Incentives and payment mechanisms in preference elicitation

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Motivation

- Monetary incentives for testing market behavior are a central tenet in experimental economics
- The mechanism for incentivizing behavior may change participant's choices when faced with multiple decisions; Choices $\neq$ Preferences
- Researcher has to make multiple decisions involving trade-offs between the incentive compatibility of various payment mechanisms and budgetary constraints of the experiment
- In the auction literature often POR
  - Cash balances (i.e., accumulated earnings over multiple rounds) and limited liability (AER: Kagel & Levin, 1986; Hansen & Lott, 1991; Kagel & Levin, 1991)
  - Cash balances also play a statistically significant role in bidding behavior in private value auctions (Ham et al., 2005, J Econom)

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Motivation #2

- Then why don't just POR?
  - Expected payoff = Prob of a trial being selected $\times$ payoffs for that trial $\rightarrow$ diluted incentives
  - Only one bidder with earnings in SPA $\rightarrow$ effective recruitment of subjects can only be achieved with large fixed show-up fees $\rightarrow$ incentives associated with the auctions are trivial
- Payment mechanisms: PAC, PAI, POR, OT etc. (Cox et al., 2015, ExpEcon); PRINCE (Johnson et al., 2021, JRU)
- Charness et al. (2016, JRU) review the arguments for or against different payoff mechanisms such as pay-all, pay-one randomly, or pay-some randomly
- POR eliminates the opportunity for wealth/portfolio effects
- Pay-all results in larger payoffs (but PAn) but can be mitigated by giving a lower probability of realization $\rightarrow$ Between-subjects Random Incentivized Schemes (BRIS)

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- Ultimatum game; Pay everyone vs. pay every 2 in 20 subjects; no difference in behavior (Bolle, 1990, J Econ Psych)
- Dictator game; 1 out of 10 subjs vs. real vs. hypothetical; no difference to real treatment (Clot et al. 2018, JBEE)
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Study 1: Experimental Design

- Preference elicitation over an endowed card of known IV (Cason and Plott, 2014)
- Subjects were asked to state their offer price
- Offer price would be compared to a fixed offer that would be randomly drawn from the interval of $[0, X]$ where X was varied
- Within subjects; 6 (randomly presented) tasks: $IV = \{1, 3\} \times X = \{4, 5, 6\}$
- Between subjects: incentives (5 levels) $\times$ 5 payment mechanisms
  - Incentives: 100%; 50%; 1%; 0.2% (1 in 500); hypothetical
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Study 1: Methods

- Study was preregistered with AEA's RCT registry (AEARCTR-0009687)
- Online via Qualtrics; Subjects were panelists from a company
- We offered a \$2.5 fixed reward for a 20 min study
- Quality controls: minimum timers in instruction screens; timed examples of how the BDM works; instructional manipulation questions; 45% of those that click the link, complete the study
- 2,575 completes; received \$3.29 on average (min=\$0, max=\$29.4)

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Study 1: Sample

		Payment mechanism					
		PAC	PACn	PAI	PAIn	POR	**Total**
Incentives	Hypothetical	100	101	101	100	102	504
	0.20%	101	100	100	101	101	503
	1%	113	100	105	100	101	519
	50%	101	115	100	99	103	518
	100%	100	99	104	120	108	531
	Total	*515*	*515*	*510*	*520*	*515*	**2,575**

Study 1: Sample descriptives

- 49% Males; 49.5% females
- mean age: 46.2; min=18, max=93
- 35.4% has underage children
- 20.6% annual income 50-75K; 20.5% $<$ 25K
- 32.5% single; 39.3% married
- 23.9% some college education; 21.4% high school grad
- 18.1% Hispanic
- 17.1% Northeast; 21.90% Midwest; 38.49% South; 22.47% West

