Voluntary Emissions Reductions Schemes

Katsuhiro Yamaguchi

Professor, Graduate School of Public Policy

The University of Tokyo

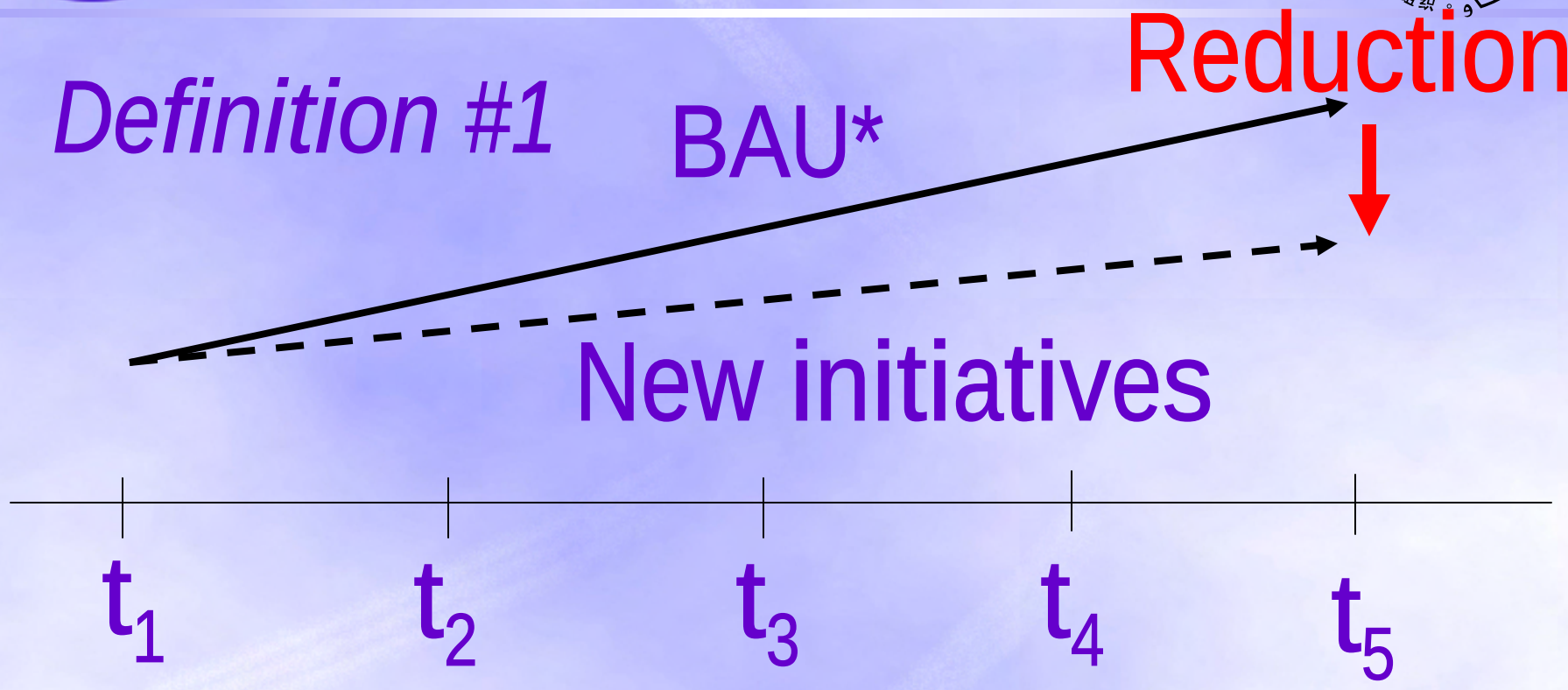
Outline

- Basic issues
- Experience in Japan
- Concluding remarks

1. Basic issues

- What is meant by “Emissions Reductions”

Voluntary Emissions Reductions Schemes



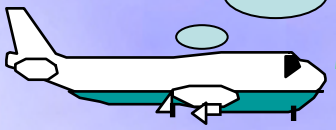
* BAU: Business as Usual

Voluntary Emissions Reductions Schemes

Definition #2

3 tons of CO_2 per passenger (round trip)

