

Congestion Management Alternatives: a Toolbox Approach

by

Michael O. Ball

University of Maryland & NEXTOR

*based on NEXTOR Congestion Management Project (co-
investigators: L. Ausubel, F. Berardino, P. Cramton, G. Donohue,
M. Hansen, K. Hoffman)*

Congestion Mgmt Goals

- I. Control of congestion and delay
- II. Maintenance of a vibrant air transportation business environment,
- III. Support for certain societal and community objectives
- IV. Consistency with international obligations

Note: for some airports, e.g. LGA, physical constraints → capacity expansion not possible; in long term expansion will become impossible or severely limited for more and more airports.

Challenge: managing congestion in such a setting.

What about the two “easy” options??

- 1.) No action – e.g. at LGA do not replace HDR.
- 2.) Status quo – continue under HDR-like rule.

Question re 1): *If there are no access controls on a high-demand airport such as LGA, is it likely that congestion and delays would become excessive, i.e. is it likely that goal I. would not be met?*

Relevant Evidence: recent ORD experience and experience at LGA during “Air 21” period.

Question re. 2.) -- HDR or similar measure:

Is economic efficiency, i.e. a vibrant air transportation business environment, achieved under HDR, i.e. is goal II. being met?

Relevant Evidence:

- HHI
- Experience with secondary market.
- LGA average aircraft gauge analysis.

Basic Options and Tradeoffs

Administrative measure vs market mechanism

Slots (aka arrival or departure authorization) vs
no slots

Market mechanism: auctions vs congestion
pricing

Should slots have finite lifetimes (lease vs
own)?