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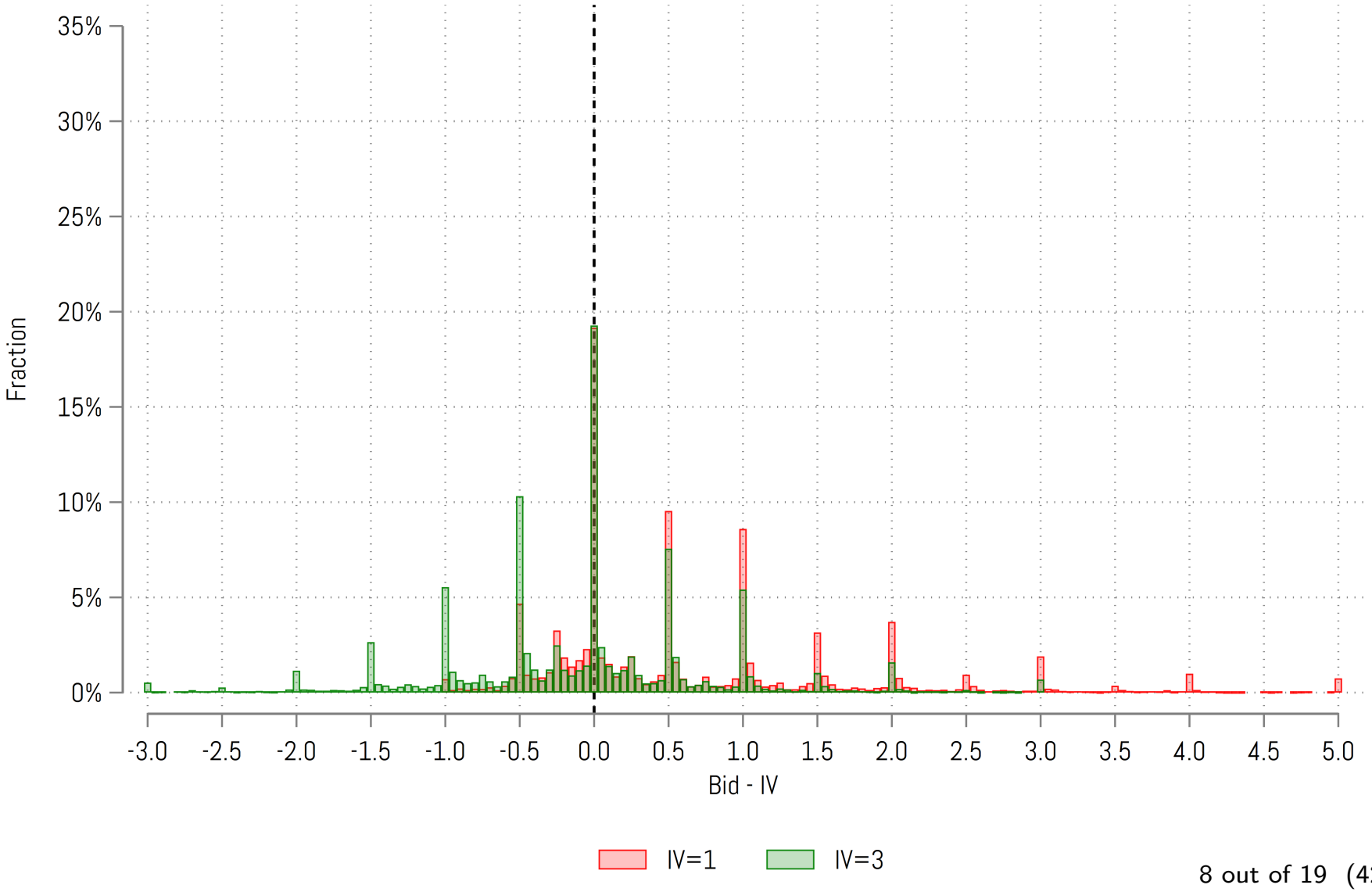
Study 1: Bidding behavior



