Distribution of Leg Load Factors, Proportion of Local Passengers and O-D Control Benefits

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• Previous results have shown that the average leg load factor and the dispersion of the leg load factor distribution have a large influence on the magnitude of O-D control revenue gains and that their impact can be combined into one metric, the proportion of legs with a load factor above 90%

• Previous research has also shown that the proportion of local passengers has an impact on the benefits of O-D control

• The objective of this research is to study the combined impact of the proportion of local passengers and the dispersion of the leg load factor distribution on O-D control benefits

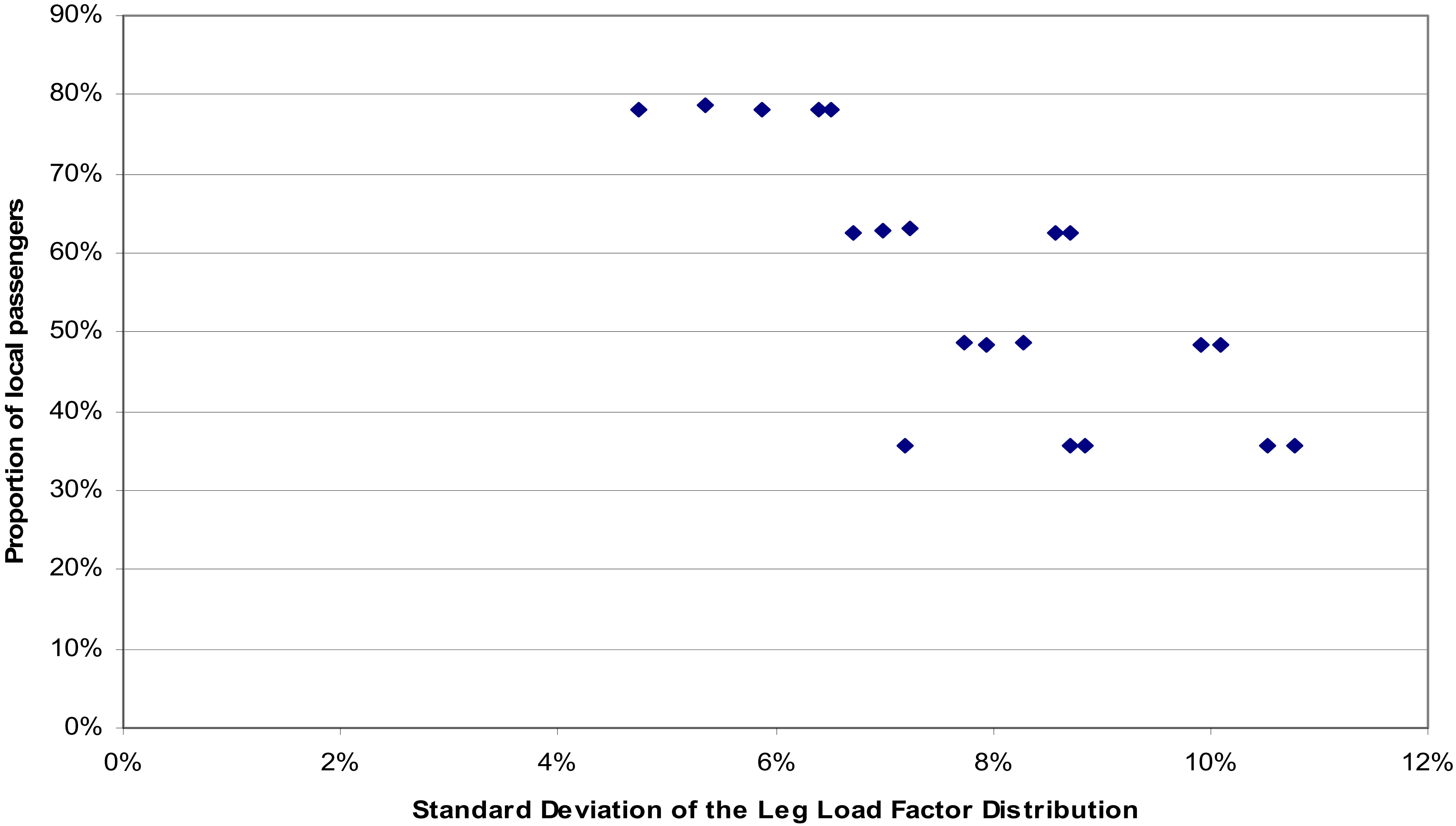
- Network D
  - New booking curves
  - 35/65 Business-Leisure mix
- One Load Factor
  - 84% Network ALF (DM 1.0)
- RM Methods:
  - Eb vs. Eb
  - DAVN vs. Eb
  - DAVN vs. DAVN

