# Week 2: Parties and party competition

A second introduction to formal political economy, Trinity Term 2025

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# Preliminaries: Quick round of feedback

1. Was the first lecture too formal / informal?
2. Was the style of the lecture helpful?
3. Was the first assignment too easy / difficult?

# Overview

1. Why political parties matter in representative democracy
2. The Downsian model of party competition and its logic
3. Limitations of the Downsian model: scope conditions and some empirics
4. Theoretical extensions and modifications:
   - → Contextual assumptions (e.g., multi-dimensionality, dynamics)
   - → Demand-side assumptions (e.g., strategic voting, uncertainty)
   - → Supply-side assumptions (e.g., party goals, activist influence, niche parties)
5. Empirical illustrations of extensions

# Outline

## What is the deal with political parties?

## Theories of party competition

- The Downsian model and the median voter theorem
- Relaxing the assumptions underlying the Downsian model

## Conclusion and outlook

# Why do parties matter for making democracy in large societies work?

Elections are crucial for democracy (as we discussed last week), and political parties are crucial for (legislative) elections and, therefore, large-scale societies with representative democracy.

Definition of political parties:

- “teams of [politicians] seeking to control the governing apparatus by gaining office in a duly constituted election.” (Downs, 1957, p. 25)
- “political group that presents at elections, and is capable of placing through elections, candidates for public office” (Sartori, 1976, p. 64)

Parties facilitate compromise between different factions who, while sharing broadly similar ideological commitments, differ in their specific policy views. As a result, they act as “intermediaries“ between voters and politicians (Caillaud and Tirole, 2002)

# What the formal theory literature tells us about the functions of parties

1. They allocate scarce resources among (potential) candidates and legislators.
2. They allow politicians to compete more effectively in (at least) two ways.
   - → Address moral hazard and collective action problems inherent in electoral campaigns
   - → Alleviate commitment problems individual candidates would face in multi-dimensional policy space
3. Under certain conditions, parties can aggregate preferences or interests effectively, i.e. so that they are “heard“ in the policymaking process.
4. Parties facilitate collective policymaking in (at least) two ways.
   - → Reduce the transaction costs of compromises (“Coasean rationale“)
   - → Enable credible log-rolling between and within parties
5. Parties or party brands can serve as informational shortcuts, enabling voters to deal with the “democratic dilemma“ (Lupia and McCubbins, 1998).

# The allocation of scarce resources

Parties allocate the scarce resource of political power by deciding (i) activists / members can run for office and (ii) which elected candidates are appointed to which parliamentary committees, cabinet posts, or other positions (Aldrich, 2011).

What is the strategic calculus for parties? They want their legislators to be loyal and competent.

Raises three thorny questions:

- How to induce loyalty?
- How to screen for competence?
- How to trade off loyalty and competence?

# Question #1: Inducing loyalty via sunk political investments

Parties are 'incentive structures that encourage sunk political investment by their members' (Svolik, 2012, p. 163).

- Members are required to perform costly service early on in their careers (that can't be transferred to other parties); resources are allocated based on seniority and therefore only given to members who have already incurred cost.

Empirically, some support: more senior members – those who have shown long-standing loyalty – tend to be rewarded via e.g. high list positions in PR systems (Cirone, Cox, and Fiva, 2020)

Other means of creating sunk political investments or inducing loyalty:

- Requiring candidates or members of one's cabinet to say or do things they can't walk back from → Examples?
- Choosing candidates who have no outside options – whose success depends entirely on remaining in the good graces of the party bigwigs → Examples?

# Question #2: Screening for competence

What are good proxies, metrics, or “sufficient statistics“ for evaluating the competence of prospective candidates?

- Which characteristics do parties care about (education, charisma, occupational background, local ties, legislative initiatives for incumbents, etc.)?
- How to balance the need for clear promotion criteria and easily *gameable* metrics (Holmstrom and Milgrom, 1991)? → Strong recommendation to read Bueno de Mesquita’s "Perils of Quantification" or listen to his lecture

In the appendix, I sketch a simple signalling game where candidates have different levels of competence and thus outside options, while the party observes effort → better outside options for incompetent types make separation via effort less likely, with reverse true for competent ones → higher reward can make separation more likely, but not necessarily

▸ Signalling model

# Question #3: Trading off loyalty and competence

Often there exists a trade-off between loyalty and competence: if those with the lowest ability have relatively unappealing outside options, then they have the greatest incentive to be loyal, with the reverse holding for those with the highest ability.

How do parties navigate this trade-off? Two examples:

- Buisseret et al., 2022: party leaders use list positions strategically; safe list slots are given to loyalists, while marginal list positions are used to incentivise effort among more electorally valuable or skilled candidates
- Fiva, Izzo, and Tukiainen, 2024: the "gatekeeper's dilemma" is whether to prioritise top individual performers or cohesive team players. Using Norwegian data, they find that parties often favour team compatibility and internal cooperation over individual superstar traits. This reflects a preference for loyalty and teamwork in parliamentary settings. Highlights a collective logic of candidate selection, where competence is understood relationally (as compatibility) rather than just individually.

# A stylised model of loyalty via sunk costs

We consider a simple two-period model with one agent and one party.

- Period 1: Agent chooses whether to join the party track by paying sunk cost $c > 0$. If not, exits permanently with normalised payoff 0.
- Period 2: The agent receives:
  - $\rightarrow$ a party reward $R > 0$, or
  - $\rightarrow$ an outside option $w > 0$
  - $\rightarrow$ Both are known and fixed scalars.
- The sunk cost is non-transferable and cannot be recovered if the agent exits.

Loyalty is defined behaviourally: the agent is loyal if they stay with the party (i.e., accept $R$ rather than take $w$).

# Solving the model: period 2 decision

Suppose agent **paid** sunk cost $c$ in period 1.

**Period 2: Stay vs exit decision**

$$\text{Payoff} = \begin{cases} R - c & \text{if stay} \\ w - c & \text{if exit} \end{cases}$$

$$\text{Agent stays (i.e. is loyal)} \iff R \geq w$$

- Important: sunk cost $c$ does not affect the *relative* payoff of staying vs exiting
- Loyalty is determined solely by comparison $R \geq w$

# Solving the model: period 1 decision

Agent chooses to join (pay cost $c$) if expected payoff is non-negative.

**Join condition**

Agent joins the party track if $\max\{R, w\} \geq c$

Observation: the sunk cost deters entry, not exit — but once paid, it does not change the stay/exit decision. But sunk costs create *selection effects*:

- Only agents with sufficiently low $w$ will join since for them $R \geq w$ is more likely to hold

$\rightarrow$ Loyalty is the result of earlier self-selection; sunk costs are a tool to filter in those with fewer outside options.

# Sunk costs as a screening mechanism

To make the selection effect concrete, consider two agent types:

- Type L (loyalist): outside option $w_L$
- Type H (high-opportunity): outside option $w_H > w_L$
- Both face the same sunk cost $c$ and same party reward $R$

**Entry condition for each type**

$$\text{Join if } \max\{R, w_t\} \geq c \quad \text{for } t \in \{L, H\}$$

- Result: Type L is more likely to join than type H
- Sunk cost $c$ deters agents with attractive outside options

# Extending the sunk-cost model: competence and loyalty

We extend the above baseline model by adding heterogeneity in agent competence.

- Each agent has:
  - → Competence $\alpha \in \{\bar{\alpha}, \underline{\alpha}\}$, with $\bar{\alpha} > \underline{\alpha}$
  - → Outside option $w(\alpha)$, where $w(\bar{\alpha}) > w(\underline{\alpha})$
- Sunk cost $c > 0$ is still imposed in period 1, which is identical across types
- Party reward $R > 0$ is fixed and common knowledge
- Loyalty is defined behaviourally: agent is loyal if they accept $R$ in period 2

# Timeline and party objective

1. Party sets a sunk cost requirement $c > 0$
2. Agent observes type $\alpha \in \{\bar{\alpha}, \underline{\alpha}\}$ and chooses whether to join (pay $c$)
3. In period 2, the agent compares $R$ to $w(\alpha)$ and decides:

$$\text{Stay (loyal) if } R \geq w(\alpha); \quad \text{exit otherwise}$$

**Party payoff**

$$\text{Payoff} = \begin{cases} v \cdot \alpha & \text{if agent stays, with } v > 0 \\ 0 & \text{if agent exits} \end{cases}$$

Goal: choose $c$ to induce loyalty *and* retain high-competence types.

