Consensus building: How to persuade a group

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Outline

Introduction

Motivation

- Many decisions in private and public organizations are made by groups, making group consensus important.
- Additional persuasion strategies compared to persuading a single decision-maker
  1. selective communication–who:
     the sender distills information selectively by choosing whom to talk to
  2. persuasion cascades–how:
     the sender approaches group members sequentially thus building on one's gained adhesion to convince another either to take a careful look or to rubberstamp altogether
     snowball sampling
  3. group size, rules and (external/internal) congruence also matter!

This Paper

- The paper builds a sender/multi-receiver model of persuasion (with costly private hard information)
- Strategics:
  1. persuasion cascade: alignment?
  2. selective communication: informational pivot-credibility?
- Ability: internal and external congruence
  1. external congruence(-): the prior probability that a given member benefits from the sponsor's project
  2. internal congruence(+): the vector of probabilities that a given member benefits from the project given that other members benefit
- the size of the group(+) and its decision-rule(-)

Applications

- legislation (democracies Congressional committees)
- corporate governance (directors)/ firms' strategic choices (managers)
- academic appointments (committees or departments)
- daily life (family/friends)
- Everywhere group deciding emerges!

Realted Literature

1. the large single-sender/single-receiver literature
   soft information:Vincent Crawford and Joel Sobel (1982)
   hard information: Sanford J. Grossman (1981), Grossman and Oliver Hart (1980)
   moral hazard in communication: Mathias Dewatripont and Jean Tirole (2005)
2. mechanism design approach with hard evidence:
   Paul R. Milgrom (1981), Jess Bull and Joel Watson (2006)
3. committees:
   Joe Farrell and Robert Gibbons (1989)

Model

Setup

- Multi-Receiver $(R_1, ..., R_N)$ and Sender S
- K-majority rule
- benefits: $(s; G, p_i; -L, 1 - p_i)$
  1. Sender's benefit s is common knowledge while Receiver's r_i is a (binary) priori unknown to anyone
  2. $\{r_i\}_{i=1}^N$ may have correlation structure used to infer more information
- An unverifiable invesitigation with private cost c
- Intepretations for the invesitigation:
  1. a written document handed over by the sponsor
  2. a "tutorial" (face–to-face communication)
  3. "issue-relevant" or "issue-irrelevant"

The dictator case

- investigation: $u^I = pG - c$ and rubberstamping: $u^R = pG - (1-p)L$
- three thresholds:
  1. rubberstamp $>$ reject the project without investigation: $u^R \geq 0 \Leftrightarrow p \geq p_0 \equiv \frac{L}{G+L}$
  2. investigate and approve whenever $r = G$ when asked to $>$ reject without investigation: $u^I \geq 0 \Leftrightarrow p \geq p_- \equiv \frac{c}{G}$
  3. rubberstamp $>$ investigate and approve: $u^R \geq u^I \Leftrightarrow p \geq p_+ \equiv 1 - \frac{c}{L}$
- Assumption 1 (No Pagen): $c < \frac{GL}{G+L}$

