The Method of Sealed Bids

Lecture 19
Section 3.5

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1. The Method of Sealed Bids
2. An Example – 3 Players, 2 Assets
   - The Bidding
   - The Allocation
   - The First Settlement
   - The Division of the Surplus
   - The Final Settlement
3. Another Example – 5 Players, 3 Assets
4. Another Example – 2 Players, 4 Assets
5. Assignment

Outline

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The Method of Sealed Bids

- The method of sealed bids is used to divide assets that cannot be subdivided.
- For example, if there are 2 assets to be divided 3 ways, then either
  - Two players get the two assets and the third player is compensated in cash, or
  - One player gets both assets and the other two players are compensated in cash.
- The first step is for each player to submit a sealed bid for each asset.

The Method of Sealed Bids

- The five steps (to be explained) are
  - The bidding
  - The allocation of assets
  - The first settlement
  - Dividing the surplus
  - The final settlement

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The Method of Sealed Bids

Example (3 Players, 2 Assets)

- Three children, Andy, Bob, and Chuck, are dividing two assets of their parents' estate.
- The assets are
  - The house
  - The yacht.

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The Method of Sealed Bids

The Bidding

- Each player submits a bid on each asset.
- No player knows any other player's bids.
- Each player's bids determine his fair share.

The Method of Sealed Bids

Example (3 Players, 2 Assets)

	House	Yacht	Total Value	Fair Share
Andy	100	200	300	100
Bob	180	150	330	110
Chuck	150	90	240	80

- Each player bids on each asset.
- The table shows their bids (in \$1000s) and their fair shares.

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The Method of Sealed Bids

Allocation of Assets

- The allocation of the assets is based on the bids.
- Each asset goes to the highest bidder for that asset.

The Method of Sealed Bids

Example (3 Players, 2 Assets)

- Bob gets the house, worth $180,000 (to him).
- Andy gets the yacht, worth $200,000 (to him).
- Chuck gets nothing, yet.

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The Method of Sealed Bids

The First Settlement

- In the first settlement, the players pay or receive cash to compensate for getting to little or too much in the allocation of assets.
- If the assets won by a player exceed his fair share, then he pays the difference in cash to the surplus.
- If the assets won (if any) by a player fall short of his fair share, then he receives the difference in cash from the surplus.

The Method of Sealed Bids

Example (3 Players, 2 Assets)

- We use cash to even things up.
  - Bob's fair share is \$110,000 and he got the house (worth \$180,000), so he pays \$70,000.
  - Andy's fair share is \$100,000 and he got the yacht (worth \$200,000), so he pays \$100,000.
  - Chuck's fair share is \$80 and he got nothing, so he receives \$80,000.

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The Method of Sealed Bids

Dividing the Surplus

- Whatever is left over is the surplus.
- The surplus is divided equally among all the players.

The Method of Sealed Bids

Example (3 Players, 2 Assets)

- Bob paid \$70,000 and Andy paid \$100,000, for a total of \$170,000.
- Then Chuck received \$80, leaving \$90,000.
- So the surplus is \$90,000.
- We will divide it equally among the players, with each receiving \$30,000.

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The Method of Sealed Bids

The Final Settlement

- The final settlement is a summary that describes for each player
  - Which assets he won (if any).
  - The net amount of cash that he paid or received.

The Method of Sealed Bids

Example (3 Players, 2 Assets)

- The final settlement is as follows:
  - Andy wins the yacht and pays $70,000 in cash.
  - Bob wins the house and pays $40,000 in cash.
  - Chuck receives $110,000 in cash.

