Experimental double auctions with private information

Data overview

Market structure

Regular (equal sides, (un)restricted asks, 10 rounds (120 seconds each), narrow CE, static)

10 buyer valuations: 148, 143, ..., 103
10 seller valuations: 73, 78, ..., 118
(CE: [108, 113])

More buyers

Duplicated buy-side (CE: [118, 128])

More sellers

Duplicated sell-side (CE: [93, 103])

Asymmetric

Large

More rounds

50 rounds (30 seconds each)

Large CE

Buyer valuations 113, 118 substituted with 153, 158; seller valuations 103, 108 substituted with 63, 68 (CE: [98, 123])

Buyer valuations shifted 20 units up, seller valuations shifted 10 units down (CE: [108, 123])

Dynamic

Seller shift

Rounds 1–5 · Rounds 6–10

Left. regular. *Right.* Seller valuations shifted 10 units down (CE: [103, 108])

From buyers to sellers

Rounds 1–5 · Rounds 6–10

From sellers to buyers

Rounds 6–10 · Rounds 1–5

Left. No valuations 73, 78 (CE: [113, 118])
Right. No valuations 143, 148 (CE: [103, 108])

Feedback

Full PI — *Full* order-book access.

Other-side PI — Access to bids/asks on the market side *opposite* to the subject.

Same-side PI — Access to bids/asks on the *same* market side as the subject.

Private Information

Black Box — *No* order-book access.

Price rule

First price — Deal at the bid/ask price – whichever was placed *first*. (Unlikely) ties broken at random.

Random price — Deal at a *random* price between bid and ask.

Matchmaker keeps — Buyer/seller trades at the bid/ask price. Difference kept by the experimenter.[*]

[*]This price mechanism is used, for example, by priceline.com to sell last-minute hotel rooms under the name Name-Your-Own-Price.

Treatment			Experimental data		
Market structure	*Feedback*	*Price rule*	`treatment`	*Subjects (markets)*	*Observations*
Regular					
	Full PI	First price	`Full`	73 (4)	4810
	Other-side PI	First price	`Other`	70 (5)	4238
	Same-side PI	First price	`Same`	71 (5)	4069
		Matchmaker keeps	`SameMMK`	64 (4)	4605
	Black Box	First price	`BB`	84 (5)	4495
		Random price	`BBRandom`	78 (5)	4249
		Matchmaker keeps	`BBMMK`	88 (5)	5334
Restricted asks	Full PI	First price	`FullLimS`	76 (5)	2802
	Black Box		`BBLimS`	71 (5)	2446
Asymmetric					
More buyers	Full PI	First price	`FullMoreB`	130 (5)	5683
	Black Box		`BBMoreB`	113 (5)	4792
More sellers	Full PI	First price	`FullMoreS`	140 (5)	8012
	Black Box		`BBMoreS`	124 (5)	5236
Large					
More rounds	Black Box	First price	`BBMoreRounds`	77 (5)	7392
Large CE	Full PI	First price	`FullLargeCE`	183 (13)	6999
	Black Box		`BBLargeCE`	74 (8)	3259
Seller shift	Full PI	First price	`FullSShift`	80 (5)	2467
From buyers to sellers			`FullFromBtoS`	74 (5)	2380
From sellers to buyers			`FullFromStoB`	81 (5)	3118
			Total	**1'751 (104)**	**86'386**

The final number of subjects active in an experimental market may differ from the number of subjects initially recruited for it either due to inactivity of the subjects or due to technical disconnections before trading began. See also our OSF registry under osf.io/gu62n.

