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Strategies and Tools for Sustainable Air Transport

THE UNIVERSITY OF TOKYO
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Session 7: Breaking the Mold

Airline-Airport Risk Sharing Model For Better Partnership

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Why AL-AP Relationship?

- Airline(AL), especially LCC, has concern about Airport(AP)-related costs.

  e.g., Landing Charges, Gate Payment …

- APs are greatly affected by ALs.

  e.g., Hub (Base), Frequencies, …

- Discussed for Long but Still Significant Issue

  e.g., Start-up aides, Vertical Relationship,...

Complex Relationship (AL-AP)

- Conflicting (Zero-Sum Game)
  → Landing Charge, Gate Payments...
- Inter-dependent / Joint-Venture type
  → Jointly Serving Users (Need Both)
- Can we improve the AL-AP relationship ?
  → Yes, if we can design contract smartly.
  e.g., NOTO(AP)-ANA case in Japan

AP-AL Vertical Relationship Literature

- Oum and Fu (2009)

  Examine Forms of Vertical Relationships & their Competition

- Barbot (2009)

  Competitiveness and Welfare depends on Market Structure & Clauses of contracts

- Feng_Zhang (2010)

  AL-AP Cooperation under Demand Uncertainty

- Zhang et al.(2010)

  AL-AP Revenue Sharing and Welfare Implication

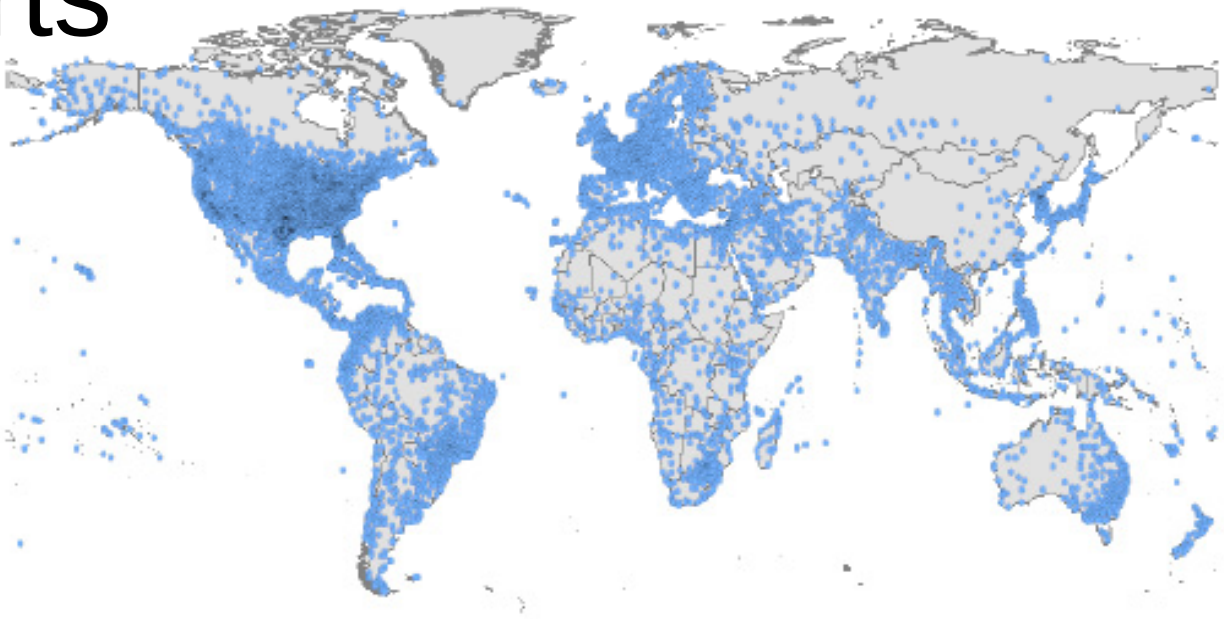
- Hihara(2008, 2011 & 2012)

