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Who's Afraid of Coalition Talk? Mapping Polarization Among Northern Europe's Cabinets in a Coevolving Latent Space

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Abstract

Do coalition governments talk like they could work together, or do ministers keep their language separated even when they later govern side by side? We study this question using 1,848,735 tweets posted by 518 cabinet ministers in seven Northern European democracies (Belgium, Denmark, Iceland, Ireland, the Netherlands, Norway, and Sweden) from 2008 to 2024. We track when ministers converge on the same topics by building networks from shared hashtags. We analyze these networks using coevolving latent space network analysis (CLSNA) models that jointly infer time-varying minister positions in latent space, estimate covariate effects on tie formation, and recover attractive and repulsive forces between ideological blocs. Three patterns stand out. First, ministers' agendas are sticky: overlap in public signaling tends to persist year to year, strongest in Ireland (δ = 1.558, SE = 0.123). Second, party matters in public communication, with the clearest within-party clustering in Ireland (ϕ_{party} = 0.431, SE = 0.124), Belgium (0.420, SE = 0.109), and the Netherlands (0.357, SE = 0.112). Third, the political center rarely generates coalescent dynamics across blocs: in every country, ties involving centrist ministers are associated with movement away from the right over time, most sharply in Sweden (A_{CR} = −1.260, SE = 0.116). More broadly, left and right usually fragment rather than coalesce, with Denmark the main exception (A_{LR} = 0.004, SE = 0.086).

Keywords: coalition governments, political polarization, Northern Europe, cabinet ministers, social media, latent space models

Word count: 9832

> "In times of division and polarization, it is more important than ever to focus on what unites us."
>
> Ulf Kristersson
> Prime Minister of Sweden
> Government Statement to the Riksdag
> September 2025

1. Introduction

Over the past fifteen years, Europe's left–right divide has widened from familiar disputes over taxes and spending to conflicts over borders, belonging, expertise, and national purpose. The Eurozone

crisis of 2010–2012 put austerity and burden sharing at the center of politics; the 2015–2016 migration surge kept identity and security high on party agendas; the 2016 Brexit referendum recast European integration as a social identity choice; and the pandemic and Russia's full-scale invasion of Ukraine in 2022 tied technocratic authority, national security, and energy policy to everyday partisan talk. Across these episodes, left–right distance did not simply grow; it hardened around issues many voters experience as markers of "us" and "them," narrowing the public language governing partners can credibly share.

Northern Europe illustrates this pattern inside government. In Sweden, the 2022 Tidö Agreement gave the Sweden Democrats leverage from outside the cabinet and pushed migration and crime to the center of governing priorities. In Denmark, the Social Democrats returned to office in 2019 while maintaining a comparatively strict migration line. In Norway in 2020, a dispute over repatriating a woman linked to ISIS turned a cabinet decision into a broader conflict over identity and security. In Finland in 2023, racism controversies involving Finns Party ministers triggered a confidence vote and weeks of damage control. In the Netherlands in 2023, the PVV's first-place finish was followed by difficult bargaining centered on asylum policy. These were not merely programmatic disagreements; they tested which alliances remained publicly defensible and which issues had become non-negotiable for potential partners.

Recent work on affective polarization in European multiparty systems argues that political conflict is increasingly organized not only by ideological disagreement but also by identity-based divisions that often map onto broader ideological blocs rather than single parties (Ryan et al. 2026). In this view, boundary-defining issues such as immigration are especially consequential because they engage group membership, national identity, and cultural belonging. One plausible mechanism is identity-consistent signaling: when politics is affectively polarized, actors face stronger incentives to maintain symbolic boundaries between ingroups and outgroups and to avoid public signals that blur those boundaries (Ryan et al. 2026). In multiparty European settings, where ideological camps can function as meaningful social identities, such pressures may be especially strong on culturally salient issues. Public discourse therefore need not reveal all coalition possibilities, but visible discursive ties may be less likely to generate cross-bloc coalescence when public convergence carries reputational costs with core supporters.

This logic motivates our approach. Coalitions still govern Europe, but they depend on more than seat totals. They also depend on cabinet portfolio allocation, especially for salient offices, and on survival risks such as votes of no confidence (Warwick and Druckman 2001; Golder and Thomas 2014). They also unfold in a public communication environment in which ministers signal priorities, affiliations, and distance from potential partners. When polarization reshapes elite communication, it may alter not only who appears close to whom at a given moment but also whether prior discursive ties are associated with later movement together or apart. We therefore model this communication structure using a coevolving latent space network with attractors (CLSNA). In this framework, ministers occupy positions in an unobserved space that evolve over time; ministers who are closer in that space are more likely to connect in public communication, and observed ties are associated with subsequent movement in latent positions. The model estimates persistence in discursive ties, party-based organization in tie formation, and bloc-level dynamics of coalescence or fragmentation. Fit in a Bayesian framework, it distinguishes baseline party homophily from the directional rate of change associated with observed ties.

We build a network-based representation of ministers' visible behavior on Twitter/X, capturing both direct interactions and shared topical framing through hashtag co-usage, and model these evolving communication networks with CLSNA (Zhu et al. 2023; Pan et al. 2025). The model estimates attraction within ideological camps, repulsion across camps, and persistence of ties, while adjusting for covariates of interest. This allows us to separate movement toward allies from movement away from opponents and to compare those dynamics with each country's coalition history.

Our empirical focus is a seven-country panel spanning 2008 to 2024: Belgium, Denmark, the Netherlands, Iceland, Ireland, Norway, and Sweden (Figure 1). We assemble the full set of public tweets posted during ministers' time in office by all sitting ministers with Twitter/X accounts and construct time-indexed communication networks from their visible interactions and shared topical frames. We estimate the model over the full 2008–2024 window in each country to preserve comparability and exploit the longest available signal in ministerial communication. By mapping how ministers align or avoid one another in public talk, we identify where bridges across blocs remain usable, where they have broken down, and how those patterns condition which coalitions are feasible, durable, or fragile.

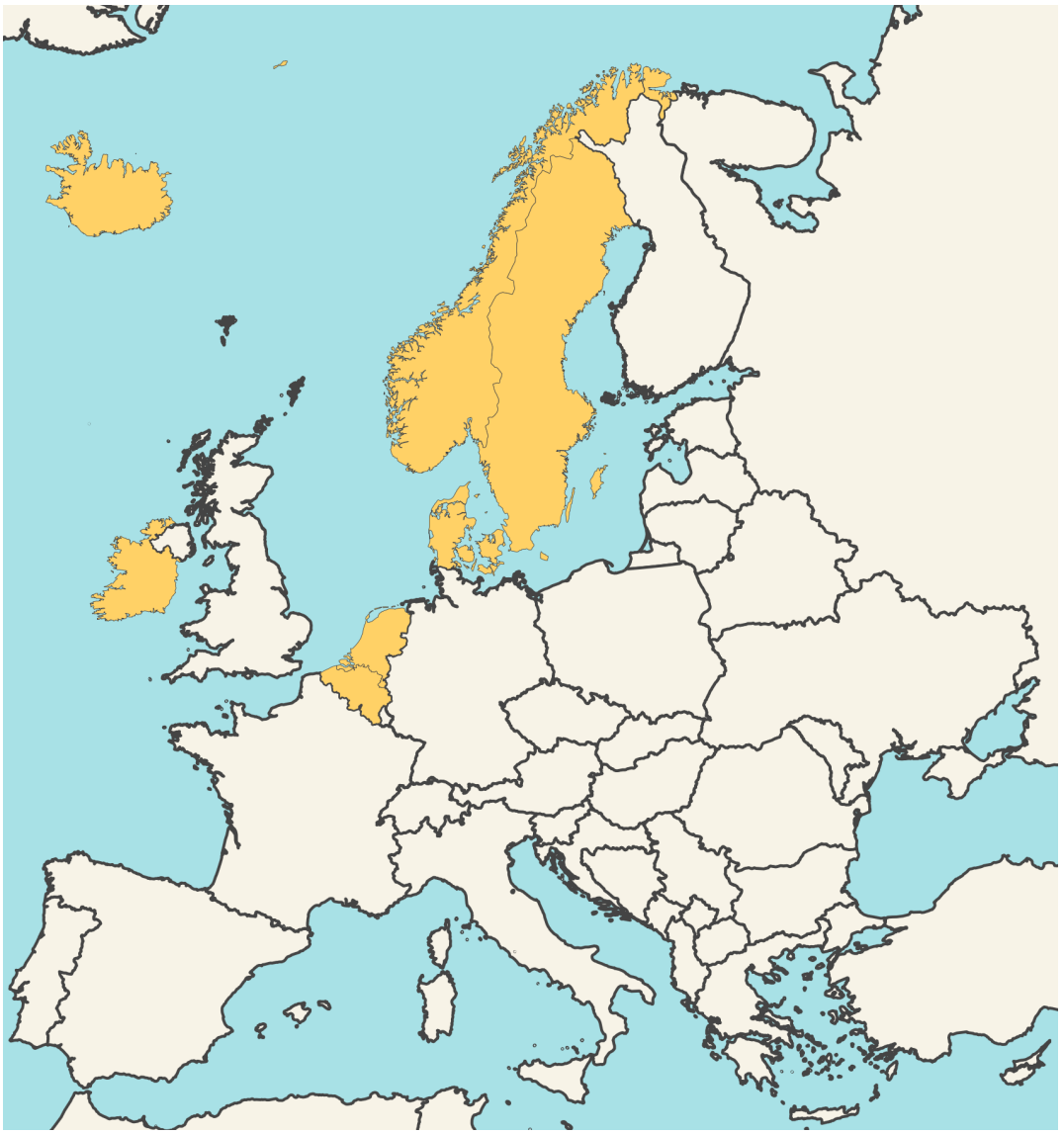

Figure 1. Countries included in the study (highlighted).

Empirically, the study links ministers and messages at scale: across the seven cases we observe 518 unique ministers and 1,848,735 tweets that fall within their time in office. When those tweets

are translated into yearly co-hashtag networks and modeled in a coevolving latent space, three quantitative signatures stand out. First, public discursive ties are strongly path dependent in every country: the persistence parameter is positive throughout and is especially large in Ireland ($\delta = 1.558$, SE = 0.123), implying that once ministers overlap in visible topical framing, that overlap tends to endure rather than constantly rewire. Second, party remains a consistent organizer of public overlap, but with clear cross-national heterogeneity: party homophily is strongest in Belgium ($\phi_{party} = 0.420$, SE = 0.109), Ireland (0.431, SE = 0.124), and the Netherlands (0.357, SE = 0.112), and more muted in Denmark (0.080, SE = 0.070) and Norway (0.106, SE = 0.080). Third, bloc-level forces indicate separation rather than centrist brokerage in the public channel. In our model, positive A values indicate attraction and negative values indicate repulsion, with more negative values indicating stronger separation. Center–right interaction is repulsive in all seven countries and strongest in Sweden ($A_{CR} = -1.260$, SE = 0.116). Left–right interaction is also repulsive in every case except Denmark, where it is essentially neutral ($A_{LR} = 0.004$, SE = 0.086). The center rarely functions as a bridge: Ireland is the lone case with a positive left–center term ($A_{LC} = 0.406$, SE = 0.167), while Denmark is distinctive for a cohesive center internally ($A_{CC} = 0.802$, SE = 0.160) without outward connectivity to either flank. Finally, demographic similarity contributes little once party and persistence are modeled: the same-gender coefficient remains near zero across countries, and age similarity shows clear effects only in a subset of cases, most notably Denmark and Norway. One possible interpretation, consistent with recent work on affective polarization in multiparty Europe, is that public communication is increasingly structured by cultural identity markers and symbolic boundary maintenance, making visible cross-bloc coalescence less likely in public settings (Ryan et al. 2026). Taken together, these results suggest that elite coalition talk on social media is sticky, party-structured, and often closed in the middle—with Sweden providing the clearest alignment between polarized discourse and polarized coalition logic, and other systems showing a weaker correspondence between public corridors and governing bargains.

2. 21st-Century Political Polarization in Europe

Political polarization has become a central feature of democratic politics in twenty-first-century Europe. While conflict is normal in pluralistic systems, it increasingly reflects not only programmatic disagreement but also ideological distance, cultural division, emotional hostility, and, in some cases, disputes over democratic rules themselves (Somer, McCoy, and Luke 2021; McCoy 2022). Research suggests that polarization has intensified across much of Europe in recent decades, with many of the most polarized elections occurring since 2000 (Bértoa and Rama 2021). This section summarizes the main trajectories and consequences of that shift.

In the early 2000s, many European party systems were still structured around alternating center-left and center-right parties. The 2008 global financial crisis disrupted that equilibrium by weakening trust in mainstream incumbents and encouraging support for more extreme or anti-establishment alternatives in both Western and Eastern Europe (Emanuele and Marino 2024). Since then, ideological polarization has increased across Western Europe, together with the electoral growth of populist, radical-left, and radical-right parties (Emanuele and Marino 2024; McCoy 2022). In Greece, Spain, and France, established parties lost ground to challengers opposing post-Cold War commitments to economic liberalism and European integration. Proportional representation often facilitated party entry, increasing both polarization and fragmentation. These developments have been especially sharp in Central and Eastern Europe, where economic grievances and conflicts over national identity deepened divides. In Hungary and Poland, governing parties adopted strongly nationalist and conservative positions and moved further from liberal or centrist opponents. (McCoy 2022) note that Europe's most severe polarization is concentrated in the East and South, with Italy increasingly fitting this pattern. Wider programmatic distance, especially when paired with declining willingness to compromise, complicates coalition formation and policy stability in parliamentary systems.

A second major shift is the growing salience of cultural and identity-based cleavages. Immigration, gender norms, LGBTQ rights, religion, and national identity have moved to the center of political competition, with the 2015 refugee crisis marking an important turning point. As (Norris and Inglehart 2019) argue, much of this reflects a cultural backlash against rapid social change. Voters alienated by cosmopolitanism, multiculturalism, and EU-backed liberal norms have often moved toward populist or nationalist parties promising to defend national traditions. This has produced a values-based cleavage that cuts across class lines, aligning many lower-education and rural voters with culturally conservative positions while urban liberal voters move in the opposite direction. Immigration, in particular, appears to function as a boundary-defining issue in Western Europe because it activates questions of group membership, national identity, and cultural belonging (Ryan et al. 2026). In response, several center-right parties have adopted more culturally conservative stances, while left parties have emphasized rights-based agendas, gender equality, and inclusive nationalism. The bundling of issue positions and the weakening of cross-cutting identities have further intensified polarization.

A third dimension is affective polarization and negative partisanship. European publics increasingly express distrust and dislike toward opposing parties and their supporters, even in multiparty systems (Reiljan 2020). In Europe, this takes the form of multiple overlapping antipathies rather than a single binary divide, but the underlying mechanism is similar: citizens view political opponents as threatening or extreme. (Reiljan 2020) show that out-party hostility can rise even without stronger in-party attachment, suggesting a broader climate of distrust. This matters because affective polarization weakens mutual toleration and democratic forbearance, making cooperation harder and institutions more vulnerable.