- The objective was to obtain various leg load factor distributions and proportions of local passengers while keeping the average network load factor constant to avoid a network ALF effect on O-D control revenue gains for the base case with a demand multiplier of 1.0
- In order to reach that objective, three key inputs were modified
  - ✈ A/C capacity: A/C capacity was either increased or decreased on a select number of legs based on the load factor
  - ✈ Demand in local markets: Demand in local markets was increased while the demand in connecting markets remained constant
  - ✈ Demand multiplier: after A/C capacity and the demand in local markets was modified, the demand multiplier was adjusted to keep network ALF constant

- At base proportions of local passengers (35%), five cases were developed
  - ✈ Base Case
  - ✈ Two A Cases in which A/C capacity is increased to 120 seats on some routes
  - ✈ Two B Cases in which A/C capacity is decreased to 70 seats on some routes
- Then, for the 3 other target proportions of local passengers (50%, 65% and 80%), an additional 15 cases were developed by modifying the demand in local markets and adjusting the demand multiplier

Description of the 20 cases

As the proportion of local pax is increased, there is less variation in the standard deviation of the leg LF distribution, since there is a high local demand that ensures a large and stable part of the loads on most legs



As the proportion of local passengers is increased, there is less variation of load factors across banks and hence the dispersion of the leg LF distribution is reduced

Average Load Factor per Bank (Eb vs. Eb, AL 1)

% Local Pax	Base	50%	65%	80%
Bank 1	82.95	82.93	82.88	83.75
Bank 2	87.35	87.35	86.14	85
Bank 3	83.32	83.79	83.57	83.61

Number of connecting and local passengers per bank (Eb vs. Eb, AL 1)

	Local				Connecting			
% Local Pax	35%	50%	65%	80%	35%	50%	65%	80%
Bank 1	1,263	1,719	2,207	2,749	1,116	889	641	383
Bank 2	1,143	1,593	2,081	2,660	1,255	1,030	760	449
Bank 3	1,364	1,834	2,309	2,825	1,058	832	590	335

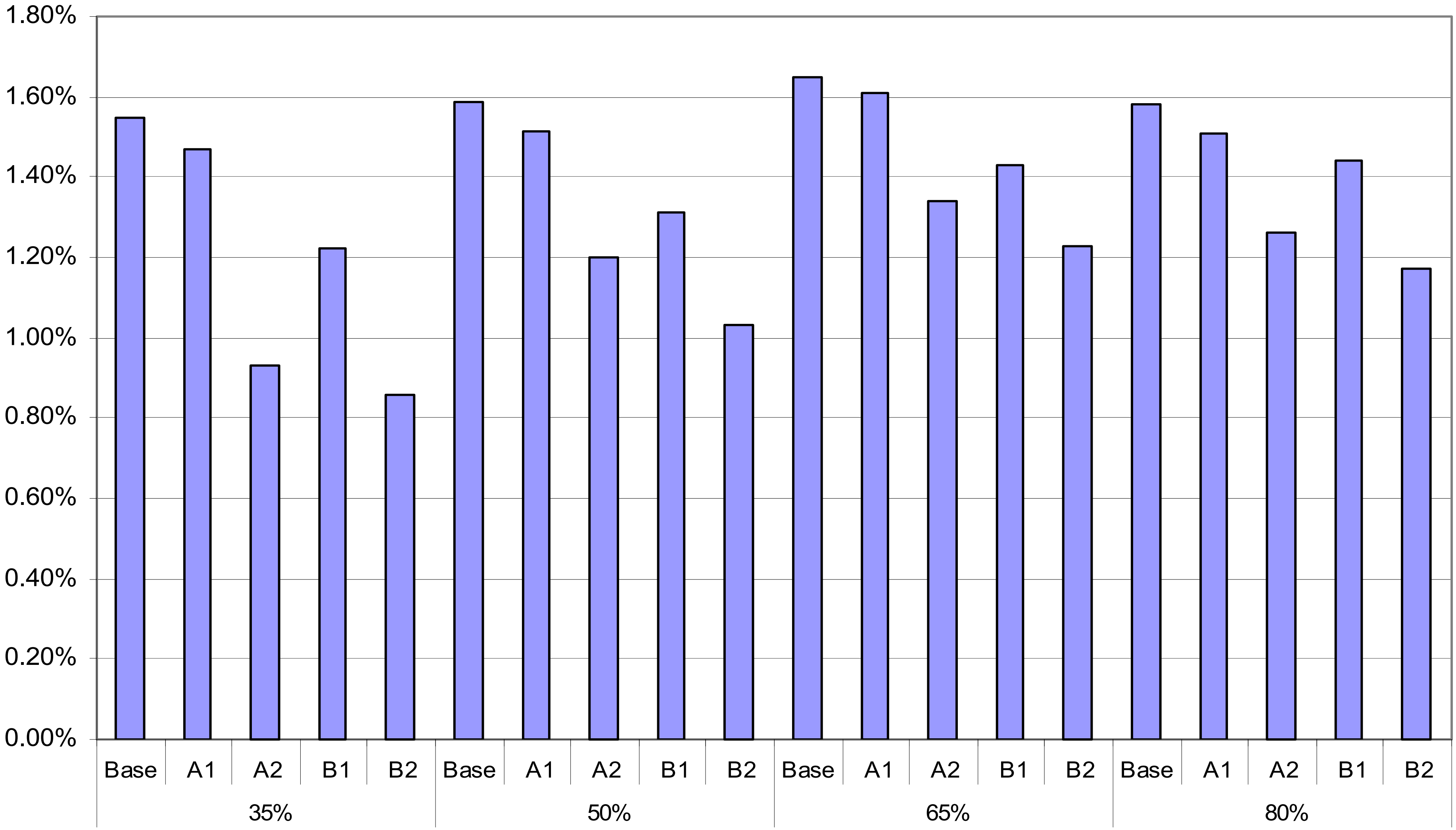
As the proportion of connecting passengers decreases, there is less connecting passengers that travel on their most preferred bank - Bank 2 - and the difference of load factor across banks as well as the dispersion of the leg load factor distribution decreases