The dictator case

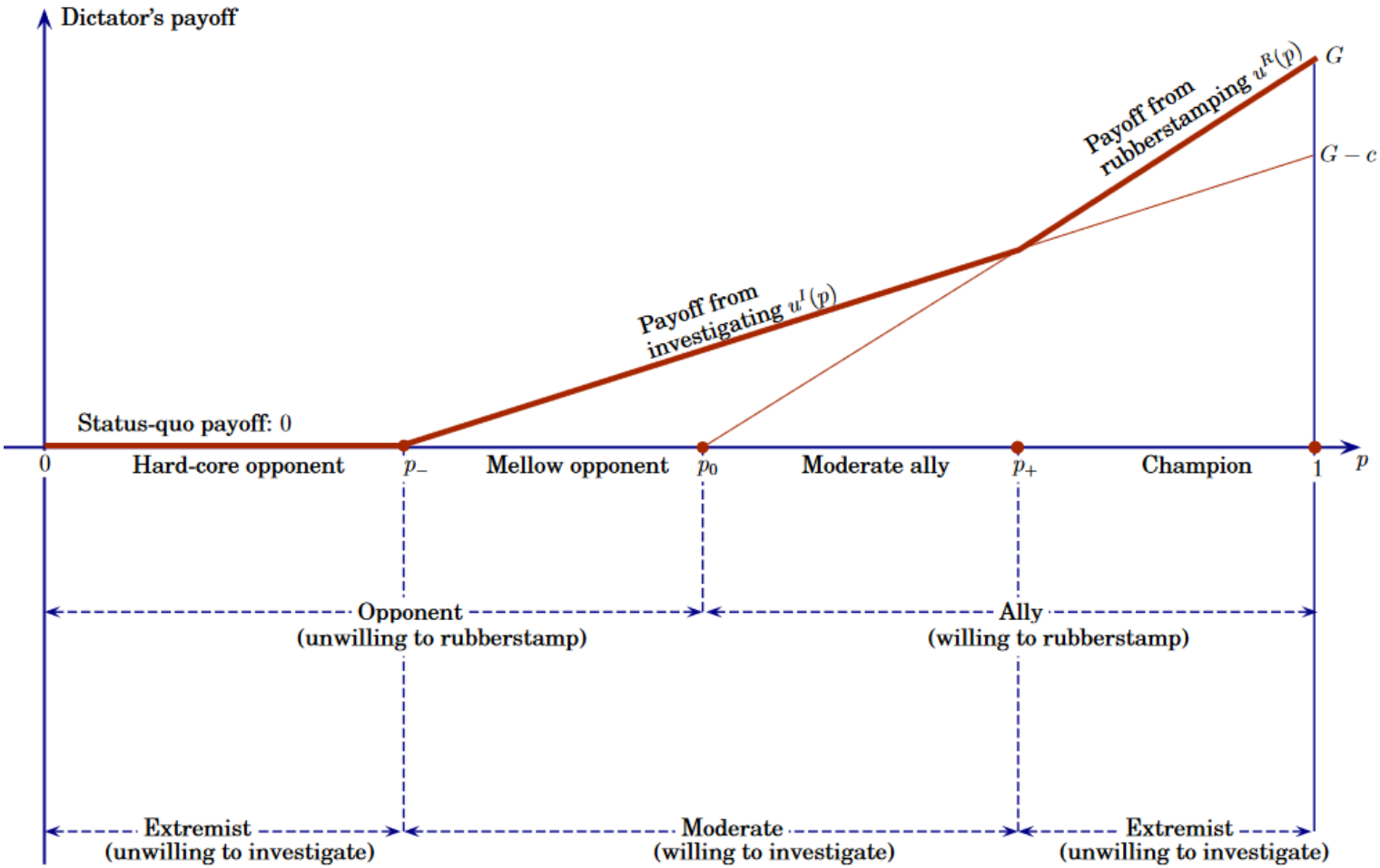
1. in absence of a report: rubberstamp if $p \geq p_0$ (an ally) , otherwise reject
2. provided with a report:
   1. rubberstamp: $p \geq p_+$ (a champion)
   2. investigate and approve whenever $r = G$: $p_- \leq p \leq p_+$ (a moderate)
   3. reject: $p \geq p_+$ (a hard-core opponent)

- a committee member can be a hard-core opponent, a mellow opponent ($p_- \leq p \leq p_0$), an ally
- moderates prefers to investigating while extremists prefer not

Proposition 1

1. $p \geq p_0$ the sponsor asks for rubberstamping with $Q = 1$
2. $p_- \leq p \leq p_0$ the sponsor asks for investigatin with $Q = p$

The dictator case



A Two-member Committee under the Unanimity Rule

- affiliated benefits:
  $\hat{p}_i \equiv Pr(r_i = G | r_j = G) = \frac{Pr(r_i=G, r_j=G)}{Pr(r_j=G)} = \frac{P}{p_j} \geq p_j$
- Suppose $p_1 \geq p_2$ w.l.o.g
- To maximizes the expected probability of implementation, under IC, IR and measurability, S chooses:
  1. which committee members to provide the report to, in which order
  2. what information he should disclose
- three types of deterministic mechanisms:
  1. no-investigation mechanism
  2. mechanisms with investigation only by R_i
  3. mechanisms with two sequential investigations

Classification

- two allies ($p_1 \geq p_2 \geq p_0$): both rubberstamp with $Q = 1$
- two hard-core opponents ($p_2 \leq p_1 \leq p_-$): never implemented
- thus restricting attention to at least one is not an ally and one not a hard-core opponent ($p_1 \geq p_-$ and $p_2 \leq p_0$)

Proposition 2: R_1 is a champion ($p_1 \geq p_+$)

1. R_2 a mellow opponent ($p_- \leq p \leq p_0$): implemented with $Q = p_2$
2. R_2 a hard-core opponent ($p_2 \leq p_-$): never implemented