In some cases, polarization has escalated into institutional conflict and democratic backsliding. In Hungary, Fidesz used its parliamentary supermajority to rewrite constitutional rules, weaken judicial independence, and consolidate influence over the media and civil society. In Poland, Law and Justice pursued parallel reforms that undermined checks and balances in the name of majority rule (McCoy 2022; Somer, McCoy, and Luke 2021). These cases illustrate how polarization can become a system-level crisis when parties frame politics as existential and portray opponents as illegitimate. Polarized publics may then support institutional changes justified as necessary for national protection, which further reinforces polarization. Not all democracies have followed this path. Countries such as the Netherlands, Norway, and Ireland have generally retained lower polarization and stronger institutions, although even there ideological sorting and emotional division appear to be increasing, especially among younger voters and in online discourse.

Overall, Europe since 2000 shows that polarization is multidimensional and path dependent. Ideological distance has widened in many systems, cultural conflict has become more central, and affective hostility has grown. Where these pressures intersect with institutional power, democratic norms can erode; where cross-cutting identities and institutional guardrails remain stronger, polarization has been more contained. Explaining contemporary European politics therefore requires integrating ideological, cultural, affective, and institutional dimensions of polarization.

3. Approaches to Measuring Polarization

3.1 Measuring Ideological Polarization

Ideological polarization refers to the degree of distance or dispersion among political actors' issue positions. A common quantitative approach is to estimate polarization from party placements on a left–right or similar scale. One widely used measure is the Dalton polarization index, which captures the spread of parties across the ideological spectrum (Dalton 2008). It is typically calculated as the weighted variance of party positions, often using vote shares as weights (Dalton 2008, 2021). Higher values indicate greater concentration at ideological extremes rather than convergence near the center. Data from sources such as CSES and CHES have been used to track these patterns across European

countries over time.

These measures show that, after relative late-twentieth-century stability, many European party systems became more ideologically polarized in the twenty-first century (Emanuele and Marino 2024; Dalton 2021). Much of this increase reflects the electoral rise of ideologically extreme challenger parties and the weakening of moderate mainstream parties (Emanuele and Marino 2024). Southern European cases such as Italy, Spain, and Greece saw especially sharp increases after economic crisis and the success of radical parties (Dalton 2021). In parts of Central and Eastern Europe, rising ideological polarization has also coincided with democratic backsliding.

Polarization is also multidimensional. Parties may diverge strongly on cultural issues, such as immigration or values, without diverging equally on economic left–right questions, or vice versa. For that reason, researchers often calculate separate indices by issue dimension. Studies suggest that newer conflicts over immigration and EU integration have intensified polarization beyond the classic economic divide. At the same time, fragmentation and volatility have produced complex "multi-polarized" party systems rather than simple two-bloc competition. These patterns can undermine democratic stability by making coalition formation harder and weakening effective representation (Emanuele and Marino 2024).

At the mass level, ideological polarization can be measured from the distribution of voter attitudes using survey data such as the European Social Survey. Researchers assess whether citizens' left–right self-placements or issue views have become more extreme or bimodal over time. Some studies find that elite polarization has grown more than mass polarization in Europe, suggesting that party competition has become more polarized than public opinion itself (Boxell, Gentzkow, and Shapiro 2022). The link between party and mass polarization is therefore not always strong, which makes multiple measures necessary.

3.2 Measuring Affective Polarization

Affective polarization captures the emotional distance between partisan groups, usually measured by the extent to which supporters of different parties dislike or distrust one another. Survey instruments often use feeling thermometers or favorability ratings, comparing evaluations of one's preferred party with evaluations of rival parties. In Europe, this concept has been adapted to multiparty systems through new indices. (Reiljan 2020), for example, introduced an Affective Polarization Index that measures the average gap between evaluations of one's preferred party and all other parties. Larger values indicate stronger attachment to the in-party and greater hostility toward out-parties. Using this approach, Reiljan shows that partisan animosity is widespread across European democracies, with especially high levels in countries such as Portugal, Spain, and Greece, and lower but still meaningful levels in cases such as the Netherlands and Switzerland (Reiljan 2020).

Comparative work also shows that affective polarization has risen in many European countries over time. Using survey data since the 1980s, (Boxell, Gentzkow, and Shapiro 2022) find increases across much of the OECD, including several European democracies. Although the United States remains among the most extreme cases, European countries such as the UK and Denmark have also experienced notable growth in partisan hostility. In some Nordic cases, the mainstreaming of radical-right parties coincided with especially sharp increases. In Sweden, recent levels of affective polarization are reported to exceed those of the United States, partly because the rise of the Sweden Democrats sharpened interparty animosity (Gidron, Adams, and Horne 2023). Across studies, affective polarization tends to intensify when politics becomes more adversarial and identity-driven.

Institutional context shapes these outcomes. In multiparty parliamentary systems, coalition government can soften hostility because former rivals must cooperate. Evidence suggests that supporters of coalition partners often feel warmer toward one another than ideology alone would predict (Gidron, Adams, and Horne 2023). By contrast, highly competitive election periods tend to intensify partisan dislike. (Hernández, Anduiza, and Rico 2021) show that as national election

campaigns become more salient, affective polarization rises, producing a clear campaign effect.

Populist and anti-establishment parties can heighten these dynamics further. Parties that frame politics as a struggle between a virtuous people and a corrupt elite, especially populist radical-right parties, often provoke stronger negative reactions from opponents. Across 20 Western democracies, voters exhibit especially intense dislike toward radical-right parties beyond what policy disagreement alone would predict (Gidron, Adams, and Horne 2023). Overall, affective polarization is now a measurable and increasingly important feature of European politics, with consequences for social trust, democratic norms, and mutual toleration.

3.3 Network Based Approaches to Polarization

Beyond surveys and ideological scales, network analysis offers another way to study polarization. Network-based approaches treat politics as a pattern of interactions among legislators, parties, or citizens and examine whether these ties split into distinct partisan communities. When cross-group connections are sparse and within-group ties are dense, the network exhibits polarized structure.

One important application is legislative networks. Rather than relying only on roll-call scaling, researchers can connect legislators or parties when they vote similarly or collaborate frequently. Community-detection methods then reveal whether parliaments divide into cohesive blocs or retain cross-cutting alliances. (Dal Maso et al. 2014), for example, built a voting network from the Italian Chamber of Deputies and found a strong community structure corresponding to government coalitions and opposition groups, indicating a polarized legislature (Dal Maso et al. 2014). They also derived quantitative measures of party polarization and coalition cohesion from the density of ties within and between these communities (Dal Maso et al. 2014). Similar approaches have been applied to the European Parliament and other legislatures, often showing strong clustering by party or coalition membership.

Network methods are also widely used to study online political communication. On platforms such as Twitter/X, researchers analyze retweet or mention networks to see whether users cluster into like-minded camps with few bridges between them. Such segregation is often interpreted as evidence of "echo chambers." In a European setting, (Cherepnalkoski and Mozetič 2016) examined the retweet network of Members of the European Parliament and found that its community structure closely tracked formal party-group affiliation: MEPs clustered strongly with co-partisans, and cross-ideological ties were relatively limited (Cherepnalkoski and Mozetič 2016). This suggests that elite social media behavior mirrors offline partisan divisions. At the broader public level, (Muñoz et al. 2024) analyze Twitter discourse during Spanish election cycles from 2011 to 2019 and show that campaign periods produced more sharply bifurcated party-based retweet networks (Muñoz et al. 2024). They also introduce an algorithm designed to detect polarization spikes around elections (Muñoz et al. 2024).

Common metrics in this literature include modularity, which measures how clearly a network divides into communities, and assortativity, which captures the tendency of actors to connect with similar others. Higher values indicate more strongly segregated interaction patterns. These measures make it possible to compare polarization across time, platforms, and countries. Network evidence often parallels survey-based findings, but it can also detect polarization where survey data are unavailable and illuminate the role of media systems and partisan information bubbles.

4. Research Questions and Hypotheses

The preceding sections show that contemporary polarization is not only ideological but also behavioral and communicative. We study that communicative dimension using longitudinal social network data on cabinet ministers' discourse on *X* (Twitter), where ties capture both visible interactions and shared topical framing through co-hashtag overlap. We analyze these time-indexed networks with a coevolving latent space network with attractors (CLSNA) model, which is especially well suited to

political communication but also applies more generally to coevolving networks shaped by attraction and repulsion. CLSNA simultaneously (i) estimates ministers' evolving positions in an unobserved latent space, (ii) identifies covariate effects on tie formation net of latent proximity and tie persistence, and (iii) recovers bloc-level attractive and repulsive forces that pull camps together or push them apart over time (Zhu et al. 2023; Pan et al. 2025). Building on this framework and the coalition literature reviewed above, we derive six theory-driven hypotheses (H1–H6) about how ministerial communication networks should be structured and how they should coevolve.

H1: Party Centrism (Party Discipline and Discursive Alignment)

To what extent is elite political discourse structured by party discipline and intra party cohesion?

We treat party discipline as a latent communication pattern visible through copartisan clustering. When parties enforce coordinated messaging and collective responsibility, ministers from the same party should converge on similar topics and interact more with one another, producing denser within-party ties. Accordingly, H1 expects higher party homophily where discipline is strong. This expectation is consistent with evidence that politicians prioritize party messaging over individual branding on social media and that ministers use social media in party-aligned ways (Pedersen 2024; Karlsen, Kolltveit, and Solheim 2025). It also accords with classic arguments that parliamentary behavior is strongly shaped by party identity and leadership control (Kam 2009; Cox and McCubbins 2005).

H2: Inertia and Stability Link (Persistence of Networks in Stable Coalition Systems)

Does the persistence of communication ties, or network inertia, increase in political systems characterized by durable and stable governing arrangements?

By network inertia, we mean the tendency of existing communication ties to persist over time rather than continually reshuffle. H2 draws on historical institutionalism: stable institutions and coalitions generate self-reinforcing relationships (Pierson 2000). Because long-lived coalition patterns in Europe are associated with enduring inter-elite ties (Warwick 1994), we expect more persistent interparty communication in stable coalition systems.

H3: Covariate Structuring of Elite Communication

Do nonideological covariates shape elite communication once party and inertia are taken into account, and if so, in what direction and with what magnitude?

Nonideological covariates include attributes such as age difference, same gender, seniority, and shared governing responsibilities. Network research shows that similarity increases tie probability through homophily and assortative mixing (McPherson, Smith-Lovin, and Cook 2001; Newman 2003), and longitudinal network models treat nodal covariates as important drivers of tie formation and persistence (Snijders 2006; Robins et al. 2007). In coalition settings, institutional proximity and joint responsibility can also encourage coordination and information sharing (Strøm, Müller, and Bergman 2008; Martin and Vanberg 2011). We therefore expect smaller age distance (Δ_{age}), same gender $\left(\phi_{gender}\right)$, and shared institutional roles to modestly increase the likelihood of a discursive tie. At the same time, because party, ideology, and network inertia (δ) are stronger organizers of elite behavior, any such covariate effects should be comparatively smaller.

H4: Right Bloc Coalescence (Asymmetry in Dynamic Coalescence)

Do ties among conservative right wing parties generate stronger coalescence over time than ties among left wing parties across Northern Europe?

H4 expects asymmetry in dynamic coalescence: prior within-right ties should pull ministers closer over time more strongly than prior within-left ties, implying more positive within-right than within-left entries in matrix A. This follows arguments that right-wing parties often project more unified messaging, whereas left parties aggregate more heterogeneous constituencies and issue agendas (Grossmann and Hopkins 2016). In Europe, right party families also cluster more tightly in ideological space than those on the left (Cerda and Gunderson 2023). If communication

reproduces these differences dynamically, right-of-center ties should induce stronger coalescence than left-of-center ties.

H5: Centrist Brokerage (Dynamic Bridging Role of Center Parties)

Do ties involving centrist parties generate coalescence with both the left and the right over time, even if centrists are not especially cohesive among themselves?

H5 treats centrist parties as dynamic pivots. Rather than merely occupying an intermediate position, they should bridge blocs if prior center–left and center–right ties generate movement toward one another over time, even when within-center ties are not especially strong. This expectation follows theories that portray centrists as pivot actors able to cooperate in multiple directions (Downs 1957; Keman 1994). Empirically, centrist parties often participate in ideologically diverse coalitions (Strøm, Müller, and Bergman 2008; Laver and Schofield 1990). If public communication reflects that brokerage role, ties involving the center should be associated with coalescence rather than fragmentation across bloc boundaries.

H6: Discursive and Coalitional Isomorphism (Dynamic Alignment with Coalition Histories)

Do the dynamic patterns of coalescence and fragmentation in interparty discourse correspond to each country's feasible or historical coalition alliances?

H6 posits that ministers' latent positions should evolve in ways that reflect coalition plausibility. Prior ties should reduce latent-space distance for party pairings that are historically common or ideologically plausible coalition partners and increase distance for pairings that are rarely allied or politically incompatible. Thus, discourse should align with coalition architecture not only in static proximity, but also in dynamic movement: coalition-relevant pairings should display coalescent dynamics, whereas incompatible pairings should display fragmentary dynamics. This follows the argument that coalitions form among ideologically adjacent parties (Axelrod 1970) and extensive evidence that viable coalitions tend to reflect such proximity (Laver and Schofield 1990; Martin and Stevenson 2001).

5. Data

5.1 Sampling on X

Our data combine who served in government and what they publicly said on *X* (formerly Twitter) across seven Northern European democracies (Belgium, Denmark, the Netherlands, Iceland, Ireland, Norway, and Sweden) from 2008–2024. We began by building a country–year list of coalition cabinets that includes prime ministers and all portfolio ministers. For each cabinet we recorded names, portfolios, and service dates from official government websites and other authoritative sources, then standardized titles and dates so they align across countries. When a cabinet reshuffled midterm, we treated each stint in office as a separate "minister spell" and linked those spells to a stable person ID to preserve chronology. The composition of the minister sample by gender, political spectrum, and age is summarized in [tab:country$_c$rosstabs$_u$nique]*Table* 5*intheAppendix*.

Next, we identified ministers' accounts on *X*. We prioritized personal accounts used in an official or semi-official capacity while in office. If a personal account did not exist, we included an office-managed account only when it was clearly attributable to the minister and served as the minister's main public channel. We excluded party accounts and generic ministry accounts. To ensure correct attribution, we cross-checked profile details, links from official sites, press coverage, and historical snapshots. We also canonicalized handles (for example, lowercasing and removing diacritics) and tracked handle changes over time so content could be merged back to the same person.

We retrieved tweets in three waves, in calendar years 2018, 2022, and 2024. To reduce rate-limit problems and improve parity across countries, we used a paid *X*/Twitter monthly membership for a total of two months during collection. We kept original posts, quotes, and replies; we flagged retweets and, unless needed for a specific analysis, excluded pure retweets to avoid duplicating the same message.

All timestamps were converted to UTC and then mapped to local time zones for country-level summaries. Our inclusion rules are straightforward. We keep only tweets that fall within a minister's time in office. We drop anything posted before appointment or after exit (for example, campaign messages). The breakdown of tweets is provided in [tab:country$_c$rosstabs$_u$nique]*Table 6intheAppendix*.

Two caveats remain. First, coverage depends on whether ministers had accounts and whether those accounts and their timelines remained public; ministers without accounts, or with timelines that later became private or were deleted, are not observed. Second, changes in platform policies and interfaces between 2018 and 2024 create minor differences in available metadata across years.