Summary Table of the 20 Cases

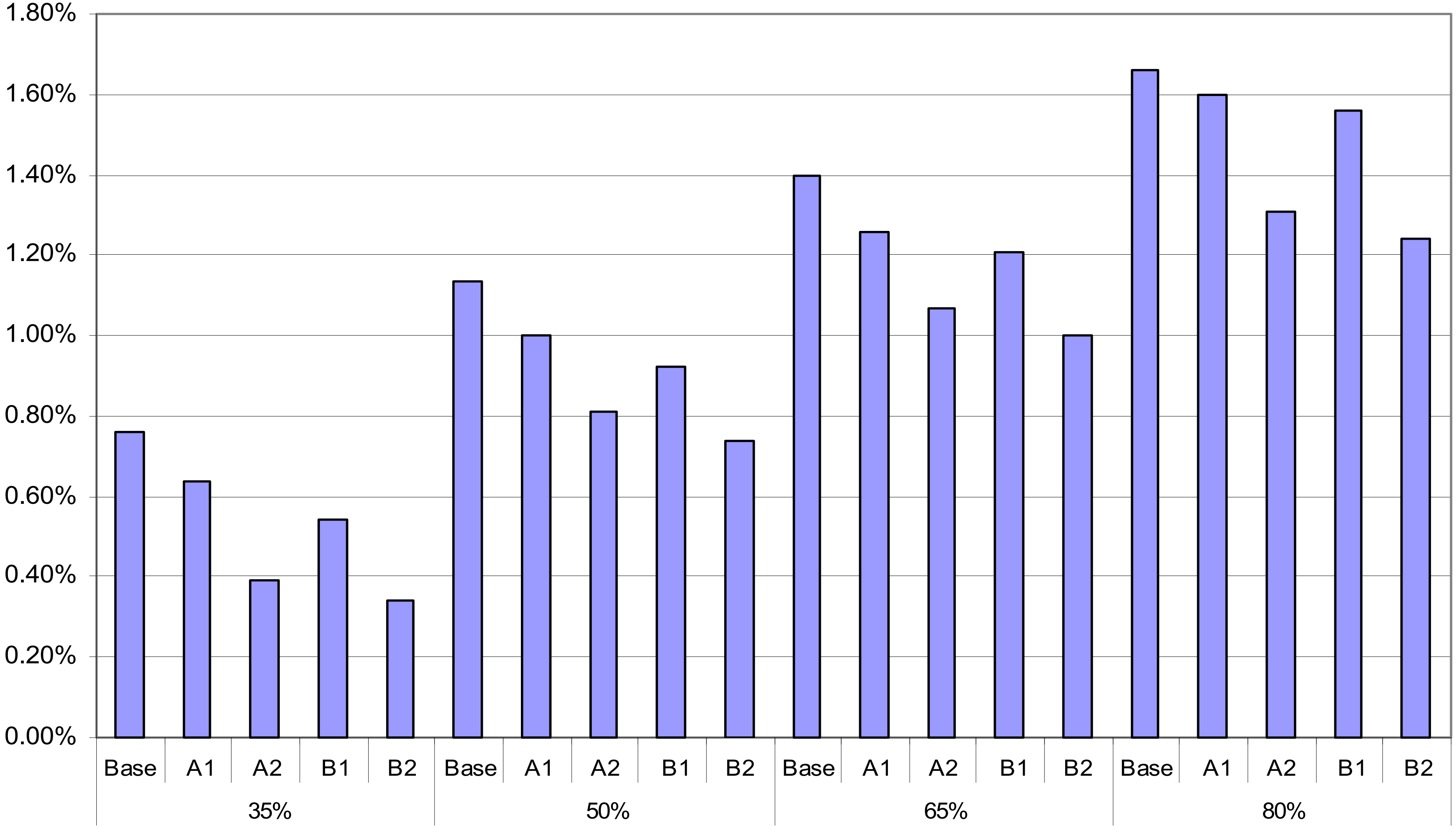
Proportion of local Pax	Leg LF Dist. Dispersion	STD LEG LF	% local Pax	% legs above 90%	% legs 80-90%
Base	Base	10.78%	35.65%	40.48%	31.75%
Base	A1	10.52%	35.68%	43.25%	28.97%
Base	A2	8.70%	35.79%	27.38%	50.40%
Base	B1	8.85%	35.72%	31.75%	38.89%
Base	B2	7.19%	35.75%	23.02%	48.81%
50%	Base	10.10%	48.46%	38.10%	37.30%
50%	A1	9.91%	48.53%	38.10%	38.10%
50%	A2	8.28%	48.77%	19.05%	60.32%
50%	B1	7.93%	48.40%	31.75%	38.89%
50%	B2	7.74%	48.54%	24.60%	46.83%
65%	Base	8.71%	62.58%	16.67%	59.52%
65%	A1	8.57%	62.68%	15.08%	61.11%
65%	A2	7.23%	63.11%	11.90%	69.05%
65%	B1	6.72%	62.63%	13.49%	59.52%
65%	B2	6.98%	62.70%	14.29%	61.11%
80%	Base	6.51%	78.18%	8.73%	72.22%
80%	A1	6.41%	78.23%	7.14%	73.81%
80%	A2	5.36%	78.60%	6.35%	79.37%
80%	B1	4.73%	78.04%	7.94%	74.60%
80%	B2	5.87%	78.11%	7.94%	76.19%