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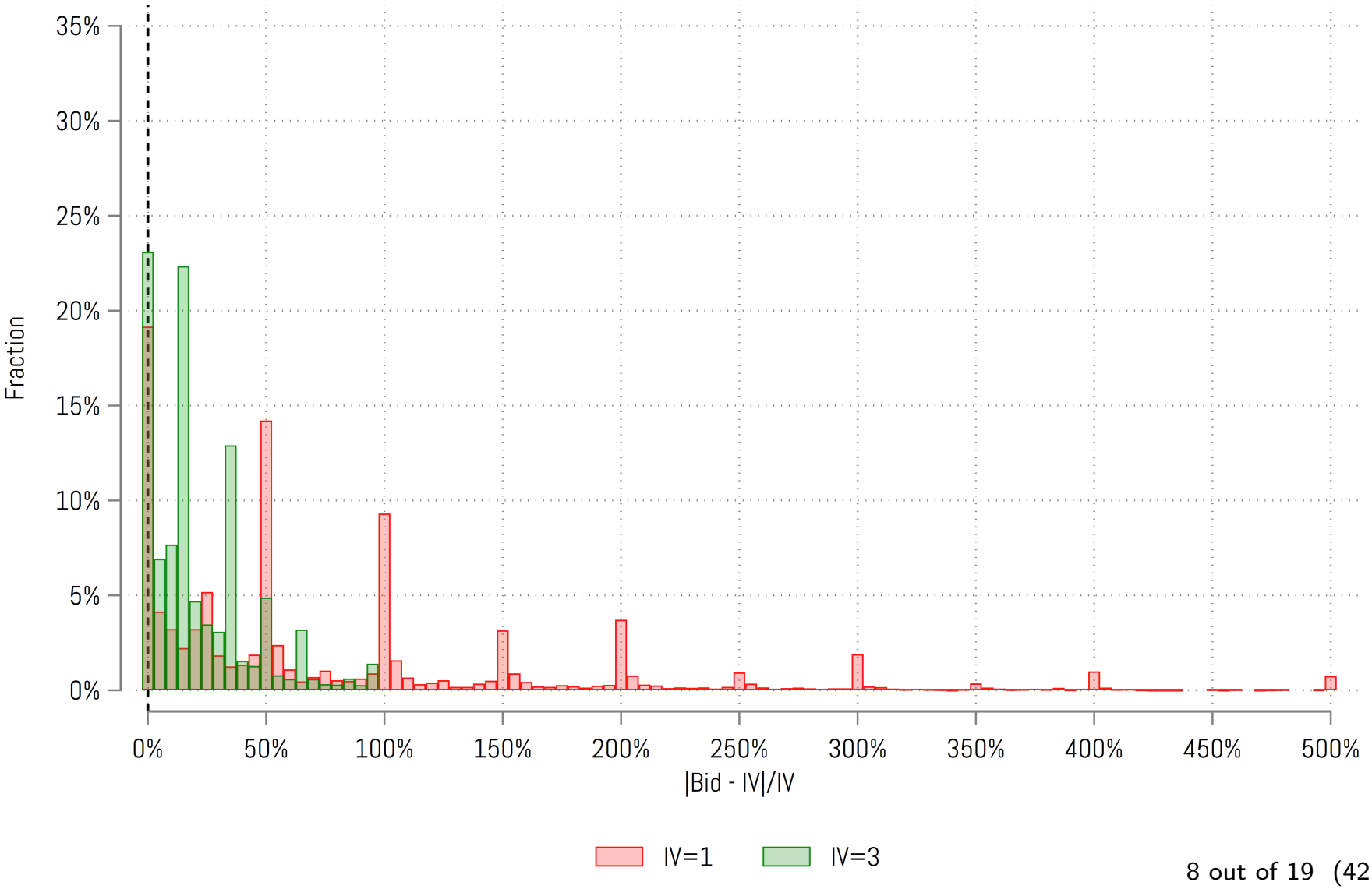

Study 1: Regressions of bid deviations from IVs

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	$Bid - IV$ (1)		$\lvert Bid - IV \rvert / IV$ (2)	
Constant	0.464***	(0.133)	0.643***	(0.079)
IV = 1 & Support = 5	0.185***	(0.017)	0.167***	(0.015)
IV = 1 & Support = 6	0.410***	(0.022)	0.387***	(0.021)
IV = 3 & Support = 4	-0.768***	(0.019)	-0.440***	(0.014)
IV = 3 & Support = 5	-0.558***	(0.019)	-0.432***	(0.013)
IV = 3 & Support = 6	-0.317***	(0.019)	-0.402***	(0.013)

Study 1: Regressions of bid deviations from IVs (continued)

	$Bid - IV$ (1)		$\lvert Bid - IV \rvert / IV$ (2)	
Hypothetical & PAC	0.001	(0.120)	0.091	(0.073)
Hypothetical & PACn	-0.119	(0.109)	-0.002	(0.066)
Hypothetical & PAI	0.082	(0.110)	0.081	(0.069)
Hypothetical & PAIn	-0.068	(0.105)	-0.013	(0.064)
Hypothetical & POR	-0.037	(0.101)	0.006	(0.065)
0.2% & PAC	-0.098	(0.098)	-0.058	(0.062)
0.2% & PACn	-0.137	(0.107)	-0.020	(0.063)
0.2% & PAI	-0.063	(0.100)	-0.034	(0.063)
0.2% & PAIn	0.036	(0.102)	0.044	(0.062)
0.2% & POR	0.041	(0.107)	0.059	(0.067)

Study 1: Regressions of bid deviations from IVs (continued)

