



***A Computationally Friendly
Combinatorial Auction: Why Ask
Wochnick When You Can Watch
The Clock Tick?***

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Costs of Using Combinatorial Auctions

- *Computation*
 - Solution Time
- *Complexity*
 - Cognitive and Participation Costs
 - Placing Bids
 - Interpreting Results (Transparency)
- *Incentives*
 - Strategic Bidding
 - Threshold

Combinatorial Auctions with Price Information

- Determine accepted and rejected bids (Primal)
- Signals are based on pseudo-dual prices
 - Prices that signal rejection
 - Prices that signal acceptance
 - Ambiguous signals

Combinatorial Auctions with Price Information

■ Trade-offs

- *Computation*

- Still an issue

- *Complexity*

- Prices help guide decisions
- Prices are not perfectly transparent: still need to ask Wochnick

- *Incentives*

- Experiments

- Harder (overlaps/synergies) problems have higher efficiencies

Clock Auction

■ Clock Auctions

- Eliminate Jump Bidding
- Simplicity

■ Features

- Price Posted
- Demand Registered
- Prices Increased based on Excess Demand
- No IDs, etc.

Combinatorial Clock Auction

■ Basic Design Features (1999)

- Prices per object
- Submit demand (packed, etc.)
 - Excess Demand_i = Number of Participants bidding on i
 - Increase Price until only 0 or 1 for each excess demand
 - Fill by doing full optimization
 - If 1 is reallocated → excess demand



Combinatorial Clock Auction

■ Tradeoffs

● *Computation*

- No Computation required until end
- Good Upper bound
- Dominated bids calculation during rounds

● *Complexity*

- Price information guidance is unambiguous

● *Incentives?*

Experiments with the Clock

■ Environments

Optimal Allocation of 10 Licenses											
A	B	C	D	E	F	G	H	I	J	\$ Value	Bidder ID
♦	♦		♦							100	1
		♦						♦		80	2
				♦			♦			80	3
					♦	♦				120	4 or 6
									♦	50	5
2 nd Best Allocation of 10 Licenses											
♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	350 or 301	6

Experiments with the Clock

■ Environments

Optimal Allocation of 10 Licenses												
A	B	C	D	E	F	G	H	I	J		\$ Value	Bidder ID
◆											17.37	4
	◆										36.27	5
		◆	◆	◆							88.59	1
					◆						24.00	2
						◆					30.00	4
							◆				36.00	3
								◆			48.00	1
									◆		54.00	5 or 6
2 nd Best Allocations of 10 Licenses												
					◆	◆	◆	◆	◆		180 or 153	5
◆	◆	◆	◆	◆							114	1

Auction Treatments

■ Mechanisms

- SMR
- Combo Auction (Plott)
- Clock



Results

Case	Join	Own	Auction	% Allocation Efficiency
1	.81	Yes	Clock	100,100,100
			Plott	78, 79, 78
			SMR	59
1	.81	No	CC	100,100,100
			Plott	97, 79
			SMR	63
1	.70	Yes	CC	100,100,100,100
			Plott	100, 100
			SMR	70
2a	.80	Yes	CC	100,100,99,100,99,100
			Plott	99, 99, 99, 95, 94, 95, 95
			SMR	100, 99, 95, 95
2b	.94	Yes	CC	100,100,100
			Plott	91, 94, 94
			SMR	100
2b	.94	No	CC	100,100,100
			Plott	95, 95
			SMR	100
2b	.80	Yes	CC	100,100,100
			Plott	100, 91
			SMR	100



Extensions

- Moving the Clocks
- OR/Eliminate past rounds
 - Dealing with budget constraints
- Exchange
 - Seller commitment and buy-back