5.2 Co-Hashtag Networks

After assembling the minister roster and tweet corpus, we constructed co-hashtag communication networks at the *country–year* level. That is, for each country c and each calendar year γ, we build a separate network using only the tweets posted by ministers serving in country c during year γ, excluding retweets. For every such (c, γ) pair, we extracted the hashtags used by each ministerial account in that country and year. Hashtags are lowercased (with no stemming or other normalization), so #Brexit and #brexit are treated as the same. Each (c, γ) network is represented as a square adjacency matrix defined over the full set of minister accounts observed at any point during the study period in country c. Accounts that did not use a hashtag in year γ appear as all-zero rows and columns. Self-loops are not allowed, so diagonal entries are zero.

Edges are weighted in two complementary ways that reflect different notions of overlap. The first network is a hashtag intersection network. For a pair of accounts i and j in country c and year γ, let $\mathcal{H}_{i,c,\gamma}$ be the set of distinct hashtags used by i in that country-year. The edge weight is the size of the intersection of these sets,

$$A^{(\cap)}_{ij,c,\gamma} = \left|\mathcal{H}_{i,c,\gamma} \cap \mathcal{H}_{j,c,\gamma}\right| \quad (i \neq j),$$

so repeated use of the same tag by the same account does not increase the weight. The second network is a minimum count–weighted network that incorporates intensity. If $c_{i,c,\gamma}(h)$ denotes how many times account i used hashtag h in country c and year γ, then the edge weight is the sum, over all hashtags used by both accounts, of the smaller of the two usage counts,

$$A^{(\min)}_{ij,c,\gamma} = \sum_{h \in \mathcal{H}_{i,c,\gamma} \cap \mathcal{H}_{j,c,\gamma}} \min\{c_{i,c,\gamma}(h),\, c_{j,c,\gamma}(h)\} \quad (i \neq j).$$

Both networks are undirected and symmetric by construction; each unordered pair receives the same weight in both directions, and $A_{ii,c,\gamma} = 0$. For each country-year, we provide two weighted adjacency matrices: one for the intersection network and one for the minimum count–weighted network.

Because the CLSNA analysis is carried out on a binary sequence of yearly networks, we convert each weighted co-hashtag network into a binary adjacency matrix defined relative to the distribution of edge weights in that country-year. This produces a country-year-specific indicator of whether a pair of ministers exhibits greater-than-average topical overlap in a given year, while accommodating cross-country and temporal differences in overall hashtag activity. Concretely, for a given country c, year γ, and network type, we compute the average edge weight only across the unordered pairs of ministers who are active in that same country-year, that is, across all pairs with $i \neq j$ in the year-specific network for c and γ, rather than across the full adjacency matrix spanning all ministers observed over the entire study period. This avoids mechanically lowering the threshold by including structurally irrelevant zero entries for ministers who were not in office in that year. We then define a binary adjacency matrix $B_{ij,c,\gamma}$ such that an edge exists if and only if the corresponding weighted

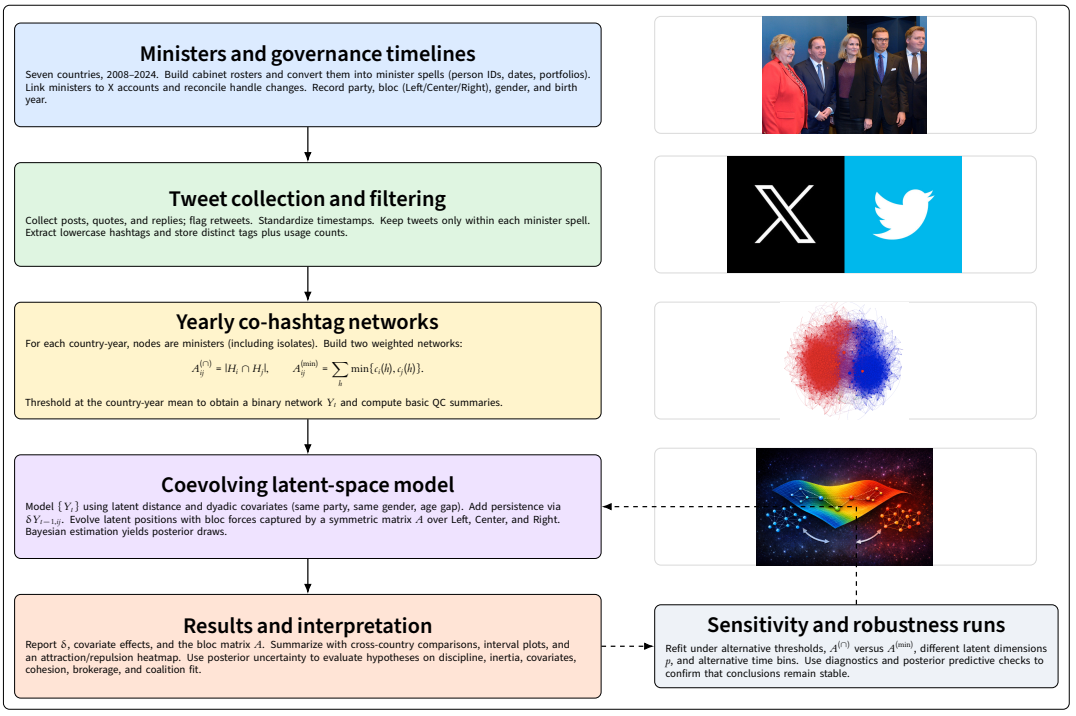

Figure 2. Computational pipeline.

edge exceeds this country-year average.

$$B_{ij,c,\gamma} = \mathbb{I}\big(A_{ij,c,\gamma} > \overline{A}_{c,\gamma}\big) \quad (i \neq j), \qquad B_{ii,c,\gamma} = 0,$$

where $\overline{A}_{c,\gamma}$ denotes the mean of the off-diagonal edge weights for country c and year γ (computed separately for $A^{(\cap)}$ and $A^{(\min)}$).

6. Methods

The earlier sections argue that polarization is not just "how far apart" parties are on paper. It shows up in who ministers publicly align with, who they avoid, and how those patterns change (or stay sticky) over time. To capture that structure directly, we treat the co-hashtag networks from the Data section as a year-by-year record of discursive ties among cabinet members. We then fit a coevolving latent-space network model in which ties are more likely when two ministers are close in an unobserved ideological space, while still allowing for straightforward drivers of connection such as party homophily, gender homophily, and age similarity. The model also builds in inertia (ties tend to recur once they exist) and, most importantly, it allows ministers' latent positions to move over time in response to bloc-level attractive and repulsive forces between the Left, Center, and Right. This gives us a direct way to recover where the bridges and barriers in elite communication actually are, and to test our hypotheses about cohesion, brokerage, and coalition compatibility. The computational pipeline is provided in Figure 2.

We begin our model specification formally by representing our yearly co-hashtag data as a sequence of network graphs, one per time period. This notation makes it easy to describe what changes from year to year (who is in the cabinet, which ties appear) and to set up the probabilistic model we estimate. Let $G_t = (V_t, E_t)$ be a network evolving in discrete time t, with vertex set

V_t and edge set E_t. We allow for V_t to vary over time. Let Y_t be the adjacency matrix at time t corresponding to G_t. Data is in the form of time series of adjacency matrices $\{y_t : t = 1, \cdots, T\}$, where $y_{t,ij}$ indicates the existence of an edge between minister i and minister j at time t.

We model Y_t using a latent space approach, with attractors added in the latent level to capture the notions of attractive and repulsive forces. Let $Z_{t,i} \in \mathbb{R}^p$ be a time-indexed latent position for node i in p-dimensional Euclidean space, and let $Z_t = \{Z_{t,i}\}$. Assume that each of the N_t nodes falls into one of several groups (Left, Center, Right), with known node label $\pi(i) \in \mathcal{C}$ for node i, where $\mathcal{C} = \{\text{Left}, \text{Center}, \text{Right}\}$ is the set of group labels.

Formally, we define our model as follows:

$$Y_{t,ij}|p_{t,ij} \sim Bernoulli(p_{t,ij}) \tag{1}$$

For the first time period $t = 1$, the log odds of an edge are defined by the latent distance and dyadic covariates:

$$\text{logit}(p_{t,ij}) = \alpha - s(z_{t,i}, z_{t,j}) + \boldsymbol{\beta}^\top \mathbf{X}_{t,ij} \tag{2}$$

$$Z_{t,i} \sim Normal(0, \sigma^2_{init} I_p) \ . \tag{3}$$

For subsequent time periods $t \geq 2$, we distinguish between new entrants and continuing ministers. If node i was absent from the network at time $t-1$:

$$\text{logit}(p_{t,ij}) = \alpha - s(z_{t,i}, z_{t,j}) + \boldsymbol{\beta}^\top \mathbf{X}_{t,ij} \tag{4}$$

$$Z_{t,i} \sim Normal(0, \sigma^2_{init} I_p) \ . \tag{5}$$

If node i was present at time $t-1$, the model incorporates network persistency and the coevolution of latent positions:

$$\text{logit}(p_{t,ij}) = \alpha + \delta Y_{t-1,ij} - s(z_{t,i}, z_{t,j}) + \boldsymbol{\beta}^\top \mathbf{X}_{t,ij} \tag{6}$$

$$Z_{t,i}|Z_{t-1,i} = z_{t-1,i} \sim Normal(\mu_{t,i}, \sigma^2_{evol} I_p) \tag{7}$$

$$\mu_{t,i} = z_{t-1,i} + \sum_{h \in \mathcal{C}} A_{\pi(i),h} \Psi^h_i(z_{t-1}, Y_{t-1}) \ . \tag{8}$$

Here $s(\cdot, \cdot)$ is the Euclidean distance, $s(z_{t,i}, z_{t,j}) = \|z_{t,i} - z_{t,j}\|_2$. The term δ captures the network persistence, measuring the tendency for a edge to recur if it existed in the previous period. The vector $\mathbf{X}_{t,ij}$ contains nodal covariates with associated coefficients $\boldsymbol{\beta}$. We explicitly define these covariates as follows:

1. Party Homophily (ϕ_{party}): An indicator function $\mathbb{I}(\text{party}_i = \text{party}_j)$ that equals 1 if ministers i and j belong to the exact same political party, and 0 otherwise.
2. Gender Homophily (ϕ_{gender}): An indicator function $\mathbb{I}(\text{gender}_i = \text{gender}_j)$ that equals 1 if ministers i and j identify with the same gender, and 0 otherwise.
3. Age Difference (Δ_{age}): A measure of the absolute age gap between ministers, defined as $|\text{birthyear}_i - \text{birthyear}_j|$.

The coevolution of the latent space is governed by the attraction matrix A and the attractor functions. Unlike US-centric models that may assume a binary system, we adapt the attraction structure for a multi-party European landscape composed of three primary blocs: Left (L), Center (C), and Right (R). Thus, A is a 3×3 symmetric matrix:

$$A = \begin{pmatrix} A_{LL} & A_{LC} & A_{LR} \\ A_{LC} & A_{CC} & A_{CR} \\ A_{LR} & A_{CR} & A_{RR} \end{pmatrix} \tag{9}$$

where entry A_{gh} represents the force between group g and group h. A positive value indicates attraction (groups move closer), while a negative value indicates repulsion (groups move apart). The attractor function Ψ_i^h for node i toward group h is defined as:

$$\Psi_i^h(z_{t-1}, Y_{t-1}) = \bar{z}_{t-1,i}^h - z_{t-1,i},\ \bar{z}_{t-1,i}^h = \frac{1}{|S_h^{(i)}|} \sum_{j \in S_h^{(i)}} z_{t-1,j} \tag{10}$$

which is the discrepancy between $z_{t-1,i}$ and the local average position of i's neighbors who belong to group h. The set of neighbors is defined as: $S_h^{(i)} = \{j \in \mathcal{N} \setminus i \mid Y_{ij} = 1, \pi(j) = h\}$. If $S_h^{(i)}$ is empty, we set $\Psi_i^h(z_{t-1}, Y_{t-1}) = 0$, implying that if node i is not connected to any members of a specific group, it receives no force from that group.

This proposed model extends the original CLSNA model (Zhu et al. 2023; Pan et al. 2025) in two ways, introducing multiple parties (rather than just two) and dyadic covariates. In this proposed extended model, each node lies in a p-dimensional Euclidean latent space, where smaller distances between two nodes correspond to a greater probability of connection at a given time point. The expression in Eq. (10) captures how a minister's prior network ties shape the evolution of that minister's latent position over time. Accordingly, the entries of matrix A should not be interpreted as measuring average ideological proximity or another form of homophily. Rather, they quantify the directional rate of change in latent positions induced by prior ties. A positive value of A_{LC} implies that observed ties between center and left ministers are associated with movement toward one another over time, indicating coalescence across those blocs. A negative value implies movement away from one another over time, indicating fragmentation. In this sense, A captures the dynamic tendency of prior interactions to generate convergence or separation in the latent space, conditional on baseline tie formation, persistence, and the observed covariates included elsewhere in the model.

The parameter δ captures the persistency of edge forming. For $\delta > 0$, the probability of an edge at time t is significantly higher if one existed at time $t-1$, independent of the actors' spatial positions.

The inclusion of covariates ϕ_{party}, ϕ_{gender}, and Δ_{age} formally disentangles baseline homophily from the latent structure of elite communication. Standard latent space models often absorb all forms of network clustering into the spatial position $Z_{t,i}$, yet elite communication is heavily structured by party and demographic similarities. Consequently, the estimated latent distances $|0Z_{t,i} - Z_{t,j}|0$ represent the residual ideological proximity between ministers that cannot be explained by simple party homophily or demographic similarities.

The symmetric matrix A expands the original CLSNA framework beyond generic scalar parameters that enforce uniform between-group repulsion. A single between-group parameter would make it impossible to capture asymmetric coalition dynamics inherent to European multiparty systems. By estimating the full symmetric matrix A across the Left, Center, and Right blocs, we allow for specific pairwise testing where a group may exert attractive force on one bloc while repelling another.

7. Results

We summarize the main empirical patterns in two steps, first for baseline tie formation and then for the bloc-level forces that govern latent-position coevolution. Figure 4, Figure 3 and Table 1 report posterior means (with standard errors) for the tie formation equation (Panel A) and the bloc-level coevolution forces (Panel B). The dominant empirical regularity is temporal dependence: δ is positive in every country and estimated with relatively small uncertainty, implying substantial edge persistence net of latent proximity and observed covariates. By comparison, covariate structuring is limited. Party homophily (ϕ_{party}) is uniformly positive but heterogeneous in magnitude—stronger in Belgium, Ireland, and the Netherlands, and more muted in Denmark, Norway, and Sweden—while age difference and same-gender effects are small and not consistently distinguishable from zero,

suggesting that once persistence and party are controlled, demographic similarity adds little predictive leverage for tie propensity.

We then turn to the bloc-level attraction–repulsion structure, which governs how observed ties translate into systematic convergence or separation across ideological camps over time. The estimated attraction–repulsion matrix indicates that latent-space motion is organized primarily by fragmentation across blocs rather than by coalescent dynamics involving the center. The Left–Right term (A_{LR}) is negative in all cases except Denmark (where it is essentially zero), indicating that observed ties across ideological extremes are generally associated with movement away from one another over time rather than convergence. In addition, the Center–Right interaction (A_{CR}) is negative in every country and is especially large in Sweden, implying that ties involving centrist and right ministers are associated with fragmentation rather than coalescence in this public communication channel. What varies across systems is the degree of within-bloc coalescence and the internal dynamic role of the center: Denmark is characterized by a strongly positive A_{CC}, indicating coalescence within the center, whereas Sweden combines strong Right–Right coalescence (A_{RR}) with pronounced fragmentation involving the center. Taken together, the results point to communication networks that are highly sticky over time and politically structured, with the most stable cross-national signature being fragmentation between the right bloc and the remainder of the ideological space.