# Type-specific participation condition

Each agent joins in period 1 only if the expected benefit exceeds the sunk cost.

**Join condition (for agent of type $\alpha$)**

$$\max\{R, w(\alpha)\} \geq c$$

- For high-competence types $\bar{\alpha}$:

$$\text{Join if } \max\{R, w(\bar{\alpha})\} \geq c$$

- For low-competence types $\underline{\alpha}$:

$$\text{Join if } \max\{R, w(\underline{\alpha})\} \geq c$$

Observation: increasing $c$ deters high-$w$ (competent) types first, as before

# The loyalty–competence trade-off in candidate selection

- If the party sets a high sunk cost $c$, then:
  - $\rightarrow$ Low-$w$ types (likely loyal) still join
  - $\rightarrow$ High-$w$, high-competence types opt out
- If the party sets a low $c$:
  - $\rightarrow$ High-competence types more likely to join
  - $\rightarrow$ But also harder to induce loyalty (as $R < w(\bar{\alpha})$)

**Strategic tension**

Loyalty requires $c$ high enough to deter opportunists, but not so high that it deters competent candidates with better outside options.

# The collective action and moral hazard problems of campaigning

Collective action problem:

- Campaigning is a team-based endeavour.
- Each candidate or party worker benefits from the party's collective success (e.g. national vote share), but has an incentive to free-ride on others' efforts.
- Effort is costly and (partly) non-observable.

Moral hazard problem:

- A specific form of the collective action problem — one of hidden action.
- Party leadership (or campaign coordinator) cannot directly observe individual candidates' campaign effort. Only the outcome (vote share, seat win/loss) is observable (Holmstrom, 1982).
- The problem: how to incentivise candidates to supply productive inputs, given limited observability and imperfect attribution.

# How do political parties alleviate these problems?

What is the incentive of electorally safe candidates (e.g. those in safe districts or with high list positions) to campaign for their party (absent any other-regarding motives)?

Without a party organisation, teams would run into the usual collective action problem, with total campaign effort being too low.

But because parties are hierarchical organisations that can, prior to the election, credibly promise to allocate benefits post election based on party rank, they can alleviate that problem → make size of reward (monotonically) increasing function of party rank, as Cox et al., 2021 show (Why is this credible? What happens if the party reneges on that reward rule?)

Then, even party grandees have incentives to put in effort.

▸ Moral hazard in electoral teams (stylised model)

# Individual legislators' commitment problem and the beauty of parties

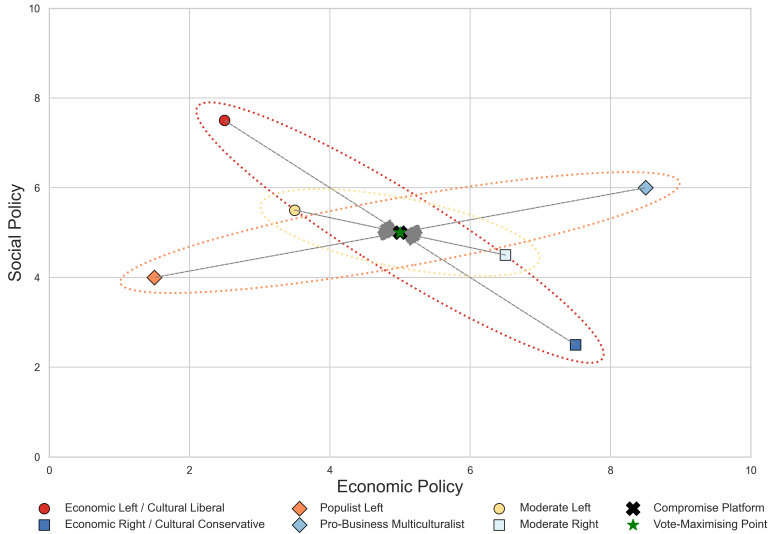
Parties allow politicians to compete more effectively for votes when the policy space is multi-dimensional (Levy, 2004), as is often the case in heterogeneous societies.

- Without parties, candidates compete in multiple dimensions by proposing policy vectors. Most candidates face the problem that their ideologically most preferred vector diverges from the vote-maximising one.

Candidates cannot credibly promise to implement a compromise vector that is closer to the vote-maximising vector than their ideologically most preferred one. After all, without parties, no one can prevent them from breaking this promise once elected: multiple dimensions create a commitment problem.

- Party-based enforcement mechanisms, such as whipping, enable individual candidates to credibly commit to a compromise vector, which is some weighted average of the ideal vectors of the different intra-party factions.

# Illustrating the argument



# When do parties aggregate preferences effectively?

Key trade-off: Internal competition boosts effort, but may signal disunity (Caillaud and Tirole, 2002).

**1. Incentive effects:**

- Competitive structures encourage effort (to win nomination). Higher effort raises perceived platform quality, improving electability.
- But if quality is not observable, effort has limited payoff.

**2. Party strategy:**

- **High transparency:** open, decentralised structure is optimal.
- **High ideological value of victory:** parties internalise quality, prefer competition.
- **High polarisation or low transparency:** parties may centralise to avoid visible internal splits.

**Conclusion:** Parties balance internal competition and platform coherence to build credibility and win elections.

# Deeper intuition: Why internal structure shapes electoral success

**Competitive, open structures:**

- Candidates exert effort to secure nomination—creates a meritocratic signal.
- Voters infer that high effort = higher quality $\rightarrow$ raises party credibility.
- Stronger incentive alignment when platform quality is observable.
- But public primaries risk exposing intra-party divisions, undermining unity.

**Hierarchical, non-competitive structures:**

- Party leaders select candidates—less responsive to performance.
- Lower candidate effort: no nomination incentive, unless ideology is very high.
- Preserves image of unity $\rightarrow$ useful under low transparency or when parties are ideologically distinct.

**Core insight:** Voters care about both candidate quality *and* party coherence. Parties act as "reputation managers," trading off transparency-driven meritocracy with control over candidate selection.

# Conditions for effective preference aggregation

1. **Informational conditions:**
   - When voters can observe candidate/platform quality, internal competition enables parties to select responsive, high-effort candidates.
   - Transparency means voters can reward merit $\rightarrow$ selection aligns with citizen preferences.
2. **Organisational conditions:**
   - Competitive parties more likely to reflect internal diversity & public demands. Hierarchical parties may suppress diversity to maintain coherence, especially in polarised systems.
3. **Political environment:**
   - Moderate ideological polarisation and high voter attentiveness favour parties as effective aggregators. In low-information or highly polarised environments, parties prioritise control over responsiveness.

**Takeaway:** *Parties aggregate preferences best when their internal competition is visible, meaningful, and trusted.*

# Parties and log-rolling

> *Logrolling is the process whereby people trade votes or support on different matters to produce a prearranged outcome. The simplest example would be when legislators vote for something they do not particularly want (or even strongly oppose), as part of a deal where other people give their support to measures they do want. (McGann, 2019, p. 452)*

Often legislation does not consist of a single policy but bundles of policies. By combining loosely or unrelated issues into a single bundle and having legislators vote on that bundle, rather than each component separately, majorities can form that would not otherwise be possible (Aksoy, 2012; Battaglini, Leone Sciabolazza, and Patacchini, 2023; Bochet, Khanna, and Siegenthaler, 2023; Casella and Palfrey, 2019, 2021; Jackson and Sonnenschein, 2007).

Caveat: Sometimes, however, the possibility of issue bundling can also induce gridlock: players may veto Pareto-improving policies so that they can bundle them at a later point with divisive issues (Lee, 2022).