Montreal

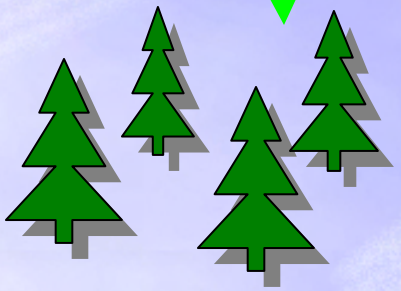


Pay for the cost of tree planting

Tokyo

Reduction

(offset)



Definition #3

- **Improving Intensity**

  CO_2 per RPK, RTK per Gallon of fuel, etc.

or

- **Reducing Absolute Emission** CO_2 ton per annum

Voluntary Emissions Reductions Schemes

- **Intensity targeting is more equitable when there is discrepancy in growth**
- **If the goal is to reduce CO_2 ppm in the atmosphere, then the absolute emission level is important**

Voluntary Emissions Reductions Schemes

- What is meant by “Voluntary”

Voluntary Emissions Reductions Schemes

- **"Voluntary" by Who?**
  - ✓ **Airlines**
  - ✓ **Passengers/Shippers**
  - ✓ **How about Airports ?**

Voluntary Emissions Reductions Schemes

- **Various types of schemes**
- **"Voluntary" with linkage to some other mechanism?**
  - **No: Unilateral commitment (individual or group), offset**
  - **Yes: Agreement with the government, voluntary ETS**

Voluntary Emissions Reductions Schemes

- **"Voluntary" with incentives?**

No: Unilateral Commitment

(there could be intangible benefits when target is achieved and social sanctions when not),

Carbon offset

Voluntary Emissions Reductions Schemes

- **"Voluntary" with incentives?**

Yes: Target achieved:

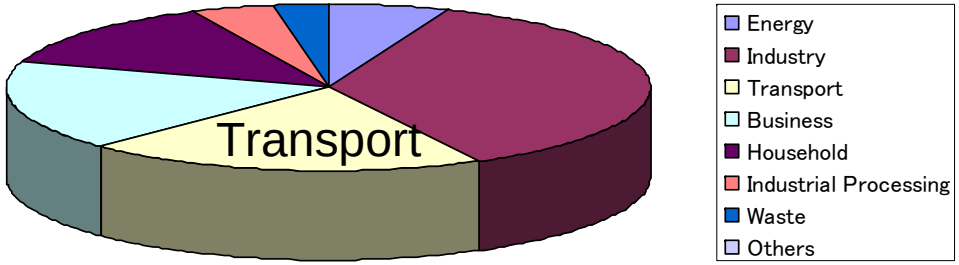
- ✓ **Reward (tax breaks, subsidy)**
- ✓ **Sell CO_2 through ETS**

Target not achieved:

- ✓ **Penalty**
- ✓ **Purchase CO_2 through ETS**

2. Experience in Japan
- The case of unilateral commitment by airlines -

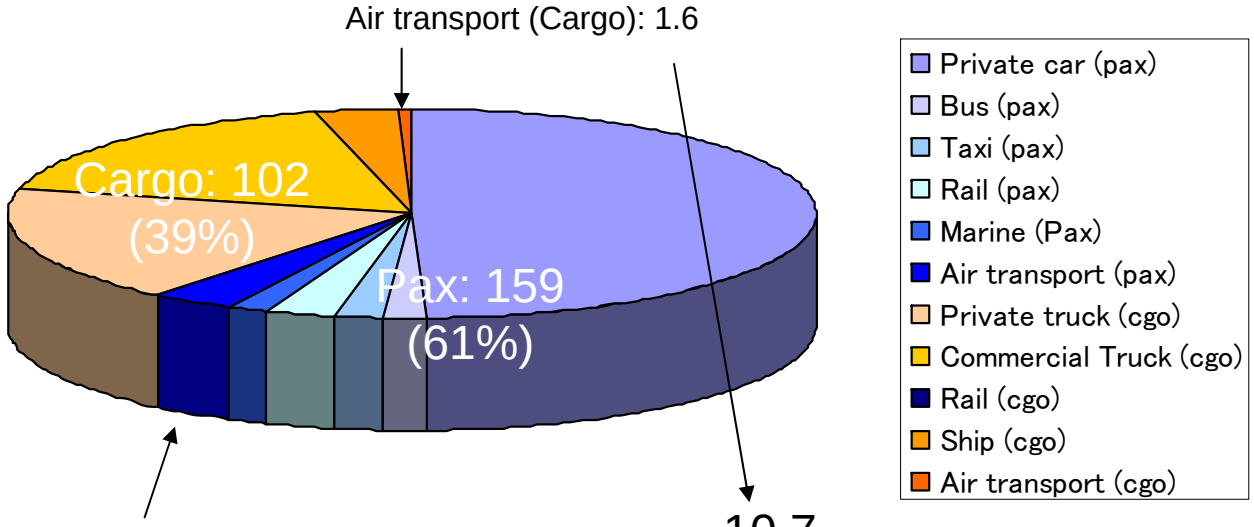
Total GHG emission in Japan: 1,291 million tons (2004)