7.1 Foundational Dynamics: Homophily, Persistence, and Demographics

We begin with the nonmatrix terms that set the baseline for tie formation: party homophily (ϕ_{party}), network inertia (δ), and two demographic covariates, age difference (Δ_{age}) and same gender (ϕ_{gender}). We summarize direction and uncertainty using the posterior means and standard errors in Table 1, with the corresponding 95% posterior intervals visualized in Figure 3. We then turn to the attraction–repulsion matrix in Figure 4. Its diagonal elements represent within-bloc dynamics (Left–Left, Center–Center, and Right–Right), whereas the off-diagonal elements represent between-bloc dynamics across ideological blocs. Because within-party clustering is already captured by the party-homophily term ϕ_{party}, the diagonal entries should be interpreted as bloc-level coalescence or fragmentation rather than strictly intra-party discourse.

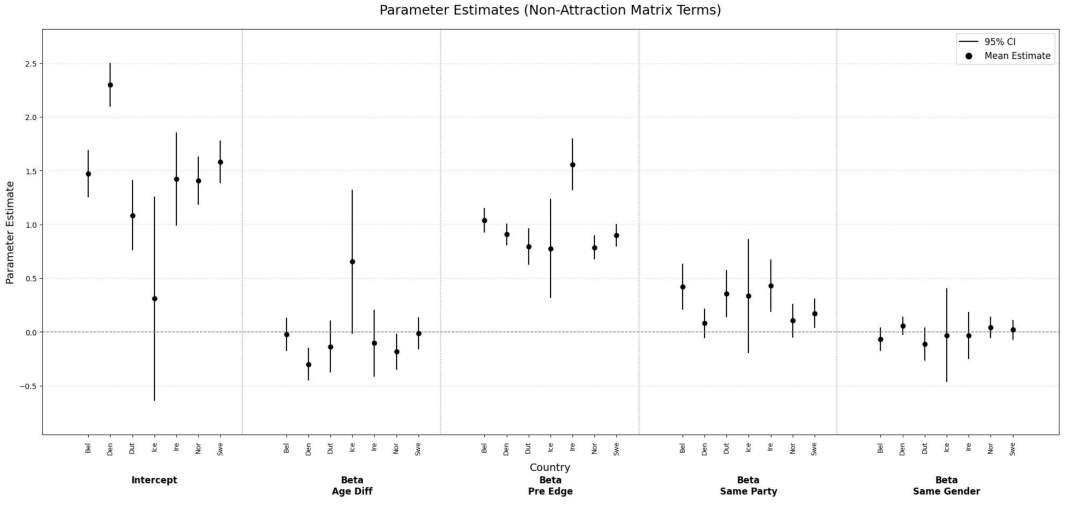

Figure 3. Estimated effects of covariates on discursive ties.

Party homophily is positive in all seven countries, but its strength is heterogeneous. The evidence for within-party clustering is strongest in Belgium (ϕ_{party} = 0.420, SE = 0.109), Ireland (0.431, SE

Table 1. Estimated Model Parameters: Network Covariates and Attraction Forces

	Belgium	**Denmark**	**Iceland**	**Ireland**	**Netherlands**	**Norway**	**Sweden**
Panel A: Network Dynamics and Covariates							
Intercept (α)	1.472	2.300	0.309	1.424	1.085	1.407	1.582
	(0.112)	(0.104)	(0.485)	(0.221)	(0.166)	(0.115)	(0.101)
Inertia (δ)	1.038	0.908	0.777	1.558	0.794	0.787	0.899
	(0.058)	(0.052)	(0.234)	(0.123)	(0.086)	(0.057)	(0.054)
Party Homophily (ϕ_{party})	0.420	0.080	0.334	0.431	0.357	0.106	0.173
	(0.109)	(0.070)	(0.270)	(0.124)	(0.112)	(0.080)	(0.070)
Age Difference (Δ_{age})	-0.022	-0.299	0.653	-0.104	-0.137	-0.184	-0.014
	(0.079)	(0.077)	(0.342)	(0.158)	(0.123)	(0.084)	(0.076)
Same Gender (ϕ_{gender})	-0.068	0.059	-0.030	-0.034	-0.113	0.042	0.021
	(0.056)	(0.043)	(0.223)	(0.113)	(0.078)	(0.051)	(0.046)
Panel B: Attraction-Repulsion Matrix (A)							
Left–Left (A_{LL})	0.140	-0.076	-0.241	-0.220	0.043	-0.689	0.239
	(0.083)	(0.090)	(0.240)	(0.156)	(0.178)	(0.103)	(0.062)
Left–Center (A_{LC})	-0.043	-0.313	-0.334	0.406	-0.595	-0.146	-1.130
	(0.081)	(0.076)	(0.234)	(0.167)	(0.179)	(0.099)	(0.113)
Left–Right (A_{LR})	-0.540	0.004	-0.970	-1.219	-0.749	-0.294	-0.597
	(0.087)	(0.086)	(0.156)	(0.168)	(0.148)	(0.088)	(0.088)
Center–Center (A_{CC})	-0.876	0.802	-0.000	-0.533	-0.342	-0.437	0.065
	(0.130)	(0.160)	(0.251)	(0.252)	(0.164)	(0.110)	(0.206)
Center–Right (A_{CR})	-0.129	-0.398	-0.287	-0.525	-0.300	-0.429	-1.260
	(0.079)	(0.075)	(0.228)	(0.128)	(0.125)	(0.078)	(0.116)
Right–Right (A_{RR})	0.121	0.020	-0.319	0.300	-0.082	-0.488	0.957
	(0.093)	(0.093)	(0.130)	(0.083)	(0.118)	(0.113)	(0.117)

Note: Each cell entries contains posterior means with standard errors in parentheses.

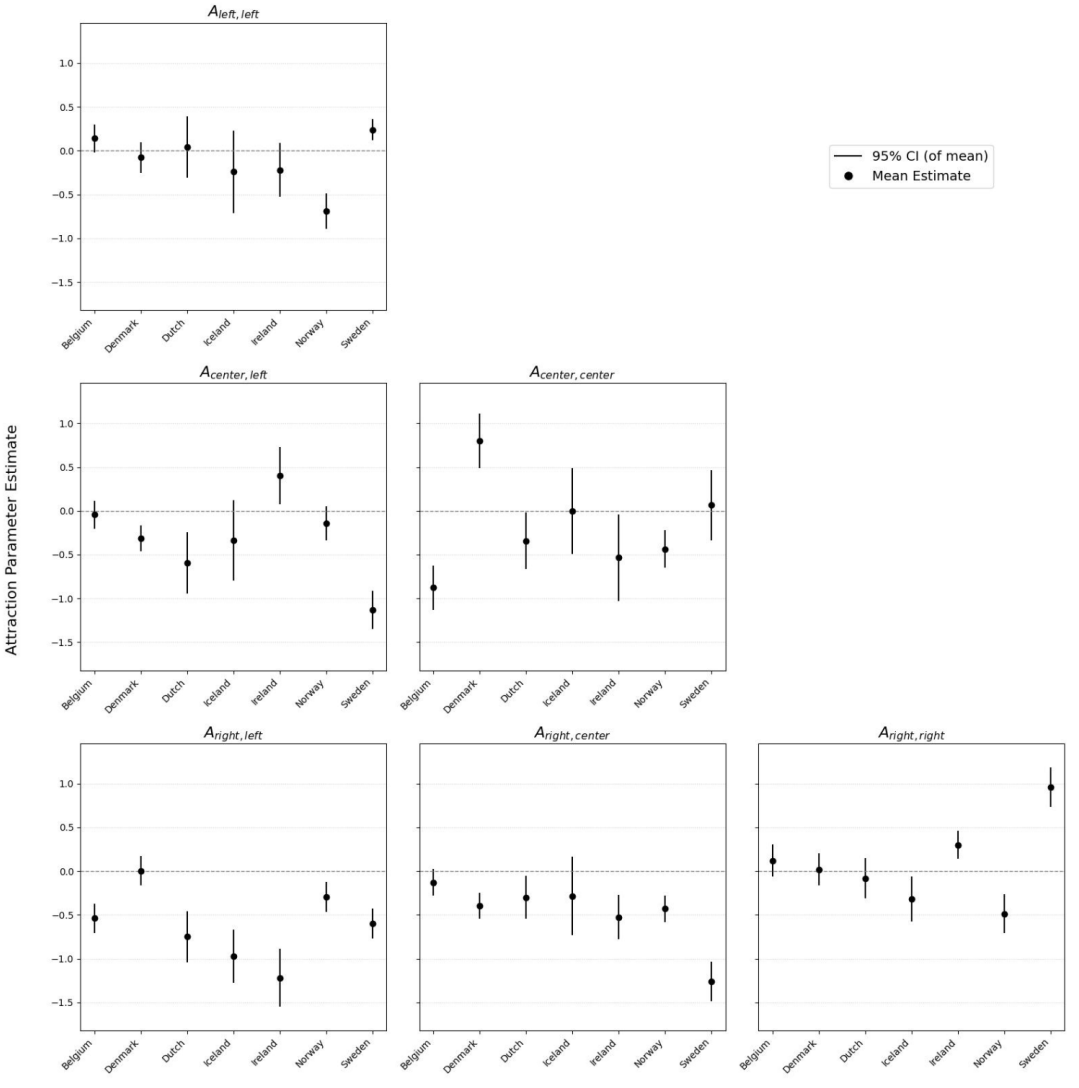

Figure 4. Attraction–repulsion matrix of within-bloc and between-bloc discourse dynamics.

= 0.124), and the Netherlands (0.357, SE = 0.112), with a smaller but still clearly positive estimate in Sweden (0.173, SE = 0.070). In Denmark (0.080, SE = 0.070), Iceland (0.334, SE = 0.270), and Norway (0.106, SE = 0.080), the point estimates are positive but more weakly separated from zero. Substantively, copartisans tend to align in co-hashtag discourse, yet the degree of party structuring varies across systems. **H1 (Party Centrism) is partially confirmed.**

Network inertia is uniformly strong. The estimate of δ is positive in every country and large relative to its uncertainty (Table 1), indicating substantial persistence in discursive ties from one year to the next. The effect is largest in Ireland (δ = 1.558, SE = 0.123), and remains sizable in Belgium (1.038, SE = 0.058), Denmark (0.908, SE = 0.052), Sweden (0.899, SE = 0.054), the Netherlands (0.794, SE = 0.086), and Norway (0.787, SE = 0.057). Iceland also shows positive inertia (0.777, SE = 0.234), albeit with greater uncertainty. Overall, the baseline dynamics are characterized by pronounced path dependence rather than continual rewiring. **H2 (Inertia and Stability) Link is confirmed.**

Demographic covariates contribute comparatively little once party homophily and inertia are included. Age difference is clearly negative in Denmark (Δ_{age} = −0.299, SE = 0.077) and more modestly negative in Norway (−0.184, SE = 0.084), consistent with slightly higher tie propensity among ministers closer in age in those cases. Elsewhere, age effects are small (e.g., Belgium −0.022 [SE 0.079], Sweden −0.014 [SE 0.076]) or uncertain (Iceland is positive at 0.653 with SE 0.342). The same-gender term is near zero in every country (ranging from −0.113 to 0.059) and never clearly separated from zero given the reported standard errors. These patterns indicate that observable demographics play, at most, a secondary role relative to persistence and partisan organization in structuring co-hashtag ties. **H3 (Covariate Structuring of Elite Communication) is partially confirmed.**

The remaining hypotheses concern the ideological attraction and repulsion structure. Those hypotheses, which address right-bloc cohesion, centrist brokerage, and the alignment of discourse with feasible coalitions, are evaluated in the next section.

7.2 Aligning Network Patterns with Coalition Histories

We now evaluate the ideological attraction and repulsion structure in light of coalition practice since 2008. Rather than treating the entries of A as indicators of average proximity or static bridge formation, we interpret them as capturing whether observed discursive ties are associated with coalescence or fragmentation across blocs over time. We summarize these dynamic forces using the posterior means and standard errors for each cell of A in Table 1, with the corresponding 95% posterior intervals visualized in Figure 4.

For within-bloc dynamics, the diagonal elements indicate substantial cross-national heterogeneity in coalescence. Right-bloc coalescence is strongest in Sweden (A_{RR} = 0.957, SE = 0.117) and is also positive in Ireland (0.300, SE = 0.083); it is near zero in Belgium (0.121, SE = 0.093) and Denmark (0.020, SE = 0.093), and negative in the Netherlands (−0.082, SE = 0.118), Iceland (−0.319, SE = 0.130), and Norway (−0.488, SE = 0.113). Left-bloc coalescence is positive in Sweden (A_{LL} = 0.239, SE = 0.062) and modestly positive in Belgium (0.140, SE = 0.083), but it is near zero in Denmark (−0.076, SE = 0.090) and the Netherlands (0.043, SE = 0.178), and negative in Iceland (−0.241, SE = 0.240), Ireland (−0.220, SE = 0.156), and Norway (−0.689, SE = 0.103). In short, there is no uniform asymmetry favoring the right across countries: Sweden and Ireland exhibit stronger within-right coalescence than within-left coalescence, while several systems show weak or negative coalescence on one or both ideological extremes. **H4 (Right Bloc Coalescence) is rejected.**

Turning to the centrist role, the off-diagonal elements provide limited evidence that ties involving the center generate coalescence with both adjacent blocs over time. The Left–Center term (A_{LC}) is negative in Belgium (−0.043, SE = 0.081), Denmark (−0.313, SE = 0.076), Iceland (−0.334, SE = 0.234), the Netherlands (−0.595, SE = 0.179), Norway (−0.146, SE = 0.099), and Sweden

(−1.130, SE = 0.113), while Ireland is the lone case with a positive estimate (0.406, SE = 0.167). Center–Right interaction is negative in every country, with particularly strong fragmentation in Sweden (A_{CR} = −1.260, SE = 0.116) and clear negative estimates in Ireland (−0.525, SE = 0.128), Denmark (−0.398, SE = 0.075), the Netherlands (−0.300, SE = 0.125), and Norway (−0.429, SE = 0.078). Denmark is distinctive on the center diagonal: it shows a strongly positive Center–Center term (A_{CC} = 0.802, SE = 0.160), whereas Belgium (−0.876, SE = 0.130), Ireland (−0.533, SE = 0.252), the Netherlands (−0.342, SE = 0.164), and Norway (−0.437, SE = 0.110) are negative, and Sweden is near zero (0.065, SE = 0.206) with Iceland essentially at zero (−0.000, SE = 0.251). Taken together, these estimates indicate that ties involving the center rarely produce coalescent dynamics across bloc boundaries in this public communication channel. Instead, center–right ties are consistently associated with fragmentation, and left–center coalescence appears only in Ireland. **H5 (Centrist Brokerage) is rejected.**