# A toy model of log-rolling: Setup

- **Legislators**: Three—Left (L), Moderate (M), Right (R)
- **Policy space**: Two dimensions, $x \in \mathbb{R}$ and $y \in \mathbb{R}$
- **Preferences**: Ideal points with quadratic loss:

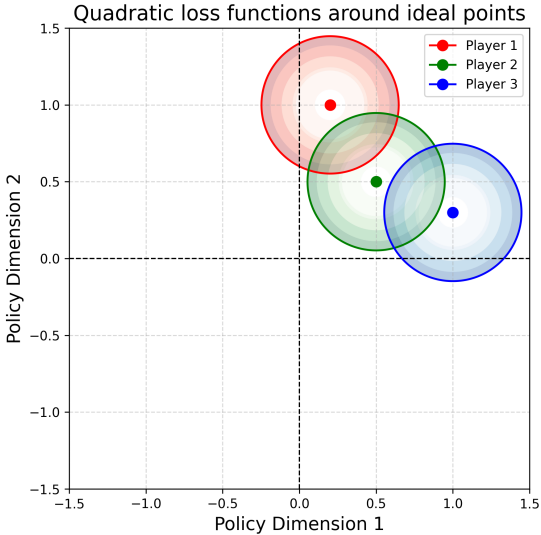
$$U_i(x, y) = -[(x - x_i)^2 + (y - y_i)^2]$$

**Ideal points:**

- L: $(x_L, y_L) = (0.2, 1.0)$
- M: $(x_M, y_M) = (0.5, 0.5)$
- R: $(x_R, y_R) = (1.0, 0.3)$

Key feature: Asymmetry in spatial preferences (not intensity) enables beneficial logrolling between L and R.

# Visualising legislators' preferences



# Case 1: Majority rule, no parties

- Each issue is voted on separately under simple majority rule.
- On each issue, the median legislator's ideal point prevails.

**Policy outcome:** $x = 0.5, \quad y = 0.5$

**Utilities:**

$$U_L = -[(0.5 - 0.2)^2 + (0.5 - 1)^2] = -[0.09 + 0.25] = \mathbf{-0.34}$$

$$U_M = -[(0)^2 + (0)^2] = \mathbf{0}$$

$$U_R = -[(0.5 - 1)^2 + (0.5 - 0.3)^2] = -[0.25 + 0.04] = \mathbf{-0.29}$$

**Baseline outcome**

This is the default policy bundle in the absence of party coordination.

# Case 2: Party-based bargaining with bloc voting

- L and R belong to disciplined parties that can commit to vote as blocs.
- They can bargain over a joint policy bundle $(x, y)$.
- If their combined votes pass a proposal, the bundle is implemented.
- If agreement fails, the outcome defaults to issue-by-issue median voting.

# A successful log-roll proposal

- L and R coordinate to propose the bundle: $(x, y) = (0.6, 0.65)$
- This bundle passes due to bloc voting (2 out of 3 legislators)
- Both L and R are strictly better off than under the median-rule baseline

**Utilities:**

$$U_L = -[(0.6 - 0.2)^2 + (0.65 - 1)^2] = -[0.16 + 0.1225] = \mathbf{-0.2825}$$

$$U_R = -[(0.6 - 1)^2 + (0.65 - 0.3)^2] = -[0.16 + 0.1225] = \mathbf{-0.2825}$$

**Key result**

This outcome is strictly Pareto-superior to the median-rule baseline for L and R:

$$U_L = -0.2825 > -0.34, \quad U_R = -0.2825 > -0.29$$

# Implications

- Parties act as institutional commitment devices that enforce cross-issue deals.
- Even in a one-shot setting, disciplined parties can expand the Pareto frontier of policies.
- This simple model helps formalise the conventional intuition that party discipline enables credible logrolling.

Another important reason for logrolling is that parties care to different extents about different policy issues.

# An extension: Logrolling as a result of differences in issue salience

Let $\alpha_i \in (0, 1)$ denote the weight that party or legislator $i$ attaches to issue $x$. Then party $i$'s utility is given by:

$$U_i(x, y) = -\left[\alpha_i(x - x_i)^2 + (1 - \alpha_i)(y - y_i)^2\right]$$

- $\alpha_i$ captures the relative salience of the two issues for party $i$.
- Unlike spatial misalignment, this version allows both parties to have the same ideal points but different priorities. This generates logrolling as parties are willing to cede ground on less-salient issues in exchange for gains on what they care about most.

Key insight: Divergent policy weights alone can justify stable logrolling—even when ideal points are otherwise aligned.

# A numerical example: Logrolling from divergent salience

- Both parties have symmetric ideal points, but care differently about the issues.
- L: $(x_L^w, y_L^w) = (0.2, 1.0),\ \alpha_L = 0.3$ (cares more about $y$)
- R: $(x_R^w, y_R^w) = (1.0, 0.2),\ \alpha_R = 0.7$ (cares more about $x$)
- Majority-rule outcome: $(x, y) = (0.5, 0.5)$

**Utilities under median rule:**

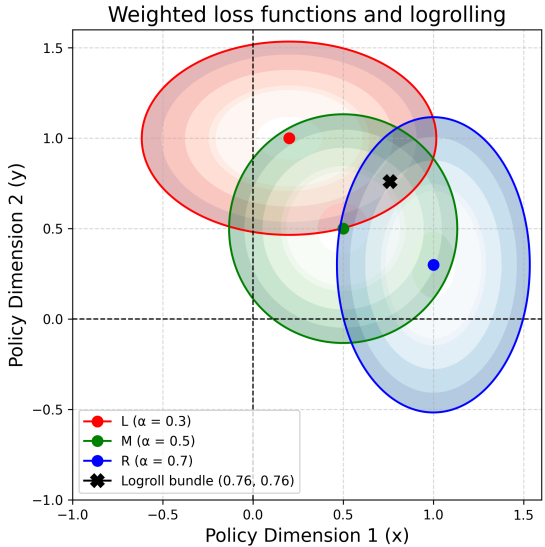
$$U_L^{\text{MR}} \approx -0.202, \quad U_R^{\text{MR}} \approx -0.202$$

**Logroll proposal:** $(x, y) = (0.76, 0.76)$

$$U_L^{\text{logroll}} = -0.1344, \quad U_R^{\text{logroll}} = -0.1344$$

Key result: Even with symmetric spatial preferences, divergent issue salience ($\alpha_L \neq \alpha_R$) enables mutually beneficial logrolling.

# Visualising the result



# A Coesean perspective on parties

Boix, 2009 argues that political parties follow a Coasean logic.

- Without parties, legislatures would consist of unorganised representatives.
  - → For each piece of legislation, new coalitions would need to form.
  - → This would be time-consuming and lead to inefficient lawmaking.
- Like firms in Coase's theory, parties emerge to reduce transaction costs.
  - → They streamline legislative coordination.
  - → Facilitate oversight and committee work.
  - → Provide continuity and organizational stability.
- Thus, parties serve as institutional solutions to the collective action problems inherent in democratic legislatures.

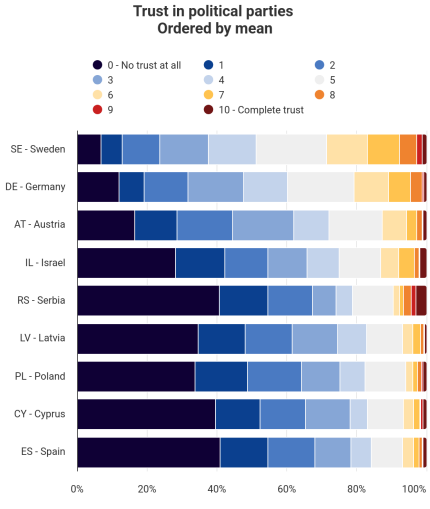
# Party brands as informational shortcuts, or revisiting the democratic dilemma

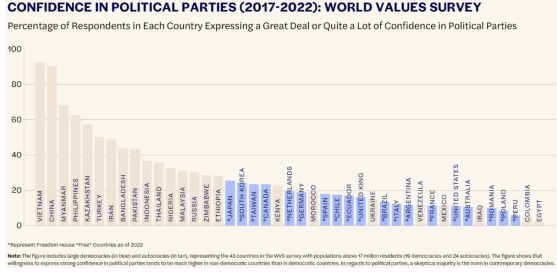
Central idea: Parties reduce the cost of information acquisition for voters to determine the policy positions of a candidate $\rightarrow$ alleviates “democratic dilemma“ (Lupia and McCubbins, 1998)

When voters are imperfectly informed about candidates’ policy positions, then – under certain conditions – parties emerge endogenously in equilibrium as a device that improves voters’ information about policy positions (Snyder and Ting, 2002).