	$Bid - IV$ (1)		$\lvert Bid - IV \rvert / IV$ (2)	
1% & PAC	0.091	(0.105)	0.092	(0.067)
1% & PACn	-0.010	(0.096)	-0.055	(0.062)
1% & PAI	-0.091	(0.094)	-0.046	(0.058)
1% & PAIn	0.070	(0.113)	0.056	(0.070)
1% & POR	-0.047	(0.098)	-0.006	(0.061)
50% & PAC	-0.137	(0.105)	-0.003	(0.062)
50% & PACn	0.047	(0.098)	0.036	(0.060)
50% & PAI	-0.038	(0.100)	-0.007	(0.063)
50% & PAIn	0.077	(0.105)	0.063	(0.064)
50% & POR	-0.059	(0.100)	0.017	(0.060)
100% & PAC	0.034	(0.097)	-0.002	(0.062)
100% & PACn	0.088	(0.103)	0.034	(0.062)
100% & PAI	-0.102	(0.091)	-0.048	(0.057)
100% & PAIn	0.039	(0.099)	0.016	(0.063)

Study 2: SPA - Experimental design

- SPA; within subjects: 4 IVs (1, 1.7, 2.3, 3); groups of 4
- 15 min; online; $2 fixed reward
- subjects were matched with others within 2 minutes; if not, played with bots

		N of bots		
Incentives	Payment mechanism	0	≥1	**Total**
Hypothetical	PAn	96	39	*135*
Hypothetical	POR	116	75	*191*
100%	PAn	96	43	*139*
100%	POR	120	52	*172*
Total		*428*	*209*	**637**

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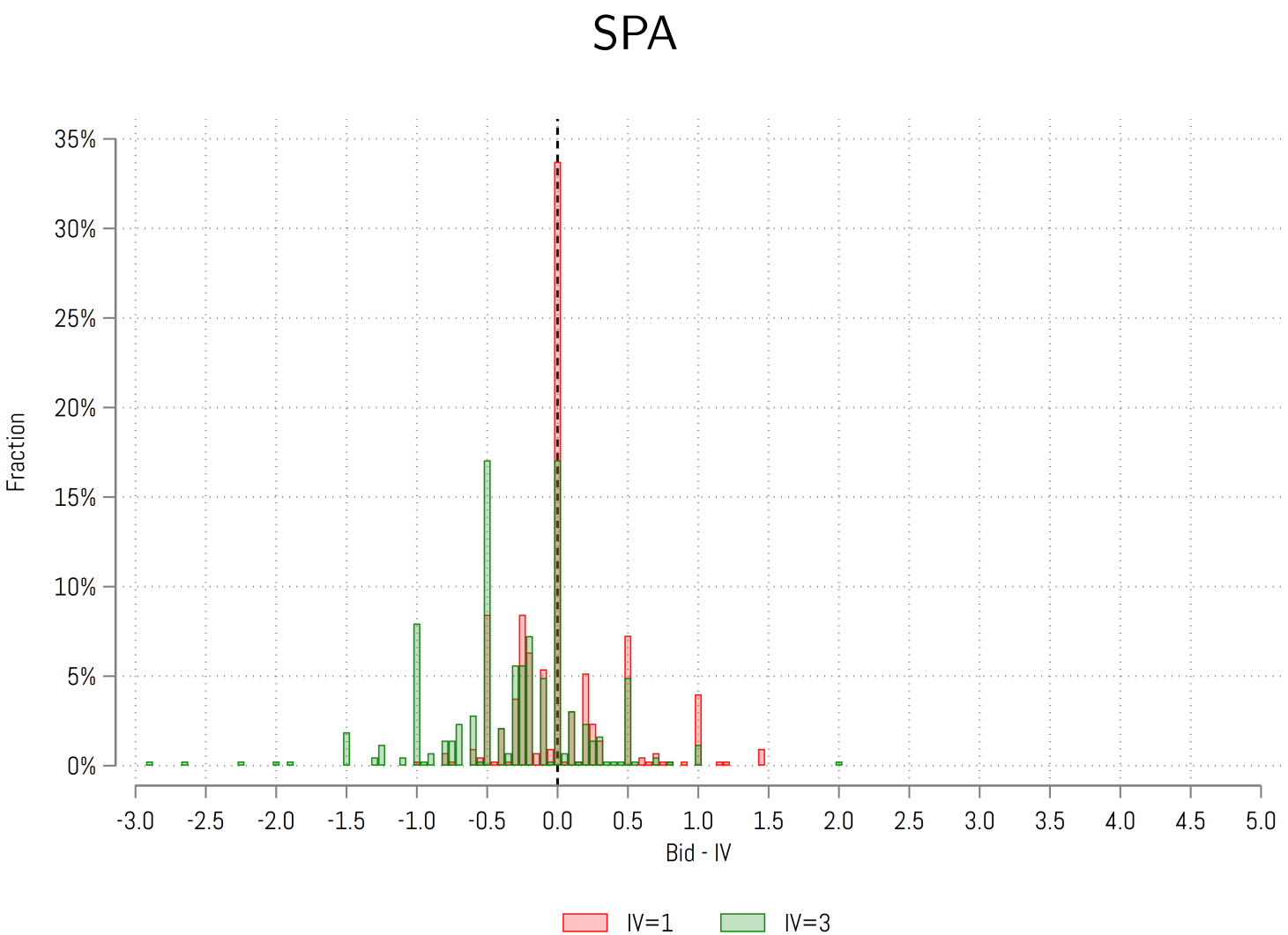

