

# A Theory of Jump Bidding in Ascending Auctions: Supplemental Tables

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This appendix to the main paper contains some supplemental tables that were omitted from the main paper to conserve space.

## 1 Bidder Utility

In the main paper we included the table showing the expected utility of bidders in the case of uniformly distributed values but omitted the table for normally distributed values. The following table indicates the average expected value to bidders under the assumption of normally distributed values when they are forced to bid straightforwardly (ST) vs. when allowed to jump bid and bid according to the equilibrium strategy (EQ) or the linear approximation of that strategy (AP). These numbers are weighted averages. The EV of each possible value is weighted by the probability of that value occurring. The numbers in () are under the assumption of  $\delta = .9$  while all other numbers assume  $\delta = 1$ .

Normal distribution

$\sigma$	$m$	EV[ST]	EV[EQ]	EV[AP]
15	1	8.22	8.31*	8.20
	3	8.24	8.54*	8.13
	7	8.36	8.70*	8.25
	10	8.52	8.77*	8.21
22.5	1	12.40* (3.69)	11.99 (9.32*)	11.90 (9.03)
	3	12.39* (7.85)	12.22 (9.90*)	11.93 (9.64)
	7	12.41* (10.40)	12.26 (10.83*)	11.87 (10.54)
	10	12.46* (11.17)	12.29 (11.26*)	11.94 (11.15)
30	1	16.28*	14.58	14.49
	3	16.19*	14.80	14.50
	7	16.04*	14.78	14.48
	10	15.94*	14.78	14.50

## 2 Revenue

These tables contain the revenue achieved in the event that bidders are forced to bid straightforwardly (St), bid according to the equilibrium strategy (Eq) or bid according to the approximation of the equilibrium strategy (Ap). The latter set of numbers were excluded from the main paper.

Normally distributed Values

	$\sigma = 15$			$\sigma = 22.5$			$\sigma = 30$		
	St	Eq	Ap	St	Eq	Ap	St	Eq	Ap
<b>m=1</b>	42.57	42.35	42.51	39.51	39.33 (41.84)	39.38 (43.02)	38.75	38.59	38.62
<b>m=3</b>	42.49	41.93	42.66	39.47	38.89 (40.69)	39.44 (41.77)	38.72	38.23	38.69
<b>m=7</b>	42.13	41.90	43.23	39.29	39.01 (39.82)	39.87 (40.76)	38.67	38.27	38.90
<b>m=10</b>	41.68	41.95	42.73	39.97	38.89 (39.55)	39.37 (40.32)	38.65	38.28	38.64

Uniformly Distributed Values

	$\forall \delta$	$\delta = .99$		$\delta = .95$		$\delta = .9$	
	St	Eq	Ap	Eq	Ap	Eq	Ap
<b>m=1</b>	34.33	34.87	35.14	36.20	36.56	37.12	37.54
<b>m=3</b>	34.34	34.09	34.35	35.17	35.56	36.07	36.65
<b>m=7</b>	35.51	34.26	34.28	34.46	34.70	35.10	35.50
<b>m=10</b>	34.74	34.57	34.57	34.62	34.71	34.75	35.06

## 3 Efficiency

These tables contain the efficiency achieved in the event that bidders are forced to bid straightforwardly (St), bid according to the equilibrium strategy (Eq) or bid according to the approximation of the equilibrium strategy (Ap). The latter set of numbers were excluded from the main paper. As with the tables in the paper, these percentages represent the percentage of cases that could possibly be inefficient that turn out to be so.

Normally distributed Values

	$\forall \sigma$	$\sigma = 15$			$\sigma = 22.5$	
	# Possible	St	Eq	Ap	Eq	Ap
<b>m=1</b>	0	-	-	-	-	-
<b>m=3</b>	390	25.90 %	11.03 %	24.36 %	11.28 % (11.79 %)	24.36 % (26.15%)
<b>m=7</b>	1122	27.81 %	12.39 %	22.28 %	15.15 % (19.16 %)	17.91 % (22.37%)
<b>m=10</b>	1629	29.83 %	18.91 %	19.77 %	21.42 % (20.63 %)	21.67 % (20.87%)

  

	$\sigma = 30$	
	Eq	Ap
<b>m=1</b>	-	-
<b>m=3</b>	14.10 %	24.87 %
<b>m=7</b>	20.32 %	22.64 %
<b>m=10</b>	24.86 %	26.09 %

Uniformly Distributed Values

	$\forall \delta$	$\delta = .99$		$\delta = .95$		$\delta = .9$		
	# Possible	St	Eq	Ap	Eq	Ap	Eq	Ap
<b>m=1</b>	0	-	-	-	-	-	-	-
<b>m=3</b>	390	25.90 %	16.41 %	25.90 %	8.97 %	25.38 %	9.49 %	24.36 %
<b>m=7</b>	1122	27.81 %	27.81 %	27.63 %	22.64 %	25.13 %	23.26 %	23.17 %
<b>m=10</b>	1629	29.83 %	30.03 %	29.77 %	28.18 %	27.69 %	26.34 %	26.46 %

## 4 Quarters

This table contains the rest of the results on the level of jump bidding for the case in which bidder values are distributed over the integers but bids are allowed to be made on increments of .25. These results are for the uniform distribution only. Notice that the Average STPrice/Value entries do not vary by discount rate, only by increment. This is not an error or mistake. This is essentially derived from notch bidding effects near the end of where a bidder is willing to bid. The last point at which a bidder finds it worthwhile to jump up by .25 to knock out an extra bidder depends primarily on the increment and the distribution.

Discount Rate	Increment	Number of Jumps	Avg. STPrice/Value
<b>.99</b>	<b>1</b>	16523	0.90625
	<b>3</b>	13585	0.8047
	<b>7</b>	10783	0.65097
	<b>10</b>	9045	0.54993
<b>.95</b>	<b>1</b>	17913	0.90625
	<b>3</b>	15388	0.8047
	<b>7</b>	11270	0.65097
	<b>10</b>	9243	0.54993
<b>.90</b>	<b>1</b>	18358	0.90625
	<b>3</b>	16040	0.8047
	<b>7</b>	11962	0.65097
	<b>10</b>	9560	0.54993