



Grouped Priority Schemes

Offering customers a choice in urban
water security

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Outline

- **Why** I did the research
- **What** I did
- **How** I did it
- **Results/** implications

Why I did it?

- Water companies are considering offering customers a choice in the security their water
 - WTP???
- We don't know the distribution of willingness to pay for water security
 - \$P???



What I did

- Found a way to implement optimal priority contracts without prior knowledge of customers distribution of valuations



How I did it

- Model:
 - Known supply distribution
 - No storage (excess/ discretionary water)
 - Unit demand (same size lots)
 - Risk neutral

Typical scheme

Supply distribution

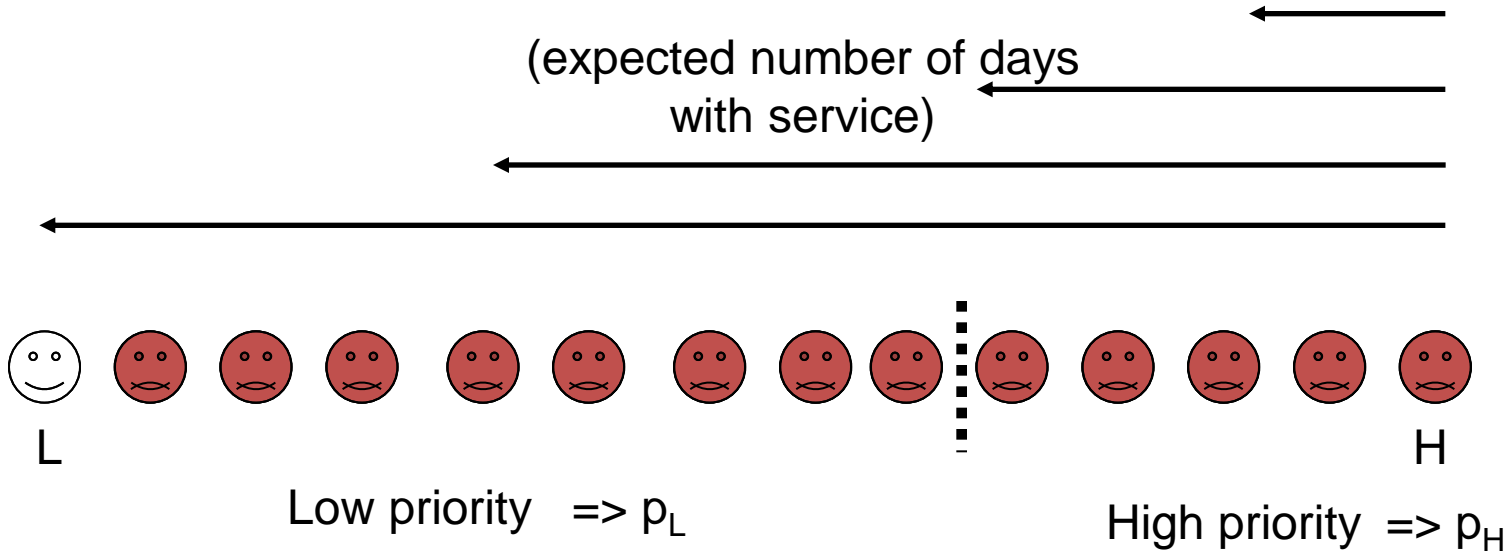
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Division of customers

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Probability of service in each group

(expected number of days with service)



How to divide customers

- If valuations known – know socially optimal split
- If unknown-
 - Arbitrarily divide customers – P unknown
 - Arbitrarily set P – division of customers unknown
 - Simultaneously reveal valuations and divide customers optimally

How: Using VCG mechanism

1. Customers report bid for the right to one period unrestricted use
E.g customer 1: $b_1 = \$10$
2. Using bids and **supply distribution** calculate the (reported) optimal split of customers
WTR = $\$10 - \9 for no restrictions
3. Using the optimal split, calculate and charge **VCG** prices
4. Bids \rightarrow True valuations, Split \rightarrow True optimal

Example

- $\mathbf{v} = 10; 10; 20; 30; 50; 60; 70; 100; 140; 180;$

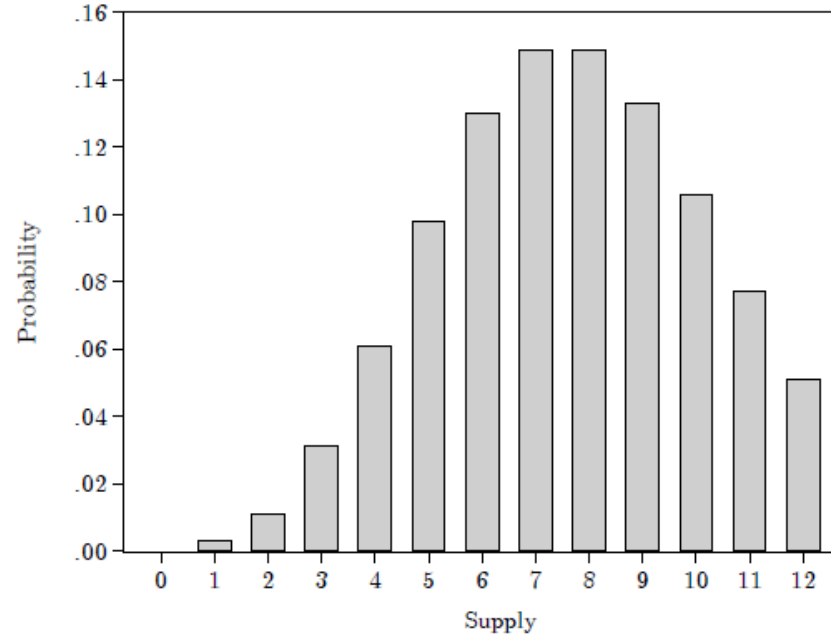




Figure 1: Truncated Poisson supply distribution

Table 1: Example service probabilities and VCG prices for two classes

Individual	Valuation	Service Probability	VCG Payment
10	180	0.938	16.82
9	140	0.938	17.95
8	100	0.938	19.09
7	70	0.938	19.94
6	60	0.938	20.22
5	50	0.938	20.52
4	30	0.446	0.00
3	20	0.446	0.00
2	10	0.446	0.00
1	10	0.446	0.00

 First priority class

 Second priority class

Results/ implications

- It is possible to implement IC contracts for priority without prior knowledge of the distribution of valuations
 - Reveals true information about WTP for security
 - Once true distribution known, selling is easier
- Guessing price is problematic
- Offering a choice is effective
 - Simple 2 group example achieves 82.4% possible gains

Thanks!



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