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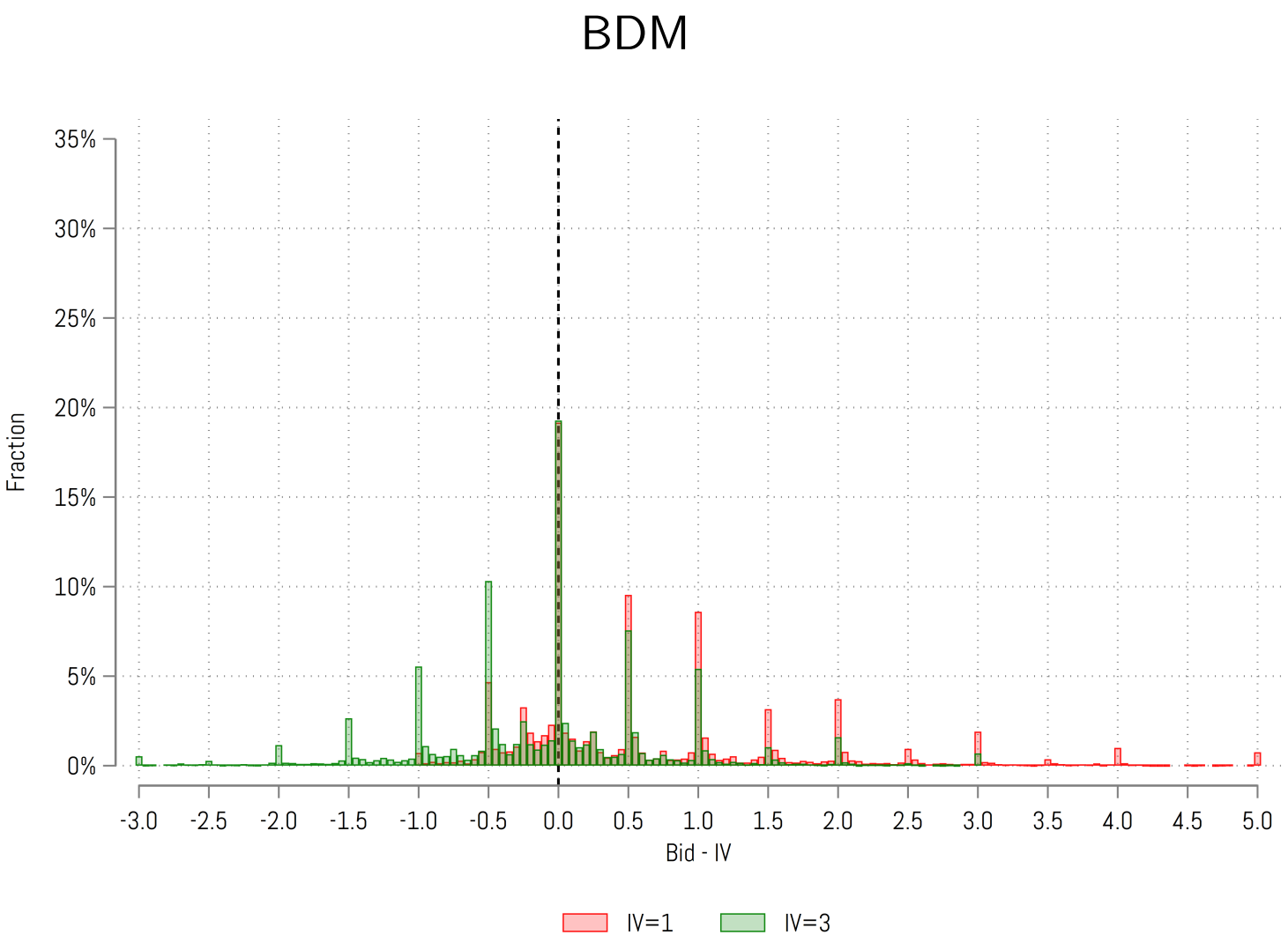