Lupu, 2016 applies and extends this logic to the Latin American context: parties diluted their brands, reducing their value as informational shortcuts $\rightarrow$ de-alignment $\rightarrow$ higher electoral volatility

# If parties are so great, why are they so unpopular?




See here for Susan Scarrow's post

# Limitations of formal justifications for political parties

What formal justifications tend to ignore is the “sociological underbelly“ of political parties, in particular their organisational linkages to certain segments of the electorate (Katz and Mair, 1995, 2018; Kitschelt, 2000; Kitschelt and Kselman, 2010, 2011; Kitschelt and Wilkinson, 2007; Kuo, 2025; Mair, 2013).

With the decline of unions and secularisation, these linkages have weakened in many “advanced“ industrialised democracies $\rightarrow$ emergence of increasingly “hollow“ parties (Schlozman and Rosenfeld, 2024)

Why does this matter strategically?

1. Decreases voter loyalty $\rightarrow$ makes it more difficult for parties to implement reforms that come with short-term costs in exchange for long-term gains
2. Previously, these costs could be imposed on core voters at relatively low electoral cost (Dixit and Londregan, 1998) $\rightarrow$ lower willingness to engage in long-term policymaking / greater myopia or symbolic policymaking

# Outline

**What is the deal with political parties?**

**Theories of party competition**

- The Downsian model and the median voter theorem
- Relaxing the assumptions underlying the Downsian model

**Conclusion and outlook**

# Party competition

# The setup for the Downsian model of party competition

Two parties compete in a (national) single-member-simple-plurality-rule district in a one-shot election, with the policy space being unidimensional.

**Demand side**

- Voters vote based on spatial proximity
  - → Rules out voting based on valence, partisan ID, organisational linkages, or strategic voting
  - → Preferences well defined
  - → Know perfectly where parties stand
- All eligible voters vote (100% turnout).
- Voters ignore dynamic considerations.

**Supply side**

- Parties:
  - → are homogenous blocks solely interested in vote-maximisation,
  - → cannot *blur* their positions, and
  - → do not consider the dynamic consequences of their current strategic choices.
- The positions of voters are known with certainty.

# The Downsian model of party competition

- Policy space: $X = [0, 1]$, unidimensional (left to right)
- Two parties $A$ and $B$ choose policy positions $x_A, x_B \in X$
- Continuum of voters $i \in [0, 1]$, each with ideal point $x_i \in X$
- Voters vote for the closest party: spatial model of voting (single-peaked preferences)

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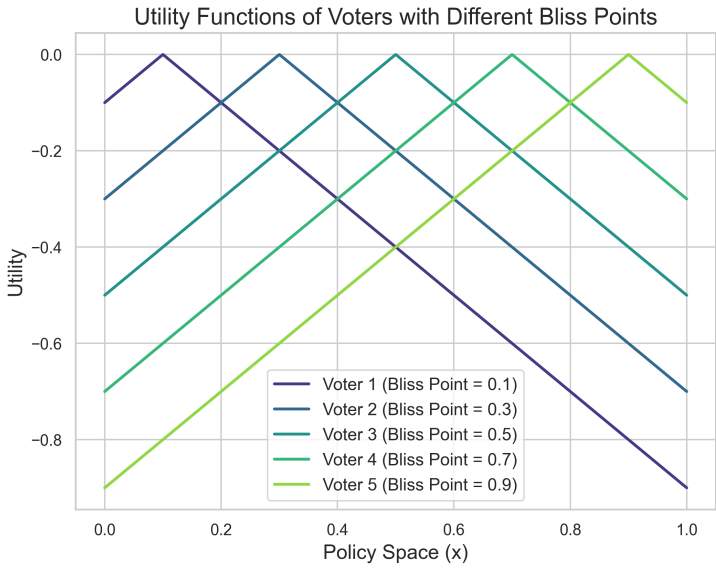
- Continuum of voters $i \in [0, 1]$, each with ideal point $x_i \in X$
- Voters vote for the closest party: spatial model of voting (single-peaked preferences)
  $\rightarrow$ Each voter $i$ derives utility from proximity:

$$U_i(x_j) = -|x_i - x_j| \quad \text{for } j \in \{A, B\}$$

**Implication**

Voter support for each party is determined entirely by policy distance, with the maximum achieved at the voter's bliss or ideal point.

# Illustrating voters' utility functions



# Party strategies and game form

- Parties choose $x_A, x_B \in X$ simultaneously (analogous to Hotelling's beach model, Gaspard, Missemer, and Mueller, 2024)
- Objective: maximise vote share
- Voter ideal points distributed by $F(x)$, with a unique median $m$ such that:

$$F(m) = 0.5$$

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**Equilibrium concept**

Pure strategy Nash equilibrium in policy choices.

# The median voter theorem

**Key result**

If $F(x)$ is continuous and strictly increasing, then the unique Nash equilibrium is:

$$x_A^* = x_B^* = m$$

where $m$ is the ideal point of the median voter.

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If $F(x)$ is continuous and strictly increasing, then the unique Nash equilibrium is:

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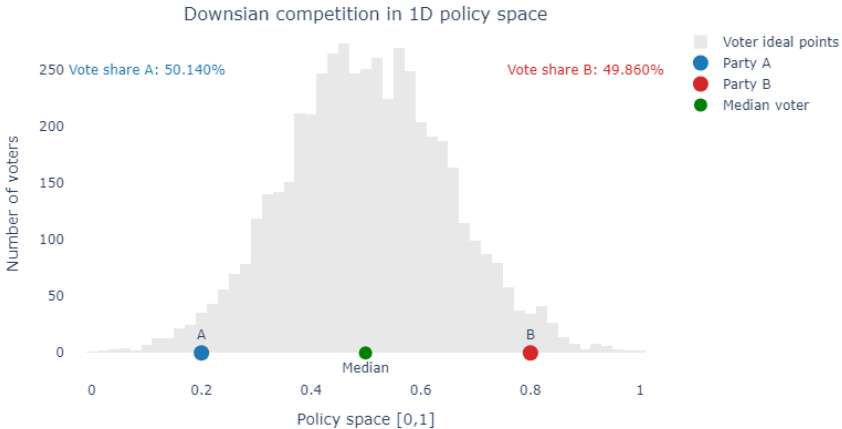
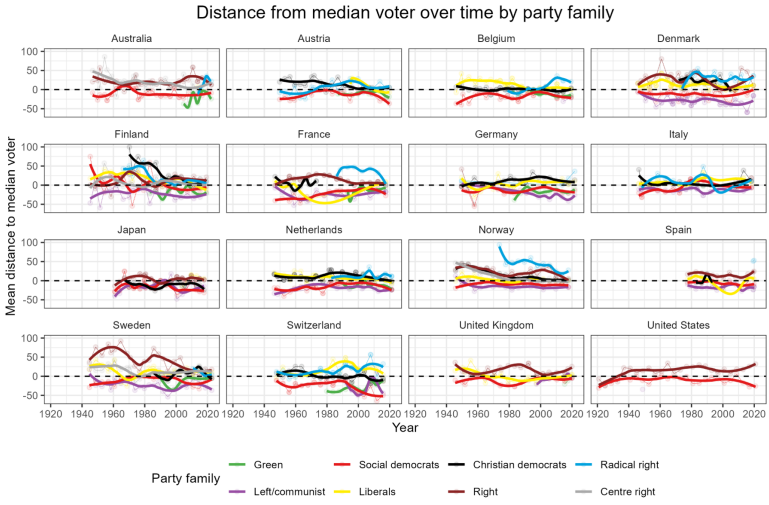
- Suppose $x_A < x_B$. Then A wins all voters left of midpoint.
- A can increase vote share by moving right $\Rightarrow$ convergence continues
- No party can gain by deviating from the median

# Developing some visual intuition for the MVT



# A very brief look at some descriptive empirical evidence

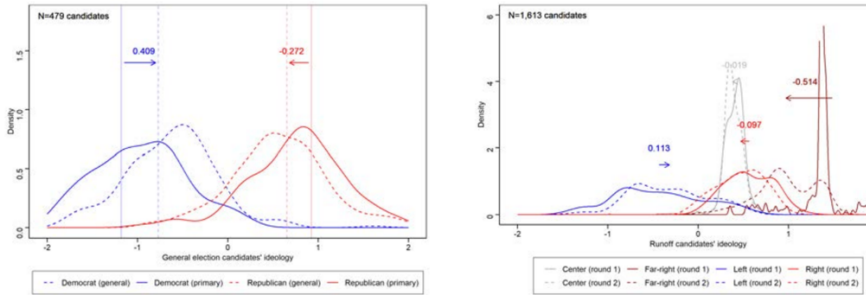



→ Measure of median voter position by Kim and Fording, 2003, based on Manifesto Project Data

# From descriptive statistics to more robust empirical results (Di Tella et al., 2023)

**Figure C.1:** Ideology moderation (second round with exactly two candidates)

**(a)** U.S. **(b)** France




Notes: The sample is restricted to races where exactly two candidates, the leader and the qualified opponent, are present in the second round. Specifically, we exclude general elections where third-party candidates are present and where a primary election winner drops out before the general election, in the U.S.; and runoffs where more than two candidates qualify for the second round, as well as runoffs where only two candidates qualify but one of them drops out of the race, in France. Other notes as in Figure 1.