262 million tons (20.6%)

CO_2 emission from transport sector in Japan

Unit: million tons



Air transport (Pax): 9.1
5.7% of total pax

10.7
4.1% of total transport
0.8% of total CO2 emission

Source: MOE, MLIT
Compiled by GraSPP

CO_2 emission reduction in domestic air transport in Japan

1997	➢Airline voluntary plan as part of multi-sector program by *Nippon Keidanren* (Japan Business Federation)	CO_2/ASK △10% by 2010 (base year 1990)	COP3 COP4
1998	➢Airline voluntary plan consolidated into transport-sector program by Ministry of Transport		

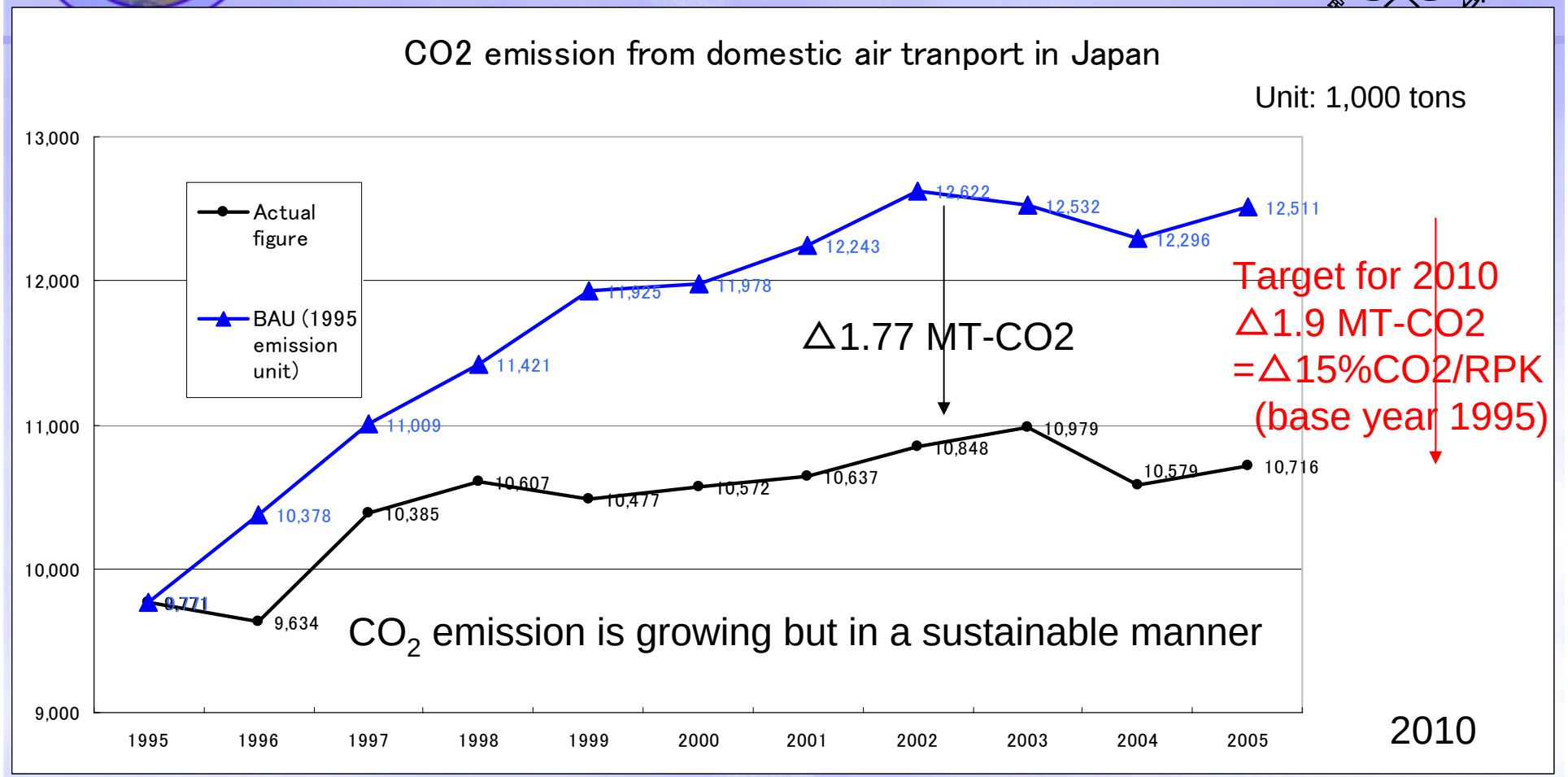
Note: ASK (Available Seat Kilometers), RPK (Revenue Passenger Kilometers)