Study 2: Bid deviations

	$Bid - IV$ (1)		$\lvert Bid - IV \rvert / IV$ (2)	
Constant	0.053	(0.033)	0.258***	(0.018)
IV = 1.7	-0.149***	(0.021)	-0.123***	(0.017)
IV = 2.4	-0.265***	(0.022)	-0.137***	(0.018)
IV = 3	-0.331***	(0.030)	-0.124***	(0.017)
Hypothetical & PAn	-0.034	(0.047)	0.016	(0.018)
100% & PAn	-0.034	(0.046)	0.027	(0.017)
100% & POR	-0.040	(0.044)	0.009	(0.017)
Observations	1712		1712	
R^2	0.081		0.056	
Adj. R^2	0.077		0.052	
F-stat. (p-value)	32.691	(< 0.001)	12.341	(< 0.001)

Study 2: Bid deviations

	(1) $Bid - IV$		(2) $\lvert Bid - IV \rvert / IV$	
Constant	0.643***	(0.018)	0.797***	(0.015)
SPA	-0.455***	(0.022)	-0.345***	(0.011)
IV High	-0.695***	(0.015)	-0.556***	(0.014)
Observations	17162		17162	
R^2	0.131		0.159	
Adj. R^2	0.131		0.159	
F-stat. (p-value)	1139.662 (< 0.001)		773.956 (< 0.001)	

Study 3: Choice under risk

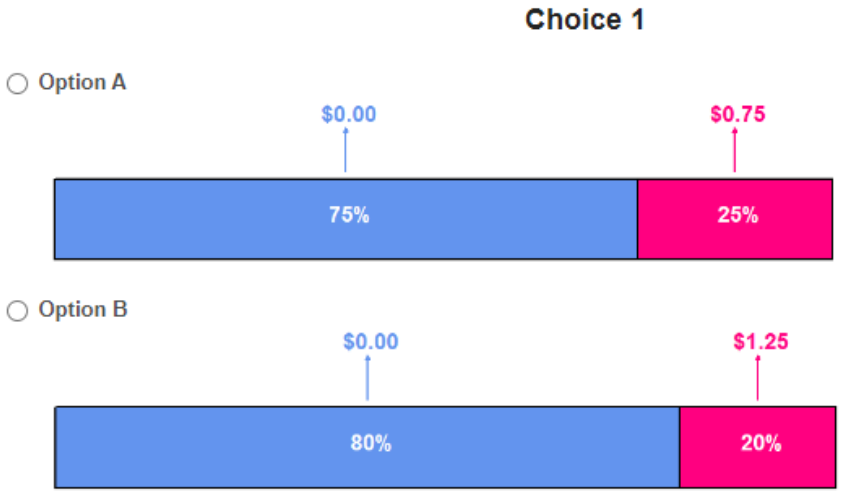
Cox et al. (2015) lottery pairs

	Less risky	More Risky
Pair 1	(0.75, **0**; **0.75**)	(0.8, **0**; **1.25**)
Pair 3	(0.75, **0**; **1.5**)	(0.8, **0**; **2.5**)
Pair 4	(0.25, **1.5**; **3**)	(0.05, **0**; 0.2, **2.5**; **3**)
Pair 2	(1, **1.5**)	(0.2, **0**; **2.5**)
Pair 5	(1, **4.5**)	(0.2, **3**; 0.8, **5.5**)