Slots vs No Slots



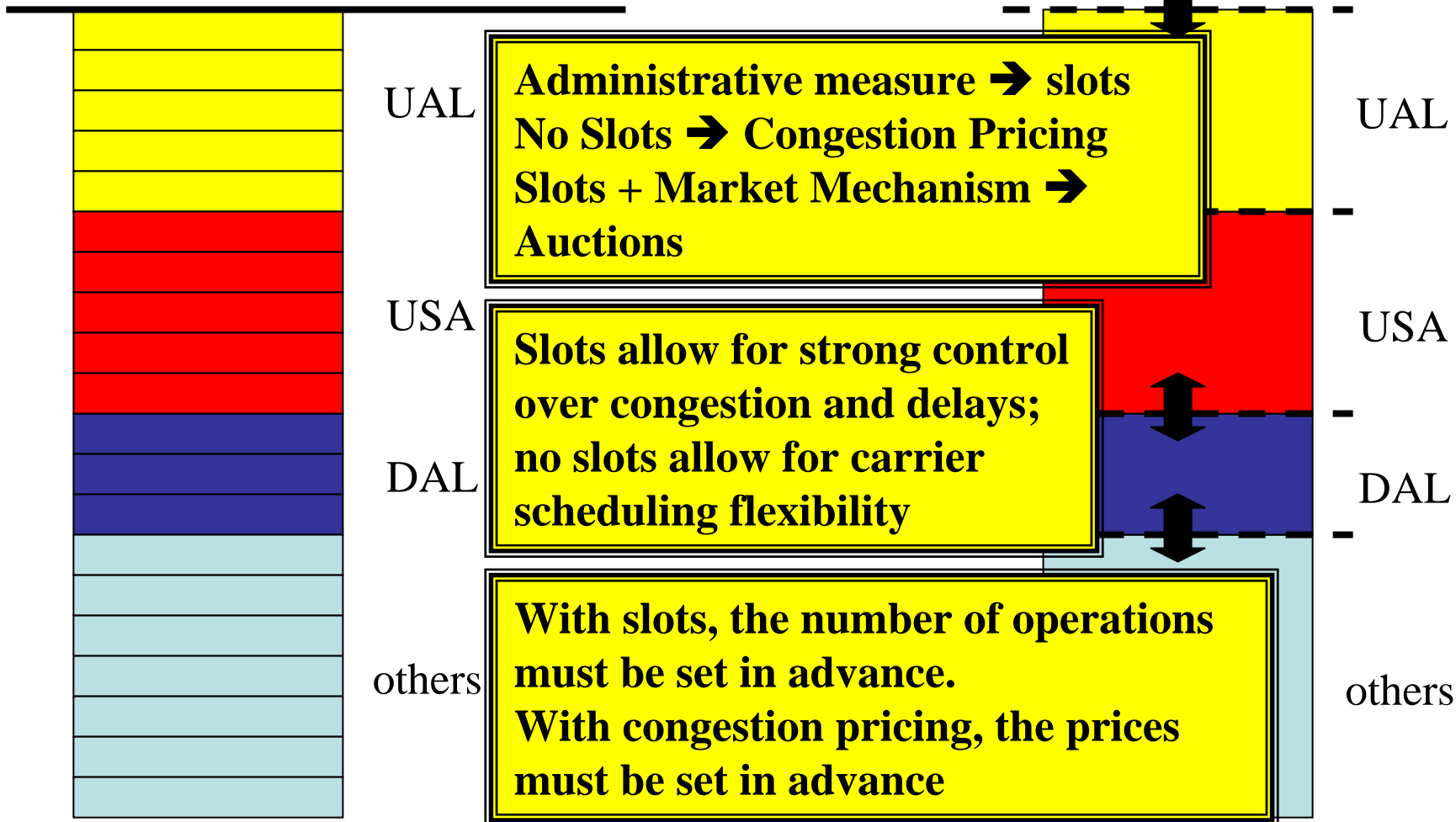
SLOTS

Fixed limit on number of operations

(Congestion) Prices provide "incentive" to limit operations

\$\$\$\$\$\$\$

NO SLOTS

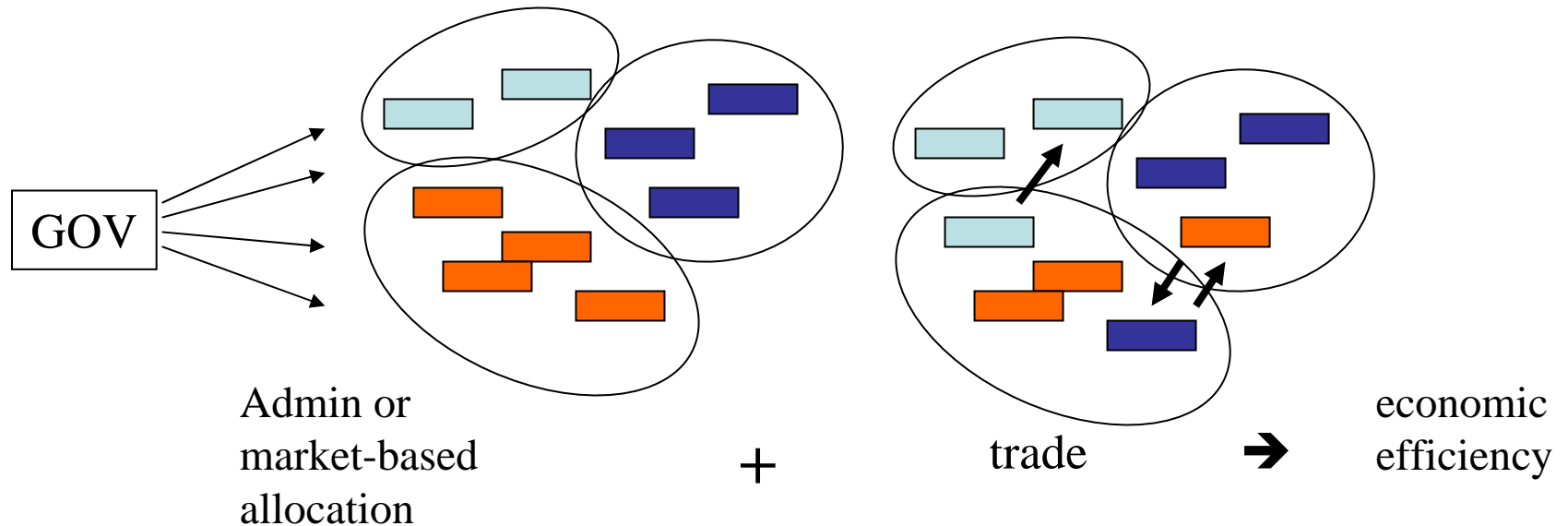


When slots are employed, there is always a question of determining the right number of slots.

- *Is it possible at certain congested airports, e.g. LGA, that the current number of slots is too high?*
- *Would new allocation mechanisms be more attractive if they coincided with a reduction in the total number of slots, thereby providing a benefit to passengers and possibly airlines (reduced congestion)?*

More generally, what level of delay should prompt the FAA or an airport operator to take action to manage congestion?

Slots, Secondary Markets and Economic Efficiency



This conclusion requires that the secondary market “works well”!!!

Stimulating Secondary Market (if it needs to be stimulated)



- Increasing “cost” for holding a slot.
- Forcing slot owner to participate in market (even if owner can buy back slot).
- Forcing all exchanges to go through “blind” market.
- Clarifying rights associated with slot ownership and eliminating politics associated with airport access.

Two “modest” proposals that maintain existing slot ownership

1.) Wgt-based landing fee → “*flat*” landing fee (or something *in between*)

Motivation: ATM resources used by flight operation largely independent of aircraft size → flat fee better reflects costs → better use of resources.

2.) *Slot Fee*: charge a monthly fee for holding a slot; fee would be charged whether or not flights assigned to that slot take place.

- could allow for elimination of use-it or lose-it rule;
- to eliminate fee, airline must either sell slot or turn it in;
- fees could vary by time window;
- should stimulate secondary market;
- could start with revenue neutral fees;
- provides basic “structure” achieved by slot auctions but is less disruptive;
- setting fees could be challenging.

