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MARKETS VS. LISTED PRICING FOR ACCESS TO DISTRIBUTION NETWORKS

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OUTLINE

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3. Listed Prices vs. Market-Based Allocation
4. Conditions for Equivalence
5. Design Options
6. Implications in Practice
7. Conclusion and Outlook

MOTIVATION

historically

- users have universal access rights to their full connected capacity at listed prices
- network operator supplies corresponding capacity at minimum cost

recently

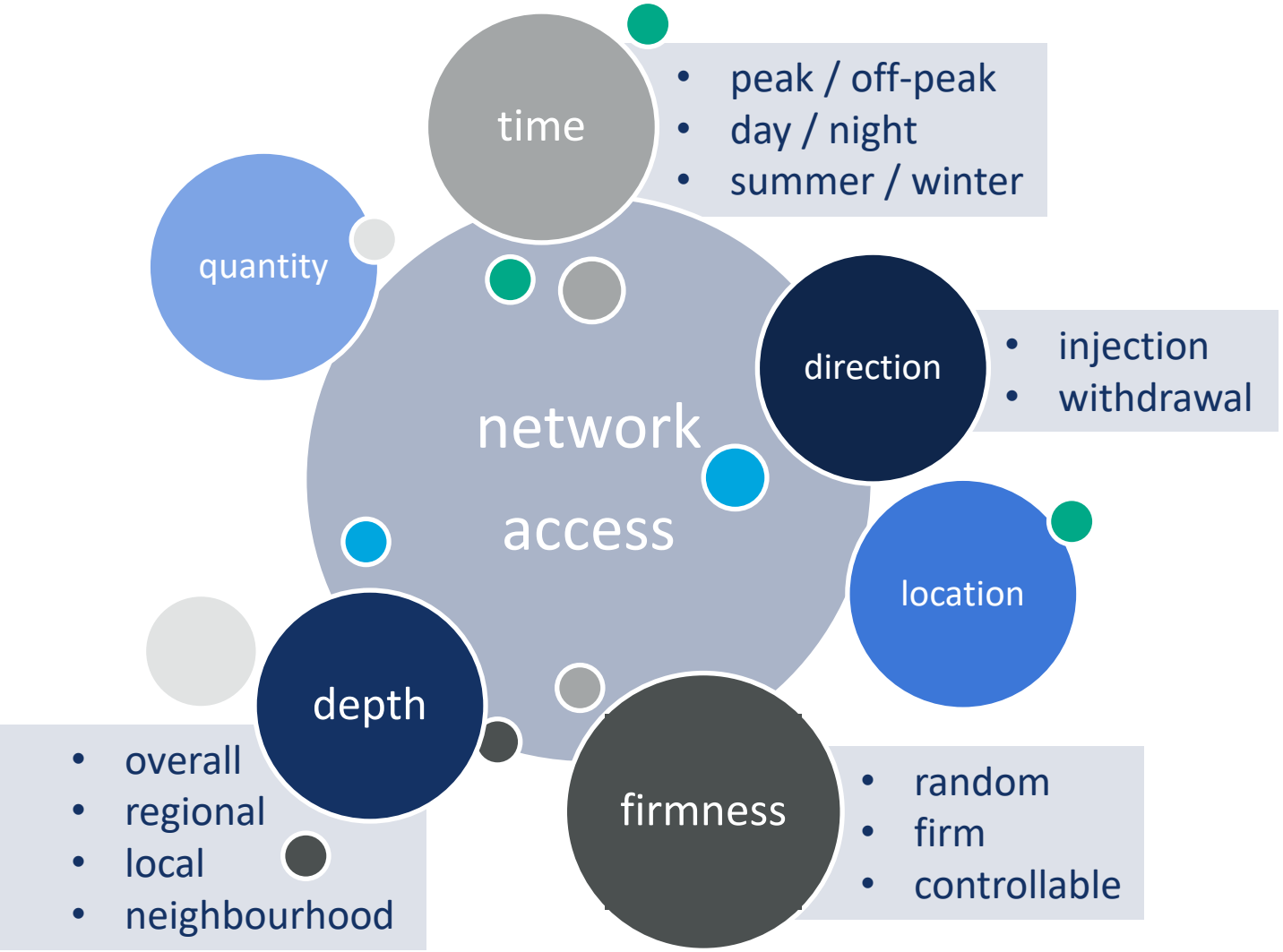
- listed pricing for small restrictions in access rights
- buy back from the network operator to correct previously assigned universal access

future?

assign restricted access in a market-based way

➢ analyse markets for differentiated access to network capacity as an alternative (or complement) to universal access and listed pricing

RESTRICTED NETWORK ACCESS RIGHTS

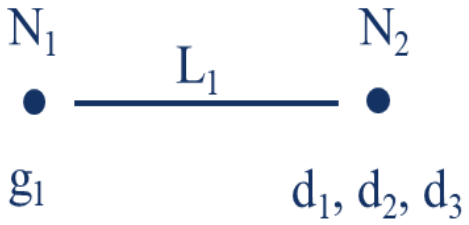


examples:

- heat pump accepts controllable access for withdrawal during the day, rather than random access all day
- electric vehicle has access to additional capacity at the workplace rather than at home
- PV has access for injection into the neighbourhood only, not to sell to users connected via transmission grid

- ➢ assigned with certain advance
- ➢ possibly in bundles
- ➢ traded subsequently

ALLOCATION OF UNIVERSAL ACCESS



capacity cost	3

		user 1	user 2	user 3
units demanded	off-peak	1	1	1
	peak	2	2	2
utility per unit	off-peak	1	2	3
	peak	2	3	4
combined utility	1st unit	3	5	7
	2nd unit	2	3	4