Data structure

Parameter	Description
`treatment`	configuration of the experimental market
`game`	sequence number of the experimental market under treatment `treatment`
`round`	index $T \in \mathbb{N}$ of the trading round in the experimental market
`time`	a measure $t_T \in \mathbb{N}$ of time within trading round T
`id`	ID of the player (unique within the dataset)
`side`	market side of the player (`Buyer` or `Seller`)
`valuation`	valuation (reservation price) of player i, $\overline{\beta}_i$ (if i is a buyer) or $\underline{\sigma}_i$ (if i is a seller)
`bid`	current value of player i's bid β_i (if i is a buyer) or ask σ_i (if i is a seller)
`price`	deal price if player i's bid/ask resulted in a match
`match_id`	ID of the player with whom player i was matched (in the case of a match)
`match_time`	time when the match was formed (in the case of a match)
`type`	`Manual` if the player manually entered the bid/ask `Auto` if the player clicked on the button to accept the best offer on the other side of the market
`status`	`Expired` if the bid/ask expired (after 10 seconds) `Replaced` if the player replaced the bid/ask before it expired `Accepted` if the bid/ask resulted in a deal

	treatment	game	round	time	id	side	valuation	bid	price	match_id	match_time	type	status
700	FullMoreS	1	4	95	1330	Seller	83	90				Manual	Replaced
701	FullMoreS	1	4	95	1338	Buyer	118	85				Manual	Expired
702	FullMoreS	1	4	96	1337	Seller	103	104				Manual	Expired
703	FullMoreS	1	4	97	1344	Buyer	103	85				Manual	Replaced
704	FullMoreS	1	4	97	1330	Seller	83	89	89	1331	98	Manual	Accepted
705	FullMoreS	1	4	97	1343	Seller	118	500				Manual	Expired
706	FullMoreS	1	4	98	1332	Seller	88	90	90	1344	100	Manual	Accepted
707	FullMoreS	1	4	98	1331	Buyer	138	89	89	1330	98	Auto	Accepted
708	FullMoreS	1	4	100	1344	Buyer	103	90	90	1332	100	Auto	Accepted
709	FullMoreS	1	4	104	1334	Seller	93	100				Manual	Expired
710	FullMoreS	1	4	104	1348	Seller	88	97				Manual	Expired

Treatment overview

1   Regular markets

1.1   Full feedback (baseline)

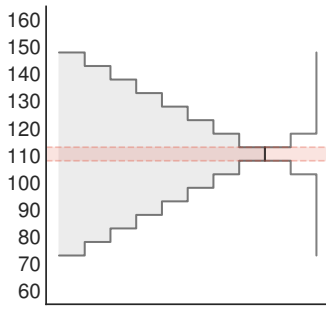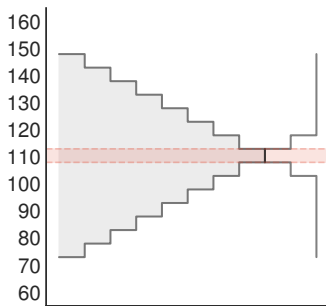`Full`   Regular, Full PI, First price (October 2016)
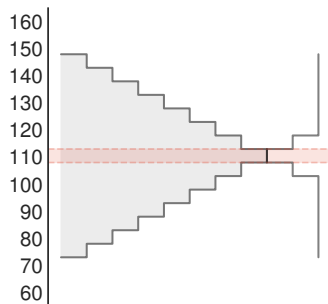
Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **10 sellers**

- **Buyer valuations**: [148, 143, 138, 133, 128, 123, 118, 113, 108, 103]

- **Seller valuations**: [73, 78, 83, 88, 93, 98, 103, 108, 113, 118]

- **CE range**: [108, 113], **gains of trade**: 320, **equilibrium quantity**: 8

2

1.2 Other-side feedback

`Other` Regular, Other-side PI, First price (October 2016)

Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **10 sellers**
- **Buyer valuations**: [148, 143, 138, 133, 128, 123, 118, 113, 108, 103]
- **Seller valuations**: [73, 78, 83, 88, 93, 98, 103, 108, 113, 118]
- **CE range**: [108, 113], **gains of trade**: 320, **equilibrium quantity**: 8
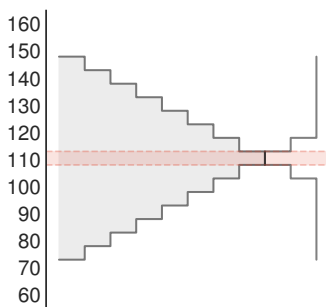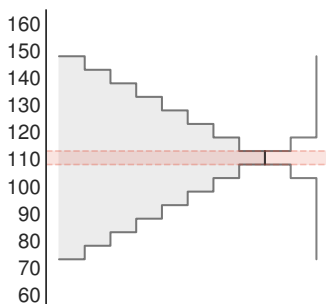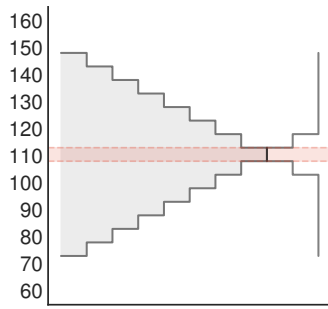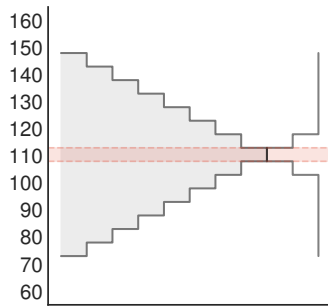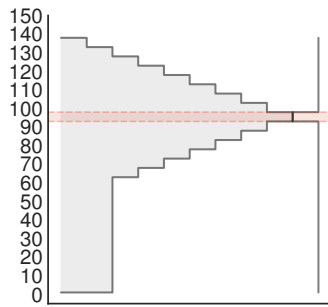
1.3 Same-side feedback

`Same` Regular, Same-side PI, First price (October 2016)
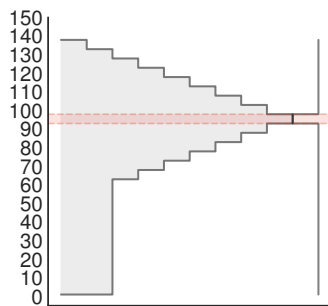
Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **10 sellers**
- **Buyer valuations**: [148, 143, 138, 133, 128, 123, 118, 113, 108, 103]
- **Seller valuations**: [73, 78, 83, 88, 93, 98, 103, 108, 113, 118]
- **CE range**: [108, 113], **gains of trade**: 320, **equilibrium quantity**: 8

`SameMMK` Regular, Same-side PI, Matchmaker keeps (October 2016)

Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **10 sellers**
- **Buyer valuations**: [148, 143, 138, 133, 128, 123, 118, 113, 108, 103]
- **Seller valuations**: [73, 78, 83, 88, 93, 98, 103, 108, 113, 118]
- **CE range**: [108, 113], **gains of trade**: 320, **equilibrium quantity**: 8

1.4 Black Box feedback

`BB` Regular, Black Box, First price (November 2016)

Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **10 sellers**
- **Buyer valuations**: [148, 143, 138, 133, 128, 123, 118, 113, 108, 103]
- **Seller valuations**: [73, 78, 83, 88, 93, 98, 103, 108, 113, 118]
- **CE range**: [108, 113], **gains of trade**: 320, **equilibrium quantity**: 8

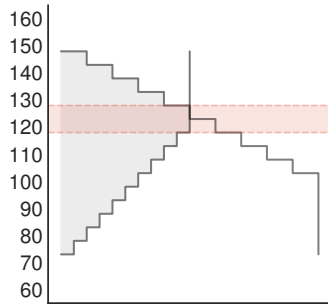**`BBRandom`** Regular, Black Box, Random price (November 2016)

Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **10 sellers**
- **Buyer valuations**: [148, 143, 138, 133, 128, 123, 118, 113, 108, 103]
- **Seller valuations**: [73, 78, 83, 88, 93, 98, 103, 108, 113, 118]
- **CE range**: [108, 113], **gains of trade**: 320, **equilibrium quantity**: 8