# Quick-and-dirty summary of the empirical literature

There are some fairly convincing empirical studies documenting the importance of "Downsian" convergence to the median (Adams, Clark, et al., 2006; Adams, Merrill III, and Grofman, 2005; Di Tella et al., 2023; Ezrow, 2010).

- Sometimes empirical challenges reflect ignorance of the model's scope conditions (see assumptions above), rather than weakness of the model per se.

That said, there are other contexts where the scope conditions of the model seem to hold and yet we do not observe convergence, e.g. Australia (Mussel and Schlechta, 2024).

Two points: scope conditions quite narrow and, even where they hold, the Downsian logic can fail $\rightarrow$ next look at (theoretical) extensions

# Overview of theoretical extensions: Contextual assumptions

| Challenge | Modification(s) | Illustrative references |
|---|---|---|
| Static (one election, one-shot game) | Consider incentives that arise from effects that materialize in future rounds | Battaglini, 2014; Castanheira, 2003; Izzo, 2023 |
| One-dimensional policy space | Introduce at least two dimensions of political competition | Roemer, 2001 |
| Competition solely over policy platforms, not worldviews. | Sometimes competition might be less about policy platforms, but about views of the world (“ideologies”). | Izzo, Martin, and Callander, 2023 |

# Overview of theoretical extensions: Demand-side assumptions

| Challenge | Modification(s) | Illustrative references |
|---|---|---|
| Voters often do not vote completely sincerely, but also strategically. | Allow for strategic voting theoretically; empirically, try to assess divergence between preferences and vote choice | Eggers and Vivyan, 2020; Myatt, 2007; Piketty, 2000; Spenkuch, 2018 |
| Preference intensity is empirically and theoretically relevant. | Measure preference intensity empirically and allow parties to take it into account when choosing their policy positions | Hill, 2022a,b |
| Parties might have "reputational" constraints / voters might dislike "opportunistic" moves. | Impose constraints on parties' ability to move to new positions on issues where they have strong reputations and/or modify voters' utility function to allow for punishment of pure opportunism | Sniderman and Stiglitz, 2012; Tavits, 2007 |
| No uncertainty about parties' positions on a given dimension | Parties might sometimes be able to adopt vague/blurry positions on issues that, for instance, create internal division | Bräuninger and Giger, 2018; Kamphorst, 2024; Rovny, 2012; Tolvanen, Tremewan, and Wagner, 2022 |

# Overview of theoretical extensions: Supply-side assumptions

| Challenge | Modification(s) | Illustrative references |
|---|---|---|
| Parties are solely vote-maximising unitary actors. | In addition to vote-/office-seeking motivations, parties may also have policy-seeking ones. They also rely on activists, which can influence their positions. | Aldrich, 1983; Duggan and Fey, 2005; Gratton, 2014; Roemer, 2001; Strom, 1990 |
| No uncertainty about median voter's position | Sometimes median voter's position is uncertain; this can influence the relative importance of vote- and policy-seeking motivations | Budge, 1994; Lindvall, Rueda, and Zhai, 2023 |
| All parties are assumed to be qualitatively similar. | Allow for some parties to be *issue owners* or niche parties, whereas others are conventional catch-all, mainstream parties | Adams, Clark, et al., 2006; De Vries and Hobolt, 2020; Meguid, 2005, 2008 |
| In multi-party contexts, parties have to consider coalition formation. | Allow beliefs about likely coalitions to influence positional choices | Schofield and Sened, 2006 |
| Parties can also select the issues they compete on, not just their positions | Political agenda and salience of issues becomes partly endogenous | Aragones et al., 2015; Dragu and Fan, 2016; Tavits and Potter, 2015 |

# But are parties only vote-*maximisers*?

Strom, 1990, following Wittman, 1977, argues that parties have three types of incentives:

1. **Vote-seeking**
   → "Downsian" parties – they choose whichever policy platform yields the maximum number of votes
2. **Office-seeking**
   → Different from "Downsian" parties in that they seek to maximise the benefits from holding political power ("rents") – e.g. positioning to anticipate coalition negotiations and to set up a bargaining position
3. **Policy-seeking**
   → Parties have policy preferences of their own: they derive utility from seeing certain policies implemented

Roemer, 2001 develops an elegant theory, where parties consist of, inter alia, "Downsians", policy-seekers, and mixed types → Party-Unanimity Nash equilibrium

# Relaxing the unitary actor assumption: What influence do party activists have on parties' policy platforms Aldrich, 1983?

- Thus far, we have assumed that parties are unitary actors.
- Parties rely on activists to, *inter alia*, conduct their electoral campaigns. These activists also have policy preferences (which are usually more extreme than those of the parties' voters).
- If activists' level or quality of campaigning depends non-trivially on the distance between their bliss points and the party's policy platform, the party might decide to move away from the median.
  - → Doing so improves campaigning effort, which might translate into a higher expected number of votes.

# Not all parties are equal — mainstream vs. niche parties (1/2)

The *Downsian* model implicitly assumes that all parties are qualitatively similar — which is plausible in two-party systems, but not so much in multi-party contexts. This leads to the emergence of niche parties and "issue owners" (e.g. Greens on climate; radical right on immigration).

- These parties occupy a niche in the policy space, often because they have a "patent" over an issue — and a small but sizeable share of the electorate cares about this issue.

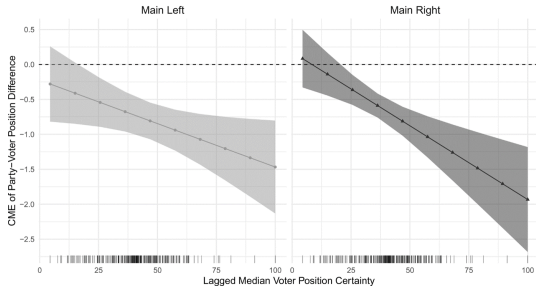
# Not all parties are equal — mainstream vs. niche parties (2/2)

These parties are quite different from mainstream (“catch-all”) parties because:

- Given their focus on a single issue, their electoral success *tends* to depend more on successfully mobilising core voters, rather than attracting new voters via ideological moderation.
  - → Trade-off: Moderation dilutes brand / “issue ownership” and alienates core voters, but potentially attracts new voters.
- The empirical literature (Adams, Clark, et al., 2006) shows that niche parties behave differently from mainstream parties:
  - → Klüver and Spoon, 2016: large parties respond to the electorate’s issue priorities, whereas niche parties respond only to issue priorities of their own voters.
  - → Abou-Chadi and Orlowski, 2016: large parties respond to greater electoral competitiveness via moderation (*“Downsian response”*), whereas niche parties move to the extremes (to “mobilise” core voters).

# How does uncertainty about the median voter's position affect party competition?

- Lindvall, Rueda, and Zhai, 2023 argue that uncertainty affects the relative importance of vote- and policy-seeking motivations:
  - → Low uncertainty: vote-seeking motives dominate (parties know where to move to win votes)
  - → High uncertainty: policy-seeking motives dominate (parties don't know whether departures from their ideal point will bring electoral benefits)
- Measure of uncertainty:
  - → Strength of 'signal' parties receive about the median's position (please refer to the paper)



# Uncertainty about parties' positions: Why do parties sometimes adopt *blurry* positions?

Parties sometimes adopt *blurry* or *ambiguous* positions on certain issues (Rovny and Edwards, 2012; Rovny and Polk, 2020; Somer-Topcu, 2015). Why?

