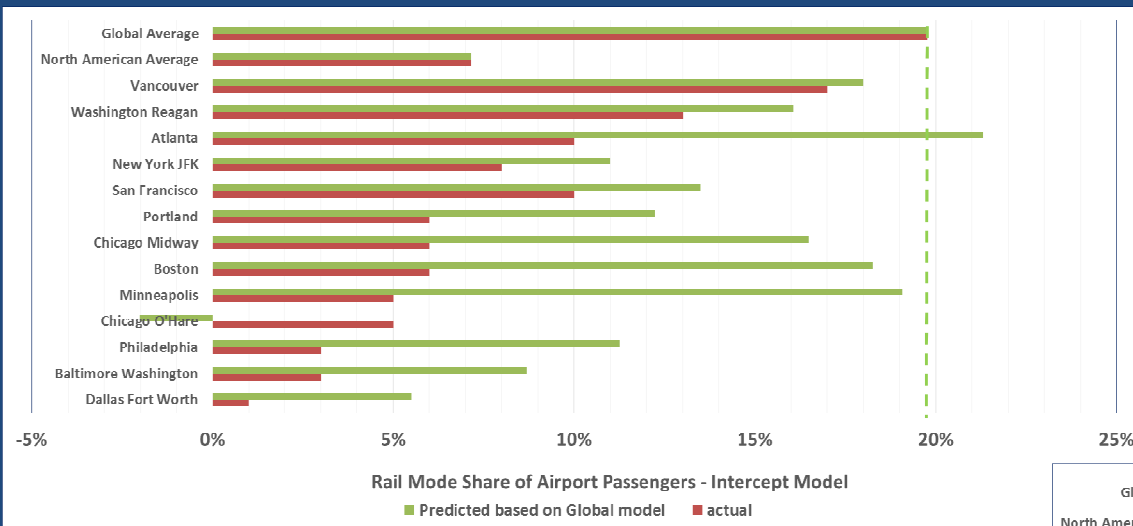
Key Points:

- Generally - Mode Share not very well correlated to factors – high degree of scatter;
- European Airports have high mode shares at relative low road distances ;
- US airport have low mode shares at low road distances;
- Share relatively insensitive to increasing distance;
- Similarly with Taxi Fare, though rail share is slightly more sensitive to increases in taxi fare;
- Appears to indicate strong cultural bias in Europe to usage of rail mode.

Predicting Rail's Share of Airport Passenger Movements

Examples of Single Factor Trends

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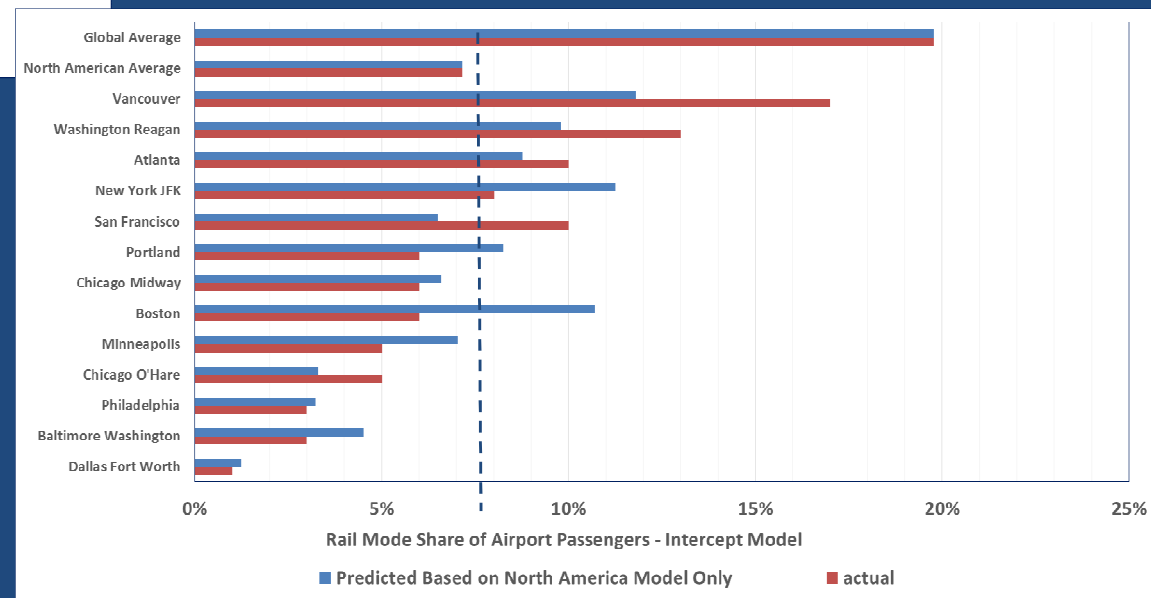
Predicted based on Global Data

- Note the Chicago O'Hare predicted as a negative mode share!
- Why? Appears to be because of the difference in best (30mins) to worse travel time (96 mins) – greatest difference of any airport assessed
- Generally predicted higher than actual

Predicted Based on North America Data Only

- Generally predicted closer to actual
- Actual exceeds predicted in several instances

Key Points: Cultural traits are important so predictions of the basis of that continent may be more relevant and realistic for airports in that geography