  AL-AP Risk Sharing Contract & its Efficiency Impacts

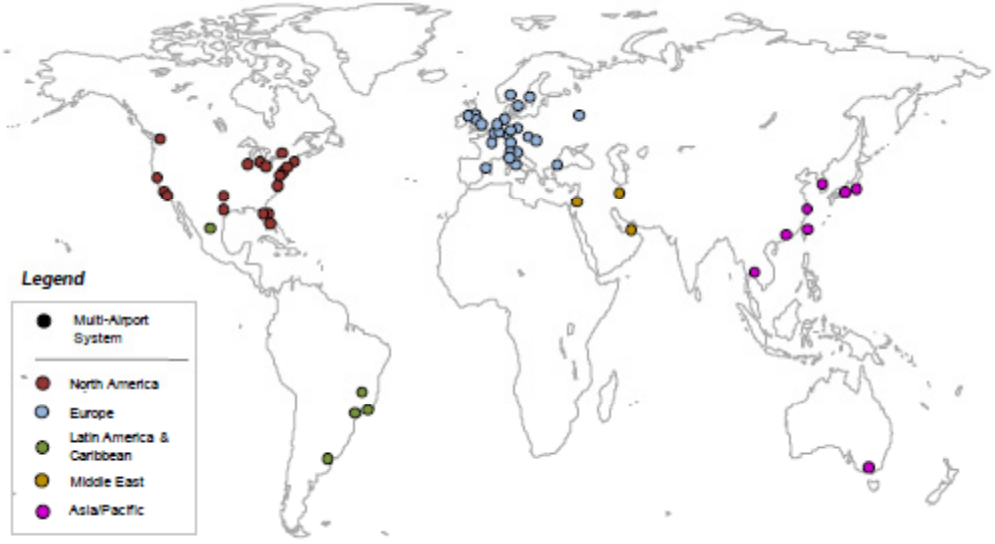
World Airports

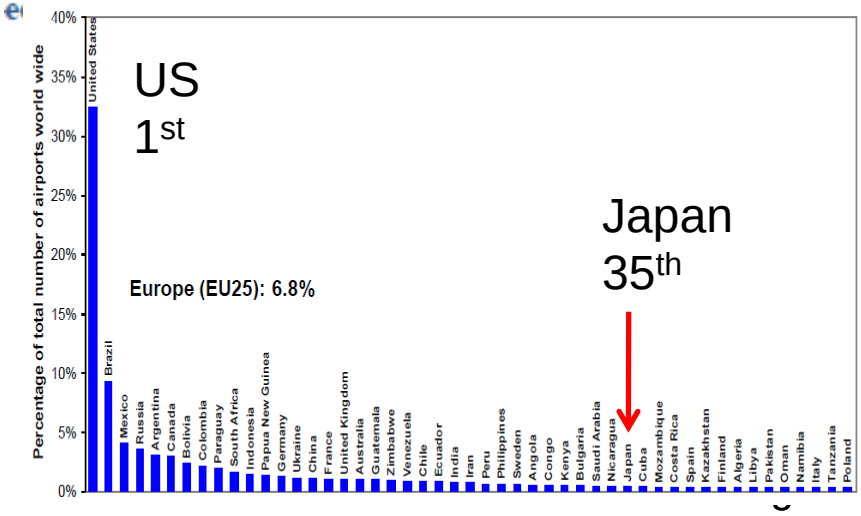
45,813 Airports
(2007)

33% US
6.8% EU 25
0.2% Japan



Multiple Airport System
59





Source: Bonnefoy-Hansman_MIT_ICAT_2008, Watts&Strogatz (1998), Cheswick(2003)

Airports (2006.04) in JAPAN

平成18年4月1日現在

記号	種別	供用空港数	ジェット化空港数	大型化空港数	未供用空港数
■	第一種空港	5	5	5	0
●	第二種（A）空港	19	18	17	0
○	第二種（B）空港	5	5	4	0
▲	第三種空港	53	31	7	2
★	その他飛行場	15	6	4	1
	合計	98	65	37	3

注 1. 非公共用飛行場は除く

2. ◯印はジェット化空港を示す

うち、◯印（太線）は大型化空港を示す

3. 空港名の下の数字は滑走路長（m）であり、（ ）印は現在整備中

NOTO (2003～)

Komatsu

Tokyo (Haneda)

Osaka (Itami)

Tokyo (Narita)

Ibaragi

Osaka (Kansai)