1. Internal division: Parties adopt ambiguous positions on issues where there are significant intra-party divisions.
   → Example: Immigration for some centre-right parties?
2. Uncertainty about voters' preferences combined with sufficient ideological similarity among candidates (Tolvanen, Tremewan, and Wagner, 2022).
3. Avoiding polarising issues: Parties avoid taking a stance on issues that voters are polarised on and that the party considers relatively unimportant (Han, 2020).
4. Centrism and party unity: Attract centrist voters while placating more extreme party members or activists (Bräuninger and Giger, 2018)

# Does *blurriness* work? Revisiting the importance of issue salience in electoral competition (Kamphorst, 2024)

Blurriness can work (Somer-Topcu, 2015), especially when the salience of a topic is low. When salience is high, however, voters tend to dislike ambiguity.

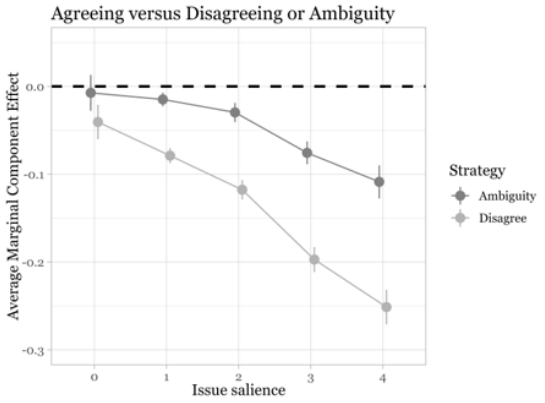
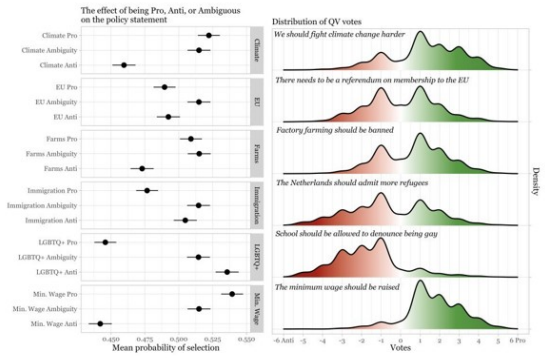



Figure 5: Counterfactual election strategies




*Note:* The figure plots the mean probability a party would be selected if they using different strategies towards a given policy statement. The left panel shows the effect of using different strategies and the right panel the distribution of respondents. The estimates for the effects of different strategies come directly from the predicted probabilities shown in Figure 1.

# Reputational constraints, or when voters dislike opportunism (Tavits, 2007)

**Theory**

- Distinction between two types of issues: pragmatic and principled.
  - → *Pragmatic* = party does not have a strong reputation or pre-existing commitments.
  - → *Principled* = party has a strong reputation and pre-existing commitments.
- Argument: Voters value shifts on *pragmatic* issues since it signals *responsiveness*, but punish shifts on *principled* ones as it signals opportunism.

**Empirics**

- DV: vote change between elections; IV: economic domain is treated as pragmatic; social domain as principled (based on CMP)
- Sample: cross-national panel of democracies
- Estimation: pooled cross-sectional time-series analysis (country FEs with + controls)

# Outline

# What have we learned, and where are we going?

- Political parties are central to the functioning of representative democracy — but they are complex organisations facing strategic trade-offs.
- The Downsian model provides a useful baseline, yet relies on restrictive assumptions (e.g., perfect information, unidimensional space, purely vote-maximising actors).
- Extensions help us understand more nuanced dynamics, such as:
  - → Why parties may adopt ambiguous or extreme positions
  - → How reputational constraints and activist influence shape party strategies
  - → When internal structure enhances or undermines electoral success
- Outlook: Next week we will look at pork-barrel politics and how it is shaped by both party competition and electoral systems

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# Outline

## Signalling game

## Moral hazard in electoral teams

# Model structure

We consider a two-player signalling game between an agent (prospective candidate) and a party. The key elements of the model are as follows:

- The agent has private information about their competence level $\alpha \in \{\underline{\alpha}, \bar{\alpha}\}$, where $\bar{\alpha} > \underline{\alpha} > 0$.
- Agents with higher competence enjoy a better outside option. That is:

$$w(\bar{\alpha}) > w(\underline{\alpha}) > 0$$

- Competence types are drawn from a common prior:

$$\Pr(\alpha = \bar{\alpha}) = p_H, \quad \Pr(\alpha = \underline{\alpha}) = 1 - p_H, \quad p_H \in (0, 1)$$

- Loyalty is not a type, but an endogenous decision: after being offered a position, the agent chooses whether to accept the party reward or exit to their outside option.

# Game timeline

The game proceeds in the following stages:

1. Nature draws the agent's competence $\alpha \in \{\underline{\alpha}, \bar{\alpha}\}$, known only to the agent.
2. The agent chooses effort $e \in \{0, 1\}$. Effort is publicly observable. Exerting effort incurs a cost $c > 0$.
3. The party observes $e$ and forms a posterior belief $\mu(\alpha \mid e)$.
4. The party decides whether to promote the agent ($a = 1$) or not ($a = 0$).
5. If promoted, the agent receives a party reward $R > 0$ and chooses whether to:
   - $\rightarrow$ accept the promotion (stay in the party), or
   - $\rightarrow$ exit to the outside option $w(\alpha)$.

# Agent preferences and strategy

Let $a \in \{0, 1\}$ denote the party's promotion decision, and $e \in \{0, 1\}$ be the agent's effort choice. The agent receives utility depending on $\alpha$, $e$, and whether they accept promotion or not. Agent strategy: $s : \alpha \to \{0, 1\}$

## Agent payoff

If promoted ($a = 1$):

$$U_\alpha(e) = \begin{cases} -c + R & \text{if they accept the party reward (i.e., if } R \geq w(\alpha)) \\ -c + w(\alpha) & \text{if they reject the reward} \end{cases}$$

If not promoted ($a = 0$):

$$U_\alpha(e) = -c \cdot e$$

# Party preferences and beliefs

The party values retaining high-competence agents. If the agent rejects the offer or is not promoted, the party receives zero. If the agent accepts promotion, the party receives payoff:

$$V(\alpha) = v \cdot \alpha, \quad \text{with } v > 0$$

**Beliefs**

- After observing $e \in \{0, 1\}$, the party forms a posterior:

$$\mu(\alpha = \bar{\alpha} \mid e) \in [0, 1]$$

- On the equilibrium path, beliefs are updated via Bayes' rule:

$$\mu(\bar{\alpha} \mid e = 1) = \frac{\Pr(\bar{\alpha} \cap e = 1)}{\Pr(e = 1)} = \frac{\Pr(\bar{\alpha}) \Pr(e = 1 \mid \bar{\alpha})}{\Pr(e = 1)} = \frac{p_H \cdot 1_{s(\bar{\alpha})=1}}{\sum_{\alpha \in \{\bar{\alpha}, \underline{\alpha}\}} \Pr(\alpha) \cdot 1_{s(\alpha)=1}}$$

Party strategy: $a : e \to \{0, 1\}$, based on updated belief. Objective: promote if only if expected value $\mathbb{E}[v \cdot \alpha \mid e] \geq 0$

# Separating equilibrium

We examine a Perfect Bayesian Equilibrium (PBE) in which:

- Effort strategy:

$$s(\bar{\alpha}) = 1 \quad \text{(high-competence agents exert effort)}$$

$$s(\underline{\alpha}) = 0 \quad \text{(low-competence agents do not)}$$

- Party strategy:

$$a(e) = \begin{cases} 1 & \text{if } e = 1 \\ 0 & \text{if } e = 0 \end{cases} \quad \text{(promote only those who exert effort)}$$

- Beliefs:

$$\mu(\bar{\alpha} \mid e = 1) = 1, \quad \mu(\bar{\alpha} \mid e = 0) = 0$$

Goal: Derive the conditions under which this equilibrium is sustainable.

