Pandering to Persuade

Yeon-Koo Che Wouter Dessein Navin Kartik

Columbia University

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Motivation

Decision makers often rely upon advice from interested agents

- business, politics, organizations, daily life

Some common features

- DM has partial knowledge about attributes of alternatives
- Agent is better informed
- Interests of agent and DM well-aligned over some alternatives but not among others

Examples

- Buyer decides which product to buy, if any, from a seller
  - Buyer has read public product reviews
  - Seller is better informed about products
- Investor must decide whether and which venture capital fund to invest in
  - Investor knows market trends
  - Venture capitalist is better informed about potential investments
- Dean decides whether to hire a new Econ faculty, and if so who
  - Dean can see a candidate's CV, recommendation letters, etc.
  - Econ department can evaluate research better

This Paper

What is the impact of differences in observable (or verifiable) information on cheap-talk communication of private (soft) information?

i.e., cheap talk when alternatives "look different" to DM

Our Baseline Framework

- Discrete decision space
  - There are $n \geq 2$ **alternative projects** and a **status quo/outside option**
- Simple preference conflict structure
  - DM and agent have no conflict amongst projects
  - Agent prefers any project to the outside option
  - DM prefers outside option (known value) to low-quality projects
- Soft and hard information
  - Some aspects of each project are observed by DM (or verifiable and endogenously disclosed by agent)
  - Others are unverifiable and can only be conveyed through cheap talk

Agent wants to persuade the DM to choose the best project over the outside option

Main Questions

- Credibility of communication
  - Is agent's advice influential? Does agent recommend the best option?
  - Impact of observable information
  - Impact of outside option (preference conflict)
  - Properties of equilibria
    - Pandering to persuade
    - Pitching to persuade (credibility through comparisons)
- Commitment from DM
  - Pandering arises in an optimal mechanism (no transfers)
    - commitment and cheap talk qualitatively similar
    - but commitment mitigates magnitude of pandering distortion
    - simple implementation via delegation to an intermediary
  - Burning ships: reduce the value of outside option
  - Ignorance: better to not observe some information

Literature

- Seminal one-dimensional cheap talk
  - Crawford and Sobel (1982): continuous actions, different conflict
- Multidimensional cheap talk
  - Chakraborty and Harbaugh (2007): no pandering
- Pandering
  - Brandenburger and Polak (1996): not cheap talk
- Optimal delegation
  - Nocke and Whinston (2011), Armstrong and Vickers (2009): verifiable information
  - Holmstrom (1977) and successors: different setup

Distinct from:

- Career concerns: Scharfstein and Stein (1990), Ottaviani and Sorensen (2001, 2007), ...
- Congruence signaling: Morris (2001), Ely and Välimäki (2003), Maskin and Tirole (2004), ...

Plan

The Model: Basics

- 2 players: Principal/DM and Agent/advisor
- $N := \{1, 2\}$ alternative projects and a status quo (project 0)
  - can generalize to more than two alternative projects
- Status quo has known value $b_0 > 0$ to Principal, 0 to Agent
- Value of project $i \in N$ to both players is b_i, drawn from common prior cdf F_i
  - F_i has a density f_i with support $\left[\underline{b}_i, \overline{b}_i\right]$
  - $0 \leq \underline{b}_i < b_0 < \overline{b}_i \leq \infty$
  - $\exists \alpha$ s.t. $\mathbb{E}[b_i | b_i > \alpha b_{-i}] > b_0$ (relevant only if $\underline{b}_{-i} > 0$)
  - F_i's are independent but not necessarily identical
    - projects have observable components, generally asymmetric
    - can be endogenized with verifiable information revelation

The Model: Leading Examples

- Can view $F_i(b_i) \equiv F(b_i|v_i)$; with v_i's commonly known
- Two leading families:

  Given parameters $v_1 \geq v_2 \geq 0$,

  1. Scale-invariant unif. distributions: $b_i \sim U[v_i, v_i + \bar{u}]$, for some $\bar{u} > 0$
  2. Exponential distributions: $b_i \sim Exp(v_i)$

  All assumptions satisfied for b_0 not too large.