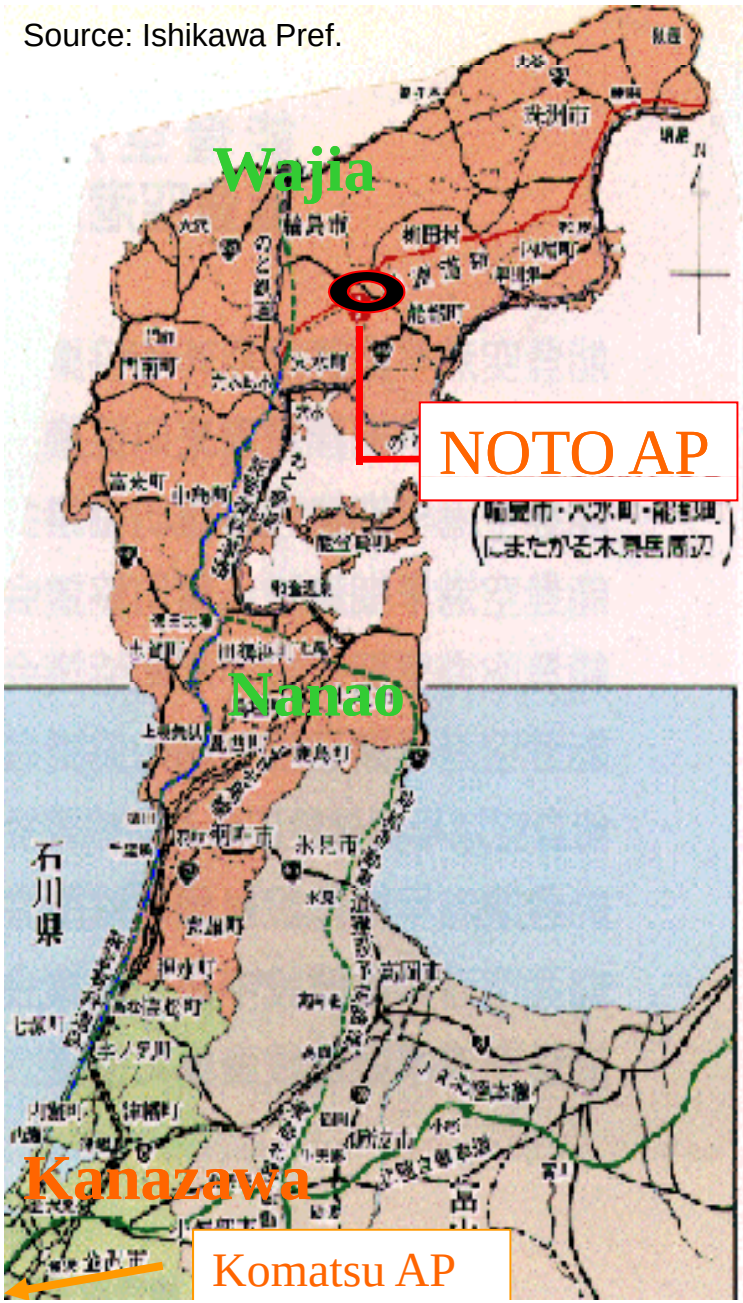
Chubu

※ 空港アクセス時間圏内の割合はNITAS 平成17年より

※ ◯印はジェット化空港、◯印は大型化空港を指す。

Source: MLIT

Source: Ishikawa Pref.



NOTO Airport

【NOTO AP Spec】

Opened
2003

AP Authority
Ishikawa Pref. Gov.

Runway 1
2,000m x 45m

Construct. Cost
about US$270M

Serving Airline
ANA group

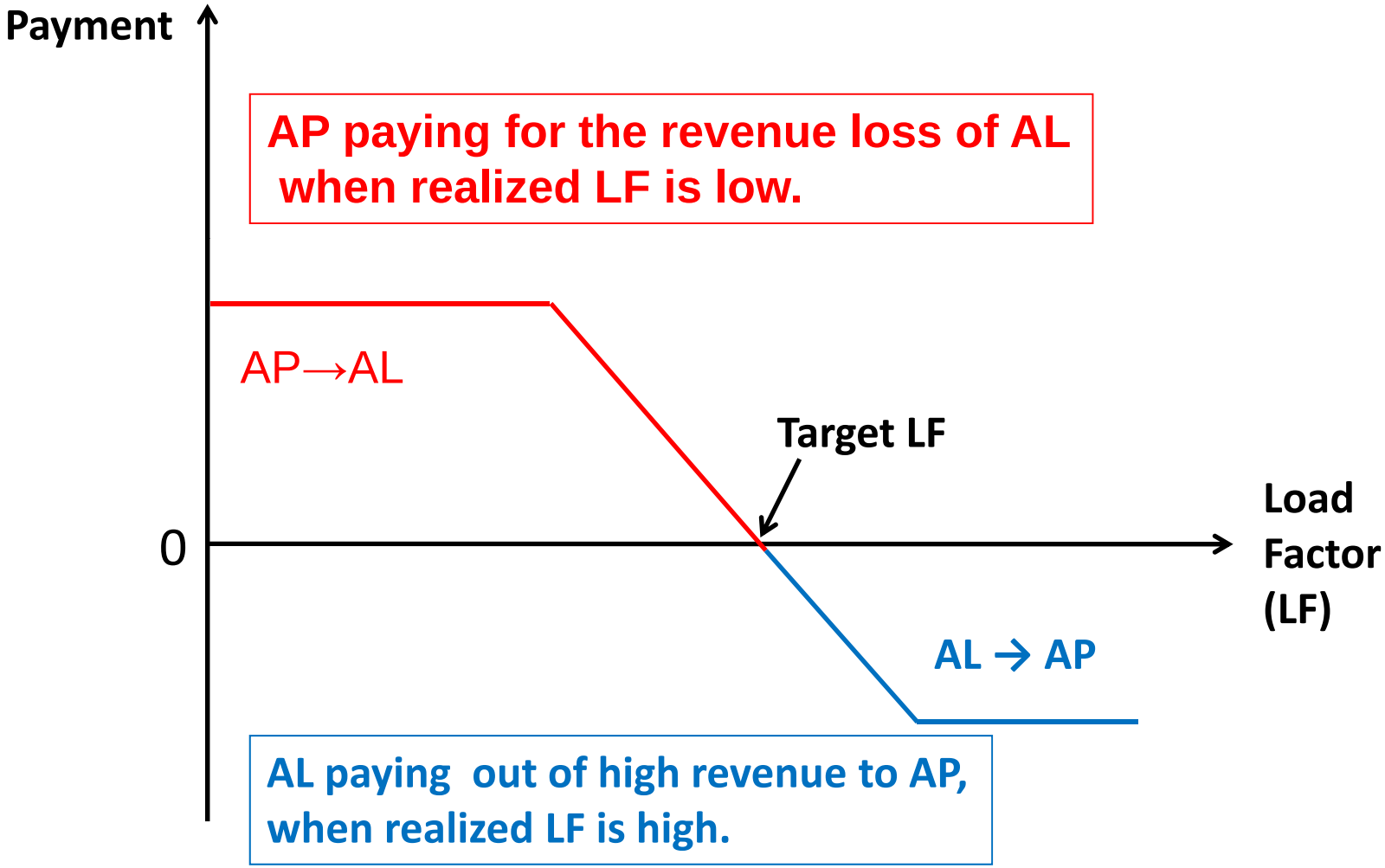
Load Factor Guarantee Mechanism (LFGM)

Contract (b/w NOTO AP and ANA AL) specifying the payment from AP to AL (or reverse) based on the difference between a target load factor and a realized load factor of the route

Payment = Target LF – Realized LF

+: AP → AL, - : AL → AP

Payment Structure of LFGM (conceptual)



Contract

- First signed in 2003 b/w NOTO AP and ANA group
- About the Route b/w NOTO=Tokyo(HANEDA) w/ 2 service/day
- They revised it every year until the fourth year and still keep it this year.
- They share not only downside but upside risk (unique).

Multiple Functions of Contract

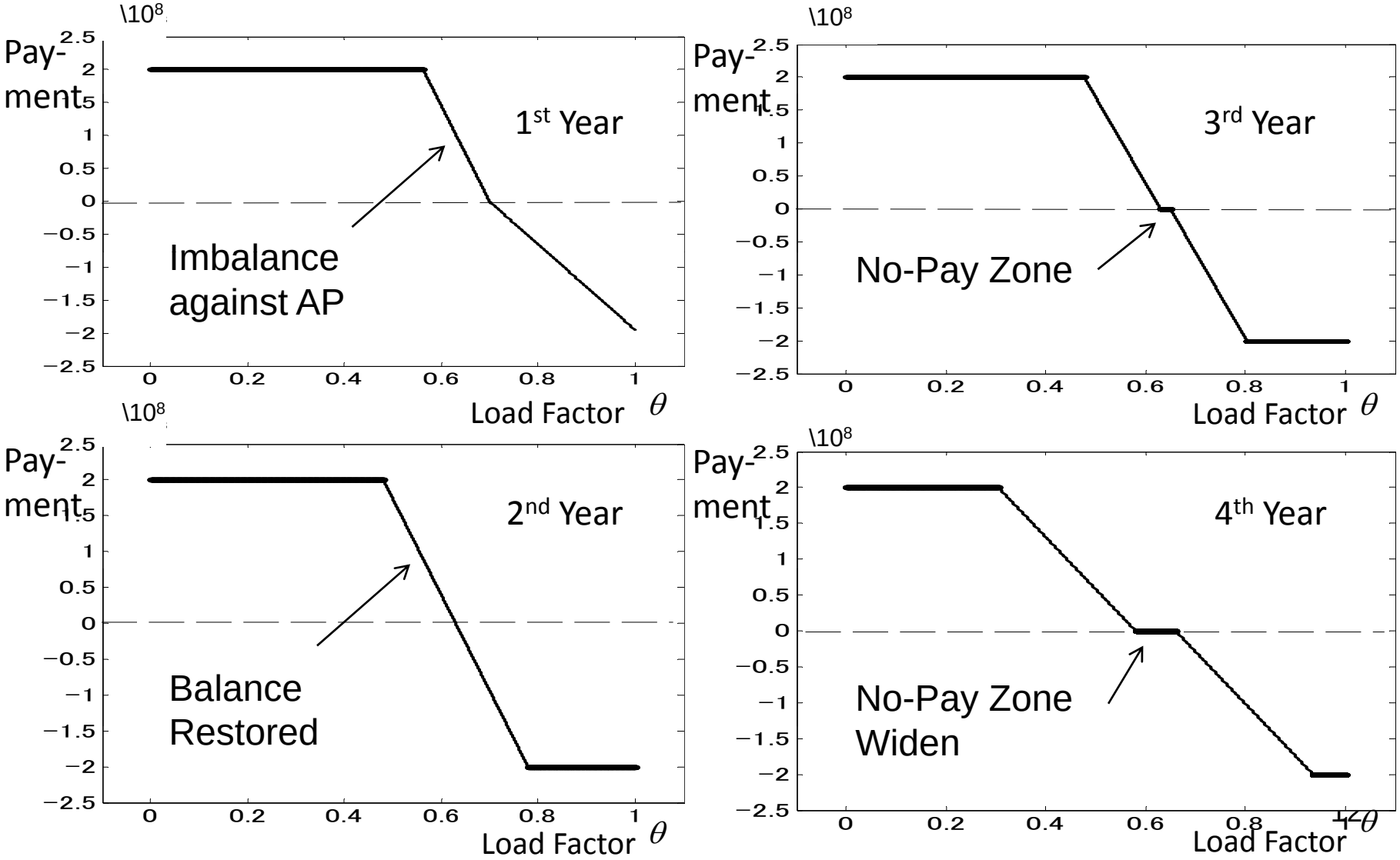
- AP & AL share revenue fluctuation risk.
- Incentive device to improve each effort (to meet target LF or to get payment)
- Commitment to serve AP by AL

Analyses from Several View Points are possible.

Risk Sharing is Balanced?	Hihara (2008)
Efficiency Gain by the Contract?	Hihara (2012)
Linear Contract is Optimal ?	Hihara (2011)

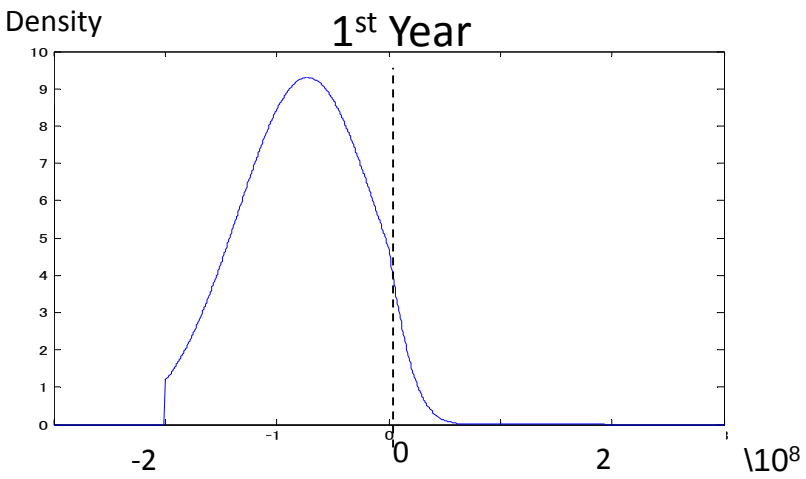
…

NOTO Contract Payment Structure (actual)

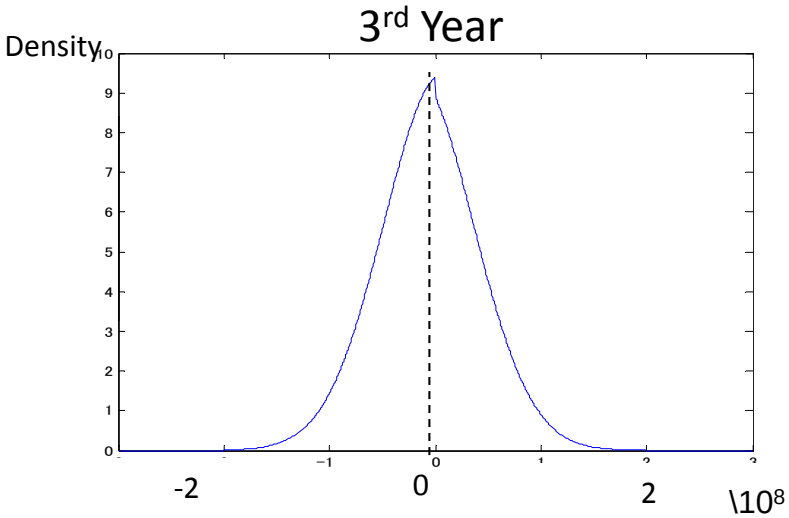


Source: Hihara (2008)

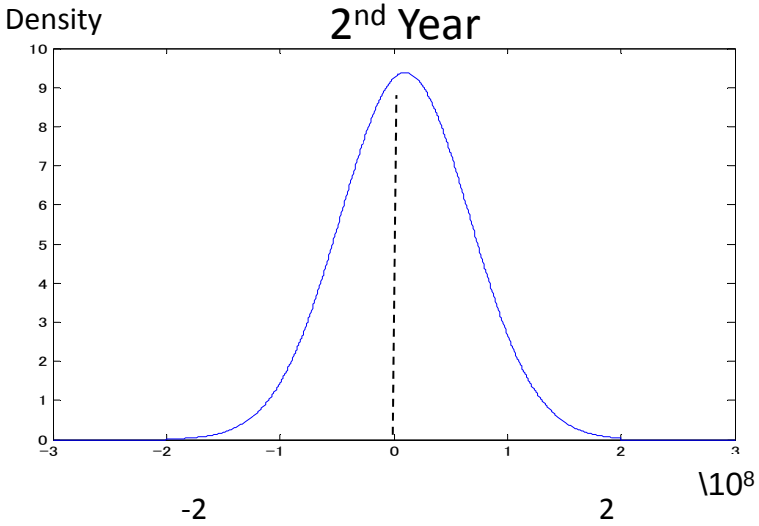
AP's Payment Probability Estimation



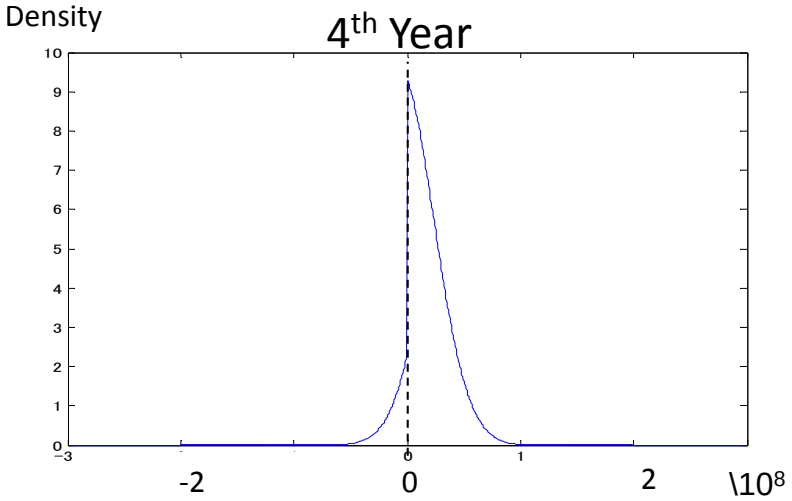
AP assuming large risk



No payment most likely



Restore balance



No payment almost certain

Source: Hihara (2008)

Actual Data at NOTO Case

Year	Target LF	Estimated LF	Realized LF	Payment AL→AP(\10⁸)
1	70%	65. 0%	79. 5%	0. 97
2	63%	63. 7%	64. 6%	0. 15
3	64%	63. 5%	66. 5%	0. 20
4	62%	65. 1%	65. 1%	0

⇒ At least 4 % revenue increase with contract

Source: Hihara (2008)

A Lot of Efforts (examples)

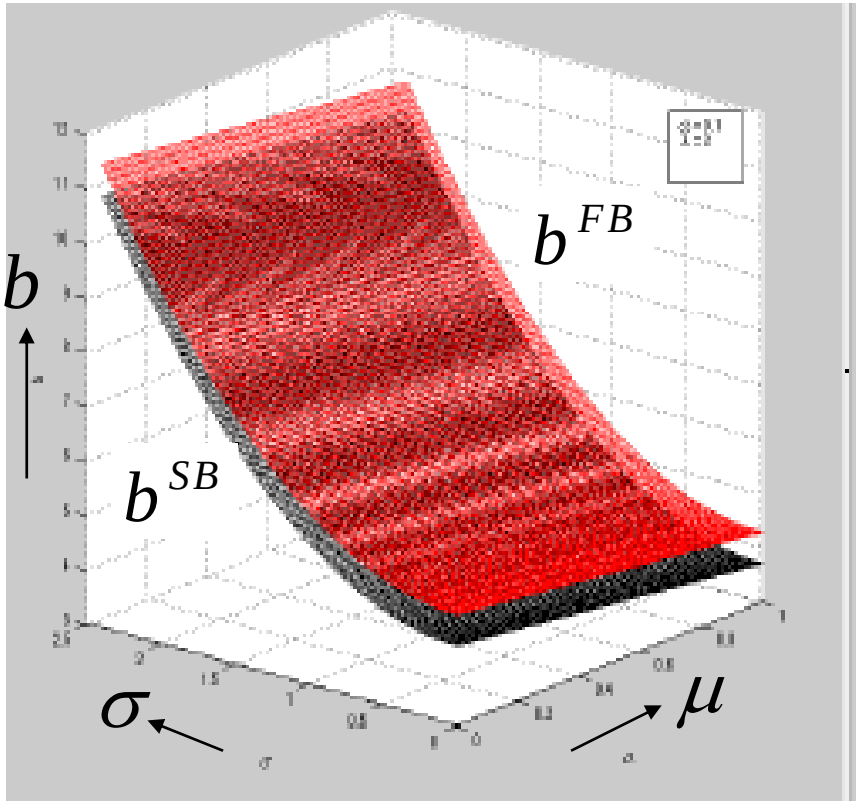
AP;

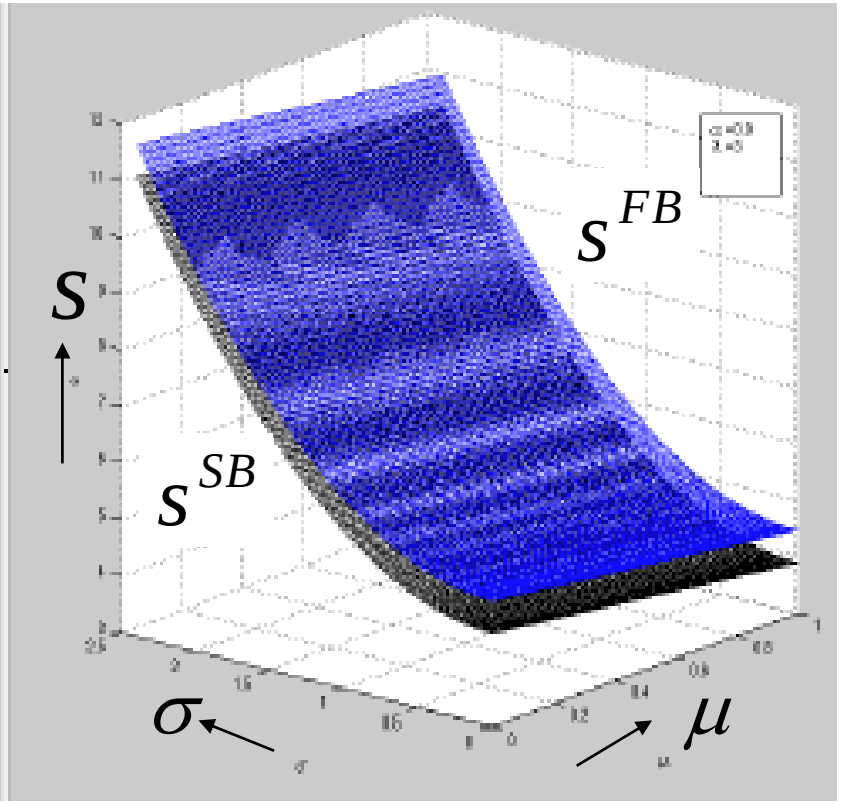
- ✈ Promotion Campaign Budget (1.1M$/year）
- ✈ Landing Fee Cut by 2/3
- ✈ AP Parking Free of Charge
- ✈ Incentive Payment to Tickets on NOTO=Haneda
- ✈ Improve Bus and Taxi to/from AP

AL;

- ✈ Improve Connection at Haneda
- ✈ Discount for Connection Ticket
- ✈ Quality Travel Package (domestic/int'l)

More Efforts with Contract





1. The red graph is the first best effort level of AP by contract.
2. The blue graph is the first best effort level of AL by contract
3. The black graph is the second best effort level of AP and AL without contract.

b : AP's Effort Level

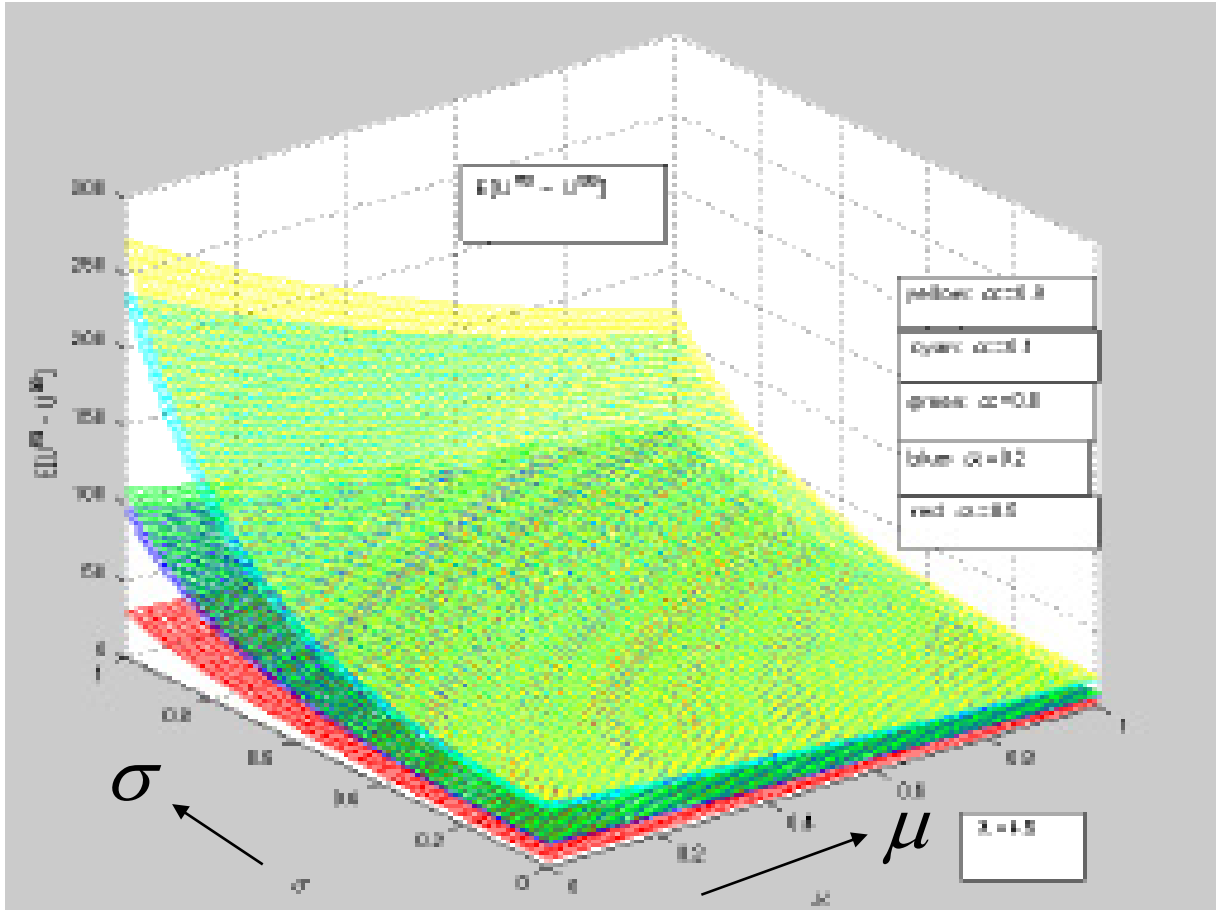
s : AL's Effort Level

μ : Route's Revenue Expectation σ: Route's Revenue Volatility

Source: Hihara (2012)

Total Utilities Increase with Contract

Total Utilities Level Increase ↑



The graphs are the difference between first best expected utility level of both AP and AL restored by contract minus second best expected utility level of AP and AL.

Graphs in colors are; α : balance b/w AL & AP

red for α =0.5; blue for α =0.2; green for α =0.8; cyan for α =0.1; yellow for α =0.9.

Source: Hihara (2012)

Conclusion

- AL & AP can improve the balance of risk sharing by revising the contract over time.
- Efficiency gains are possible, if the contract is designed smartly.
- To reach smart contract, clever incentive design & decreasing asymmetries is the key.

  e.g., level the playing field,
  enhance transparency,
  improve communication ...

Special Gratitude to

- Kansai International Airport Co., Ltd.
- Airport Environment Improvement Foundation
- Narita International Airport Co., Ltd.
- Japan Airport Terminal Co., Ltd.

Thank you for your attention!

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