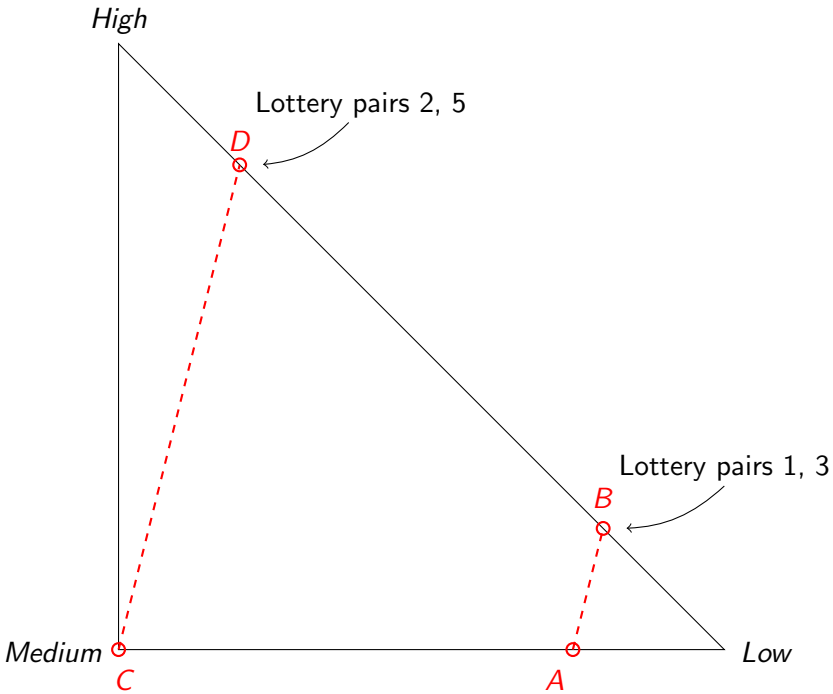
Study 3: Choice under risk

Cox et al. (2015) lottery pairs

	Less risky	More Risky
Pair 1	(0.75, **0**; **0.75**)	(0.8, **0**; **1.25**)
Pair 3	(0.75, **0**; **1.5**)	(0.8, **0**; **2.5**)
Pair 4	(0.25, **1.5**; **3**)	(0.05, **0**; 0.2, **2.5**; **3**)
Pair 2	(1, **1.5**)	(0.2, **0**; **2.5**)
Pair 5	(1, **4.5**)	(0.2, **3**; 0.8, **5.5**)



Study 3: Choice under risk



Study 3: Sample

		Payment mechanism		
		POR	PACn	PAIn
Incentives	100%	100	101	100
	Hypothetical	99	109	101

Study 3: ME of Pr(choosing the less risky lotter

	(1) Pair 1-3		(2) Pair 4		(3) Pair 2-5	
Hypothetical & POR	0.053	(0.052)	-0.016	(0.070)	-0.070	(0.053)
Hypothetical & PACn	0.031	(0.050)	-0.056	(0.068)	-0.054	(0.053)
Hypothetical & PAIn	-0.007	(0.049)	0.025	(0.070)	-0.055	(0.053)
100% & PACn	0.121**	(0.053)	0.095	(0.070)	-0.046	(0.053)
100% & PAIn	0.095*	(0.051)	0.010	(0.070)	-0.065	(0.053)
Observations	1220		610		1220	

Wrap up

- Study 1 and 2
  - IV preference elicitation exercise; low truthful revelation but better for the SPA
  - Portfolio effects cannot explain results in valuation tasks
- Study 3
  - Portfolio effects can explain results in lottery choices tasks where alternatives are uncertain
  - Portfolio effects cannot explain results in lotteries involving certain choices; certainty effect crowds-out differences in payment mechanisms
- Certainty effect may also explain overbidding in the BDM task; subjects submit a higher ask to exchange their IV for a random mechanism
- Certainty effect may be mitigated by overconfidence to outsmart others in the SPA

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Finale!

Thank you for your attention!

Study 1: Example screens #1

This study has Two Parts. We will provide you with instructions for the First Part and only after completing the First Part you will see the instructions for Part 2. In the First Part you will receive a **fixed fee of $2.5** but you will also be given the chance to **earn more money** as described below.

In the First Part you will participate in **6 tasks**. These tasks involve real money, so please pay attention to the instructions. After completing all 6 tasks the computer will draw a random number between 1 and 100. If the random number is between 1 and 50 you will receive the payoff as described below. That is, **you have** a **50% chance** of **receiving** an **additional payoff** from this study.

In each task **you will own an item** that can be **redeemed** for a monetary bonus that might be different for each task. **We want to buy this item from you!** Your task is to make an offer for the item.

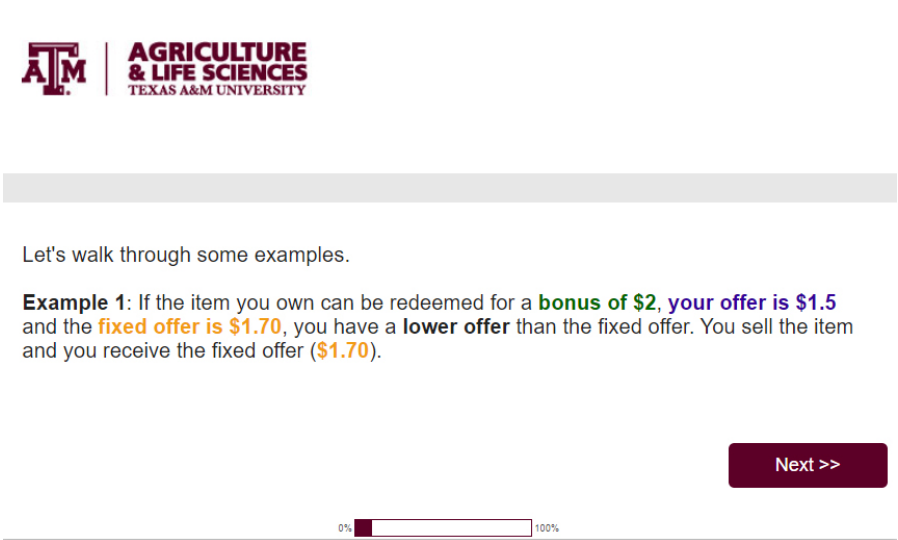
Your offer will be compared to an **unrelated fixed offer** that is equally likely to be a number between **$0 and $X**, where **X** might vary for each task.