The Model: Timing

1. The agent privately observes (b_1, b_2)
2. Agent sends a cheap-talk message to DM (large message space)
3. DM chooses a project or status quo

We are interested in the perfect Bayesian equilibria of this game.

Lemma

Generically, there is no equilibrium in which a positive measure of types induce the DM to randomize between projects 1 and 2.

The Model: Equilibrium

- The cheap-talk game can thus be simplified to
  1. Agent "recommends a project", i.e. sends message $m \in N$
  2. Principal's strategy is vector of acceptance probabilities, $\mathbf{q} \in [0,1]^n$
- $\mathbf{q}$ characterizes an equilibrium
  - Agent recommends project i if

$$q_i b_i > q_{-i} b_{-i}$$

  - $q_i > 0$ only if

$$\mathbb{E}[b_i | q_i b_i > q_{-i} b_{-i}] \geq \max\{b_0, \mathbb{E}[b_{-i} | q_i b_i > q_{-i} b_{-i}]\}$$

    with $q_i = 1$ when inequality is strict

An Example

- $b_1 \sim U[\frac{1}{3}, \frac{4}{3}]$; $b_2 \sim U[0, 1]$
- So project 1 "looks better"
- $\mathbb{E}[b_1 | b_1 > b_2] = 0.91 > 0.78 = \mathbb{E}[b_2 | b_1 < b_2]$
- Thus, a truthful equilibrium, $\mathbf{q} = (1, 1)$
  - Agent recommends project i if $b_i > b_{-i}$
  - DM chooses the recommended project

  exists if and only if $b_0 \leq 0.78$

An Example

What if $b_0 > 0.78$? There is no truthful eqm, but

- If $b_0 \leq \frac{5}{6} = \mathbb{E}[b_1]$, there is an uninformative eqm: $\mathbf{q} = (1, 0)$
- If $b_0 > \frac{5}{6}$, there is a zero eqm: $\mathbf{q} = (0, 0)$
- Both are rather inefficient outcomes given common interest over projects ... anything better?
- If $b_0 \in (0.78, 0.85)$, there is a (partially) informative eqm in which $q_1 = 1$ and $q_2 \in (0, 1)$
  - **Intuition:** Suppose q_2 falls below 1 ("DM gets tough on project 2")

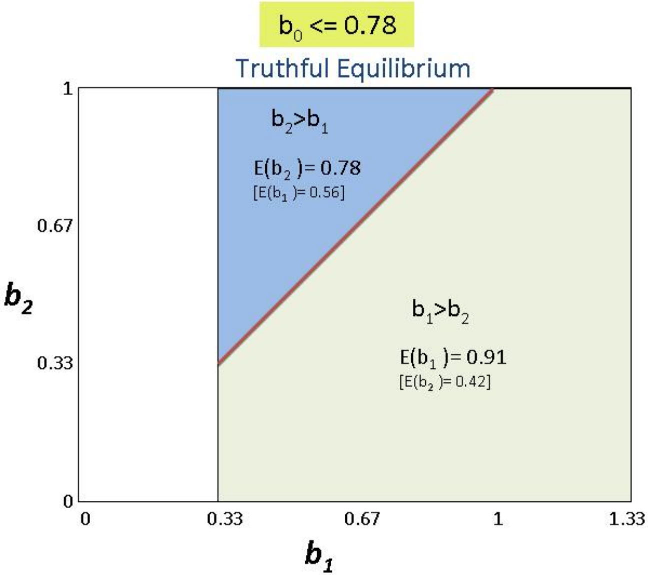
    $\Rightarrow$ Agent becomes more selective against 2 ("pandering toward 1")

    $\Rightarrow$ Posterior of project 2 improves, becoming acceptable to DM
  - **Eqm constraints:**