- Intuition:
  1. too strong a support is no useful support
  2. R_2 is pivotal

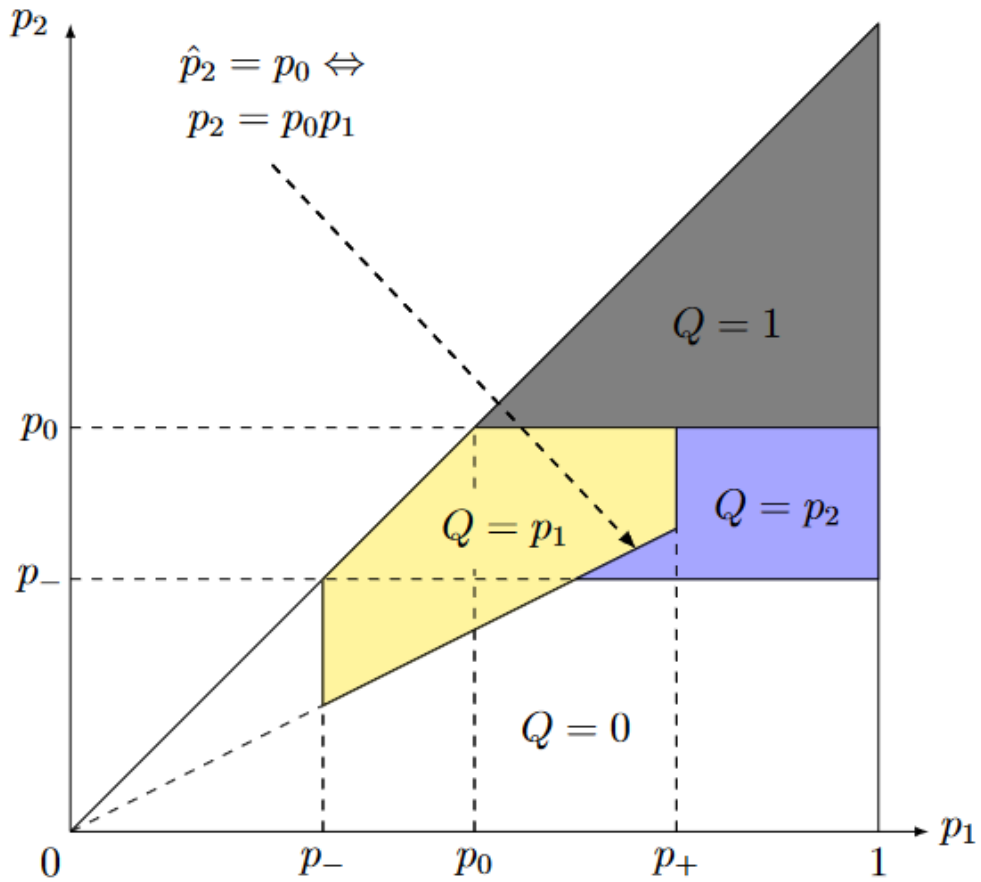
Classification: A Moderate and An Opponent

Proposition 3: A Moderate ($p_- \leq p_1 \leq p_+$) and An Opponent ($p_2 \leq p_0$)

1. $\hat{p}_2 \geq p_0$: R_1 investigates and implemented with $Q = p_1$
2. $\hat{p}_2 < p_0$ and $\hat{p}_1 \geq p_0$: R_2 investigates and implemented with $Q = p_2$ if $p_2 \geq p_-$ or $Q = 0$ if $p_2 < p_-$
3. $\hat{p}_i \leq p_0$: both investigate and implemented with $Q = P$ if $P \geq p_-$ or $Q = 0$ if $P < p_-$

- Intuition:
  1. persuasion cascade matter! reliability matters!
  2. whether R_i is reliable depends on $r_i = G$ is sufficiently good
  3. prefers R_i to invesitigating only when he is reliable to another one
  4. only under respective reliability $R_1 > R_2$, $R_i \geqslant$ both one

An illustrative example



Congruence: A Formal Definition

- Persuasion cascades rely on correlation structure (i.e congruence)
- stochastically independent: no such cascade can exist and degenerated to multiple dictatorship
- formalize the mixture of nested and independent benefits: (p_1, p_2, ρ)
  1. (more) external congruence: $(p_1', p_2') \geq (p_1, p_2)$ for a given ρ (i.e. the alignment of (p_1, p_2))
  2. (more) internal congruence: an increase in ρ (i.e. the correlation among (p_1, p_2))
- trigger a persuasion cascade with high internal congruence, convince both with poor