O-D Control Revenue Gains

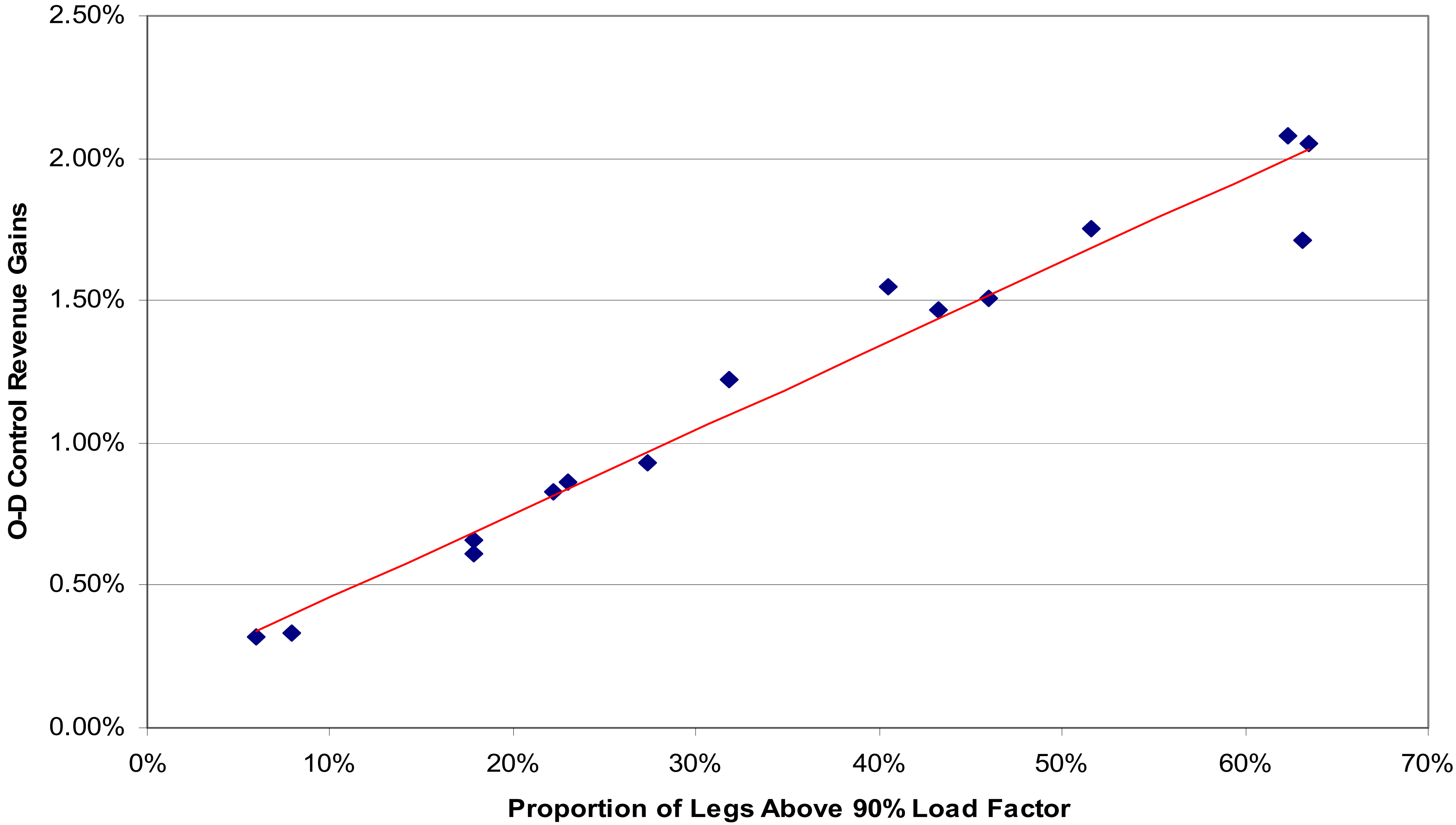
As in previous studies, AL 1 DAVN revenue gains increase slightly as the proportion of local passengers increases and tend to increase with the dispersion of the leg LF distribution (AL 1 uses DAVN, BC: Eb vs. Eb)