    (1) $\mathbb{E}[b_2 | 2 \text{ proposed}] = b_0$

    (2) $\mathbb{E}[b_1 | 1 \text{ proposed}] \geq b_0$

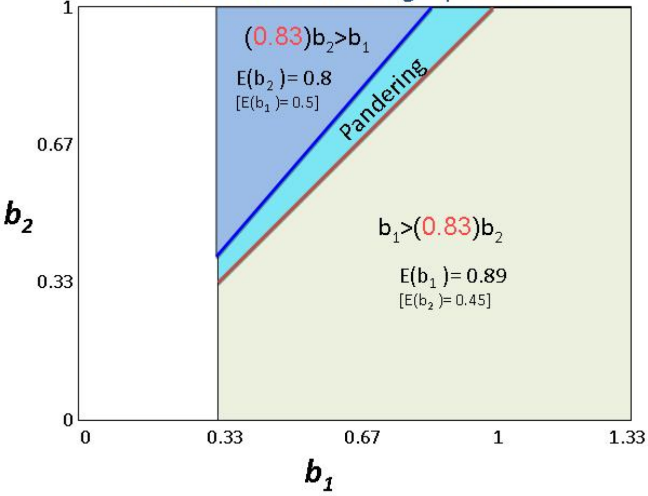
Parametric Example: $b_2 \sim U[0,1]$ $b_1 \sim U[1/3, 4/3]$