`BBMMK` Regular, Black Box, Matchmaker keeps (November 2016)

Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **10 sellers**
- **Buyer valuations**: [148, 143, 138, 133, 128, 123, 118, 113, 108, 103]
- **Seller valuations**: [73, 78, 83, 88, 93, 98, 103, 108, 113, 118]
- **CE range**: [108, 113], **gains of trade**: 320, **equilibrium quantity**: 8

1.5   Regular with restricted asks

`FullLimS` Regular with restricted asks, Full PI, First price (November 2020)

Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **10 sellers**
- **Buyer valuations**: [138, 133, 128, 123, 118, 113, 108, 103, 98, 93]
- **Seller valuations**: [1, 1, 63, 68, 73, 78, 83, 88, 93, 98]
- **CE range**: [93, 98], **gains of trade**: 514, **equilibrium quantity**: 9

`BBLimS` Regular with restricted asks, Black Box, First price (November 2020)

Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **10 sellers**
- **Buyer valuations**: [138, 133, 128, 123, 118, 113, 108, 103, 98, 93]
- **Seller valuations**: [1, 1, 63, 68, 73, 78, 83, 88, 93, 98]
- **CE range**: [93, 98], **gains of trade**: 514, **equilibrium quantity**: 9

2 Asymmetric markets
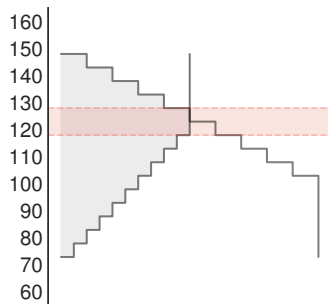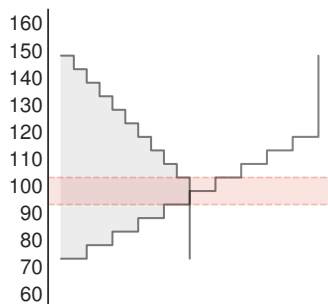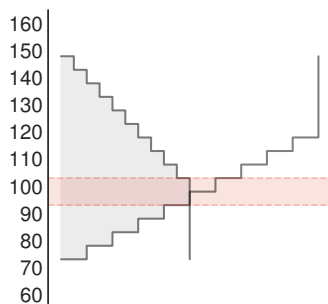
2.1 More buyers

| FullMoreB | More buyers, Full PI, First price (May 2018)

Proposed experimental scheme:

- **10 rounds** (120 seconds each), **20 buyers**, **10 sellers**

- **Buyer valuations**: [148, 148, 143, 143, 138, 138, 133, 133, 128, 128, 123, 123, 118, 118, 113, 113, 108, 108, 103, 103]

- **Seller valuations**: [73, 78, 83, 88, 93, 98, 103, 108, 113, 118]

- **CE range**: [118, 128], **gains of trade**: 425, **equilibrium quantity**: 10

| BBMoreB | More buyers, Black Box, First price (May 2018)

Proposed experimental scheme:

- **10 rounds** (120 seconds each), **20 buyers**, **10 sellers**

- **Buyer valuations**: [148, 148, 143, 143, 138, 138, 133, 133, 128, 128, 123, 123, 118, 118, 113, 113, 108, 108, 103, 103]

- **Seller valuations**: [73, 78, 83, 88, 93, 98, 103, 108, 113, 118]

- **CE range**: [118, 128], **gains of trade**: 425, **equilibrium quantity**: 10

2.2 More sellers

| FullMoreS | More sellers, Full PI, First price (May 2018)

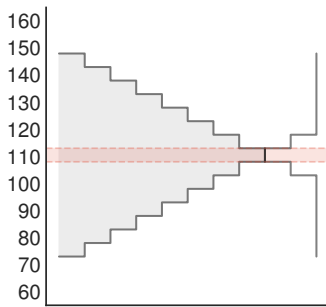Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **20 sellers**

- **Buyer valuations**: [148, 143, 138, 133, 128, 123, 118, 113, 108, 103]