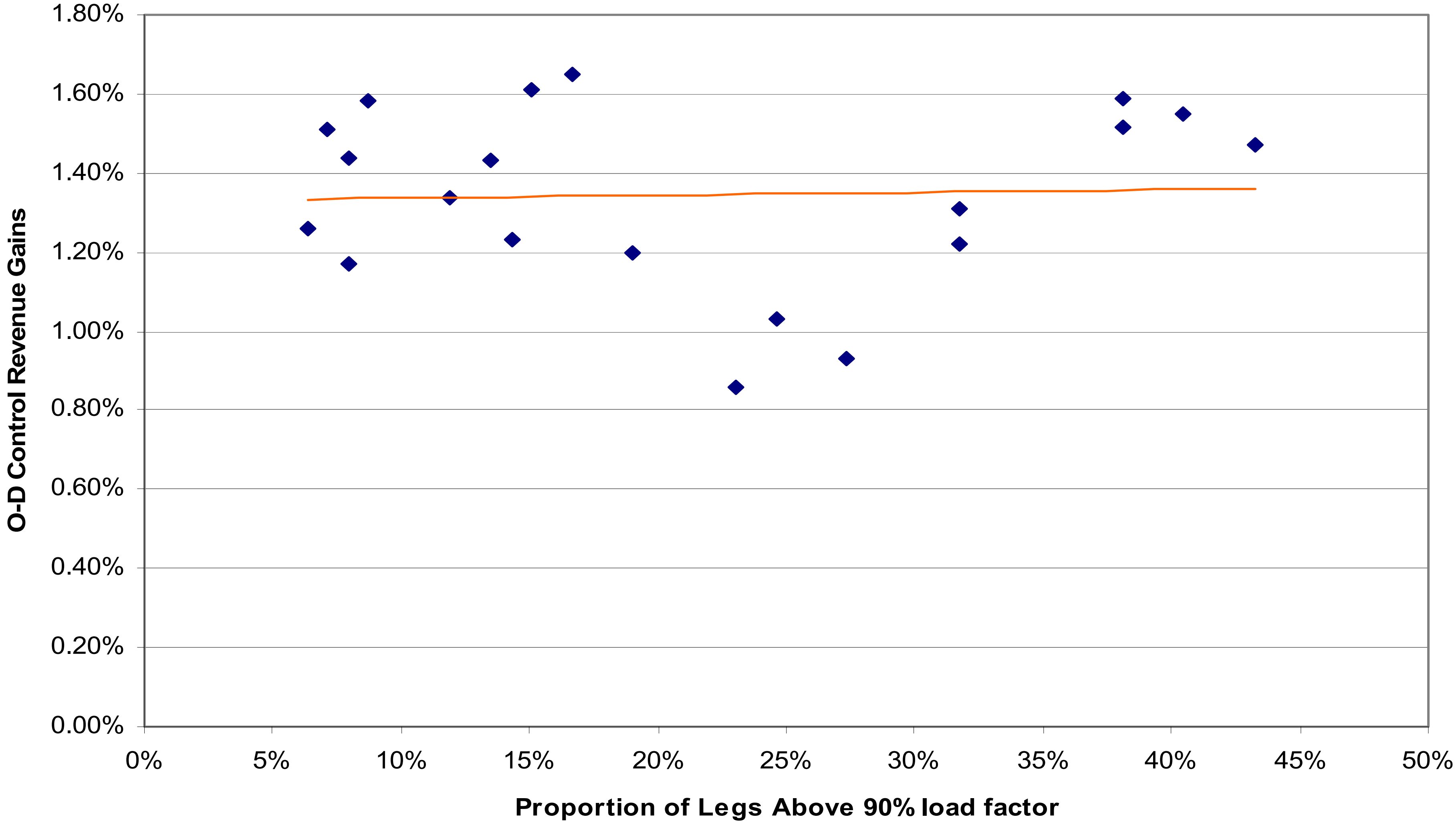
When both airlines use DAVN, AL 1 revenues increase with the proportion of local passengers as in previous studies (Both airlines use DAVN, BC: Eb vs. Eb)