Parametric Example: $b_2 \sim U[0,1]$ $b_1 \sim U[1/3,4/3]$

$b_0 = 0.8$

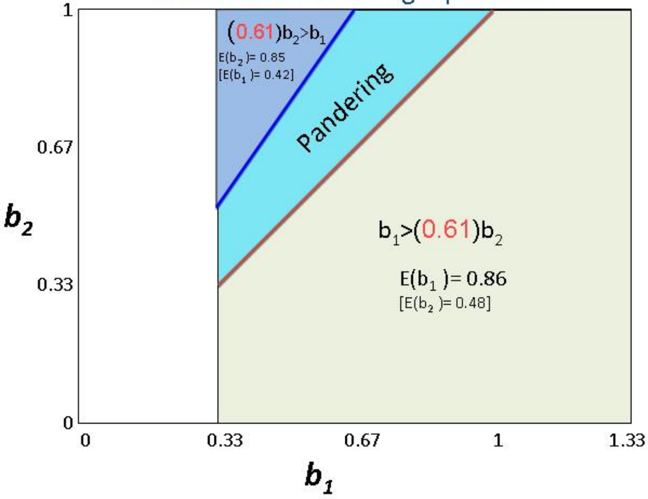
Informative Pandering Equilibrium



Parametric Example: $b_2 \sim U[0,1]$ $b_1 \sim U[1/3, 4/3]$

$b_0 = 0.85$

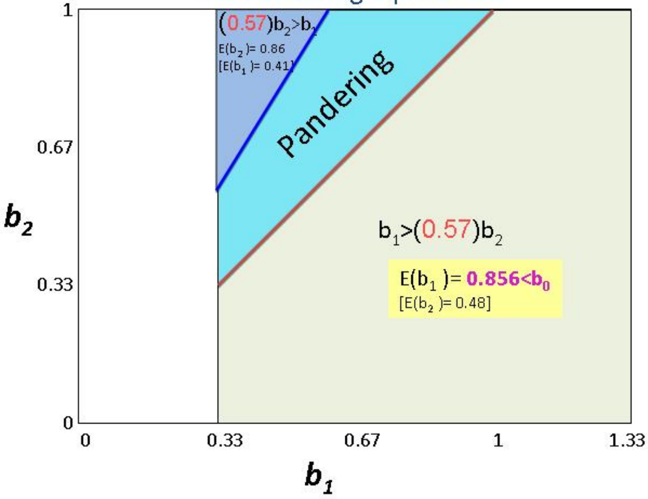
Informative Pandering Equilibrium



Parametric Example: $b_2 \sim U[0,1]$ $b_1 \sim U[1/3, 4/3]$

$b_0 = 0.86$

No Pandering Equilibrium



Pandering in General Model

Definition

An equilibrium $\mathbf{q}$

1. is influential if $\mathbf{q} \gg \mathbf{0}$
   - wlog, we assume $q_i > 0 \Rightarrow q_i \bar{b}_i > q_{-i} \underline{b}_{-i}$
2. is truthful if $q_1 = q_2 = 1$
3. has pandering if it is influential and $q_1 \neq q_2$
   - pandering toward the project with higher q_i
4. is better than equilibrium if it is interim Pareto superior
   - agent knows his type but DM does not

Pandering in General Model

- If b_0 is large enough, truthful equilibria won't exist
- Any influential eqm in such cases will feature pandering towards some project
- Would like to identify systematically which project the agent panders toward
  - across equilibria for a given b_0
  - across different values of b_0

  and do comparative statics, welfare, etc.
- This requires a stochastic ranking of projects

Strong Order

▸ Weaker

Definition

The two projects are strongly ordered if

$$\mathbb{E}[b_1|b_1 > b_2] > \mathbb{E}[b_2|b_2 > b_1], \tag{R1}$$

and, for any $i \in \{1, 2\}$,

$$\mathbb{E}[b_i|b_i > \alpha b_{-i}] \text{ is nondecreasing in } \alpha \in \mathbb{R}_+ \tag{R2}$$

so long as the expectation is well-defined.

- We say that project 1 "looks (conditionally) better" than project 2
- (R1) is mild given non-identical projects
- (R2) is the important part: conditioning vs. selection effects
- Leading examples satisfy strong order when $v_1 > v_2$

General Pandering

Theorem

Assume projects are strongly ordered. There exist thresholds

$$b_0^{**} \geq b_0^* := \mathbb{E}\left[b_2 | b_2 \geq b_1\right]$$

such that:

1. *If* $b_0 \leq b_0^*$, *the best eqm is the truthful equilibrium:* $\mathbf{q}^* = (1, 1)$

General Pandering

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Assume projects are strongly ordered. There exist thresholds

$$b_0^{**} \geq b_0^* := \mathbb{E}\left[b_2 | b_2 \geq b_1\right]$$

such that:

1. *If* $b_0 \leq b_0^*$, *the best eqm is the truthful equilibrium:* $\mathbf{q}^* = (1, 1)$
2. *If* $b_0 \in \left(b_0^*, b_0^{**}\right)$, *the best eqm is a pandering eqm with* $\mathbf{q}^* = (1, q_2^*)$ *for some* $q_2^* \in (0, 1)$*:*
   - *the agent proposes project* 2 *if and only if* $b_2 > b_1 / q_2^*$
   - $\mathbf{q}^*$ *is the largest eqm, i.e.* $\mathbf{q}^* > \mathbf{q}$ *for any other eqm* $\mathbf{q}$
   - *An increase in DM's outside option,* b_0
     - *increases pandering, i.e. decreases* q_2^*
     - *decreases expected payoffs of both Agent and DM*
3. *If* $b_0 > b_0^{**}$, *the only eqm is non-influential,* $\mathbf{q}^* = (0, 0)$.

General Pandering: Discussion

- When $b_0 \in (b_0^*, b_0^{**})$, the agent would be worse off with a commitment to truthfully rank alternatives
  - Ability to distort rankings is not self-defeating
  - Agent wants DM to know that he is pandering!
- *Both* projects benefit from pandering compared to truthful ranking
  - Better-looking project recommended more often
  - Worse-looking project becomes credible and acceptable
- DM's payoff is non-monotonic in outside option
  - can benefit from burning ships, i.e. reducing the outside option even at a cost

Ordering: Meaning of "Looks Better" (1)

- Under Strong Ordering, a project looks better than another if it's expectation is higher **when recommended under truthful strategy**

- The ordering can be intuitive
  - Leading examples: exponential, scale-invariant uniform
  - Here, order coincides with ranking under ex-ante expectation

Ordering: Meaning of "Looks Better" (2)

But the ordering can also be less intuitive.