1999	➢Voluntary plan incorporated into the Global Warming Prevention Package	CO_2/RPK △7% by 2010 (base year 1995)	COP5
2002	➢CO_2 intensity target is converted into CO_2 emission level in the Global Warming Prevention Package ver2	1.1 MT-CO_2 reduction by 2010 (base year 1995)	Japan ratifies Kyoto

2004	➢Achieved 1.77 MT-CO_2 reduction (CO_2/RPK△14%) (base year 1995)		COP10 /MOP1
2005	➢Reduction target revised and incorporated into the legal framework of National COP3 Achievement Plan	1.9 MT-CO_2 (CO2/RPK△ 15%) (base year 1995) firms)	Kyoto Protocol comes into effect

<Addendum>

2005	➢Revised Energy Conservation Law stipulates targets for transport sector	Energy Consumption per ASK△1% per annum from 2006 (a common target for large transport firms)


CO2 emission from domestic air tranport in Japan
Unit: 1,000 tons
13,000
12,000
11,000
10,000
9,000
Actual figure
BAU (1995 emission unit)
9,771
10,378
11,009
11,421
11,925
11,978
12,243
12,622
12,532
12,296
12,511
9,634
10,385
10,607
10,477
10,572
10,637
10,848
10,979
10,579
10,716
△1.77 MT-CO2
Target for 2010
△1.9 MT-CO2
=△15%CO2/RPK
(base year 1995)
CO2 emission is growing but in a sustainable manner
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2010

➢Was the voluntary plan effective?

Voluntary Emissions Reductions Schemes

CO_2 intensity
$=CO_2$ per RPK
= *function of*

1) technological & operational improvements
   approximated by time trend (*t*)
2) voluntary plan
   dummy variable since 1998 (*d*)
3) average flight stage (*dis*)
4) load factor (*L/F*)
5) average aircraft size (*capa*)

Voluntary Emissions Reductions Schemes

- Annual technological & operational improvement: 1.1% per annum
  =25% improvement
  in 20 years since1985

- Impact of the voluntary plan:
  3.6% improvement
  after 1998 (in addition to the above)