Internal dissonance

- negatively correlated: $\hat{p}_i < p_i$
- Suppose $p_2 < p_0$ and $p_1 > p_-$

Proposition 4

1. $p_2 < p_-$: never implemented
2. $p_2 > p_-$ and $\hat{p}_1 > p_0$: R_2 investigates and implemented with $Q = p_2$
3. $p_2 > p_-$ and $\hat{p}_1 < p_0$: both investigate and implemented with $Q = P$ if $P \geq p_-$ or $Q = 0$ if $P < p_-$

- Intuition:
  1. $\hat{p}_i < p_i < p_0$: R_2 must invesitigate
  2. whether R_1 invesitigates depends on $\hat{p}_1 <$ and p_0

Members' optimum

- receivers may have access to a smaller set of mechanisms in two ways:
  1. force the sponsor to communicate $\Rightarrow$ more communication
  2. cut communication channels (a binary situation):
     $u^I(p_2) + p_2 u^R(\hat{p_1}) > u^I(p_1) + p_1 u^R(\hat{p_2}) \Leftrightarrow L > G$ and $p_1 > p_2$
     the tradeoff between the cost of type I error in adopting the project with the cost of type II error

Proposition 5

In the symmetric-receiver case or if $G > L$, the members never gain from preventing the sponsor from communicating with one specific receiver (or both).

- Intuition:
  1. asymmetric: investigation by R_2 instead of R_1 might maximize the receivers' average welfare
  2. $G > L$: the negative externality from preventing a willingful receiver exceeds that imposed on an unwillingful receiver

Comparative Analysis

Changes in Congruence

- **Corollary 1**: Fixing priors (p_1, p_2), the implementation probability is (weakly) increasing in ρ (Proposition 3)
- **Corollary 2**: Fixing priors ρ, increasing p_1 may decrease the implementation probability
- Intuition:
  1. less credible: $\hat{p_2} = p_2(\frac{\rho}{p_1} + (1 - \rho))$
  2. no longer investigate if $p_1 > p_+$

Changes in Payoffs

- **Corollary 3**:
  1. reducing potential loss of the most favorable member may decrease implementation probability
  2. reducing communication costs increases it
- Intuition (modify the project characteristics):
  1. too strong an ally is useless
  2. raising an ally's external congruence
  3. can be extended to continuous payoffs (only sign matters!)

More Veto Powers

- the use of persuasion cascades to persuade a group v.s. the status-quo bias

Proposition 6

A randomly drawn two-member committee may approve the project more often than a randomly drawn dictator

- Intuition:
  merely on external congruence v.s. high compensates low

Robustness

Side Communication

- There may be uncontrolled channels of communication:
  1. exchange soft information about preferences and invesitigation
  2. forward the file to others

Proposition 7 Robustness to Side Communication

The sponsor can obtain the same expected utility even when he does not control communication channels among members.

- Intuition:
  1. only under a single investigation and rubberstamping is non-trivial
  2. conditional on the invesitgator liking the project indeed exists
- this robustness result is fragile:
  1. other equilibria may exists in which side communication matters
  2. depending on our focusing on deterministic mechanisms
  3. side commuincation could matter if investigation imperfectly revealed to a member her payoff

Informed sponsor

- the sponsor may not know how the description of the project will map into receivers' taste for it
- the sponsor's type: $t = (p, \rho)$, the support of t is $[0, 1]^2$
- $p^a = E[p(t)]$, $\hat{p}^a = E[\rho(t) + (1 - \rho(t))p(t)]$

Proposition 8 (two symmetrical members)

1. $p = p^a$ and $\hat{p} = \hat{p}^a$ a pooling equilibrium of the informed sponsor game
2. This equilibrium is Pareto-dominant for all types of sender.

- a sketch of the proof:
  1. a deviation mechanism cannot generate fewer investigations before approval
  2. in any equilibrium, the number must be the same

Stochastic mechanisms

Proposition 9 (a symmetric two-member committee with p and $\hat{p}$)

1. $p_- < p < p_0 < \hat{p}$, optimal mechanism:
   1. R_i to investigate and R_j to rubberstamp with $prob = \theta \in (0, \frac{1}{2})$
   2. both rubberstamping with $prob = 1 - 2\theta$
2. $p < p_- < p_0 < \hat{p}$ and $p_0 > \frac{1+p_-}{2}$, the optimal mechanism yields $Q > 0$ provided p is close enough to p_-

- Intuition (constructive ambiguity):
  1. $p_- < p < p_0 < \hat{p}$: R_1 investigates then R_2 rubberstamps, while R_1 does not then R_2 does not
     $\Rightarrow$ not necessary to have R_1 investigate (binding/cut-off)
  2. Sender simply randomizes the order of investigation, without revealing the actual order
  3. two hard-core opponents with strong internal congruence can also be motivated to invesitigate