A job-market example:

Stanford	$b_S \sim U[2,3]$
Ohio	$b_O \sim U[1,3]$

Who "looks better": Stanford or Ohio State Ph.D. student?

$$\mathbb{E}[b_O | b_O > b_S] = 2.66$$

$$\mathbb{E}[b_S | b_S > b_O] = 2.55$$

Can verify Ordering here, but OHIO is "conditionally better looking"!

$\Rightarrow$ Pandering towards OHIO, even though $\mathbb{E}[b_O] < \mathbb{E}[b_S]$

Does NOT mean Ohio is recommended more often; rather, at the margin

Ordering: Meaning of "Looks Better" (3)

- Standard stochastic dominance relations and our "conditionally better looking" relation cannot be generally compared
  - F_1 can be dominated in LR (hence FOSD) by F_2 and yet satisfy strong order
  - F_1 can be dominated in SOSD by F_2 and yet satisfy strong order
- "Looking better" in a comparative ranking vs. in isolation
- A sufficient condition for (R1):
  - with common support: $\frac{f_2}{F_2}\frac{F_1}{f_1}$ is decreasing
  - if different supports, a generalization
- A sufficient condition for (R2):
  - for $i = 1, 2$: $F_i(b_i/\alpha)$ is logsupermodular

Pitching

A recommendation becomes more likely to be accepted ("sellable") when it is pitched in comparison to projects that are themselves stronger

- even if these projects are already accepted with prob 1. when proposed

Pitching

Theorem

Assume $\mathbf{F} = (F_1, F_2)$ *and* $\tilde{\mathbf{F}} = (\tilde{F}_1, \tilde{F}_2)$ *both satisfy strong order, but each* F_i *weakly dominates* $\tilde{F}_i$ *in likelihood ratio, one of them strictly.*

Let $\mathbf{q}^*$ *and* $\tilde{\mathbf{q}}^*$ *denote the best equilibria respectively. Then,*

1. $\mathbf{q}^* \geq \tilde{\mathbf{q}}^*$
2. $\mathbf{q}^* > \tilde{\mathbf{q}}^*$ *if* $\mathbf{q}^* > (0,0)$ *and* $\tilde{\mathbf{q}}^* < (1,1)$.

Implications:

(a) Agent's recommendation for Ohio is more acceptable when the alternative is Stanford than Brown.

(b) Ohio may prefer to compete with Stanford than Brown.

(c) Agent never benefits from "hiding" a project (by analogous result).

More than Two Projects

Definition

For $n > 2$, projects are **strongly ordered** if

1. For any $i < j$, and any $k \in \mathbb{R}_+$,

$$\mathbb{E}[b_i | b_i > b_j, b_i > k] > \mathbb{E}[b_j | b_j > b_i, b_j > k]. \tag{R1'}$$

whenever both expectations are well-defined.

2. For any i and j, and any $k \in \mathbb{R}_+$,

$$\mathbb{E}[b_i | b_i > \alpha b_j, b_i > k] \text{ is nondecreasing in } \alpha \in \mathbb{R}_+ \tag{R2'}$$

so long as the expectation is well-defined.

- Satisfied by leading families when $v_1 > v_2 > \ldots > v_n$
- Previous results generalize under this strengthened ordering
  - Focus on largest equilibrium
  - Caveat that it may not be the best equilibrium for DM

Simple Delegation

What happens if the decision is delegated to agent?

- Eliminates pandering
- But sometimes a project is chosen when principal prefers status quo

Theorem

Compared to any eqm $\mathbf{0} < \mathbf{q} < \mathbf{1}$, the principal is strictly better off with unconstrained delegation to the agent.