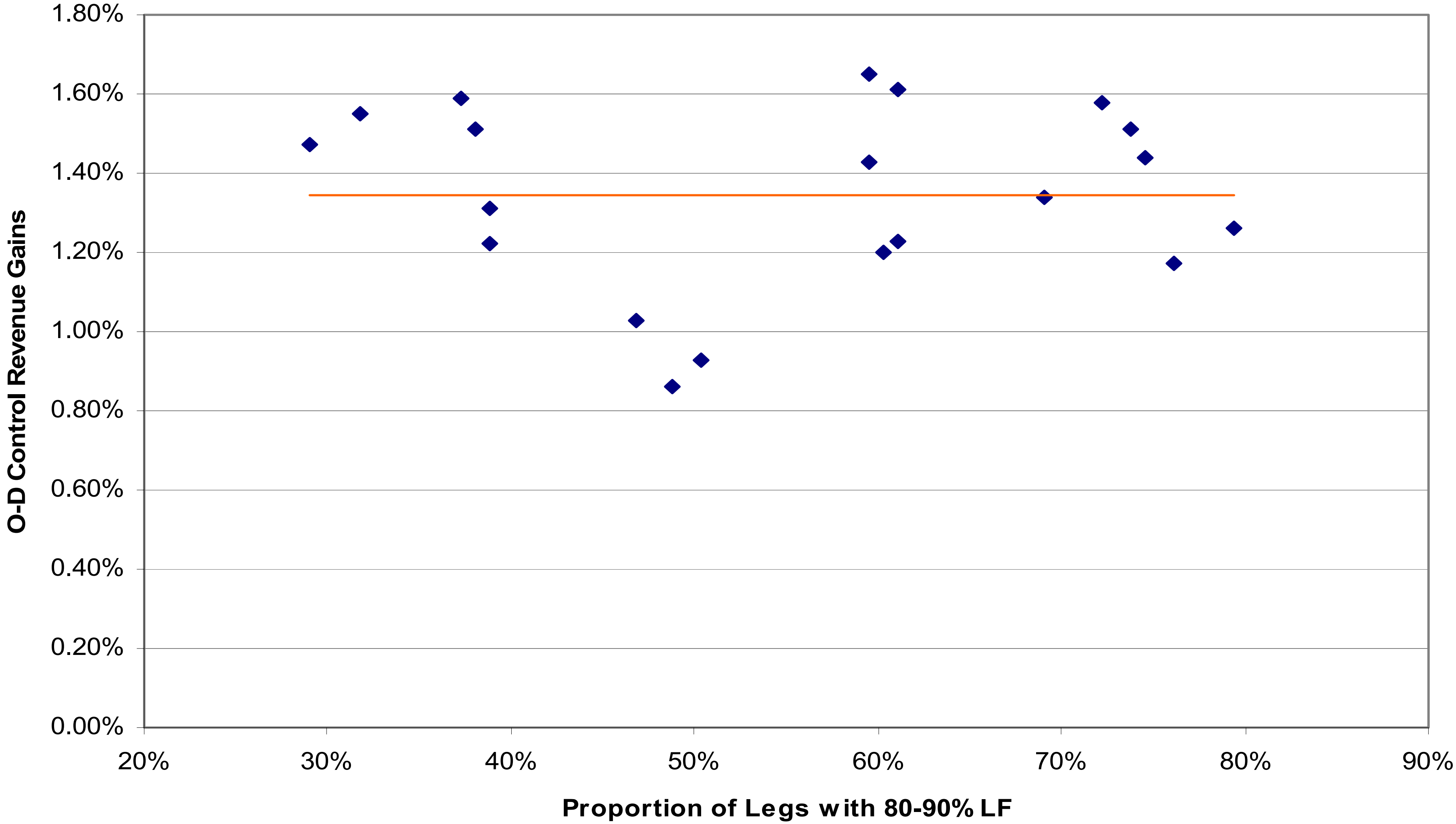
Review: When both the average LF and the dispersion of the leg LF distribution vary, O-D control revenue gains were increasing linearly with the proportion of legs that have a LF above 90%(DAVN vs. Eb, AL 1)