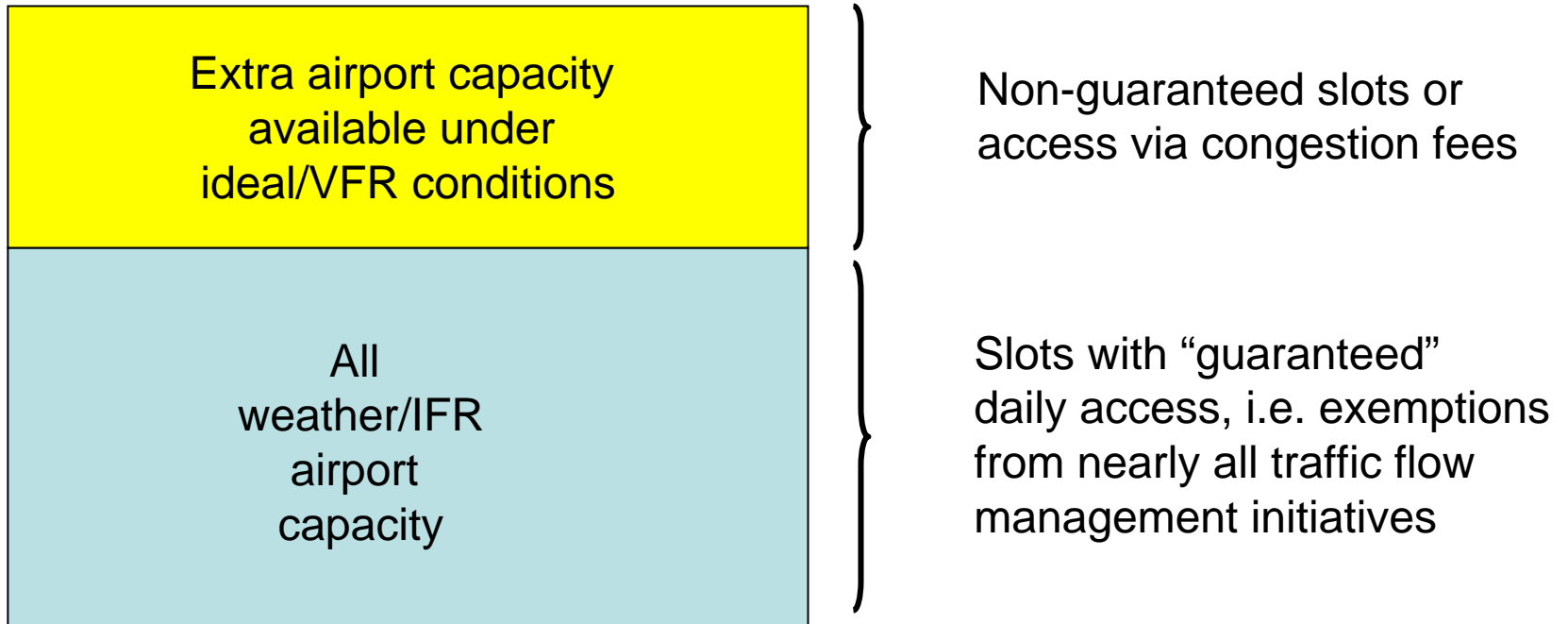
Who implements the solution (manages process, collects new fees, etc.)



FAA/Federal Government vs Airport Operator???

- Airport operator “owns” the *ground* at an airport and the FAA “owns” the *air* above it → both have legal argument for controlling access.
- FAA solution: allows for NAS-wide coordination and better “system optimization”; more flexibility with respect to collecting fees.
- Airport operator solution: allows for “custom” implementation, better management and better coordination with access to “other” airport resources, e.g. gates, overnight parking, baggage handling, etc.
- Challenges in both cases.

Access rights and traffic flow management: transferring more control to flight operators



Slot Property Rights

The collaborative decision making procedures provide a prescription for the definition of property rights:

- Property right → right to schedule operation in time window
- In times of reduced capacity, CDM procedures (ration-by-schedule) convert scheduled flight time into priority used in allocation of controlled arrival time

2nd aspect of property rights: slot's value is always relative to number of other slots → there need to be well-defined procedures for determining the number of slots, including possible increases, e.g. in advent of new technology; there should be guarantees that these procedures are not over-ridden by political processes.

2 levels of slots: high priority slots receive exemptions from traffic flow management initiatives (except in extreme cases).

What should be done if/when “new” airports become congested?

- Down the road should we think in terms of classification of airports as in Europe?
- What is trigger for action (delay level)?
- What is appropriate sequence of actions?
e.g. flat landing fees → congestion pricing → slots ...

Final Thoughts

- Politically acceptable proposals should offer benefits to all parties.
- All parties seem to agree that efforts to improve secondary market would be worthwhile – question: What steps should be taken?
- But, improving the secondary market does not impact current delay levels.
- Start thinking longer term, i.e. toward NAS-wide solutions.