Proof.

- Given pandering strategy, principal is indifferent between $\mathbf{q}$ and $\mathbf{1}$.
- Delegation implements the latter, but also eliminates pandering. □

- Delegation requires credible commitment to not override whenever $\mathbf{q} = \mathbf{1}$ is not an eqm
- Delegation may be beneficial even if $\mathbf{q} = \mathbf{0}$ is the only eqm

Optimal Commitment (1)

- Suppose the principle has rich commitment power. General mechanism design problem, without transfers.
- First: a simple but restricted class of mechanisms, where the the agent recommends a project, and the DM commits to an acceptance vector
  - includes delegation and cheap talk as special cases
- Is $\mathbf{q}^D := \mathbf{1}$ the optimal commitment for the principal, at least when $\mathbf{q}^D$ is preferred to $\mathbf{q} = \mathbf{0}$?

Optimal Commitment (2)

Theorem

If the best cheap-talk eqm, $\mathbf{q}^*$*, is such that* $\mathbf{0} < \mathbf{q}^* < \mathbf{q}^D$*, then the optimal simple mechanism is* $\mathbf{q}^M$ *such that* $\mathbf{q}^* < \mathbf{q}^M < \mathbf{q}^D$*.*

So no rubberstamping in optimal simple mechanism if no rubberstamping in communication eqm.

- $\mathbf{q}^D$ not an eqm if and only if

$$\mathbb{E}[b_2 | b_2 \geq b_1] < b_0$$

- Reducing q_2 slightly from 1 $\Rightarrow$ 2nd order loss from pandering distortion, but 1st order gain from choosing b_0 sometimes when project 2 is recommended
- Since $\mathbb{E}[b_2 | q_2^* b_2 \geq b_1] = b_0$, raising q_2^* slightly has no direct effect on principal's utility
- But it reduces pandering

Can implement this decision rule by delegating decision-making to a third party whose value from the status quo is $b_0' \in (0, b_0)$.

Optimal Commitment (3)

- Now unrestricted class of mechanisms (but no transfers)
  - e.g. sometimes randomize between the two projects?
- Can focus on incentive-compatible direct mechanisms
  - mappings from (b_1, b_2) to $\Delta := \{(x, y) \in [0, 1]^2 : x + y \leq 1\}$
- Key lemma: IC implies $(x(\mathbf{b}), y(\mathbf{b})) = (x(\mathbf{b}'), y(\mathbf{b}'))$ if $\frac{b_1}{b_2} = \frac{b_1'}{b_2'}$
  - not trivial, because even though for the agent the ratio determines his preferences over Δ, the principal cares about the levels
- Reduce problem to one-dimensional, with agent's type $\theta := \frac{b_1}{b_2}$
  - Can treat agent as if $u(x, y, \theta) = x\theta + y$
- Now y looks similar to a transfer in standard mechanism design
  - but the analogy is imperfect, because of probability constraint

Optimal Commitment (4)

Mild regularity condition that suitable "virtual valuation" is piecewise monotone:

$$J(\theta) := -(1-\theta)b_0 f(\theta) + \int_\theta^{\bar{\theta}} \left(\mathbb{E}\left[b_2 \middle| \frac{b_1}{b_2} = s \right] - b_0 \right) f(s) ds.$$

Theorem

If $\mathbf{q}^* < \mathbf{1}$, then the optimal simple mechanism is optimal in the class of all mechanisms.