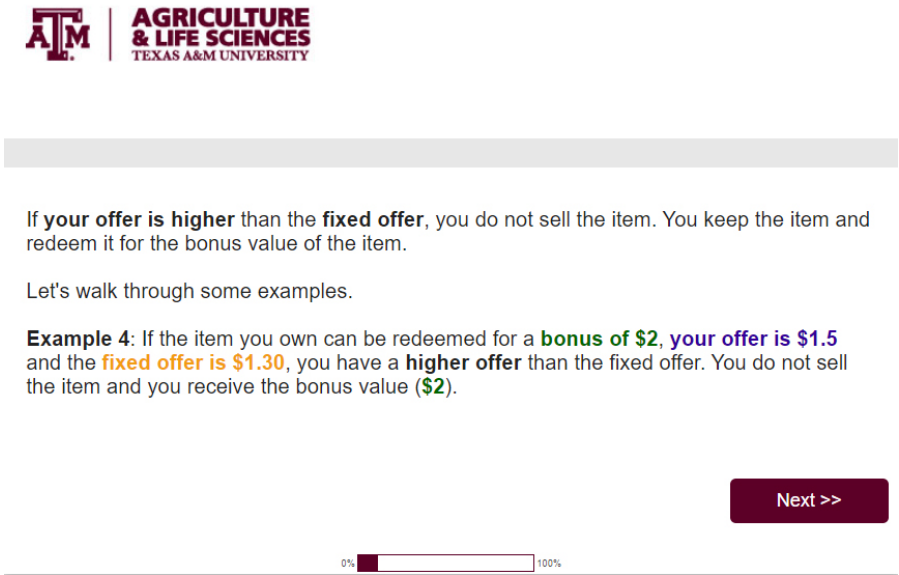
If **your offer** is **less than or the same as the fixed offer**, then you sell the item. In this case you had the low offer, so you are the seller. But, here is the interesting part! You do not receive the amount of your offer. Instead, **you receive the fixed offer**, a price **higher** than **your offer**.

Next >>

0% 100%

Study 1: Example screens #2





Study 1: Example screens #3

True or False? The fixed offer will be a known number to me before I make a decision.

- ○ True
- ◉ False

True or False? The fixed offer is randomly selected and is equally likely to be any number between two numbers. I will know the fixed offer only after I make a decision.

- ◉ True
- ○ False

True or False? I should always select an offer that is as large as possible.

- ○ True
- ◉ False

True or False? The best strategy is to select the lowest possible offer.

- ○ True
- ◉ False

True or False? My best strategy is to bid the minimum I'd be willing to accept.

- ◉ True
- ○ False

Study 1: Example screens #4

In Part 1 of this study, you are asked to make an offer according to the instructions you just received. In total, in Part 1 you will make decisions in **6 Tasks**.

After you make a decision on each of the 6 Tasks, all your tasks will be realized as follows. First, the computer will **randomly choose** a **percentage between 0% and 100%** for each task and then **multiply** this percentage number with the upper limit of the allowed offer in each Task. This will allow us to determine the fixed offer **with an independent draw** in each task:

Assume, for example, that the computer chooses the percentage number 10%, 25%, 15%, 50%, 70%, 90% (or 0.10, 0.25, 0.15, 0.50, 0.70, 0.90) and that the upper limits in the 6 tasks were: 2, 3, 2, 5, 4, 1. Then the **fixed offer** for each Task is: 0.2, 0.75, 0.3, 2.5, 2.8, 0.9 respectively. Your offer in each stage will be compared with these fixed offers and your bonus will be determined for every task.

Your total payoff is the sum of your payoffs from all 6 decision Tasks; all payoffs are determined by an independent percentage number drawn separately for each task.

Remember, you have a 50 in 100 chance of receiving an additional payoff. We will randomly draw a number between 1 and 100 and if that number is lower or equal to 50, you will receive the payoff.

Study 1: Example screens #5