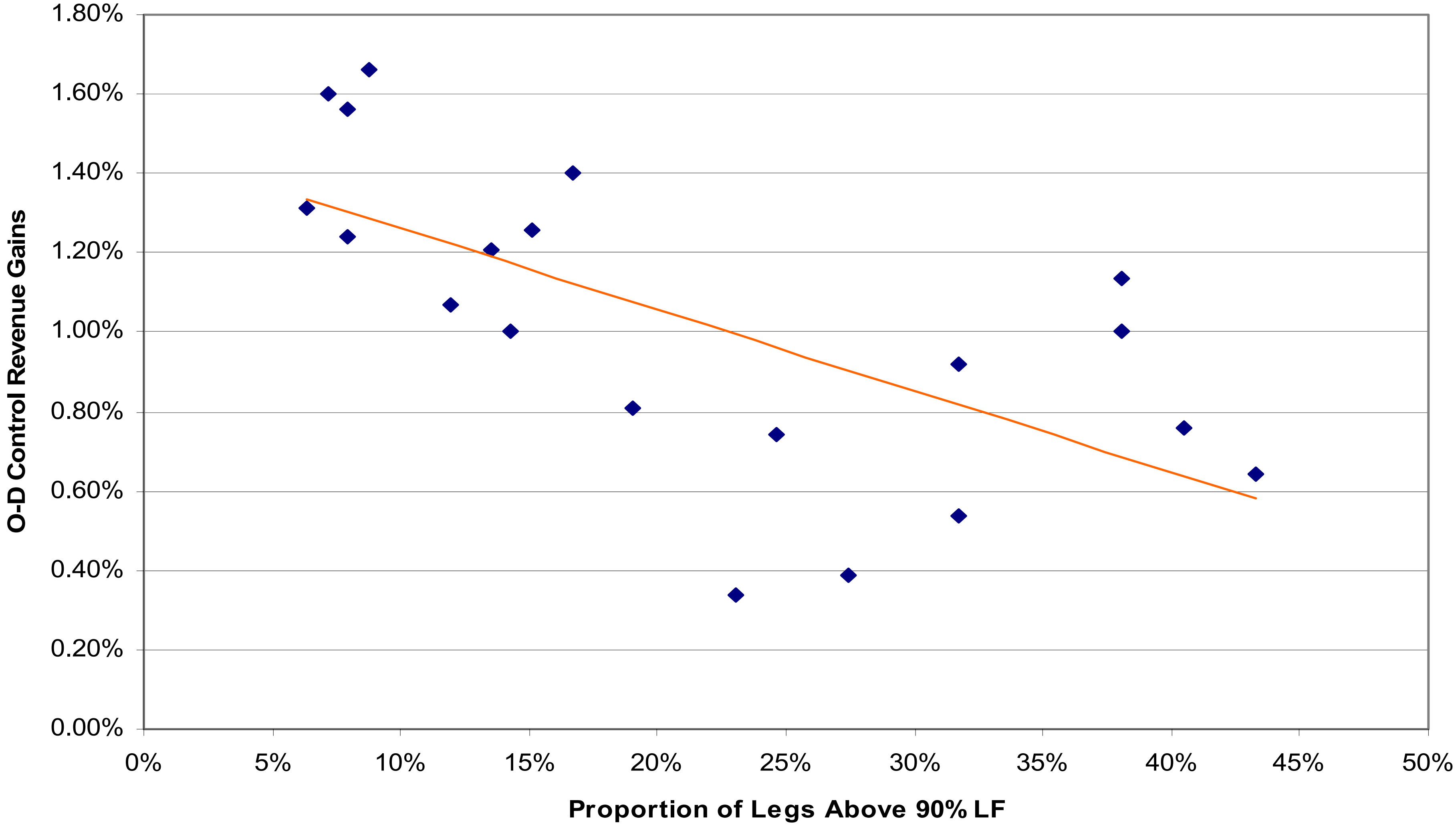
When the dispersion of the leg LF distribution and the proportion of local pax vary, the proportion of legs above 90% LF does not seem to be the primary driver of O-D control revenue gains (DAVN vs. Eb, AL 1)



The same is true for the proportion of legs between 80 and 90% load factor (DAVN vs. Eb, AL 1)



And when both airlines use DAVN (DAVN vs. DAVN, AL 1)



Regression Analysis

The linear regression of O-D control Revenue Gains w.r.t. to a single variable cannot explain by itself the variation of O-D control Revenue Gains, including the proportion of legs with a LF above 90%

PODS

	% local Pax	T-Test	Adj R-Square
AL 1 DAVN vs. Eb	0.0046	1.47	0.0582
AL 1 DAVN vs. DAVN	0.0216	9.18	0.8142

	STD Leg LF Dist.	T-Test	Adj R-Square
AL 1 DAVN vs. Eb	0.0331	1.07	0.0075
AL 1 DAVN vs. DAVN	-0.1179	-2.56	0.2257

	% Legs > 90% LF	T-Test	Adj R-Square
AL 1 DAVN vs. Eb	0.0007	0.16	-0.0541
AL 1 DAVN vs. DAVN	-0.0205	-3.63	0.3912

	% Legs 80-90% LF	T-Test	Adj R-Square
AL 1 DAVN vs. Eb	0.0000	0.00	-0.0556
AL 1 DAVN vs. DAVN	0.0165	3.97	0.4373

The regression of O-D control revenue gains w.r.t. two variables shows that the model that provides the best fit includes both the standard deviation of the leg LF and the proportion of local pax

PODS

	% local Pax	T-Test	% Legs > 90% LF	T-Test	Adj R-Square
AL 1 DAVN vs. Eb	0.0206	4.35	0.0243	3.89	0.4720
AL 1 DAVN vs. DAVN	0.0330	8.97	0.0174	3.57	0.8876

	% local Pax	T-Test	% Legs 80-90% LF	T-Test	Adj R-Square
AL 1 DAVN vs. Eb	0.0237	4.57	-0.0216	-4.10	0.4983
AL 1 DAVN vs. DAVN	0.0358	9.19	-0.0161	-4.07	0.9003

	% local Pax	T-Test	STD	T-Test	Adj R-Square
AL 1 DAVN vs. Eb	0.0190	7.00	0.1754	6.75	0.7292
AL 1 DAVN vs. DAVN	0.0310	11.93	0.1148	4.61	0.9125

Regression of O-D control revenue gains w.r.t. three or four variables

	% local Pax	T-Test	STD	T-Test	% Legs > 90% LF	T-Test	Adj R-Square
AL 1 DAVN vs. Eb	0.0210	6.18	0.1504	4.13	0.0062	0.98	0.7287
AL 1 DAVN vs. DAVN	0.0333	10.34	0.0866	2.51	0.0069	1.17	0.9143

	% local Pax	T-Test	STD	T-Test	% Legs 80-90% LF	T-Test	Adj R-Square
AL 1 DAVN vs. Eb	0.0237	6.69	0.1390	4.51	-0.0087	-1.91	0.7655
AL 1 DAVN vs. DAVN	0.0359	10.73	0.0775	2.67	-0.0090	-2.07	0.9267

	% local Pax	T-Test	STD	T-Test	% Legs > 90% LF	T-Test	% Legs 80-90% LF	T-Test	Adj R-Square
AL 1 DAVN vs. Eb	0.0242	6.84	0.1549	4.61	-0.0127	-1.13	-0.0173	-1.96	0.7697
AL 1 DAVN vs. DAVN	0.0363	10.77	0.0909	2.84	-0.0107	-1.00	-0.0162	-1.92	0.9267

The regression of O-D control revenue gains w.r.t. three or four variables show that the proportion of legs with a LF between 80-90% should not be included in the model and that the coefficient of the proportion of legs with more than 90% LF is insignificant and does not improve the explanatory power of the model

Summary

• As shown in previous studies, O-D control revenues gains tend to increase with the standard deviation of the leg load factor distribution and in some cases with the proportion of local passengers

• Unlike in previous studies, the proportion of legs above 90% load factor cannot be used as a primary explanatory metric of O-D control revenue gains when both the dispersion of the leg load factor distribution and the proportion of local passengers vary

• Under those circumstances, the regression models that include both the standard deviation of the leg load factor distribution and the proportion of local passengers have the best fit