- utility for universal access is combined utility for peak & off-peak
- decreases for 2nd unit as no utility from a second unit of off-peak

via listed prices

- price for access to both periods at capacity cost
- users with utility /willingness to pay ≥ capacity cost buy access

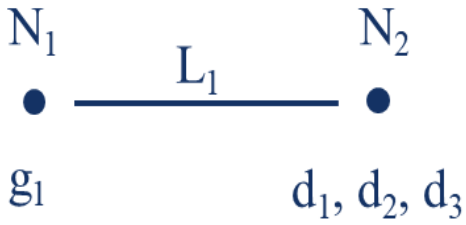
via auction market

- users bid truthfully
- network operator accepts all bids ≥ capacity cost

in both settings

➢ network operator builds capacity of 5 units at cost of 15
➢ all demands obtain a first unit, demand 2 and 3 obtain a second
➢ demand surplus of 6 (sd1=0, sd2=2, sd3=5)

ALLOCATION OF RESTRICTED ACCESS



capacity cost	3

		user 1	user 2	user 3
units demanded	off-peak	1	1	1
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utility per unit	off-peak	1	2	3
	peak	2	3	4

pairs	off-peak	u3:3	u2:2	u1:1			
	peak	u3:4	u3:4	u2:3	u2:3	u1:2	u1:2
pair w2p		7	6	4	3	2	2

- utility for restricted access is per peak & off-peak period

via listed prices

- price for access to peak period at capacity cost
- access to off-peak period at variable cost (here 0)

via auction market

- users bid truthfully
- network operator pairs and sorts bids
- accepts all bid pairs with willingness to pay ≥ capacity cost

in both settings

- ➢ network operator builds capacity of 4 units at cost of 12
- ➢ all demands obtain off-peak access, 2 and 3 also obtain peak
- ➢ demand surplus of 6 munits (sd1=1, sd2=2, sd3=5)

EQUIVALENCE UNDER OPTIMAL CONDITIONS

preconditions:

- network operator has incentives to build optimal capacity
  - ➢ monopoly regulation necessary with pricing and auctions alike
- knowledge of long-term marginal cost of the network
  - difficult to precisely distinguish cost for different parts of the network and different types of uses
  - ➢ affects pricing and auctions alike
- knowledge of network users utilities
  - projected based on past manifestations for listed pricing
  - revealed via market allocation, but prone to strategic behaviour and market power
  - ➢ benign circumstances for demand revelation can be created via market and product design

	universal access			restricted access		
	user1	user2	user3	user1	user2	user3
off-peak units	1	1	1	1	1	1
peak units	1	2	2	0	2	2
utility	3	8	11	1	8	11
cost	3	6	6	0	6	6
surplus	0	2	5	1	2	5

AUCTION DESIGN

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repetitions

-short access periods
-closer to real-time

+ more attractive chances for entrants
+ higher predictability for demand
+ lower likelyhood of default via bankruptcy

- enables learning, signalling and retaliation
- less certainty for capacity investment
- higher transaction cost

bid transparency

- sealed / anonymous > open bids
- descending > ascending auctions

+ prevent learning and signalling
+ encourages involvement of weaker bidders

- reinforces uncertainty about common valuations

pricing rules

- uniform > discriminatory price
- trigger price
- second price rule (at margin)
- reserve price

+ encourages truthhful bidding / reveals demand
+ reduces winners curse / auction inefficiency
+ introduces quantity risk

- may limit revenue and efficiency

DESIGN OPTIONS II

allowing resale

+ corrects allocation via grandfathering or uninformed listed prices
+ reduces risks of long-term products
+ helps develop capacity efficiently

- legitimizes transfers between colluding competitors
- shifts surplus from regulated operator to private parties
- higher transaction cost

encouraging resale
- use-it-or-loose-it/trade-it/-pay
- allowing intermediaries

+ prevent predatory behaviour
+ encourages involvement of weaker bidders
+ anticipating future competition with long-term products

IMPLICATIONS IN PRACTICE

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wind generator in export constrained part of the grid

- benefits from differentiating access, e.g. peak, local or curtailable access
- benefits from adapting access rights over time

- challenge of entry deterring by incumbents
  - less relevant in congestion-blind electricity markets
  - network operators can adapt capacity via grid enhancing technology or forced curtailment

- challenge of monopsony power for incumbents
  - short access periods increase competition, in theory also help collusion, but likely detectable in small, clearly arranged network sections
  - potential for intermediaries

electric vehicles in import constrained part of the grid

- benefits from differentiating access, e.g. peak, local or curtailable access

- challenge of assessing value of flexibility for inexperienced users
  - optional universal access and price taking bids
  - aggregators to mediate complexity and limit transaction cost

- challenge of monopsony power for incumbents
  - likely detectable with uniform household user types
  - risky when curtailment is linked to value of access rights

CONCLUSIONS AND OUTLOOK

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constantly evolving distribution grids with increasingly flexible users

- restricted network access helps to coordinate different aspects of network use
- market-based allocation enables continuous adjustment of capacity allocation trend towards market-based allocation of access rights.

preconditions: adequate design of products and market rules

- balance between short- and long-term allocation (competition, risks)
- balance between complexity and individual fit (efficiency, transaction cost)
- control market power
  - adjust to specific setting (substitutable / complementary access, prevent learning / signalling)
  - facilitate detection and antitrust
- reveal value of access and thus inform regulation and efficient system development (e.g. uniform pricing)

concerns in addition to efficient allocation

- social: not entirely rational, unexperienced users
- political :hesitation to rely uncertain price-based reactions for security of supply

THANK YOU FOR YOUR TIME AND ATTENTION.

ANY QUESTIONS OR COMMENTS?

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