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The Method of Sealed Bids

Example (3 Players, 2 Assets)

- Five children, Andy, Bob, Chuck, Dave, and Eddie are dividing three old camping items.
- The assets are
  - A tent
  - A stove
  - A backpack

The Method of Sealed Bids

Example (The Bidding)

	Tent	Stove	Backpack	Total Value	Fair Share
Andy	80	20	50		
Bob	120	30	40		
Chuck	100	35	45		
Dave	65	30	80		
Eddie	150	20	60		

The Bids

The Method of Sealed Bids

Example (The Bidding)

	Tent	Stove	Backpack	Total Value	Fair Share
Andy	80	20	50	150	
Bob	120	30	40	190	
Chuck	100	35	45	180	
Dave	65	30	80	175	
Eddie	150	20	60	230	

The Bids

The Method of Sealed Bids

Example (The Bidding)

	Tent	Stove	Backpack	Total Value	Fair Share
Andy	80	20	50	150	30
Bob	120	30	40	190	38
Chuck	100	35	45	180	36
Dave	65	30	80	175	35
Eddie	150	20	60	230	46

The Bids

The Method of Sealed Bids

Example (The Allocation of Assets)

- Eddie gets the tent, worth \$150 (\$104 over his fair share).

The Method of Sealed Bids

Example (The Allocation of Assets)

- Eddie gets the tent, worth \$150 (\$104 over his fair share).
- Chuck gets the stove, worth \$35 (\$1 under his fair share).

The Method of Sealed Bids

Example (The Allocation of Assets)

- Eddie gets the tent, worth \$150 (\$104 over his fair share).
- Chuck gets the stove, worth \$35 (\$1 under his fair share).
- Dave gets the backpack, worth \$80 (\$45 over his fair share).

The Method of Sealed Bids

Example (The Allocation of Assets)

- Eddie gets the tent, worth \$150 (\$104 over his fair share).
- Chuck gets the stove, worth \$35 (\$1 under his fair share).
- Dave gets the backpack, worth \$80 (\$45 over his fair share).
- Andy gets nothing (\$30 under his fair share).

The Method of Sealed Bids

Example (The Allocation of Assets)

- Eddie gets the tent, worth \$150 (\$104 over his fair share).
- Chuck gets the stove, worth \$35 (\$1 under his fair share).
- Dave gets the backpack, worth \$80 (\$45 over his fair share).
- Andy gets nothing (\$30 under his fair share).
- Bob Gets nothing (\$38 under his fair share).

The Method of Sealed Bids

Example (The First Settlement)

- Andy receives \$30 in cash.
- Bob receives \$38 in cash.
- Chuck receives \$1 in cash.
- Dave pays \$45 in cash.
- Eddie pays \$104 in cash.

$$45 + 104 - 30 - 38 - 1 = 80.$$

The Method of Sealed Bids

Example (Dividing the Surplus)

- The surplus is \$80, to be divided 5 ways.
- So, each player gets \$16 from the surplus.

The Method of Sealed Bids

Example (The Final Settlement)

- The final settlement is
  - Andy receives $46 in cash.
  - Bob receives $54 in cash.
  - Chuck gets the stove and receives $17.
  - Dave gets the backpack and pays $29.
  - Eddie gets the tent and pays $88.

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Example (2 Players, 4 Assets)

- Two children, Andy, Bob, are dividing four assets.
- The assets are four paintings

The Method of Sealed Bids

Example (The Bidding)

	Painting of Grandma	Painting of Grandpa	Painting of Great Grandma	Painting of Great Grandpa	Total Value	Fair Share
Andy	100	300	500	600	1500	750
Bob	250	200	300	350	1100	550

The Bids

The Method of Sealed Bids

Example (The Allocation of Assets)

- Andy gets the paintings Grandpa, Greatgrandma, and Greatgrandpa, worth $1400.
- Chuck gets the painting of Grandma, worth $250.

The Method of Sealed Bids

Example (The First Settlement)

- Andy pays \$650 in cash.
- Bob receives \$300 in cash.

The Method of Sealed Bids

Example (Dividing the Surplus)

- The surplus is \$350, to be divided 2 ways.
- So, each player gets \$175.

The Method of Sealed Bids

Example (The Final Settlement)

- The final settlement is
  - Andy receives the paintings Grandpa, Greatgrandma, and Greatgrandpa and pays $475 in cash.
  - Bob receives the painting of Grandma and receives $475 in cash.

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- Chapter 3: Exercises 43, 44, 46, 47, 48.