# Incentive compatibility (IC): high-competence types

To sustain a separating equilibrium, high-competence agents must prefer to exert effort and accept the reward. If the agent exerts effort:

$$U_{\bar{\alpha}}(e = 1, a = 1) = -c + \max\{R, w(\bar{\alpha})\}$$

If they do not exert effort, they are not promoted:

$$U_{\bar{\alpha}}(e = 0, a = 0) = 0$$

Condition for effort to be worthwhile:

$$-c + \max\{R, w(\bar{\alpha})\} \geq 0 \quad \Rightarrow \quad \max\{R, w(\bar{\alpha})\} \geq c$$

This ensures that high-competence agents prefer signalling over opting out.

# Comparative statics: conditions for separation

**Feasibility of separation**

A separating equilibrium exists if and only if:

$$\max\{R, w(\underline{\alpha})\} < c \leq \max\{R, w(\bar{\alpha})\}$$

- This inequality defines a feasible region for the cost $c$. If the interval is empty, separation is not possible.

**Necessary condition**

$\max\{R, w(\underline{\alpha})\} < \max\{R, w(\bar{\alpha})\}$ (types must differ enough in outside options)

# Comparative statics: increasing the cost $c$

- Raising $c$:
  - $\rightarrow$ Makes it harder for high types to meet $c \leq \max\{R, w(\bar{\alpha})\}$
  - $\rightarrow$ But makes it easier to satisfy $c > \max\{R, w(\underline{\alpha})\}$
- There is a trade-off:
  - $\rightarrow$ Too low $\rightarrow$ pooling: low types mimic
  - $\rightarrow$ Too high $\rightarrow$ attrition: high types exit

**Optimal cost for separation**

$$c^* \in (\max\{R, w(\underline{\alpha})\}, \max\{R, w(\bar{\alpha})\}]$$

# Comparative statics: increasing the reward $R$

- Increasing $R$ affects both bounds in the separation condition:

$$\max\{R, w(\underline{\alpha})\} \uparrow \text{ and } \max\{R, w(\bar{\alpha})\} \uparrow$$

- As $R$ increases:
  - $\rightarrow$ High types are more willing to exert effort
  - $\rightarrow$ Low types are also more tempted to mimic

**Ambiguous effect**

If $R$ increases, but $w(\underline{\alpha})$ and $w(\bar{\alpha})$ are already low, separation becomes harder.

Interpretation: excessive rewards induce pooling unless cost $c$ increases in parallel.

# Comparative statics: outside option of high types

- Suppose $w(\bar{\alpha})$ increases (e.g. competent candidates have better private sector options)

**Effect on upper bound**

$$\max\{R, w(\bar{\alpha})\} \uparrow$$

- This widens the feasible region for $c$, making separation more likely
- But if $w(\bar{\alpha}) \gg R$, even high types may not accept the party reward

Interpretation: more outside options increase the cost of retaining talent — effort becomes a more meaningful signal.

# Comparative statics: outside option of low types

- Suppose $w(\underline{\alpha})$ increases (e.g. more fallback jobs for incompetent types)

**Effect on lower bound**

$$\max\{R, w(\underline{\alpha})\} \uparrow$$

- This raises the threshold cost needed to deter low types
- Narrows the separating interval

Interpretation: when low-ability agents are less dependent on the party, mimicking becomes more attractive.

# Summary: drivers of separation

**Separating equilibrium feasible if**

$$\max\{R, w(\underline{\alpha})\} < c \leq \max\{R, w(\bar{\alpha})\}$$

- Cost $c$ too low  pooling; too high  talent loss
- Reward $R$ must be high enough to retain high types, but not so high that it attracts mimics
- Outside options drive selection:
  - $\rightarrow$ Higher $w(\bar{\alpha})$: harder to retain talent
  - $\rightarrow$ Higher $w(\underline{\alpha})$: harder to deter mimics

Parties face a design trade-off: balancing selectivity, effort thresholds, and retention incentives

# Pooling equilibrium

We consider a pooling equilibrium in which:

- Agent strategy: Both types choose the same action:

$$s(\bar{\alpha}) = s(\underline{\alpha}) = e^* \in \{0, 1\}$$

- Party strategy: After observing $e^*$, the party forms beliefs:

$$\mu(\bar{\alpha} \mid e^*) = p_H$$

  since observing $e^*$ reveals no new information
- The party chooses whether to promote based on expected value:

$$\mathbb{E}[\alpha \mid e^*] = p_H \cdot \bar{\alpha} + (1 - p_H) \cdot \underline{\alpha}$$

- The agent decides post-promotion whether to accept or exit, depending on whether $R \geq w(\alpha)$

# Payoffs under pooling

**Agent payoff (both types choose $e^*$)**

If promoted:

$$U_\alpha(e^* = 1, a = 1) = -c + \max\{R, w(\alpha)\}$$

If not promoted:

$$U_\alpha(e^* = 1, a = 0) = -c$$

If $e^* = 0$, the same logic applies with zero cost:

$$U_\alpha(e^* = 0, a = 1) = \max\{R, w(\alpha)\} \quad \text{and} \quad U_\alpha(e^* = 0, a = 0) = 0$$

- Agent prefers to exert effort only if the expected net benefit outweighs $c$
- Party promotes if expected value is non-negative

# Party's strategy under pooling

**Expected value from promotion**

$$\mathbb{E}[v \cdot \alpha \mid e^*] = v \cdot (p_H \cdot \bar{\alpha} + (1 - p_H) \cdot \underline{\alpha})$$

- The party promotes if and only if:

$$v \cdot \mathbb{E}[\alpha] \geq 0 \quad \text{(which always holds if } v > 0)$$

- We often assume the party faces a cost or constraint (e.g., scarcity of positions), so promotion may only happen if: $\mathbb{E}[\alpha] \geq \alpha^*$, for some threshold productivity level $\alpha^*$

Pooling removes all informational value from effort: the party's decision depends on priors alone.

# Agent incentives in pooling equilibrium

- Agents will only exert effort $e = 1$ in pooling if it yields higher utility than shirking.
- That is, for all $\alpha \in \{\underline{\alpha}, \bar{\alpha}\}$:

$$-c + \max\{R, w(\alpha)\} \geq \max\{R, w(\alpha)\} \quad \Rightarrow \quad c \leq 0$$

- This implies that:

> **Pooling with effort is not incentive compatible**
>
> If effort is costly ($c > 0$), and there is no informational value to the signal, agents strictly prefer to avoid effort.

Conclusion: the only sustainable pooling equilibrium is one where $e^* = 0$

# When do pooling equilibria arise?

Pooling equilibria arise when:

- The cost $c$ is either too low to deter low types, or too high to retain high types.
- Outside options $w(\alpha)$ are so close across types that separation is infeasible.
- The party's posterior belief is close to the prior and doesn't shift with effort.

**Implications for party design**

- Incentive-compatible effort thresholds are no longer feasible
- The party must rely on other signals (e.g., past performance, recommendations, visibility)
- Or accept noisy selection

# Summary: pooling vs separating

- In a separating equilibrium, effort is informative — only high types exert effort
- In a pooling equilibrium, effort is uninformative — both types behave the same

> **Key insight**
>
> If effort has no strategic value (i.e., it does not change beliefs), and is costly, then no one exerts it.

- Separation depends on credible self-selection
- Pooling reflects a breakdown of screening: the party cannot distinguish types, and effort loses all informational content

# Partial pooling equilibria

Partial pooling arises when:

- Some types exert effort ($e = 1$), while others do not.
- The party updates its beliefs partially: $\mu(\bar{\alpha} \mid e = 1) \in (0, 1)$
- For example: $s(\bar{\alpha}) = 1, \quad s(\underline{\alpha}) = 1$ with probability $q < 1$

> **Interpretation**
>
> Effort becomes a noisy signal of competence. The party promotes based on mixed beliefs, and agents may use mixed strategies.

Partial pooling is less efficient than separation, but may arise when separating conditions fail.

# Beliefs off the equilibrium path

In Perfect Bayesian Equilibrium (PBE), beliefs must be:

- Bayesian on-path: updated using Bayes' Rule whenever possible
- Specified off-path: for actions not taken in equilibrium (e.g., if all types play $e = 1$, what does the party believe when it observes $e = 0$?)