Finally, we compare these dynamic patterns to coalition histories. The relevant question is not whether blocs appear close in a static sense, but whether observed discursive ties are associated with movement together or movement apart over time among coalition-relevant pairings. Belgium does not display strong coalescent dynamics between the left and center in this channel: A_{LC} is slightly negative (−0.043), while both Center–Right (A_{CR} = −0.129) and Left–Right (A_{LR} = −0.540) are negative, indicating fragmentation across bloc boundaries with the sharpest separation between left and right. Sweden aligns most closely with a polarized bloc structure in dynamic terms: Left–Right fragmentation is clearly negative (A_{LR} = −0.597, SE = 0.088), both center cross-bloc terms are negative (A_{LC} = −1.130, SE = 0.113; A_{CR} = −1.260, SE = 0.116), and within-right coalescence is strong (A_{RR} = 0.957, SE = 0.117). Denmark is more difficult to reconcile with a flexible coalition image in dynamic terms: both Left–Center and Center–Right are negative (A_{LC} = −0.313; A_{CR} = −0.398), while Left–Right is essentially zero (A_{LR} = 0.004), and the center is internally coalescent (A_{CC} = 0.802) without corresponding coalescence toward either flank. Ireland also does not map neatly onto its dominant center–right governing pattern: it is the only case with Left–Center coalescence (A_{LC} = 0.406), yet it still shows Center–Right and Left–Right fragmentation (A_{CR} = −0.525; A_{LR} = −1.219). Iceland and Norway likewise exhibit fragmentation across coalition-relevant pairings, including Left–Right fragmentation (Iceland: A_{LR} = −0.970; Norway: A_{LR} = −0.294) and negative Center–Right interaction (Iceland: A_{CR} = −0.287; Norway: A_{CR} = −0.429), providing limited evidence that observed discursive ties generate coalescence across broader governing combinations over time. The Netherlands also shows negative cross-bloc dynamics throughout (A_{LC} = −0.595, A_{CR} = −0.300, A_{LR} = −0.749), indicating fragmentation rather than coalescence among coalition-relevant blocs over the period studied. Overall, the correspondence between discursive dynamics and coalition histories is strongest for Sweden and less clear elsewhere. Outside Sweden, the dynamic motion implied by A does not track coalition history cleanly or consistently. **H6 (Discursive and Coalitional Isomorphism) receives only limited support.**

7.3 Country Case Studies

In this section, we evaluate all six hypotheses country by country using the nonmatrix coefficient plot for ϕ_{party}, δ, Δ_{age}, and ϕ_{gender} (Figure 3) and the attraction–repulsion plots for the matrix entries (Figure 4). All inferential claims are based on the posterior means and corresponding 95% posterior credible intervals displayed in those figures.

Table 2. Country-by-country summary of coalition logic and discursive dynamics.

Country	Dominant Coalition Logic	Key Discursive Dynamics	Interpretation & Concordance
Belgium	Broad left–center coalitions that exclude the main right actor.	L–C: Weak fragmentation C–R: Fragmentation L–R: Fragmentation	The estimated dynamics do not indicate left–center coalescence over time; instead, cross-bloc ties are generally associated with movement apart, with the clearest fragmentation between left and right. **H1: confirmed** ($\Phi_{party} > 0$); **H2: confirmed** ($\delta > 0$); **H3: rejected** ($\Delta_{age} \approx 0$, $\Phi_{gender} \approx 0$); **H4: rejected**; **H5: rejected**; **H6: limited support**.
Denmark	History of center–left and center–right cabinets; brief broad coalition experience.	L–C: Fragmentation C–R: Fragmentation L–R: Approximately zero C–C: Strong coalescence	The estimated dynamics show internal coalescence within the center but little evidence that ties involving the center generate movement together with either flank over time. **H1: rejected**; **H2: confirmed**; **H3: partially confirmed** (age distance negative, gender near zero); **H4: rejected**; **H5: rejected**; **H6: limited support**.
Iceland	Experience with a broad coalition spanning left, center, and right.	L–C: Weak fragmentation C–R: Fragmentation L–R: Fragmentation	The estimated dynamics provide little evidence that observed ties generate coalescence across the broad coalition-relevant blocs over time. **H1: rejected**; **H2: confirmed**; **H3: rejected** (age positive and imprecise, gender near zero); **H4: rejected**; **H5: rejected**; **H6: limited support**.
Ireland	Dominant center–right cooperation between FF and FG.	L–C: Coalescence C–R: Fragmentation L–R: Fragmentation	The estimated dynamics indicate left–center coalescence, but not the center–right coalescence that would align more closely with the dominant governing pattern. **H1: confirmed**; **H2: confirmed**; **H3: rejected** (covariates near zero); **H4: confirmed** (right coalescence exceeds left); **H5: rejected**; **H6: limited support**.
Netherlands	Frequent center–right cabinets; earlier left–right "purple" episode.	L–C: Fragmentation C–R: Fragmentation L–R: Fragmentation	The estimated dynamics indicate movement apart rather than movement together across coalition-relevant blocs over time. **H1: confirmed**; **H2: confirmed**; **H3: confirmed** (age distance negative); **H4: rejected**; **H5: rejected**; **H6: limited support**.
Norway	Alternation between center–left and center–right coalitions.	L–C: Weak fragmentation C–R: Fragmentation L–R: Fragmentation	The estimated dynamics provide limited evidence of coalescence across coalition-relevant blocs and instead point to fragmentation, especially in ties involving the right. **H1: rejected**; **H2: confirmed**; **H3: partially confirmed** (age distance negative, gender near zero); **H4: rejected**; **H5: rejected**; **H6: limited support**.
Sweden	Two-bloc competition with strong polarization.	L–C: Strong fragmentation C–R: Strong fragmentation L–R: Fragmentation R–R: Strong coalescence	The estimated dynamics align most closely with a polarized bloc structure: cross-bloc ties are associated with movement apart, while the right bloc exhibits strong internal coalescence. **H1: confirmed**; **H2: confirmed**; **H3: rejected** (covariates near zero); **H4: confirmed** (right coalescence strongest); **H5: rejected**; **H6: strongest support**.

While the comparative results identify the paper's main cross-national patterns, the country-level estimates reveal important variation in how those dynamics map onto coalition histories. Belgium combines strong party homophily (ϕ_{party} = 0.420, SE = 0.109) and inertia (δ = 1.038, SE = 0.058) with fragmentation across blocs, including a near-zero Left–Center term (A_{LC} = −0.043, SE = 0.081) and a strongly negative Left–Right term (A_{LR} = −0.540, SE = 0.087). Denmark shows weak party structuring (ϕ_{party} = 0.080, SE = 0.070) but clear persistence (δ = 0.908, SE = 0.052) and a distinctive internally cohesive center (A_{CC} = 0.802, SE = 0.160), despite negative Center–Left and Center–Right dynamics. Iceland's broad coalition does not translate into coalescent public discourse: all three cross-bloc terms are negative, including a strongly negative Left–Right estimate (A_{LR} = −0.970, SE = 0.156). Ireland is the clearest case of stability and party structuring (δ = 1.558, SE = 0.123; ϕ_{party} = 0.431, SE = 0.124), but its only positive cross-bloc term is Left–Center (A_{LC} = 0.406, SE = 0.167), not Center–Right. The Netherlands combines positive party homophily and persistence (ϕ_{party} = 0.357, SE = 0.112; δ = 0.794, SE = 0.086) with negative dynamics across all coalition-relevant pairings. Norway likewise shows positive inertia (δ = 0.787, SE = 0.057) but little evidence of cross-bloc coalescence. Sweden is the clearest polarized case, with strongly negative Left–Center and Center–Right dynamics (A_{LC} = −1.130, SE = 0.113; A_{CR} = −1.260, SE = 0.116) and the strongest within-right coalescence in the sample (A_{RR} = 0.957, SE = 0.117). Across cases, same-gender effects remain near zero, while age similarity matters most clearly in Denmark and Norway. Full country-by-country interpretation is provided in Appendix C.

8. Discussion, Theoretical Implications, and Future Directions

This study maps how cabinet ministers talk in public and asks how those patterns relate to the coalitions their countries actually form. Three recurring findings emerge across the seven cases. First, elite communication is meaningfully organized by party in every country, but the degree of within-party clustering varies. In some systems, co-hashtag ties are tightly aligned with partisan boundaries; in others, party plays a weaker organizing role and ministers' public overlap appears less party-centric. Second, discursive ties are highly persistent over time. Once ministers share a public topical footprint, that overlap tends to endure rather than constantly reshuffle, suggesting a slow-moving communication architecture. Third, once party and persistence are accounted for, demographic similarity contributes little additional structure. To the extent that demographics matter at all, it is primarily through limited age-similarity tendencies in a subset of cases, while gender similarity does not appear to be a meaningful driver of elite co-hashtag overlap.

The bloc-level attraction–repulsion patterns sharpen these baseline conclusions, but they should be interpreted dynamically. The central result is not that the model reveals a static bridge structure; rather, it estimates whether prior discursive ties are associated with coalescence or fragmentation across ideological blocs over time. Across countries, ties involving the political center rarely generate coalescence with the right and only occasionally generate coalescence with the left. Instead, center–right ties are typically associated with fragmentation, and left–right ties are also commonly associated with movement apart over time, with Denmark standing out as the main case where that extreme cleavage is not pronounced. What varies most across national contexts is the degree of within-bloc coalescence and, relatedly, whether the center forms an internally coalescent cluster without generating coalescence outward. In some systems, coalescence is concentrated on the right; in others, the left is not internally consolidated; and in at least one case the center is internally coalescent while still failing to produce coalescent dynamics with either flank.

These dynamic patterns help explain why the correspondence between discourse and coalition practice differs so sharply across the region. Sweden stands out as the clearest case where observed discursive ties generate a polarized dynamic structure: cross-bloc ties are associated with fragmentation, while the right bloc shows strong internal coalescence, matching a political environment in which alliances across the ideological divide are difficult to sustain publicly. Elsewhere, the fit is

weaker. Belgium displays fragmentation that is broadly consistent with exclusionary dynamics, but it does not show strong left–center coalescence over time. Denmark and Norway, despite histories of coalitions that span ideological lines, do not show coalescent dynamics linking the center durably to both sides. Denmark's distinctive feature is that the center can be internally coalescent without generating movement together with either flank. The Netherlands exhibits fragmentation across all coalition-relevant bloc pairings, which may be more consistent with increasingly difficult coalition building than with the older image of stable pragmatic flexibility. Ireland is a particularly instructive mismatch: the clearest cross-bloc coalescence runs left–center rather than center–right, underscoring that public discourse dynamics can diverge from dominant governing practice. Iceland similarly shows limited evidence that public discursive ties generate coalescence across the broad coalition it has sustained in office. Taken together, the evidence suggests that the dynamic motion captured in public discourse is often a poor proxy for backstage bargaining capacity, with Sweden as the most consistent exception.

Two theoretical implications follow. First, bargaining space and discursive space are not the same. Parties may sustain workable governing agreements through private coordination while keeping public messaging compartmentalized, especially when cross-bloc signaling carries reputational costs with core supporters. On this reading, the widespread absence of coalescent cross-bloc dynamics in public discourse is consistent with a division between backstage coalition work and frontstage communication. Second, polarization is not only the distance between left and right at a given moment. It also consists of whether the corridors that could connect camps tend to open or close over time. In dynamic terms, those corridors open when prior ties induce coalescence and close when prior ties induce fragmentation. The attraction–repulsion structure therefore provides a direct way to characterize how public discourse reproduces, dampens, or intensifies bloc separation over time.

The results also suggest a practical lesson for research design. Because persistence is a dominant feature of elite communication networks, visible patterns of talk change slowly. Analysts should expect hysteresis in public communication and be cautious in attributing short-run events to deep structural realignments. At the same time, the limited role of demographics once party and persistence are included implies that the main drivers of public overlap are organizational cues, repeated interaction patterns, and the strategic management of party-aligned messaging rather than basic social similarity.

This paper has limits by design. We measure a single visible channel over a long window, which is conservative and emphasizes durable patterns over transients. We do not observe private bargaining or coordination, and that is precisely where bridging work may occur. Two next steps are especially promising. First, condition the analysis on topic and venue to test whether coalescent dynamics emerge in technocratic domains such as economic management while fragmentary dynamics dominate identity and migration. Second, allow the parameters to vary around institutional shocks to evaluate whether new governments widen or narrow discursive corridors over time and whether unusual alliances leave durable imprints on public communication dynamics.

In short, elite talk in Northern Europe is sticky, politically organized, and often characterized by fragmentation rather than coalescence across blocs. That structure helps explain why some governing partnerships are difficult to narrate publicly even when they remain viable in practice, and it offers a tractable way to track how these communication dynamics evolve as parties confront the next crisis and the next bargain.

Appendix A1. Minister spells, tenure, and party composition

The unit of observation in this study is a minister spell, defined as a continuous period during which a cabinet minister holds office within a given government. When ministers change portfolios, exit and reenter government, or serve across cabinet reshuffles, each uninterrupted period of service is treated as a distinct spell. This approach preserves the temporal structure of cabinet composition

while allowing individuals to appear multiple times over the observation window.

Table 3 reports descriptive statistics for ministerial tenure by country. Tenure is measured in years and calculated inclusively from the recorded start and end dates of each spell. Spells coded as Independent are excluded.

Table 3. Tenure length of minister spells.

Country	Spells	Mean (years)	Median (years)	SD (years)	Min (years)	Max (years)
Belgium	78	2.64	2.29	2.21	0.07	12.56
Denmark	96	1.61	1.54	0.86	0.15	3.74
Iceland	25	2.38	2.23	1.23	0.77	4.88
Ireland	47	3.01	3.04	1.48	0.05	6.27
Netherlands	65	2.32	2.06	2.13	0.02	13.62
Norway	98	2.52	2.24	1.57	0.10	8.00
Sweden	109	2.64	2.46	1.34	0.03	8.04
Total	518	2.41	2.08	1.64	0.02	13.62

To clarify how minister spells map onto parties and ideological blocs, Table 4 reports the distribution of spells by country, party, and ideological spectrum (Left, Center, Right). The unit of observation is the minister spell. Parties coded as Independent are excluded, consistent with the main analysis. Prior to tabulation, party labels are harmonized to ensure comparability across countries and over time by merging abbreviations, translated names, and historically linked labels that refer to the same political organization.[1] Ideological bloc assignments are held fixed according to the coding used in the main analysis and are not re-estimated during the merging process. Unique ministers are counted using canonicalized *X* handles.

Table 4. Party breakdown by country and ideological bloc.

