


Spectrum Buyouts

A Mechanism to Open Spectrum



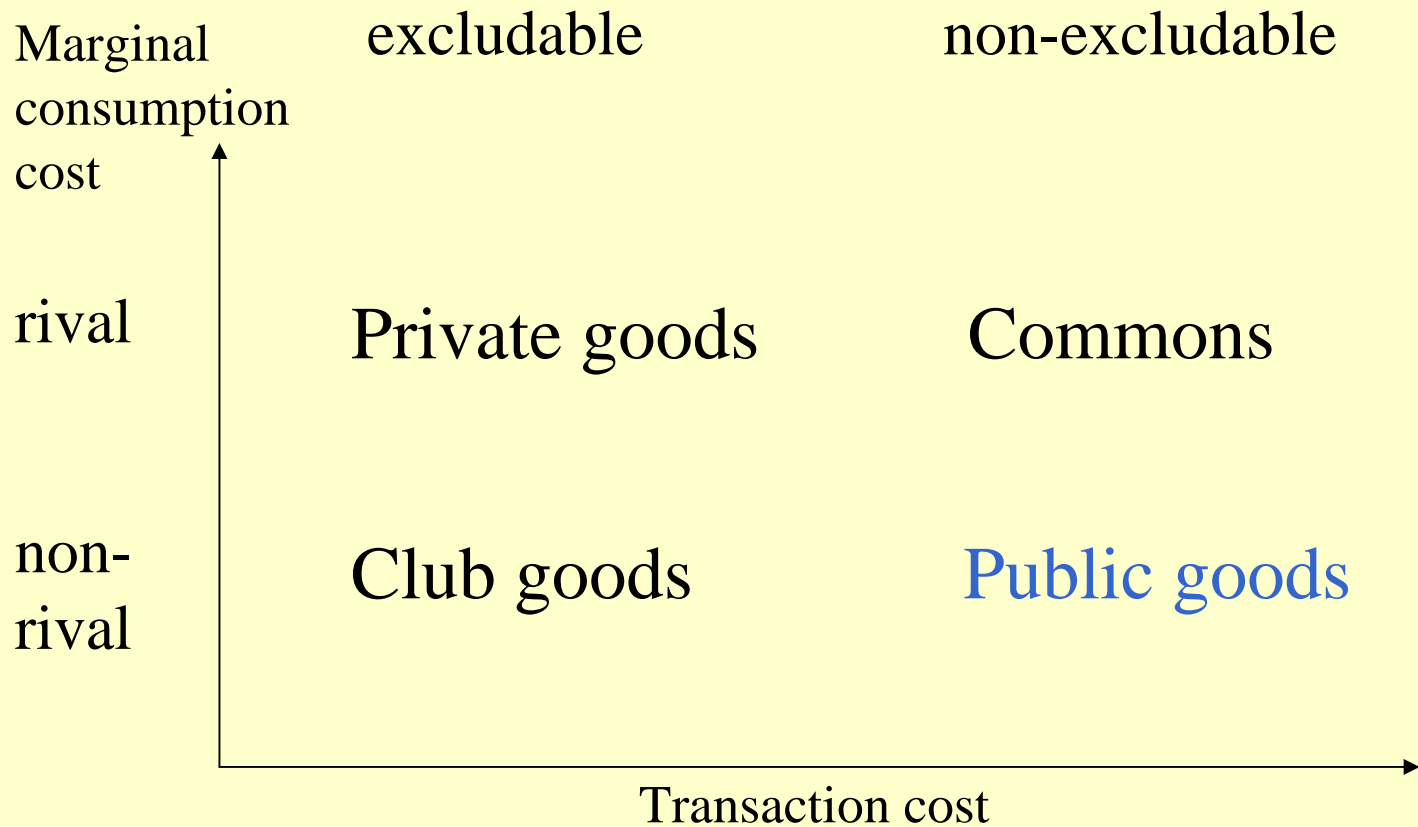
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3 Approaches to Spectrum

- Command and control: Japan
 - Eminent domain: nominal compensation
- Property rights: the U.S.
 - Incentives for incumbents to exit
 - Fragmentation and **monopoly**
- Commons (public goods)
 - Technically efficient
 - **No incentives** for incumbents to vacate

Spectrum: Neither Property nor Commons



Spectrum as “Protocol”

- Spectrum management **device rights**
 - Pricing terminals for the priority of channels
- Relocation by **reverse auctions**
 - Providing incentives without monopoly
 - Buying the spectrum open
- Finance
 - General account
 - Spectrum usage fees (for device rights)
 - Auction fees (selling lower bands)