**Example**

If $e = 0$ is off-path, then $\mu(\bar{\alpha} \mid e = 0)$ can be set arbitrarily — this may support:

- Deterrent beliefs: party assumes anyone choosing $e = 0$ is low type $\rightarrow$ does not promote
- Lenient beliefs: party assumes $e = 0$ is a high type (may destabilise separation)

# Equilibrium multiplicity

In this game, multiple equilibria may exist:

- Separating equilibrium: high types signal, low types do not
- Pooling equilibrium: all types behave the same
- Partial pooling: effort partially separates types

**Why?**

Effort cost $c$, reward $R$, and outside options $w(\alpha)$ determine whether:

- Separation is incentive-compatible
- Mimicry is profitable for low types
- The party's beliefs support screening

# Welfare and design implications

From the party's perspective:

- Separation allows better allocation of scarce positions
- But requires fine-tuning of incentives: $\max\{R, w(\underline{\alpha})\} < c \leq \max\{R, w(\bar{\alpha})\}$
- Pooling leads to inefficient selection: High types may not be promoted; low types may be promoted without merit

**Institutional design**
To enable separation, the party can:

- Adjust $R$ (e.g. promise greater long-term benefits), raise/lower $c$ (e.g. via symbolic or administrative burdens)
- Supplement effort with additional screening mechanisms (e.g. tests, interviews, references)

# How parties screen candidates in practice

| Party tool (real world) | Model analogue | Strategic purpose |
|---|---|---|
| Unpaid party work, activism | Costly effort $c > 0$ | Filters out high-$w(\alpha)$ types; screens for commitment |
| Ideological signalling, loyalty oaths | Irreversible reputational cost | Raises $c$; discourages hedging or defect-prone types |
| Party schools, cadre training | Effort investment with delay | Lengthens horizon; deters short-term opportunists |
| Seniority-based promotion | Sequential effort stages before $R$ | Rewards long-term loyalty; raises cumulative $c$ |
| Trial appointments | Intermediate effort + observation | Adds granularity to $e$; allows performance screening |
| Internal endorsements | Delegated type verification | Supplements or substitutes direct signalling |
| Forced severing of outside ties | Reduces $w(\alpha)$ | Makes party path relatively more attractive |

# Outline

## Signalling game

## Moral hazard in electoral teams

# Moral hazard in electoral teams: setup

- $N$ candidates $i = 1, \ldots, N$, each chooses unobservable campaign effort $e_i \in [0, 1]$
- Each candidate pays cost $c(e_i)$, with:

$$c'(e_i) > 0, \quad c''(e_i) > 0, \quad c(0) = 0$$

- Total electoral performance:

$$Y = f\left(\sum_{i=1}^{N} e_i\right) + \varepsilon \quad \text{where } f'(E) > 0, \quad f''(E) \leq 0, \quad \mathbb{E}[\varepsilon] = 0$$

- $\varepsilon$ captures shocks (e.g. national trends, scandals, economic news)
- Party precommits to reward each candidate $i$ with $\pi_i = \phi(r_i) \cdot f(E)$, where: $\phi'(r_i) < 0$

Key friction: effort is hidden, but rewards must be fixed in advance

# Team production with equal sharing: the free-rider problem

- Party output depends on total effort:

$$Y = f\left(\sum_{j=1}^{N} e_j\right), \quad \text{with } f' > 0,\ f'' \leq 0$$

  $\rightarrow$ Note: although electoral output is subject to shocks ($\varepsilon$), agents are risk neutral and payoffs depend only on expected output $f(E)$. Hence, $\varepsilon$ drops out of the utility maximisation problem.

- All candidates share the outcome equally:

$$U_i = \frac{1}{N} f\left(\sum_{j=1}^{N} e_j\right) - c(e_i)$$

# Team production with equal sharing: the free-rider problem (cont'd)

**First-order condition (candidate $i$)**

$$\frac{dU_i}{de_i} = \frac{1}{N} f'\left(\sum e_j\right) - c'(e_i) = 0 \quad \Rightarrow \quad c'(e_i^*) = \frac{1}{N} f'\left(\sum e_j\right)$$

- Each candidate internalises only $\frac{1}{N}$ of their contribution to output
- Compared to planner's optimum: $f'(E) = c'(e_i^{\text{FB}})$, we have:

$$e_i^* < e_i^{\text{FB}} \quad \text{for all } i$$

Result: classic free-rider problem — effort is underprovided in equilibrium

# Solving the free-rider problem with rank-based rewards

- Party rewards candidates based on fixed pre-campaign rank:

$$\pi_i = \phi(r_i) \cdot f\left(\sum_{j=1}^{N} e_j\right), \quad \phi'(r_i) < 0$$

- Candidate $i$'s utility:

$$U_i = \phi(r_i) \cdot f\left(\sum e_j\right) - c(e_i)$$

- Best response:

$$\frac{dU_i}{de_i} = \phi(r_i) \cdot f'\left(\sum e_j\right) - c'(e_i) \Rightarrow \quad c'(e_i^*) = \phi(r_i) \cdot f'\left(\sum e_j\right)$$

- Higher-ranked candidates (with larger $\phi(r_i)$) face stronger incentives to exert effort
- Individual $i$ now internalises a personalised share of marginal team output

# Solving the free-rider problem with rank-based rewards (cont'd)

**Key insight**

Differentiated reward structures restore incentives even when effort is hidden.

$$\text{No observability} \Rightarrow \text{design incentives via hierarchy}$$

# Comparative statics: Formal derivation

**Equilibrium condition (Nash):**

$$c'(e_i^*) = \phi(r_i) \cdot f'\left(\sum_{j=1}^{N} e_j^*\right)$$

Let $E^* = \sum_j e_j^*$, and define: $F(e_i^*, \phi, f', c'') = c'(e_i^*) - \phi \cdot f'(E^*) = 0$

**Implicit function theorem:** Totally differentiate w.r.t. an exogenous parameter $x$:

$$\frac{\partial F}{\partial e_i^*} \cdot \frac{de_i^*}{dx} + \frac{\partial F}{\partial x} = 0 \Rightarrow \frac{de_i^*}{dx} = -\frac{\partial F/\partial x}{c''(e_i^*)}$$

Since $c''(e_i^*) > 0$, signs of effects depend on $\partial F/\partial x$

Goal: analyse how $e_i^*$ changes in response to changes in parameters

# Comparative statics: Parameter effects

**A. Change in reward weight $\phi(r_i)$:**

$$\frac{\partial F}{\partial \phi} = -f'(E^*) \Rightarrow \frac{de_i^*}{d\phi} = \frac{f'(E^*)}{c''(e_i^*)} > 0$$

**B. Change in team productivity $f'(E)$:**

$$\frac{\partial F}{\partial f'} = -\phi(r_i) \Rightarrow \frac{de_i^*}{df'} = \frac{\phi(r_i)}{c''(e_i^*)} > 0$$

**C. Change in marginal cost curvature $c''$:**

$$\frac{de_i^*}{dc''} < 0 \quad \text{(since higher convexity makes effort more costly)}$$

**D. Change in rank $r_i$, assuming $\phi(r_i) = \frac{1}{r_i}$:**

$$\frac{d\phi}{dr_i} = -\frac{1}{r_i^2} \Rightarrow \frac{de_i^*}{dr_i} = \frac{de_i^*}{d\phi} \cdot \frac{d\phi}{dr_i} = -\frac{f'}{c''} \cdot \frac{1}{r_i^2} < 0$$

# Comparative statics: Summary

**How key parameters affect equilibrium effort $e_i^*$:**

- $\uparrow \phi(r_i)$: stronger reward $\rightarrow \uparrow e_i^*$
- $\uparrow f'(E)$: higher team productivity $\rightarrow \uparrow e_i^*$
- $\uparrow c''(e_i)$: more convex cost $\rightarrow \downarrow e_i^*$
- $\uparrow r_i$: lower rank $\rightarrow \downarrow e_i^*$

- Implication: party leaders can shape effort incentives by:
  - $\rightarrow$ Steepening the reward function $\phi(r_i)$
  - $\rightarrow$ Choosing technologies or strategies that raise $f'(E)$
  - $\rightarrow$ Selecting candidates with flatter marginal cost of effort

Conceptual takeaway: differentiated rewards + team productivity drive candidate effort