- Optimal mechanism induces pandering
- Straightforward implementation of the optimal mechanism through intermediary delgation

Ignorance Can Be Bliss

- Suppose there are two projects A and B that are ex-ante identical, but there will be a public signal $s \in S$ (finite set) about them after which communication game ensues
- Say that the signal is value neutral if

$$\mathbb{E}[\max\{b_A, b_B\}|s] \text{ is the same for all } s \in S$$

and non-trivial if

$$\mathbb{E}[b_A|b_A > b_B, s] \neq \mathbb{E}[b_A|b_A > b_B, s'] \text{ for some } s, s' \in S$$

Theorem

If the signal is value neutral, the DM at least weakly prefers not observing the signal. If the signal is also non-trivial, then there is an interval of b_0 in which the DM strictly prefers not observing the signal.

Implications:

- If DM cannot commit to anything after observing s, she would prefer to commit to not observing information (if possible)
- Can be optimal to appoint a less capable/informed DM

Endogenous Status Quo

Interpret $b_0 \in \mathbb{R}_+$ as an alternative developed by the principal at cost $c(b_0)$, where $c'(\cdot) > 0$. This is done after observing hard information but before soft information is communicated. Assume there is a solution to $\max[b_0 - c(b_0)]$.

Corollary

Assume that the largest equilibrium of communication game is played. Then depending on (F_1, F_2), the principal chooses either

1. $b_0 = 0$ *and rubberstamps the agent's recommendation*
2. $\hat{b}_0 > 0$ *and never accepts agent's recommendation*

- That is, no soft communication on eqm path, only hard info (reflected by F_1, F_2)

Conclusions

- New model of strategic communication/persuasion, relevant to wide variety of settings
  - equilibrium features interaction of hard and soft information: pandering and pitching to persuade
  - pandering arises even under full commitment for the DM
- Important (and potentially destructive) role of verifiable information
  - can distort and even crowd out the communication of soft information
  - DM might be better off not observing the verifiable information, or committing to ignore it

Some Extensions

- Routine
  - Variable project size
  - Private info of DM about outside option
- More Interesting: conflicts of interest between projects
  - E.g. agent gets $a * b_1$ from project 1, for some $a > 0$
  - View pandering as distortion of agent's true preference ranking
  - Agent now has an incentive to pander to counter preference bias
    - can reinforce or mitigate/reverse informational-pandering
  - Pandering can be good for the DM, e.g. if $a < 1$
  - Delegation may not be good

Future

- Multiple agents with distinct projects competing
  - Intuition: exacerbate pandering distortions
  - DM may be better off limiting the set of agents
- Information acquisition
  - Strong incentives to strengthen project distributions
    - delegation can demotivate, contrast to Aghion and Tirole (1997); cf. Che & Kartik (2009)
  - But may also distort effort incentives towards projects with observable characteristics

Thank you.

Weak Ordering

Stronger

Definition

For $n = 2$, projects are **weakly ordered** if

$$\forall \alpha \geq 1,\ \mathbb{E}[b_1 | b_1 > \alpha b_2] > \mathbb{E}[b_2 | \alpha b_2 > b_1].$$

whenever the LHS and RHS are well-defined.

Theorem

Assume $n = 2$ and the projects are weakly ordered. Then, for any equilibrium $\mathbf{q}$:

1. *If $q_1 > 0$, then $q_1 \geq q_2$.*
2. *If $q_i > 0$ and $q_{-i} < 1$, then $q_i > q_{-i}$.*
3. *If $\mathbb{E}[b_2 \,|\, b_2 \geq b_1] < b_0$, then $q_2 < 1$; otherwise, there is a truthful equilibrium.*

Weak vs. Strong Ordering

◂ Stronger

- Weak Ordering can be satisfied even when $\mathbb{E}[b_1|b_1 \geq \alpha b_2]$ is not increasing in α (hence Strong Ordering fails)

- Truncated Normal Example: $G_1 \sim N(5,1)$ and $G_2 \sim N(4.5,1)$
  Let b_1 and b_2 have support on $\mathbb{R}^+$ with

$$f_i(x) = g_i(x)/[1 - G_i(0)]$$

$\mathbb{E}[b_1|b_1 > \alpha b_2]$ and $\mathbb{E}[b_2|\alpha b_2 > b_1]$: