# Online Appendix

## 1.1 Theoretical Extensions

Below, we present two generalizations of the shape of the superiority-seeking motive described in the main text. While these two generalizations can be directly combined, for ease of exposition, we describe them separately. Let person $i$'s consumption utility be just as before with the same properties. For notational simplicity only, we suppress the notation to a kind of good/attribute and ignore the corresponding subscript $l$, but all extends.

### 1.1.1 Weighted Average of Excess Valuations

First, we generalize the shape of the superiority-seeking motive and allow it to vary between the average excess valuation and the maximal excess valuation of others. Consider person $i$. Let her overall utility $U_i(c, t_i) : C \times \mathbb{R} \to \mathbb{R}$ be given by:

$$v_i(c_i) + \alpha(1-\beta)\frac{\sum_{j\in M\setminus i} v_{j,i}}{M-1} + \alpha\beta \max_{j\in M\setminus i} v_{j,i} + t_i, \tag{2}$$

where for any fixed consumption vector $c$, $v_{j,i} \equiv \max\{v_j(c_j + c_i) - v_j(c_j) - v_i(c_i), 0\}$ is $j$'s excess valuation of $i$'s consumption, and $\beta \in [0, 1]$.

In the above formulation, for any $c$ and $\beta < 1$, (i) there is a strictly positive weight assigned to the excess valuation of each player; (ii) the sum of these weights always add up to one, (iii) for any given $j$, $i$'s superiority boost increases in $j$'s excess valuation.[61] If $\beta = 0$, the boost simply corresponds to the average excess valuation of others. As $\beta$ increases, the boost also increases, and as $\beta \to 1$, it converges to the specification described in the main text. This formulation then always corresponds to a *smaller* impact of the superiority motive, relative to consumption utility, than that in the main text. The following is immediate.

**Lemma 1.** *For any $\alpha < 1$, $U_i(c, t_i)$ is increasing in $c_i$ and in $\beta$.*

Consider now the predictions. Below, we make the same assumptions about consumption utility as we did in the main text, and also adopt the same notation. For the auction context, let $\Pi_\beta(M, K)$ denote the seller's expected revenue for a given $\beta$.

**Proposition 6. a.** *Corollaries 1-3, Proposition 2, Proposition 4, and Proposition 5 with the adjusted boost term in Eq.(2), continue to hold as stated for any $\beta \in$*

[61] Note that above if some $j$ has no excess valuation for $i$'s consumption, $v_{j,i} = 0$, she still receives a positive weight, although her contribution to $i$'s superiority boost is 0. If instead the boost assigned such positive weights only to those who have a positive excess valuation in the above fashion, the boost may decrease in how much others like what $i$ has.

$[0, 1]$.[62]

**b.** *For Proposition 1 (and Corollary 4), fix any* $\alpha > 0$ *and* $M > M_\alpha$*. There exists a lowest* $\beta_{M,\alpha} < 1$ *such that for any* $\beta \geq \beta_{M,\alpha}$ *random exclusion is strictly beneficial for the seller. Furthermore, holding such an* $M$ *constant, an increase in* $\alpha$ *leads to a decrease in* $\beta_{M,\alpha}$*.*

**c.** *For Proposition 3, if* $\alpha < \alpha^*$*, then* $\Pi_\beta(M, K) < \Pi_\beta(M, 0)$ *for any* $K > 0$*; if* $\alpha > \alpha^*$*, there exists* $\beta_{\alpha,M} < 1$ *such that as long as* $\beta \geq \beta_{\alpha,M}$*, then* $\Pi_\beta(M, K) > \Pi_\beta(M, 0)$ *for any* $K \leq K_{M,\alpha}$*.*

*Proof.* In bilateral contexts, $U_i(c, t_i)$ is constant in $\beta$. Hence, Corollaries 1-2 are immediate. Corollary 3 is also immediate since the boost is increasing in the excess valuation of any player $j$, and the expected boost of a cup owner is strictly decreasing in $C$. Consider Proposition 1. Fix any $\alpha > 0$ and $M > M_\alpha$. For a given $M$, a strict sufficient condition is that

$$(M - 1)q(\alpha, \beta)p^* > V,$$

where we now made the dependence of the demand boost given random exclusion at $p^*$ on the parameters $\alpha$ and $\beta$ explicit. Note that $q(\alpha, \beta) > 0$ holds for any $\beta$ as long as $\alpha > 0$. Since $q(\alpha, \beta)$ strictly and continuously increases in $\beta$ and in $\alpha$, for any given $M$, this sufficient condition continues to hold for all $\beta \geq \beta^*_{\alpha,M}$ where $\beta_{\alpha,M} < 1$ is decreasing in $\alpha$ (note that $M_\alpha$ is decreasing in $\alpha$). For Corollary 4, note again that if $v^h > p^*$, then $q_{v^h}(\alpha, \beta) > 0$ and this quantity is smooth and increasing in $\beta$; if $v^h \leq p^*$ there is again no expected loss when charging $p^*$.

Consider the auction setting. Given symmetric monotone strategies, the superiority boost is still derived only from those excluded from bidding. Let then:

$$K_\beta(x) \equiv E[B(x) \mid v_i = y = x, K],$$

where $B(v_i)$ corresponds to the $\beta$-dependent superiority boost from Eq.(2), and $y$ corresponds to the highest of the $M - K$ independent draws from $F(x)$. If $K = 0$, then $K_\beta(x) = 0$ and $K_\beta(x)$ is strictly increasing in $K$ for any $\beta \in [0, 1]$, since $v_{j,i}$ takes a positive value with positive probability iff $j \in K$ and consumption utilities are i.i.d. Also $K_\beta(x)$ continuously increases in $\beta$.

It is easy to verify then that for any given $\beta$, $M$ and $K$, the ranking of the overall expected utilities from winning the object amongst the $N$ active bidders is the same as the ranking based on consumption utilities alone amongst these active bidders. In turn, the overall payoff from winning, $u_i(v_i, v_{-i}, \beta)$, is increasing in all of its arguments, and strictly so in $v_i$ given any $\alpha < 1$. By the same logic as before,

[62] For point 3 of Proposition 2 we prove this only for $K = 0$.

Milgrom and Weber (1982), a symmetric monotone equilibrium exists and is given by $b_\beta(v) = G(v)^{-1} \int_0^v g(x)(x + \alpha K_\beta(x))dx$.

Since $g(x)$ only depends on $N$, Proposition 2 follows immediately if for point 3 we assume $K = 0$. It also follows that $b_\beta(v_i)$ and $\Pi_\beta(M, K)$ are continuously increasing in $\beta$ with $\lim_{\beta\to 1} K_\beta(x) = K(x)$ and $\lim_{\beta\to 1} \Pi_\beta(M, K) = \Pi(M, K)$. If $\alpha < \alpha^*$, then for any $K > 0$, it follows that $\Pi_\beta(M, K) < \Pi_\beta(M, 0)$ since $\Pi_\beta(M, K) \leq \Pi(M, K) < \Pi(M, 0) = \Pi_\beta(M, 0)$. If $\alpha > \alpha^*$, then for any $K \leq K_{M,\alpha}$, $\Pi(M, K) > \Pi(M, 0)$, and since $\Pi_\beta(M, K)$ is strictly and continuously increasing in $\beta$, iff $K > 0$, and $K$ is discrete, the same holds for any $\beta$ bounded away from 1, but not too low. For Proposition 4, note that under lowest exclusion $K_\beta(x) = 0$ for any $\beta$ and other terms do not depend on $\beta$.