- **Seller valuations**: [73, 73, 78, 78, 83, 83, 88, 88, 93, 93, 98, 98, 103, 103, 108, 108, 113, 113, 118, 118]

- **CE range**: [93, 103], **gains of trade**: 425, **equilibrium quantity**: 10

| BBMoreS | More sellers, Black Box, First price (May 2018)

Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **20 sellers**

- **Buyer valuations**: [148, 143, 138, 133, 128, 123, 118, 113, 108, 103]

- **Seller valuations**: [73, 73, 78, 78, 83, 83, 88, 88, 93, 93, 98, 98, 103, 103, 108, 108, 113, 113, 118, 118]

- **CE range**: [93, 103], **gains of trade**: 425, **equilibrium quantity**: 10

3 Large markets

3.1 More rounds

`BBMoreRounds`   More rounds, Black Box, First price (May 2018)
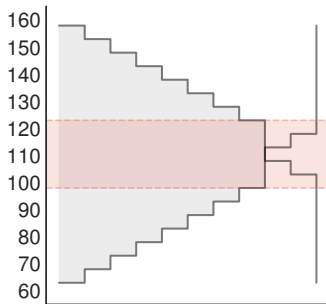
Proposed experimental scheme:

- **50 rounds** (30 seconds each), **10 buyers**, **10 sellers**
- **Buyer valuations**: [148, 143, 138, 133, 128, 123, 118, 113, 108, 103]
- **Seller valuations**: [73, 78, 83, 88, 93, 98, 103, 108, 113, 118]
- **CE range**: [108, 113], **gains of trade**: 320, **equilibrium quantity**: 8
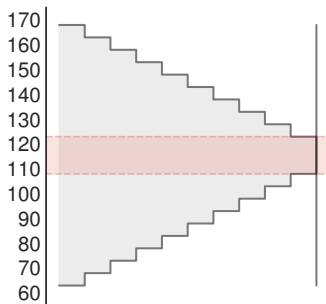
3.2 Large CE range

`FullLargeCE`   Large CE, Full PI, First price

Games 1–8 (May 2018):

Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **10 sellers**
- **Buyer valuations**: [158, 153, 148, 143, 138, 133, 128, 123, 108, 103]
- **Seller valuations**: [63, 68, 73, 78, 83, 88, 93, 98, 113, 118]
- **CE range**: [98, 123], **gains of trade**: 480, **equilibrium quantity**: 8
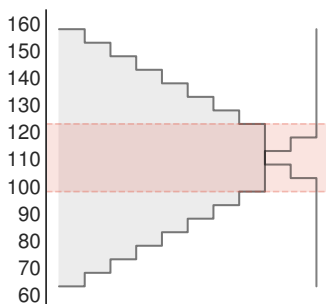
Games 9–13 (November 2020):

Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **10 sellers**
- **Buyer valuations**: [168, 163, 158, 153, 148, 143, 138, 133, 128, 123]
- **Seller valuations**: [63, 68, 73, 78, 83, 88, 93, 98, 103, 108]
- **CE range**: [108, 123], **gains of trade**: 600, **equilibrium quantity**: 10

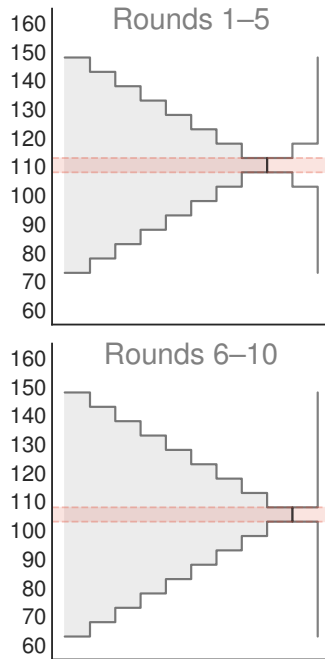`BBLargeCE`   Large CE, Black Box, First price (May 2018)

Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **10 sellers**
- **Buyer valuations**: [158, 153, 148, 143, 138, 133, 128, 123, 108, 103]
- **Seller valuations**: [63, 68, 73, 78, 83, 88, 93, 98, 113, 118]
- **CE range**: [98, 123], **gains of trade**: 480, **equilibrium quantity**: 8

3.3 Dynamic markets

`FullSShift` Seller shift, Full PI, First price (May 2018)
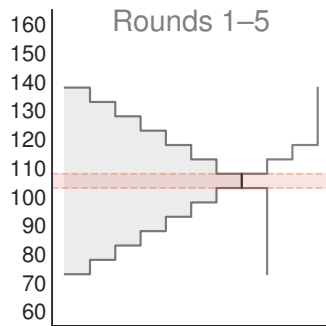

Proposed experimental scheme:

- **10 rounds** (120 seconds each), **10 buyers**, **10 sellers**

- **Buyer valuations**: [148, 143, 138, 133, 128, 123, 118, 113, 108, 103]

- **Rounds 1–5**:

  - **Seller valuations**: [73, 78, 83, 88, 93, 98, 103, 108, 113, 118]
  - **CE range**: [108, 113], **gains of trade**: 320, **equilibrium quantity**: 8

- **Rounds 6–10**:

  - **Seller valuations**: [63, 68, 73, 78, 83, 88, 93, 98, 103, 108]
  - **CE range**: [103, 108], **gains of trade**: 405, **equilibrium quantity**: 9

`FullFromBtoS` From buyers to sellers, Full PI, First price (May 2018)
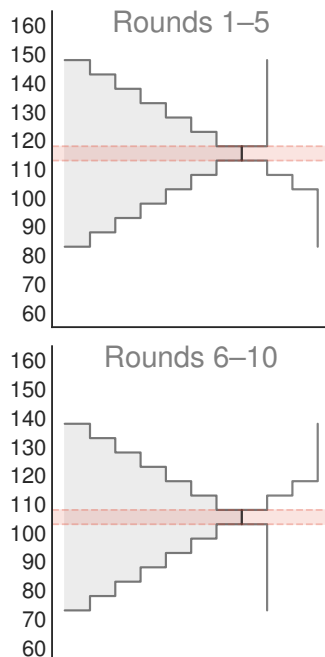
Proposed experimental scheme:

- **10 rounds** (120 seconds each)

- **Rounds 1–5**:

  - **10 buyers**, **8 sellers**
  - **Buyer valuations**: [148, 143, 138, 133, 128, 123, 118, 113, 108, 103]
  - **Seller valuations**: [83, 88, 93, 98, 103, 108, 113, 118]
  - **CE range**: [113, 118], **gains of trade**: 245, **equilibrium quantity**: 7

- **Rounds 6–10**:

  - **8 buyers**, **10 sellers**
  - **Buyer valuations**: [138, 133, 128, 123, 118, 113, 108, 103]
  - **Seller valuations**: [73, 78, 83, 88, 93, 98, 103, 108, 113, 118]
  - **CE range**: [103, 108], **gains of trade**: 245, **equilibrium quantity**: 7

Proposed experimental scheme:

- **10 rounds** (120 seconds each)

- **Rounds 1–5**:

    – **8 buyers**, **10 sellers**
    – **Buyer valuations**: [138, 133, 128, 123, 118, 113, 108, 103]
    – **Seller valuations**: [73, 78, 83, 88, 93, 98, 103, 108, 113, 118]
    – **CE range**: [103, 108], **gains of trade**: 245, **equilibrium quantity**: 7

- **Rounds 6–10**:

    – **10 buyers**, **8 sellers**
    – **Buyer valuations**: [148, 143, 138, 133, 128, 123, 118, 113, 108, 103]
    – **Seller valuations**: [83, 88, 93, 98, 103, 108, 113, 118]
    – **CE range**: [113, 118], **gains of trade**: 245, **equilibrium quantity**: 7