Auction Design

- “Bribing” incumbents (in the sense of Coase)
 - PCS auctions: selling at the **highest** price
 - Reverse auctions: buying at the **lowest** price
 - Requirement for the minimum bandwidth
- **VCG mechanism**
 - Firm i 's report affects its payoff through the change of the collective outcome
 - Efficient: truth telling is the dominant strategy
 - Competitive the cheapest price

VCG Auction

Pay i = alternative group's value - other's value
 (if not for i) (i's group)

$$t_i(\theta) = \sum_{j \neq i} v_j(x_{-i}^*(\theta_{-i}), \theta_j) - \sum_{j \neq i} v_j(x^*(\theta), \theta_j)$$

- : valuation
- x^* : efficient decision (1 or 0)
- $v(x, \theta) = x$
- $- i$: firms other than i

Results

- Proposition

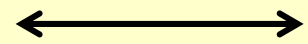
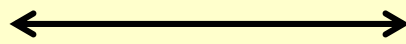
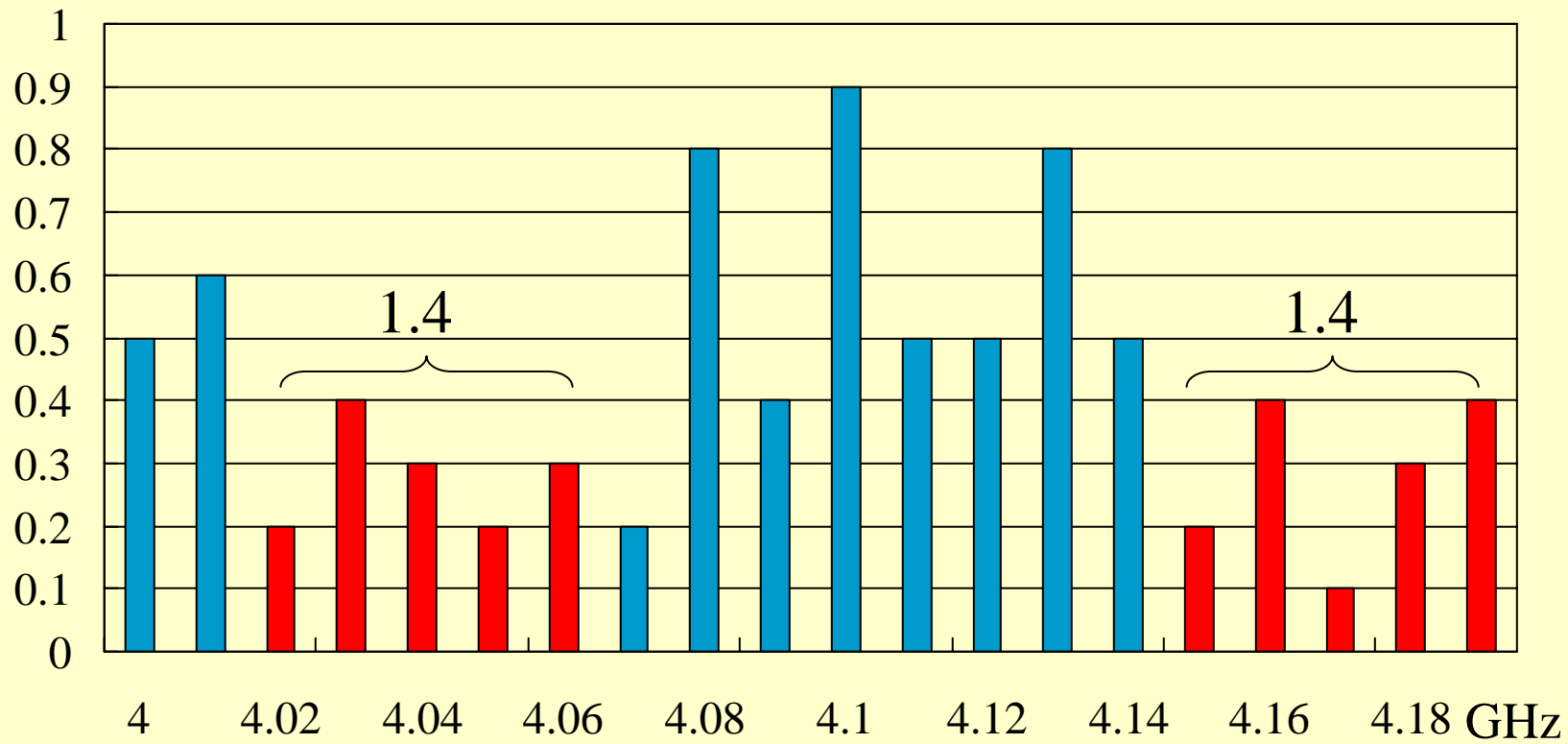
“Truthful reporting is a dominant strategy.”

- Corollary

“With increasing competition, the buyout prices will be close to the total value of the least efficient band group.”

Example

Billion yen



Hybrid Approach