Predicting Rail's Share of Airport Passenger Movements

Multiple Linear Regression Models for North American Airports

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Airport	Actual Rail Share	Predicted Rail Share only on North American Data	Report Card (NAA = North American Average)	Predicted Rail Share on Global Data	Report Card (GA = Global Average)	Summary Remarks
Dallas Fort Worth	1%	1.2%	On Prediction; Below NAA	5.50%	Below Prediction; Way Below GA	Can do very much better !
Baltimore Washington	3%	4.5%	Below Prediction; Below NAA	8.69%	Below Prediction; Way Below GA	Can do much better !
Philadelphia	3%	3.2%	On Prediction; Below NAA	11.26%	Below Prediction; Way Below GA	Can do much better !
Chicago O'Hare	5%	3.3%	Above Prediction; Below NAA	-2.02%	Well above prediction; Way Below GA	A <u>paradox</u> but probably can do better!
Minneapolis	5%	7.0%	Below Prediction; Below NAA	19.07%	Well Below Prediction; Well Below GA	More work needed!
Boston	6%	10.7%	Below Prediction; Below NAA	18.27%	Well Below Prediction; Well Below GA	More work needed!
Chicago Midway	6%	6.6%	On Prediction; Below NAA	16.48%	Well Below Prediction; Well Below GA	More work needed!
Portland	6%	8.3%	Below Prediction; Below NAA	12.25%	Below Prediction; Well Below GA	More work needed!
San Francisco	10%	6.5%	Above Prediction; Above NAA	13.50%	Below Prediction; Below GA	Keep working at It!
New York JFK	8%	11.3%	Below Prediction; Above NAA	10.99%	Below Prediction; Well Below GA	Keep working at It!
Atlanta	10%	8.8%	Above Prediction; Above NAA	21.30%	Below Prediction; Below GA	Keep working at It!
Washington Reagan	13%	9.8%	Above Prediction; Above NAA	16.05%	Below Prediction; Below GA	Doing OK! Keep working at It!
Vancouver	17%	11.8%	Above Prediction; Above NAA	17.99%	On Prediction; Close to GA	Doing Fine! Whatever you're doing, keep doing it!
NAA	7.2%	7.2%		GA 19.8%		

Key Points: ● North American Airports exhibit a similar degree of variability in terms of airport railway share of passengers for ground access as compared to global airports ● Only one or two get close to the global average ● Many fall below the predicted mode share using the North American data only and all – except Vancouver - do using the Global data.



Source: <https://www.upexpress.com/AboutUP/MediaKit>

	UP Express Data	Global Average	North American Average
Rail Mode Share	6.1% (forecast)	19.8%	7%
Road Distance (kms)	29.6	28.4	19.4
Best Road Time (Mins)	24	29.7	21.9
Worst Road Time (mins)	55	51.3	47.8
Rail Travel Time (mins)	25	29.0	28.1
Headway Mins	15	13.9	15.8
Taxi Fare (USD Parity)	\$45.4	\$53.70	\$29.6
Parking 24 hrs (USD Parity)	\$23.1	\$34.93	\$27.4
One Way Rail Fare (USD Parity)	\$21.2	\$10.81	\$3.7

Key Points

- UP Express forecast is about on North American average;
- Forecast based on Global Model is **<10.9%> !!!**
- Why? – it seem to be driven by a combination of higher than average difference in road travel times and a much higher than average rail cost
- Forecast based on North American model is **19.9% !!!**
- Why? – paradoxically and unrealistically, the higher the rail fare, the higher the mode share in this model – due to the low US fares and variable mode shares with little variation in rail fare
- Conclusion: The relatively high rail fare may prove an impediment to growing mode share given low parking cost

Predicting Rail’s Share of Airport Passenger Movements

A new North American Airport Rail Link - Toronto

Conclusions

- Complex task to acquire reliable and consistent data; any conclusions must be judged in that light;
- Linear regression analysis does not yield highly correlated trends due to the high degree of scatter on almost all dimensions assessed – forecasts from models are interesting, indicative and instructive in the absence of anything better but not investment grade;
- Market share for airport rail links around the world is seemingly most influenced by cultural attitude to use of rail transport – no airport link in North America, Australia or Africa exceeds 20% mode share; some do in Asia and many do in Europe;
- Rail's global average market share of ground transportation is about 20%;
- The top 24 airports in the world which all exceed a mode split of 20%, averaged 30%;
- The average mode share to rail in North American is about 7.2%.
- The best performing North American Airport rail link of those analysed is Vancouver with a mode share of about 17%
- In summary:
 - a well-connected airport rail link in a country where people are already well used to using public transport ought to be able to achieve at least 20% and possibly up to 30% of market share of the airport's total passengers.
 - In North America, an airport rail link is doing ok if it exceeds 7% - many don't! - and will be doing really well if it achieves the global average of about 20% mode share of total airport passengers.

And Finally.....

	Global Average	Copenhagen	Dallas Fort Worth
Rail Mode Share	19.8%	55%	1%
Road Distance (kms)	28.4	13.4	37.9
Best Road Time (Mins)	29.7	28	24.0
Worst Road Time (mins)	51.3	40	45.0
Rail Travel Time (mins)	29.0	13	51.0
Headway Mins	13.9	5	30.0
Taxi Fare (USD Parity)	\$53.70	\$33.9	\$43.0
Parking 24 hrs (USD Parity)	\$34.93	\$26.3	\$22.0
One Way Rail Fare (USD Parity)	\$10.81	\$5.9	\$4.0

Predicting Rail's Share of
Airport Passenger Movements

.....What does make Copenhagen different to Dallas Fort Worth?

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