Congruence in a symmetric N-member committee

- for any $k = 1, ..., N$, $P_k \equiv Pr\{r_1 = r_2 = ... = r_k = G\}$ is non-increasing in k
- $P_1 = p < p_0$, $P_0 = 1$
- $Pr\{r_{k+1} = G | r_1 = r_2 = ... = r_k = G\} = \frac{P_{k+1}}{P_k}$ is non-increasing in k, for any $k = 1, ..., N-1$
- k sequential investigations such that R_j investigates for $j \leq k$ only if all R_i with $i < j$ have investigated and $r_i = G$

The Optimal Number of (Sequential) Investigations

Proposition 10

If there exists $k^* = min\{k \in \{1, ..., N\} | \frac{P_{k+1}}{P_k} \geq p_0$ and $P_k \geq p_-\}$, then $Q = P_{k^*}$. Otherwise no implementation.

- Intuition:
  1. Any non-investigating member is willing to rubberstamp, i.e. $\frac{P_{k+1}}{P_k} \geq p_0$
  2. Willingness to sequentially invesitigate, i.e. $P_k \geq p_-$
  3. (IC) invesitigate $>$ rubberstamp, i.e.
     $\frac{P_k}{P_{j-1}} G - c \geq \frac{P_{k-1}}{P_{j-1}} [\frac{P_k}{P_{k-1}} G - (1 - \frac{P_k}{P_{k-1}} L)]$
     $\Leftrightarrow P_{k-1} - P_k \geq 1 - p_+$
     We have $P_{k^*-1} - P_{k^*} > \frac{1-p_0}{p_0} P_{k^*} \geq \frac{1-p_0}{p_0} p_- = 1 - p_+$

Internal congruence

Defintion of Internal congruence

stochastic structure $\mathcal{P} = \{P_k\}_{k=1}^N$ with $P_1 = p$ exhibits higher internal congruence than $\mathcal{P}' = \{P'_k\}_{k=1}^N$ with $P'_1 = p$ if for all $k \in \{1, ..., N-1\}$, $\frac{P_{k+1}}{P_k} > \frac{P'_{k+1}}{P'_k}$

- Higher internal congruence coincides with uniformly smaller hazard rates: $Pr\{r_{k+1} = -L | r_1 = r_2 = ... = r_k = G\} = \frac{P_k - P_{k+1}}{P_k}$
- $P_k \geq P'_k$ for all k

Corollary 4

Fixing external congruence, $\mathcal{P}$ exhibits higher internal congruence than $\mathcal{P}'$,then $Q \geq Q'$

Selective communication in a N-committee with nested preferences

- $p_i = Pr\{r_i = G\}$ and $0 \leq p_N \leq p_{N-1} \leq ... \leq p_1 \leq 1$
- $r_j = G \Rightarrow r_k = G$ for any $j > k$
- K-majority voting rule and suppose $p_K < p_0$
- the informational pivot R_{i^*}:
  $i = min\{j \mid p_0 p_j \leq p_K \text{ and } p_j \leq p_+\}$
- a "coalition walk-away" option: directly ban the project if at least $N - K + 1$ members with negative ex-ante expected utility

Selective communication in a N-committee with nested preferences

Proposition 11 Informational-pivot mechanisms

a K-majority rule with the coalition walk-away option or the unanimity rule, the optimal mechanism involves:

1. $i^* > 1$, $p_- \leq p_{i^*-1} \leq p_{i^*} \leq p_+$ and $p_{i^*} \geq p_{i^*-1} p_0$: a single investigation randomly choosing R_{i^*-1} or R_{i^*} with equal probability and $Q = \frac{p_K}{p_0}$. The pivotal's benefit from the project is disclosed but not her identity
2. $i^* = 1$ and $p_0 \leq p_1$: zero or one investigation choosing R_1 and similarly relies on constructive ambiguity, yielding $Q = \frac{p_K}{p_0}$

- Key Insights:
  1. the informational pivot differs from the voting pivot
  2. the trade-off between internal congruence with R_K and external congruence with S matters

Conclusion

- Group = "Dictatorship" (in size) + Correlation Structure $\Rightarrow$ Persuasion Cascades and Selective Communication Matters!
- three open questions:
  1. Multiple sponsors engage in targeted lobbying (contest theory)
  2. Size and composition of groups (serving independent goals)
  3. Two-tier persuasion cascades (different layers)