Voluntary Emissions Reductions Schemes
Standard

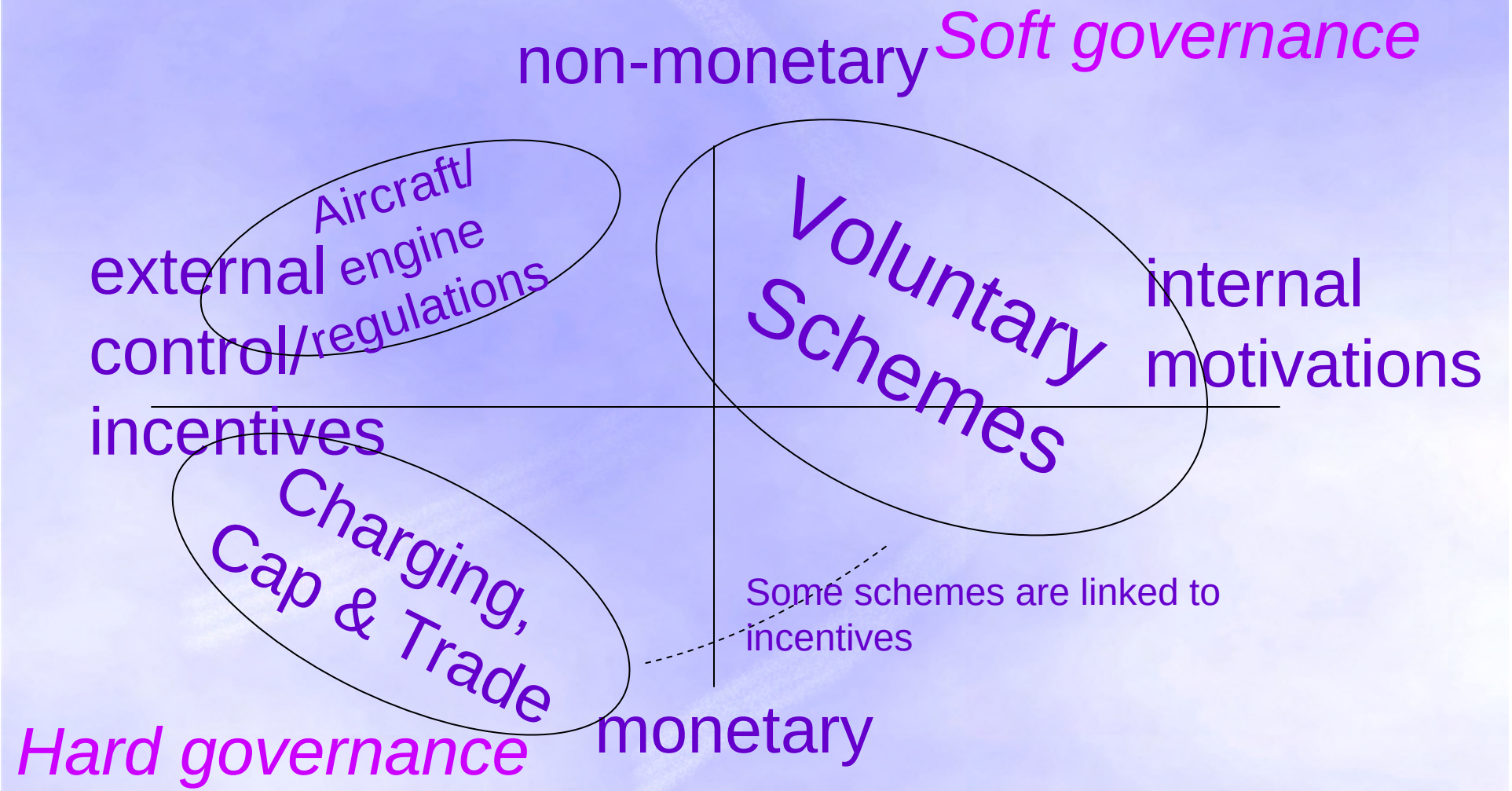
Parameter	Estimate	Error	t-statistic	P-value
c	6.90	0.35	19.45	[.000]
t	-0.011	0.001	-11.44	[.000]
d	-0.036	0.008	-4.52	[.000]
ln(dis)	0.26	0.09	2.95	[.003]
L/F	-1.24	0.06	-20.98	[.000]
ln(capa)	-0.49	0.07	-7.03	[.000]
rho	-0.37	0.20	-1.90	[.057]

Dependent variable: *ln (CO_2/RPK)*
Estimated by autoregressive mode (AR1) with data from 1985 to 2005, Adjusted R-squared = 0.982

3. Concluding remarks

- Observations on voluntary vs. mandatory schemes -

Voluntary Emissions Reductions Schemes



- **Difference in governance structure**

  Why?

Voluntary Emissions Reductions Schemes

- **What is the goal?**

  Technology driven dynamics vs. short-term achievements

- **How is the decision made?**

  Multi-agent collective goal-seeking vs. hierarchical control

Voluntary Emissions Reductions Schemes

- **What is the time frame?**
- **To what extent should international aviation contribute?**
- **Who should take the initiative?**

Thank you for your attention

ITPU
International Transport Policy Research Unit
http://www.pp.u-tokyo.ac.jp/ITPU/