Country	Bloc	Party	Minister spells
Belgium	Left	Ecolo (Parti écologiste)	3
Belgium	Left	Groen	2
Belgium	Left	Parti Socialiste	13
Belgium	Left	Socialistische Partij Anders	6
Belgium	Left	Sociaal-Liberale Partij (SPIRIT)	1
Belgium	Left	Vooruit	3
Belgium	Left	*Total (Belgium, Left)*	28
Belgium	Center	Christen-Democratisch en Vlaams	13
Belgium	Center	Centre démocrate humaniste	1
Belgium	Center	Christelijke Volkspartij	3
Belgium	Center	Parti social-chrétien	2
Belgium	Center	*Total (Belgium, Center)*	19
Belgium	Right	Mouvement Réformateur	14

1. Party-label harmonization merges abbreviations, full names, translations, and rebranded labels that refer to the same political organization. Specifically, in Belgium: PS and Parti Socialiste; MR and Mouvement Réformateur; N-VA and Nieuw-Vlaamse Alliantie; Open VLD, Open Vld, and Open Vlaamse Liberalen en Democraten; SP.a and Socialistische Partij Anders; and SPIRIT and Sociaal-Liberale Partij. In Denmark: RV and Radikale Venstre; S, SD, and Socialdemokratiet; KF and Det Konservative Folkeparti; and V and Venstre. In Iceland: LG and Vinstrihreyfingin – grænt framboð; PP and Framsóknarflokkurinn; CiP and Miðflokkurinn; IP and Sjálfstæðisflokkurinn; and SDA and Samfylkingin. In Ireland: FG and Fine Gael; FF and Fianna Fáil; and Green and Green Party. In the Netherlands: D66 and Democraten 66; CDA and Christen-Democratisch Appèl; CU and ChristenUnie; VVD and Volkspartij voor Vrijheid en Democratie; and PvdA and Partij van de Arbeid. In Norway: DNA and Arbeiderpartiet; FrP and Fremskrittspartiet; H and Høyre; KrF and Kristelig Folkeparti; V and Venstre; and Sp and Senterpartiet. In Sweden: KD, KDS, and Kristdemokraterna; FP and Liberalerna; M and Moderata samlingspartiet; MP and Miljöpartiet de gröna; and S and Sveriges socialdemokratiska arbetareparti.

Table 4 continued

Country	Bloc	Party	Minister spells
Belgium	Right	Nieuw-Vlaamse Alliantie	6
Belgium	Right	Open Vlaamse Liberalen en Democraten	11
Belgium	Right	*Total (Belgium, Right)*	31
Belgium	Total	**Total (Belgium)**	**78**
Denmark	Left	Socialistisk Folkeparti	7
Denmark	Left	Socialdemokratiet	34
Denmark	Left	*Total (Denmark, Left)*	41
Denmark	Center	Radikale Venstre	13
Denmark	Center	*Total (Denmark, Center)*	13
Denmark	Right	Det Konservative Folkeparti	8
Denmark	Right	Fremad	1
Denmark	Right	Liberal Alliance	2
Denmark	Right	Moderaterne	3
Denmark	Right	Venstre	28
Denmark	Right	*Total (Denmark, Right)*	42
Denmark	Total	**Total (Denmark)**	**96**
Iceland	Left	Vinstrihreyfingin – grænt framboð	3
Iceland	Left	Samfylkingin	3
Iceland	Left	*Total (Iceland, Left)*	6
Iceland	Center	Björt framtíð	1
Iceland	Center	Miðflokkurinn	4
Iceland	Center	Framsóknarflokkurinn	1
Iceland	Center	*Total (Iceland, Center)*	6
Iceland	Right	Sjálfstæðisflokkurinn	10
Iceland	Right	Framsóknarflokkurinn	3
Iceland	Right	*Total (Iceland, Right)*	13
Iceland	Total	**Total (Iceland)**	**25**
Ireland	Left	Democratic Left	1
Ireland	Left	Green Party	3
Ireland	Left	Labour Party	7
Ireland	Left	*Total (Ireland, Left)*	11
Ireland	Center	Fianna Fáil	14
Ireland	Center	*Total (Ireland, Center)*	14
Ireland	Right	Fine Gael	21
Ireland	Right	Progressive Democrats	1
Ireland	Right	*Total (Ireland, Right)*	22
Ireland	Total	**Total (Ireland)**	**47**
Netherlands	Left	GroenLinks–Partij van de Arbeid	1
Netherlands	Left	Partij van de Arbeid	13
Netherlands	Left	*Total (Netherlands, Left)*	14
Netherlands	Center	Christen-Democratisch Appèl	16
Netherlands	Center	ChristenUnie	4
Netherlands	Center	Democraten 66	12
Netherlands	Center	*Total (Netherlands, Center)*	32
Netherlands	Right	Lijst Pim Fortuyn	2
Netherlands	Right	Volkspartij voor Vrijheid en Democratie	17
Netherlands	Right	*Total (Netherlands, Right)*	19
Netherlands	Total	**Total (Netherlands)**	**65**
Norway	Left	Arbeiderpartiet	35
Norway	Left	Sosialistisk Venstreparti	8
Norway	Left	*Total (Norway, Left)*	43
Norway	Center	Senterpartiet	9
Norway	Center	Kristelig Folkeparti	8
Norway	Center	Venstre	8
Norway	Center	*Total (Norway, Center)*	25
Norway	Right	Høyre	15
Norway	Right	Fremskrittspartiet	15

Table 4 continued

Country	Bloc	Party	Minister spells
Norway	Right	*Total (Norway, Right)*	30
Norway	Total	**Total (Norway)**	**98**
Sweden	Left	Miljöpartiet de gröna	12
Sweden	Left	Sveriges socialdemokratiska arbetareparti	48
Sweden	Left	*Total (Sweden, Left)*	60
Sweden	Center	Centerpartiet	6
Sweden	Center	Kristdemokraterna	10
Sweden	Center	Liberalerna	10
Sweden	Center	*Total (Sweden, Center)*	26
Sweden	Right	Moderata samlingspartiet	23
Sweden	Right	*Total (Sweden, Right)*	23
Sweden	Total	**Total (Sweden)**	**109**
All countries	Total	**Total (All countries)**	**518**

Appendix A2. Ideological bloc coding

Ideological bloc assignments (Left, Center, Right) are taken directly from the coding used in the main analysis and are held fixed across minister spells. Party-level ideological classifications are based on the political party descriptions provided on Wikipedia and are applied consistently across countries and over time. All bloc-based analyses in the main text rely on this same spell-level coding.

Appendix A3. Descriptive properties

This section summarizes the basic composition of our minister and tweet corpora across the seven countries. Table 5 reports distributions of ministers by gender, ideological bloc (left/center/right), and age group (excluding Independents). Table 6 provides the corresponding breakdown for tweets, reporting total volume and the mean tweets per minister within each subgroup.

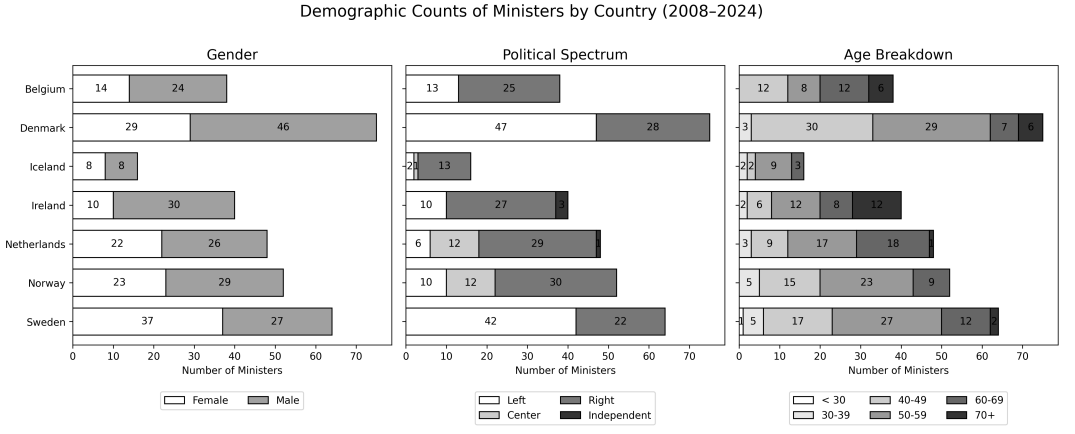

Figure 5. Descriptive properties of the minister dataset. The bars display the total count of unique ministers serving between 2008 and 2024, broken down by gender, political spectrum, and age across the seven countries.

Appendix B1. Model Formulation

This section outlines the mathematical formulation and inference framework used to estimate the Coevolving Latent Space Network with Attractors (CLSNA) model.

Table 5. Descriptive properties of the minister dataset (excluding Independents).

Category: Gender			
	Female	Male	Total
Belgium	22 (28.2%)	56 (71.8%)	78 (100.0%)
Denmark	42 (43.8%)	54 (56.2%)	96 (100.0%)
Iceland	10 (40.0%)	15 (60.0%)	25 (100.0%)
Ireland	10 (21.3%)	37 (78.7%)	47 (100.0%)
Netherlands	22 (33.8%)	43 (66.2%)	65 (100.0%)
Norway	41 (41.8%)	57 (58.2%)	98 (100.0%)
Sweden	56 (51.4%)	53 (48.6%)	109 (100.0%)
Total	203 (39.2%)	315 (60.8%)	518 (100.0%)

Category: Political Spectrum				
	Left	Center	Right	Total
Belgium	28 (35.9%)	16 (20.5%)	34 (43.6%)	78 (100.0%)
Denmark	43 (44.8%)	11 (11.5%)	42 (43.8%)	96 (100.0%)
Iceland	6 (24.0%)	2 (8.0%)	17 (68.0%)	25 (100.0%)
Ireland	11 (23.4%)	7 (14.9%)	29 (61.7%)	47 (100.0%)
Netherlands	15 (23.1%)	23 (35.4%)	27 (41.5%)	65 (100.0%)
Norway	43 (43.9%)	27 (27.6%)	28 (28.6%)	98 (100.0%)
Sweden	60 (55.0%)	16 (14.7%)	33 (30.3%)	109 (100.0%)
Total	206 (39.8%)	102 (19.7%)	210 (40.5%)	518 (100.0%)

Category: Age							
	<30	30–39	40–49	50–59	60–69	70+	Total
Belgium	0 (0.0%)	0 (0.0%)	16 (20.5%)	16 (20.5%)	30 (38.5%)	16 (20.5%)	78 (100.0%)
Denmark	0 (0.0%)	4 (4.2%)	32 (33.3%)	33 (34.4%)	10 (10.4%)	17 (17.7%)	96 (100.0%)
Iceland	0 (0.0%)	2 (8.0%)	3 (12.0%)	10 (40.0%)	3 (12.0%)	7 (28.0%)	25 (100.0%)
Ireland	0 (0.0%)	2 (4.3%)	7 (14.9%)	11 (23.4%)	10 (21.3%)	17 (36.2%)	47 (100.0%)
Netherlands	0 (0.0%)	1 (1.5%)	11 (16.9%)	15 (23.1%)	22 (33.8%)	16 (24.6%)	65 (100.0%)
Norway	0 (0.0%)	5 (5.1%)	18 (18.4%)	33 (33.7%)	24 (24.5%)	18 (18.4%)	98 (100.0%)
Sweden	1 (0.9%)	6 (5.5%)	19 (17.4%)	37 (33.9%)	31 (28.4%)	15 (13.8%)	109 (100.0%)
Total	1 (0.2%)	20 (3.9%)	106 (20.5%)	155 (29.9%)	130 (25.1%)	106 (20.5%)	518 (100.0%)

Table 6. Descriptive properties of the tweet dataset.

Category: Gender			
	Female	Male	Total
Belgium	97,818 (4446.27)	212,742 (3798.96)	310,560 (3981.54)
Denmark	152,714 (3636.05)	287,340 (5321.11)	440,054 (4583.9)
Iceland	21,910 (2191.0)	9,460 (630.67)	31,370 (1254.8)
Ireland	67,923 (6792.3)	192,003 (5189.27)	259,926 (5530.34)
Netherlands	75,613 (3436.95)	108,258 (2517.63)	183,871 (2828.78)
Norway	83,339 (2032.66)	150,769 (2645.07)	234,108 (2388.86)
Sweden	226,445 (4043.66)	162,401 (3064.17)	388,846 (3567.39)
Total	725,762 (3575.18)	1,122,973 (3564.99)	1,848,735 (3568.99)

Category: Political Spectrum				
	Left	Center	Right	Total
Belgium	101,628 (3629.57)	41,666 (2604.12)	167,266 (4919.59)	310,560 (3981.54)
Denmark	216,841 (5042.81)	71,962 (6542.0)	151,251 (3601.21)	440,054 (4583.9)
Iceland	4,703 (783.83)	507 (253.5)	26,160 (1538.82)	31,370 (1254.8)
Ireland	77,485 (7044.09)	15,676 (2239.43)	166,765 (5750.52)	259,926 (5530.34)
Netherlands	41,392 (2759.47)	49,859 (2167.78)	92,620 (3430.37)	183,871 (2828.78)
Norway	88,926 (2068.05)	67,225 (2489.81)	77,957 (2784.18)	234,108 (2388.86)
Sweden	218,779 (3646.32)	29,768 (1860.5)	140,299 (4251.48)	388,846 (3567.39)
Total	749,754 (3639.58)	276,663 (2712.38)	822,318 (3915.8)	1,848,735 (3568.99)

Category: Age							
	< 30	30–39	40–49	50–59	60–69	70+	Total
Belgium	0 (0.0)	0 (0.0)	91,931 (5745.69)	61,301 (3831.31)	128,083 (4269.43)	29,245 (1827.81)	310,560 (3981.54)
Denmark	0 (0.0)	17,660 (4415.0)	185,558 (5798.69)	183,550 (5562.12)	29,352 (2935.2)	23,934 (1407.88)	440,054 (4583.9)
Iceland	0 (0.0)	10,596 (5298.0)	2,400 (800.0)	15,329 (1532.9)	2,028 (676.0)	1,017 (145.29)	31,370 (1254.8)
Ireland	0 (0.0)	12,998 (6499.0)	48,102 (6871.71)	69,674 (6334.0)	70,653 (7065.3)	58,499 (3441.12)	259,926 (5530.34)
Netherlands	0 (0.0)	6,372 (6372.0)	50,856 (4623.27)	56,792 (3786.13)	63,301 (2877.32)	6,550 (409.38)	183,871 (2828.78)
Norway	0 (0.0)	20,090 (4018.0)	60,596 (3366.44)	90,501 (2742.45)	50,833 (2118.04)	12,088 (671.56)	234,108 (2388.86)
Sweden	6,362 (6362.0)	32,832 (5472.0)	101,411 (5337.42)	159,337 (4306.41)	74,897 (2416.03)	14,007 (933.8)	388,846 (3567.39)
Total	6,362 (6362.0)	100,548 (5027.4)	540,854 (5102.4)	636,484 (4106.35)	419,147 (3224.21)	145,340 (1371.13)	1,848,735 (3568.99)

Note. Each cell reports the total number of tweets, with the mean in parentheses.