For Proposition 5, consider a symmetric equilibrium, $b(v)$. Within $N$, the ranking of the overall expected utility from obtaining the good is the same as that ranking based on consumption utility alone for any $\beta$ as long as $\alpha < 1$. Suppose now that for some $v_i > v_s$ we have $b(v_s) > b(v_i)$. It must be true that conditional on paying $b(v_s)$, type $v_s$ realizes a non-negative expected overall utility. Consider now type $v_i$ deviating to the bid of $v_s$. This is consequential only if the realized price $p \in [b(v_i), b(v_s)]$. Type $v_i$, vis-a-vis type $v_s$, receives a relative gain from consumption utility equal to $v_i - v_s$ and a relative loss from superiority-seeking bounded by $\alpha(v_i - v_s)$. Hence, $b(v)$ must be monotone. Suppose then that $b(v_i) = v_i + \alpha E[B(v_i) \mid v_i = y, K]$. It is easy to see that there are no profitable deviations and no other symmetric equilibrium exists. ∎

### 1.1.2 Multiplicative Case

Our second extension considers the case where superiority boost is a multiplicative rather than additive factor of consumption utility. To simplify notation, suppose that each $v_i(c_i)$ is bounded from above by 1. All our statements continue to hold given a general upper bound $\omega$ on $v_i(c_i)$ when replacing $v_i(c_i)^\gamma$ with $(v_i(c_i)/\omega)^\gamma$ in the second term of the equation below. Let then $U_i(c, t_i) : C \times \mathbb{R} \to \mathbb{R}$ be:

$$v_i(c_i) + \alpha v_i(c_i)^\gamma \max_{j\in M\setminus i}\{v_j(c_j + c_i) - v_j(c_j) - v_i(c_i), 0\} + t_i, \tag{3}$$

where $\gamma \in [0, 1]$. If $\gamma = 0$, the above corresponds to the specification described in the main text. For any $\gamma > 0$, however, superiority-seeking is no longer an additive, but a multiplicative factor of basic consumption utility and $\gamma = 1$ describes the equiproportional case. We note the following lemma.

**Lemma 2.** *$U_i(c, t_i)$ increases in $c_i$ and decreases in $\gamma$.*

*Proof.* The first part is immediate. If for some $j$, the expression $v_j(c_j + c_i) - v_j(c_j) - v_i(c_i) > 0$, the sign of $\partial U_i(c, t_i)/\partial\gamma$ is the same as the sign of $\ln v_i(c_i) < 0$. Otherwise $\partial U_i(c, t_i)/\partial\gamma$

is zero. ■

Consider now the predictions. Below, we again make the same assumptions about consumption utility as we did in the main text, and adopt the same notation. In the auction context, we denote the seller's expected revenue by $\Pi_\gamma(M,K)$.

**Proposition 7. a.** *Corollaries 1-4, Propositions 1, 2, 4, & 5, with the adjusted superiority boost term Eq.(3), continue to hold as stated for any* $\gamma \in [0,1]$.[63]

**b.** *For Proposition 3, for any* $\gamma$*, (i) if* $\alpha < \alpha^*$*, then* $\Pi_\gamma(M,K) < \Pi_\gamma(M,0)$ *for any* $K > 0$*, (ii) if* $\alpha \geq \alpha_\gamma$*, there exists* $M_\gamma$ *such that if* $\alpha \geq \alpha_\gamma$ *and* $M \geq M_\gamma$*, then* $\Pi_\gamma(M,K) > \Pi_\gamma(M,0)$ *for any* $K$ *positive but not too large.*

*Proof.* In bilateral trade, $i$'s overall utility still strictly increases in $j$'s excess valuation. Consider Corollary 3. The proof applies without change. For Proposition 1 note that while $q(\alpha,\gamma)$, where we made the dependence on parameters $\alpha$ and $\gamma$ explicit, decreases in $\gamma$, it is independent of $M$. Hence, the statement follows, with an adjusted cutoff value for $M$ given $\alpha$, from the main proof. The same for Corollary 4.

Consider the auction setting. Let $K_\gamma(x) \equiv E[v_i^\gamma \max_{j\in M}\{v_j - v_i\} \mid v_i = y = x, K]$. $K_\gamma(x)$ is decreasing in $\gamma$, increasing in $K$, and is independent of $N$. Player $i$'s overall utility has the same monotonicity properties as before and we can then use the same arguments as before. The symmetric monotone equilibrium is given by $b_\gamma(v) = G(v)^{-1}\int_0^v g(x)(x + \alpha K_\gamma(x))dx$. In turn, Proposition 2 continues to hold as stated. Furthermore, Proposition 4 continues to hold as stated.