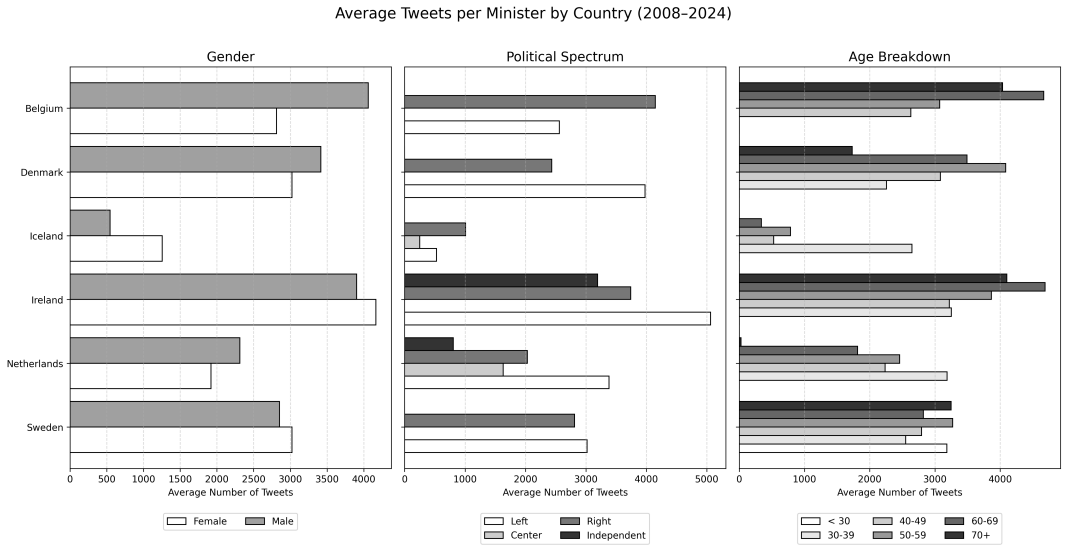

Figure 6. Average public messaging volume. The grouped bars show the average number of tweets posted per minister across different demographic categories in six countries (2008–2024).

Let $G_t = (V_t, E_t)$ be a network evolving in discrete time t, with vertex set V_t and edge set E_t. We allow for V_t to vary over time. The time series of adjacency matrices is denoted $\{\gamma_t : t = 1, \ldots, T\}$, where $Y_{t,ij}$ indicates the existence of an edge between minister i and minister j at time t.

We model Y_t using a latent space approach with attractors to capture ideological forces. Let $Z_{t,i} \in \mathbb{R}^p$ be a time-indexed latent position for node i. Each node belongs to a known group label $\pi(i) \in \mathcal{C}$, where $\mathcal{C} = \{\text{Left}, \text{Center}, \text{Right}\}$. The base probability model is defined as:

$$Y_{t,ij} | p_{t,ij} \sim \text{Bernoulli}(p_{t,ij}) \tag{11}$$

For the first time period $t = 1$, and for any new entrants in subsequent periods, the log odds of an edge are defined by the latent Euclidean distance $s(z_{t,i}, z_{t,j}) = \|z_{t,i} - z_{t,j}\|_2$ and dyadic covariates $\mathbf{X}_{t,ij}$:

$$\text{logit}(p_{t,ij}) = \alpha - s(z_{t,i}, z_{t,j}) + \boldsymbol{\beta}^\top \mathbf{X}_{t,ij} \tag{12}$$

$$Z_{t,i} \sim \mathcal{N}(0, \sigma^2_{init} I_p) \tag{13}$$

For continuing ministers at $t \geq 2$, the model incorporates network inertia (δ) and the coevolution of latent positions:

$$\text{logit}(p_{t,ij}) = \alpha + \delta Y_{t-1,ij} - s(z_{t,i}, z_{t,j}) + \boldsymbol{\beta}^\top \mathbf{X}_{t,ij} \tag{14}$$

$$Z_{t,i} | Z_{t-1,i} = z_{t-1,i} \sim \mathcal{N}(\mu_{t,i}, \sigma^2_{evol} I_p) \tag{15}$$

The expected latent position $\mu_{t,i}$ is driven by the structural forces of the political system, governed by the 3×3 symmetric attraction matrix A and the attractor function Ψ:

$$\mu_{t,i} = z_{t-1,i} + \sum_{h \in \mathcal{C}} A_{\pi(i),h} \Psi^h_i(z_{t-1}, Y_{t-1}) \tag{16}$$

where A_{gh} represents the estimated force (attraction or repulsion) between group g and group h. The attractor function Ψ^h_i calculates the discrepancy between node i's previous position and the local

average position of i's neighbors who belong to group h:

$$\Psi_i^h(z_{t-1}, Y_{t-1}) = \bar{z}_{t-1,i}^h - z_{t-1,i}, \quad \text{where} \quad \bar{z}_{t-1,i}^h = \frac{1}{|S_h^{(i)}|} \sum_{j \in S_h^{(i)}} z_{t-1,j} \tag{17}$$

and $S_h^{(i)} = \{j \in V_{t-1} \setminus \{i\} \mid Y_{t-1,ij} = 1, \pi(j) = h\}$. If $S_h^{(i)}$ is empty, $\Psi_i^h = 0$.

Prior Specification and Hyperparameters

To complete the model formulation, we specify the priors and fixed hyperparameters used in estimation. For the initial latent positions, we assume

$$Z_{t=1,i} \sim \mathcal{N}(0, \sigma_{init}^2 I_p), \qquad \sigma_{init} = 6. \tag{18}$$

For the latent position evolution, we assume

$$Z_{t,i} \mid Z_{t-1,i} \sim \mathcal{N}(\mu_{t,i}, \sigma_{evol}^2 I_p), \qquad \sigma_{evol} = 1. \tag{19}$$

For the attraction matrix, we place independent zero-mean Gaussian priors on its unique elements:

$$A_{gh} \sim \mathcal{N}(0, \sigma_A^2), \qquad \sigma_A^2 = \frac{1}{8}, \tag{20}$$

which induces shrinkage toward zero. We assume flat priors for the global parameters $(\alpha, \boldsymbol{\beta}, \delta)$.

Appendix B2. Estimation Methodology

Following Pan et al. 2025, we employ a multi-stage optimization algorithm to generate Maximum A Posteriori (MAP) point estimates for the model parameters θ and latent positions $Z_{1:T}$, followed by a stochastic gradient descent (SGD)-based approach for uncertainty quantification.

Objective Function

We define the joint negative log-posterior (up to an additive constant) as the objective function to be minimized, denoted $\mathcal{L}(\theta, Z_{1:T})$.

Because our nodes are individual ministers rather than fixed ministerial roles, the set of active actors can change from year to year as cabinets reshuffle and ministers enter, exit, or in some cases return to office. Accordingly, the analysis should not be understood as a balanced panel of the same individuals observed at every time period. Instead, each country-year network is embedded in the broader country-specific set of ministers observed during the study window, while substantive ties in a given year are defined with respect to the ministers who are active in that country-year. The network inertia term therefore applies to dyads observed across adjacent periods, whereas latent positions evolve over time for ministers when they are present in the network.

For numerical stability, we express the Bernoulli negative log-likelihood using the log-sum-exp form of the dyadic linear predictor (logit) $\eta_{t,ij}$. For each time t and dyad (i, j) with $i < j$, define

$$\eta_{t,ij} = \alpha + \delta\, \mathbb{I}(t \geq 2)\, Y_{t-1,ij} - |0 z_{t,i} - z_{t,j}|0_2 + \boldsymbol{\beta}^\top \mathbf{X}_{t,ij}. \tag{21}$$

Equivalently, $\eta_{1,ij} = \alpha - |0 z_{1,i} - z_{1,j}|0_2 + \boldsymbol{\beta}^\top \mathbf{X}_{1,ij}$ and for $t \geq 2$ the inertia term $\delta Y_{t-1,ij}$ is included.

The full negative log-posterior objective is then

$$\mathcal{L}(\theta, Z_{1:T}) = \sum_{t=1}^{T} \sum_{i<j} \left[\log\left(1 + \exp(\eta_{t,ij})\right) - Y_{t,ij}\, \eta_{t,ij} \right] + \frac{1}{2\sigma_{init}^2} \sum_{i} |0z_{1,i}|0_2^2 + \frac{1}{2\sigma_{evol}^2} \sum_{t=2}^{T} \sum_{i} |0z_{t,i} - \mu_{t,i}|0_2^2 + \frac{1}{2\sigma_A^2} \sum_{g \le h} A_{gh}^2, \tag{22}$$

where $\mu_{t,i}$ is defined by the attractor dynamics in Equation (6). We assume improper flat priors for the global parameters $(\alpha, \boldsymbol{\beta}, \delta)$, so no additional penalty term is included for them.

Objective Function

We define the joint negative log-posterior (up to an additive constant) as the objective function to be minimized, denoted $\mathcal{L}(\theta, Z_{1:T})$.

Because our nodes are individual ministers rather than fixed ministerial roles, the set of active actors can vary over time as ministers enter office, leave office, and sometimes return. We therefore do not assume that the same individuals are active at every time t. Instead, each country-year network is defined over the ministers active in that year, even if the broader country-specific node set is tracked across the full study period. We use the same edge model for all dyads among ministers active at time t, and for $t \geq 2$ we include the lagged edge $Y_{t-1,ij}$ with coefficient δ for dyads observed across adjacent periods.

For numerical stability, we write the Bernoulli negative log-likelihood in terms of the logit $\eta_{t,ij}$. For each time t and dyad (i, j) with $i < j$, define

$$\eta_{t,ij} = \alpha + \delta\, \mathbb{I}(t \geq 2)\, Y_{t-1,ij} - |0z_{t,i} - z_{t,j}|0_2 + \boldsymbol{\beta}^\top \mathbf{X}_{t,ij}. \tag{23}$$

The full objective is

$$\mathcal{L}(\theta, Z_{1:T}) = \sum_{t=1}^{T} \sum_{i<j} \left[\log\left(1 + \exp(\eta_{t,ij})\right) - Y_{t,ij}\, \eta_{t,ij} \right] + \frac{1}{2\sigma_{init}^2} \sum_{i} |0z_{1,i}|0_2^2 + \frac{1}{2\sigma_{evol}^2} \sum_{t=2}^{T} \sum_{i} |0z_{t,i} - \mu_{t,i}|0_2^2 + \frac{1}{2\sigma_A^2} \sum_{g \le h} A_{gh}^2, \tag{24}$$

where $\mu_{t,i}$ is defined by the attractor dynamics in Equation (6). We assume flat priors for $(\alpha, \boldsymbol{\beta}, \delta)$, so there is no extra penalty term for them.

Point Estimation (MAP)

To address the risk of local optima, the estimation proceeds in three phases:

1. High-Dimensional Initialization (Stage 1): The model is first initialized in a higher latent dimension ($p = 3$) and optimized via SGD with momentum. This expanded space allows the nodes to move more easily during the initial exploration phase. This stage runs for a fixed schedule of 4,000 iterations.

2. Dimensionality Reduction (Stage 2): Because the CLSNA objective is highly nonconvex, a good initialization is important. We therefore first obtain provisional estimates of the latent positions in a slightly higher-dimensional space, with $Z_{\text{init}} \in \mathbb{R}^3$, during Stage 1. In this context, "learned latent positions" simply refers to the node coordinates estimated at the end of that first optimization stage. We then use Principal Component Analysis (PCA) to project those provisional coordinates from $\mathbb{R}^3$ into the target two-dimensional latent space, $\mathbb{R}^2$. The resulting PCA scores, together with the global parameters carried over from Stage 1, provide an informed starting point for Stage 2, which is then optimized using SGD for 4,000 additional iterations.
3. Refinement (Stage 3): The final point estimates are then refined using the Adam optimizer, an adaptive first-order stochastic optimization method (Kingma and Ba 2014). In this stage, we minimize the negative log-posterior $\mathcal{L}(\theta, Z)$ for a final 4,000 iterations.

During the SGD phases (Stages 1 & 2), stability is maintained through sign-based gradient updates for the global parameters θ. Specifically, the magnitude of the gradient is ignored, and updates are determined solely by the sign (direction) of the gradient to prevent exploding gradients during early optimization.

Uncertainty Quantification

Variance estimation is performed using a perturbation-based SGD procedure. Intuitively, we assess uncertainty in a parameter by asking how much the log-posterior declines when that parameter is nudged slightly away from its MAP value and the remaining parameters are then re-optimized. For a given parameter θ_m, let $(\theta^*, Z^*_{1:T})$ denote the MAP estimates. We then perturb θ_m by a small amount η and re-optimize the remaining parameters to obtain $(\theta^{(k)}, Z^{(k)}_{1:T})$. This comparison provides a local measure of curvature of the log-posterior around the optimum: if a small perturbation produces a large decline in fit, the parameter is estimated precisely; if the decline is small, the parameter is estimated with greater uncertainty. The variance is estimated as

$$\widehat{\text{Var}}(\theta_m \mid Y) = \frac{1}{2} \frac{\eta^2}{\log \pi(\theta^*, Z^*_{1:T} \mid Y_{1:T}) - \log \pi(\theta^{(k)}, Z^{(k)}_{1:T} \mid Y_{1:T})}. \tag{25}$$

See Pan et al. 2025 for details.

Appendix B3. Model Highlights

To accommodate the structural complexity of multiparty European systems, we implement several key covariates.

Model Covariates

The dyadic covariates $\mathbf{X}_{t,ij}$ are included in the equations for the log-odds of an edge. Specifically, for new entrants:

$$\text{logit}(p_{t,ij}) = \alpha - s(z_{t,i}, z_{t,j}) + \boldsymbol{\beta}^\top \mathbf{X}_{t,ij} \tag{2}$$

And for continuing ministers:

$$\text{logit}(p_{t,ij}) = \alpha + \delta Y_{t-1,ij} - s(z_{t,i}, z_{t,j}) + \boldsymbol{\beta}^\top \mathbf{X}_{t,ij} \tag{4}$$

Here, $\mathbf{X}_{t,ij}$ consists of the following variables:

1. Party Homophily (ϕ_{party}): An indicator function $\mathbb{I}(\text{party}_i = \text{party}_j)$ that equals 1 if ministers i and j belong to the exact same political party, and 0 otherwise.

2. Gender Homophily (ϕ_{gender}): An indicator function $\mathbb{I}(\text{gender}_i = \text{gender}_j)$ that equals 1 if ministers i and j identify with the same gender, and 0 otherwise.
3. Age Difference (Δ_{age}): A measure of the absolute age gap between ministers, defined as $|\text{birthyear}_i - \text{birthyear}_j|$.

It is important to note how we interpret the latent positions ($z_{t,i}$), with the inclusion of these explicit covariates.

First, there is a key difference in time dynamics. While the covariate coefficients (β) are static and remain constant across the entire observation period, the latent positions update at each time step t. Second, the latent positions act as a residual space. Because we explicitly control for observable, fixed factors like exact party affiliation, gender, and age gaps, the latent distances ($s(z_{t,i}, z_{t,j})$) capture the remaining unobserved affinity between ministers. In other words, the latent space represents the underlying ideological or social proximity between two people after factoring out the baseline fixed effects of their demographics and party labels.

Latent Structure: Symmetric Attraction Matrix

The coevolution of the latent space is governed by the attraction matrix A and the attractor functions. Unlike US-centric models that may assume a binary system, we adapt the attraction structure for a multi-party European landscape composed of three primary blocs: Left (L), Center (C), and Right (R). Thus, A is a 3×3 symmetric matrix:

$$A = \begin{pmatrix} A_{LL} & A_{LC} & A_{LR} \\ A_{LC} & A_{CC} & A_{CR} \\ A_{LR} & A_{CR} & A_{RR} \end{pmatrix} \tag{26}$$

where entry A_{gh} represents the force between group g and group h. A positive value indicates attraction (groups move closer), while a negative value indicates repulsion (groups move apart).

To constrain the parameter space and ensure the estimated forces represent robust structural signals rather than noise, we place a strong, independent zero-mean Gaussian prior (with variance $\sigma_A^2 = 1/8$) on the attraction matrix elements to induce shrinkage toward zero.

Appendix B4. Hyperparameters & Settings

Optimization Settings

The step sizes (λ) and momentum (β) vary by stage. A linear step size warmup is applied for the first 200 iterations of each stage.