Consider now Proposition 3. Note that $b_\gamma(v)$ is decreasing in $\gamma$ for any fixed $N$ and $K > 0$. It follows that while $\Pi_\gamma(M,0)$ is constant in $\gamma$, $\Pi_\gamma(M,K)$ is decreasing in $\gamma$ if $K > 0$. In turn, if $\alpha < \alpha^*$, then $\Pi_\gamma(M,K) < \Pi_\gamma(M,0)$ for any $K > 0$. Consider $\alpha > \alpha^*$. Straightforward calculations show that $\Pi_\gamma(M,K)$ is:

$$\frac{N-1}{N+1} + \alpha N \frac{N-1}{N+\gamma}\left[\frac{K}{K+1}\frac{1}{N-1+\gamma} - \frac{1}{N+\gamma+1}\right] + \alpha\frac{N-1}{K+N+\gamma}\left(\mathbf{1} - \frac{K}{K+1}\right)\frac{N}{K+\gamma+N+1}.$$

Consider now $\lim_{\alpha\to 1}\Pi_{\gamma=1}(M,K) - \Pi(M,0)$. The sign of this difference is the same as the sign of $\{(M-K)^2 - 7M + K - 12\}$. This expression decreases in $K$. Furthermore, it strictly increases in $M$ as long as $M$ is not too small relative to $K$. It turn, there exists $\widehat{M}$ and $\widehat{\alpha} < 1$ such that if $M \geq \widehat{M}$ and $\alpha \geq \widehat{\alpha}$, then $\Pi_{\gamma=1}(M,K) > \Pi_{\gamma=1}(M,0)$ for $K$ positive, but not too large. Since $\Pi_\gamma(M,K)$ is decreasing in $\gamma$, the same holds a fortiori for any $\gamma < 1$. For Proposition 5, the logic is the same as before. ■

[63] For Corollary 1, there may still be trade give $\varepsilon$ transaction cost given $\alpha \to 1$ if $\gamma > 0$.

### 1.1.3 Corollary 6

Returning to our main specification, in the context of Section 2.2, bilateral trade, consider now the elicitation procedure of a multiple price list and, for simplicity, suppose that the density of valuations is uniform. Suppose that the full range of prices is given to each party and they have to simultaneously indicate whether or not they would be willing to trade at that price. Then an actual price is drawn randomly and trade is implemented iff both parties said yes to that price. The realization of consumption utilities is again private. The next corollary shows that superiority-seeking leads to the classic wedge between WTA and WTP.

**Corollary 6** (WTA>WTP). *For any $\alpha > 0$, there exists a cutoff equilibrium where the seller's reservation price $p_s(v)$ is increasing, the buyer's reservation price $p_b(v)$ is decreasing in $v$ with $p_s(v) > p_b(v) = v$. The gap $p_s(v) - p_b(v)$ is increasing in $\alpha$*

*Proof.* Consider the case where the buyer's reservation price is $p(v_b) = v_b$ and the seller's reservation price $p_s(v_s)$ solves $(1-\alpha)v_s + \alpha E[v \mid v > p_s] = p_s$. To show that this is an equilibrium note that since conditional on trade $v_b > v_s$, and the buyer does not experience a superiority boost. To check for the seller, note that differentiating $(1-\alpha)v_s + \alpha E[v \mid v > p_s] = p_s$ with respect to $p_s$, the RHS has a derivative of 1 and the LHS has a derivative of $\alpha/2$. Hence, there is a unique solution and this solution is strictly increasing in $v_s$ and $\alpha$. ■

## 1.2 Estimating Preferences for Superiority-seeking

In this simple setting of basic exchange Proposition 5, maintaining the assumption of well-calibrated expectations about $F$, Study 1 allows us to estimate the $\alpha$ parameter in the following equation outlined in Section 2.1:

$$\text{person } i\text{'s valuation} = \overbrace{v_i}^{\text{consumption utility}} + \overbrace{\alpha \max_{k \in K}\{v_k - v_i, 0\}}^{\text{superiority-seeking}}$$

The $\alpha$ parameter corresponds to the weight placed on superiority-seeking. We do this in two ways. The first employs standard maximum likelihood estimation to compute a 95% confidence interval. The second uses Bayesian methods assuming an improper uniform prior of $\alpha \geq 0$.

Both methods yield similar estimates. The mean of the maximum likelihood estimator is 0.94 with a 95% confidence interval of (0.86, 1.02). The mean of the Bayesian estimator is 0.91 with a 95% confidence interval of (0.78, 1.04). In both cases, $\alpha$ is estimated to be significantly greater than 0, implying substantial weight placed on superiority-seeking in our setting.

## 1.3 Additional Analyses

### 1.3.1 Study 1

| Model: | M = 4 | M=6 | M=8 |
|---|---|---|---|
| Exclusion | 2.750 | 1.114 | 2.567** |
| | (1.686) | (1.165) | (1.196) |
| Constant | 5.750*** | 2.542*** | 2.833*** |
| | (1.104) | (0.8803) | (0.7416) |
| N | 14 | 42 | 39 |

*iid standard-errors in parentheses*
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

**Table 1:** Effect of Exclusion on WTP by Group Size $M$

### 1.3.2 Study 2

| Model: | M=4 (1) | M=6 (2) | M=8 (3) | M=4 (4) | M=6 (5) | M=8 (6) | M=4 (7) | M=6 (8) | M=8 (9) |
|---|---|---|---|---|---|---|---|---|---|
| K=1 | 1.012* | | | 0.3383 | | | 0.4236 | | |
| | (0.5253) | | | (0.5177) | | | (0.5059) | | |
| K=2 | | 0.7843** | | | -0.2043 | | | -0.3368* | |
| | | (0.3561) | | | (0.1449) | | | (0.1786) | |
| K=3 | | | 0.6800** | | | 0.2800 | | | 0.3438 |
| | | | (0.1783) | | | (0.5436) | | | (0.5459) |
| Random | | | | | | | 0.1992 | -0.3312 | 0.1912** |
| | | | | | | | (0.3761) | (0.2626) | (0.0708) |
| K=1 × Random | | | | | | | 0.4751 | | |
| | | | | | | | (0.7862) | | |
| K=2 × Random | | | | | | | | 1.320*** | |
| | | | | | | | | (0.4239) | |
| K=3 × Random | | | | | | | | | 0.2088 |
| | | | | | | | | | (0.5664) |
| Constant | 0.7729*** | 1.067*** | 1.720*** | 0.7729*** | 1.067*** | 1.720*** | 0.6875*** | 1.199*** | 1.656*** |
| | (0.1762) | (0.1370) | (0.0775) | (0.1811) | (0.1373) | (0.0726) | (0.1705) | (0.1726) | (0.0708) |
| N | 58 | 118 | 34 | 37 | 110 | 59 | 67 | 138 | 69 |

*Clustered standard-errors at session level in parentheses*
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

**Table 2:** Effect of Exclusion on Bids by Group Size $M$ and Treatment

### 1.3.3 Study 3

| | (1) | (2) | (3) |
|---|---|---|---|
| Two-Coin (=1) | 0.24*** | -0.13 | -0.13 |
| | (0.08) | (0.09) | (0.09) |
| Three-Coin (=1) | 0.62*** | -0.09 | -0.09 |
| | (0.13) | (0.14) | (0.14) |
| No Information (=1) | | | 0.18 |
| | | | (0.31) |
| Two-Coin*No Information | | | 0.38*** |
| | | | (0.12) |
| Three-Coin*No Information | | | 0.71*** |
| | | | (0.19) |
| Constant | 3.51*** | 3.33*** | 3.33*** |
| | (0.23) | (0.21) | (0.21) |
| $N$ | 441 | 453 | 894 |

*** : $p \leq 0.01$, ** : $p \leq 0.05$, * : $p \leq 0.1$. Standard errors clustered at the individual level are reported in parentheses below each estimate. Column 1 reports the relationship between the number of coin flips and WTP in the No Information treatment. Column 2 reports reports the relationship between the number of coin flips and WTP in the Low Information treatment. Column 3 compares the No and Low Information treatments.

**Table 3:** Effect of Exclusion on WTP: No Information vs. Low Information