Optimization Settings

The optimization routine requires stage-specific tuning parameters for the gradient updates. In particular, we use separate learning rates for the latent positions Z and the global parameters θ, and we use a momentum coefficient, denoted here by ρ to avoid confusion with the model coefficient vector β. These settings vary across stages of the estimation procedure, and a linear warmup is applied to the learning rates during the first 200 iterations of each stage to improve numerical stability.

Stopping Criterion & Perturbation

Optimization relies on a fixed schedule of iterations to ensure asymptotic stability. For variance estimation, the perturbation size η is adaptive. It is calculated as $\eta = \sigma_{rough} \times M$, where σ_{rough} is a preliminary rough estimate of the standard deviation and $M \in \{11.0, 13.0, 15.0\}$ is a multiplier used to ensure the perturbation escapes local basins.

Table 7. Optimization schedule and step sizes derived from source code.

Stage	Optimizer	Iterations	Step Size (Latent Z)	Step Size (Global θ)
1. High-Dim Init	SGD	4,000	0.005	0.02
2. Dimensionality Reduction	SGD	4,000	0.005	0.02
3. Refinement	Adam	4,000	0.001	0.005
Variance Est.	Adam	1,000	0.001	0.005

C1. Country-by-Country Interpretive Notes

While the main text emphasizes cross-national regularities, the case-level results add important substantive nuance. The country notes below connect the estimated CLSNA parameters to each country's coalition history and institutional setting. Their purpose is interpretive: they show how the model's estimates map onto concrete patterns of coalition management, bloc competition, and public discursive alignment.

C2. Belgium: Consociational Complexity with Cross-Bloc Fragmentation

Belgium's federal politics are built on layered linguistic and party families that often require broad governing bargains. The question is whether public communication among ministers exhibits coalescent dynamics between the left and center alongside fragmentation involving the main right actor.

The baseline terms indicate a structured and persistent environment. Party homophily is substantively positive ($\phi_{party} = 0.420$, SE = 0.109) and network inertia is strong ($\delta = 1.038$, SE = 0.058), indicating that co-hashtag ties are both party-organized and highly path dependent. The demographic covariates provide little additional structure: age difference is essentially null ($\Delta_{age} = -0.022$, SE = 0.079) and the same-gender effect is small ($\phi_{gender} = -0.068$, SE = 0.056).

The attraction–repulsion matrix shows broad cross-bloc separation rather than a coalescent left–center dynamic. The Left–Center term is slightly negative and close to zero ($A_{LC} = -0.043$, SE = 0.081), while both Center–Right ($A_{CR} = -0.129$, SE = 0.079) and Left–Right ($A_{LR} = -0.540$, SE = 0.087) are negative, with the largest cleavage between left and right. On the diagonals, within-left coalescence is modestly positive ($A_{LL} = 0.140$, SE = 0.083), within-right coalescence is near zero ($A_{RR} = 0.121$, SE = 0.093), and within-center coalescence is negative ($A_{CC} = -0.876$, SE = 0.130). In short, the public co-hashtag channel records fragmentation across blocs and does not exhibit the left–center coalescence that would be expected if consociational bargains translated into public discourse dynamics.

Substantively, Belgium's estimates point to fragmentation across coalition-relevant blocs over time, with especially strong movement apart between left and right. They do not indicate that observed discursive ties generate sustained left–center coalescence in this public channel. In terms of the hypotheses, H1 (Party Centrism) is confirmed, H2 (Inertia and Stability) is confirmed, H3 (Covariate Structuring) is rejected, H4 (Right Bloc Coalescence) is rejected, H5 (Centrist Brokerage) is rejected, and H6 (Discursive and Coalitional Isomorphism) receives limited support relative to the country's coalition record.

C3. Denmark: Internal Center Coalescence without Cross-Bloc Coalescence

Denmark has a long record of minority cabinets and cooperation across the spectrum. The model asks whether ministerial communication exhibits coalescent dynamics that could support both center–left and center–right arrangements over time.

On the baseline terms, party homophily is small ($\phi_{party} = 0.080$, SE = 0.070), while network inertia is clearly positive ($\delta = 0.908$, SE = 0.052), indicating substantial persistence in co-hashtag

ties even in the absence of strong within-party clustering. The covariates add limited additional structure. Age difference is negative and sizable relative to its uncertainty ($\Delta_{age} = -0.299$, SE = 0.077), consistent with a higher probability of ties among ministers closer in age, whereas the same-gender effect is close to zero ($\phi_{gender} = 0.059$, SE = 0.043).

The attraction–repulsion matrix indicates fragmentation through the center rather than coalescence across it. Left–Center interaction is negative ($A_{LC} = -0.313$, SE = 0.076) and Center–Right interaction is also negative ($A_{CR} = -0.398$, SE = 0.075), while Left–Right is essentially zero ($A_{LR} = 0.004$, SE = 0.086). On the diagonals, Denmark is distinctive for strong within-center coalescence ($A_{CC} = 0.802$, SE = 0.160), whereas within-left and within-right coalescence are near zero ($A_{LL} = -0.076$, SE = 0.090; $A_{RR} = 0.020$, SE = 0.093). In short, the center appears internally coalescent but does not generate coalescent dynamics with either flank in this public co-hashtag channel.

In terms of the hypotheses, H1 (Party Centrism) is rejected, H2 (Inertia and Stability) is confirmed, H3 (Covariate Structuring of Elite Communication) is partially confirmed, H4 (Right Bloc Coalescence) is rejected, H5 (Centrist Brokerage) is rejected, and H6 (Discursive and Coalitional Isomorphism) receives limited support relative to Denmark's history of both center–left and center–right governing arrangements.

C4. Iceland: Broad Coalition amid Cross-Bloc Fragmentation

Iceland has been governed since 2017 by a cabinet that spans the full ideological spectrum, joining the Left Green Movement, the Independence Party on the right, and the centrist Progressive Party. The question is whether public communication among ministers exhibits coalescent dynamics consistent with that cross-spectrum bargain.

On the baseline terms, the estimates are comparatively uncertain, but the main signals are familiar. Party homophily is positive but weakly identified ($\phi_{party} = 0.334$, SE = 0.270), and network inertia is positive ($\delta = 0.777$, SE = 0.234), indicating persistence in co-hashtag ties with wider uncertainty than in most other countries. The covariates provide little additional structure: age difference is positive but imprecise ($\Delta_{age} = 0.653$, SE = 0.342) and the same-gender effect is near zero ($\phi_{gender} = -0.030$, SE = 0.223).

The attraction–repulsion matrix does not indicate the coalescent dynamics one would expect under an ideologically broad coalition. Left–Right interaction is strongly negative ($A_{LR} = -0.970$, SE = 0.156) and Center–Right is also negative ($A_{CR} = -0.287$, SE = 0.228). Left–Center is negative as well ($A_{LC} = -0.334$, SE = 0.234). On the diagonals, within-bloc coalescence does not offset this pattern: Left–Left is negative ($A_{LL} = -0.241$, SE = 0.240), Right–Right is negative ($A_{RR} = -0.319$, SE = 0.130), and Center–Center is effectively zero ($A_{CC} = -0.000$, SE = 0.251). In short, the co-hashtag channel shows fragmentation across ideological blocs rather than coalescence among coalition-relevant pairings.

Taken together, these results suggest that Iceland's cross-spectrum cooperation is not expressed as systematic coalescence across blocs in this public communication network, or that the relevant coordination occurs in arenas that do not generate shared tagging. In terms of the hypotheses, H1 (Party Centrism) is rejected for Iceland, H2 (Inertia and Stability) is confirmed, H3 (Covariate Structuring) is rejected, H4 (Right Bloc Coalescence) is rejected, H5 (Centrist Brokerage) is rejected, and H6 (Discursive and Coalitional Isomorphism) receives limited support relative to the governing arrangement.

C5. Ireland: Stable Communication with Left–Center Coalescence

For most of the twentieth century Irish politics centered on the rivalry between Fianna Fáil and Fine Gael. Today those parties share power alongside a strengthened left opposition. The model asks

whether public communication among ministers exhibits coalescent dynamics that correspond to that history.

On the baseline terms, Ireland is the clear outlier on persistence. The inertia parameter is the largest in the sample ($\delta = 1.558$, SE = 0.123), indicating especially strong year-to-year carryover in co-hashtag ties. Party homophily is also substantively positive ($\phi_{party} = 0.431$, SE = 0.124), consistent with within-party clustering in this channel. The demographic covariates add little additional structure: age difference is modestly negative but uncertain ($\Delta_{age} = -0.104$, SE = 0.158) and the same-gender effect is near zero ($\phi_{gender} = -0.034$, SE = 0.113).

The attraction–repulsion matrix points in a direction that departs from Ireland's dominant center–right governing pattern. The Left–Center term is the only clearly positive cross-bloc estimate in the sample ($A_{LC} = 0.406$, SE = 0.167), whereas both Center–Right ($A_{CR} = -0.525$, SE = 0.128) and Left–Right ($A_{LR} = -1.219$, SE = 0.168) are negative, indicating fragmentation involving the right and especially strong left–right separation. On the diagonals, within-right coalescence is positive ($A_{RR} = 0.300$, SE = 0.083), while within-left coalescence is negative ($A_{LL} = -0.220$, SE = 0.156) and within-center coalescence is negative ($A_{CC} = -0.533$, SE = 0.252). In short, the discursive dynamics indicate movement together between the left and center while positioning the right apart from both.

These results portray a highly stable and party-organized communication environment in which the clearest cross-bloc coalescence runs left–center rather than center–right. In terms of the hypotheses, H1 (Party Centrism) is confirmed, H2 (Inertia and Stability) is confirmed, H3 (Covariate Structuring) is rejected, H4 (Right Bloc Coalescence) is confirmed, H5 (Centrist Brokerage) is rejected, and H6 (Discursive and Coalitional Isomorphism) receives limited support relative to Ireland's coalition record in this co-hashtag domain.

C6. The Netherlands: Pragmatism amid Fragmentary Coalition Dynamics

Dutch governments are known for pragmatic coalition making, often led by center–right combinations and, in an earlier period, by a left–right "purple" arrangement. The question is whether public communication among ministers exhibits coalescent dynamics consistent with those flexible pathways.

On the baseline terms, party homophily is substantively positive ($\phi_{party} = 0.357$, SE = 0.112) and network inertia is clearly positive ($\delta = 0.794$, SE = 0.086), indicating persistent ties and meaningful within-party clustering. Among the covariates, age difference is modestly negative ($\Delta_{age} = -0.137$, SE = 0.123), consistent with a slightly higher likelihood of ties among ministers closer in age, while the same-gender effect is small and near zero ($\phi_{gender} = -0.113$, SE = 0.078).

The attraction–repulsion matrix implies fragmentation over time across all coalition-relevant bloc pairings rather than coalescence along flexible governing pathways. Left–Center interaction is negative ($A_{LC} = -0.595$, SE = 0.179), Center–Right interaction is negative ($A_{CR} = -0.300$, SE = 0.125), and Left–Right interaction is also negative ($A_{LR} = -0.749$, SE = 0.148). These estimates indicate that observed ties across each of these pairings are associated with movement apart rather than movement together over time. On the diagonals, within-left coalescence is close to zero ($A_{LL} = 0.043$, SE = 0.178), within-right coalescence is mildly negative ($A_{RR} = -0.082$, SE = 0.118), and within-center coalescence is negative ($A_{CC} = -0.342$, SE = 0.164). In short, the co-hashtag channel does not reveal dynamic coalescence among blocs that have often been relevant for coalition formation; instead, it records fragmentation on both sides of the center and between the ideological extremes.

These estimates point to a communication environment that is party-organized and persistent, but in which the dynamic motion implied by observed ties is fragmentary across Left–Center, Center–Right, and Left–Right pairings over the period studied. Rather than reflecting the older image of stable pragmatic flexibility, these dynamics may be more consistent with increasingly difficult or deteriorating coalition-building conditions in the public communication domain. In

terms of the hypotheses, H1 (Party Centrism) is confirmed, H2 (Inertia and Stability) is confirmed, H3 (Covariate Structuring) is confirmed, H4 (Right Bloc Coalescence) is rejected, H5 (Centrist Brokerage) is rejected, and H6 (Discursive and Coalitional Isomorphism) receives limited support relative to the coalitions that have been feasible or common in practice.

C7. Norway: Alternation with Limited Cross-Bloc Coalescence

Norway frequently alternates between center–left and center–right combinations. The model evaluates whether public communication among ministers exhibits coalescent dynamics from the center to both sides.

The baseline results show weak party structuring and strong persistence. Party homophily is small ($\phi_{party} = 0.106$, SE = 0.080), while network inertia is clearly positive ($\delta = 0.787$, SE = 0.057), indicating substantial carryover in co-hashtag ties over time. The demographic covariates add limited additional structure. Age difference is negative and moderately sized ($\Delta_{age} = -0.184$, SE = 0.084), consistent with a slightly higher tie propensity among ministers closer in age, whereas the same-gender effect is near zero ($\phi_{gender} = 0.042$, SE = 0.051).

The attraction–repulsion matrix does not indicate strong cross-bloc coalescence through the center. Left–Center interaction is negative ($A_{LC} = -0.146$, SE = 0.099) and Center–Right is negative ($A_{CR} = -0.429$, SE = 0.078); Left–Right is also negative ($A_{LR} = -0.294$, SE = 0.088). The diagonals do not offset this pattern: within-left coalescence is negative ($A_{LL} = -0.689$, SE = 0.103), within-right coalescence is negative ($A_{RR} = -0.488$, SE = 0.113), and within-center coalescence is negative ($A_{CC} = -0.437$, SE = 0.110). In short, the co-hashtag channel records fragmentation on both sides of the center and little evidence that prior ties generate movement together across coalition-relevant blocs.

In terms of the hypotheses, H1 (Party Centrism) is rejected, H2 (Inertia and Stability) is confirmed, H3 (Covariate Structuring) is partially confirmed, H4 (Right Bloc Coalescence) is rejected, H5 (Centrist Brokerage) is rejected, and H6 (Discursive and Coalitional Isomorphism) receives limited support relative to Norway's alternating coalition practice in this co-hashtag domain.

C8. Sweden: Polarized Blocs and Reinforcing Fragmentation

Sweden is a clear case of bloc competition in public communication among ministers. The baseline terms fit that picture. Party homophily is substantively positive ($\phi_{party} = 0.173$, SE = 0.070) and network inertia is clearly positive ($\delta = 0.899$, SE = 0.054), indicating persistent ties alongside within-party clustering. The covariates do not add much structure: age difference is essentially null ($\Delta_{age} = -0.014$, SE = 0.076) and the same-gender effect is close to zero ($\phi_{gender} = 0.021$, SE = 0.046).

The attraction–repulsion matrix shows consistent cross-bloc fragmentation. Left–Right interaction is clearly negative ($A_{LR} = -0.597$, SE = 0.088), and both Left–Center and Center–Right are strongly negative ($A_{LC} = -1.130$, SE = 0.113; $A_{CR} = -1.260$, SE = 0.116). On the diagonals, within-right coalescence is the strongest signal ($A_{RR} = 0.957$, SE = 0.117), within-left coalescence is also positive ($A_{LL} = 0.239$, SE = 0.062), and within-center coalescence is near zero ($A_{CC} = 0.065$, SE = 0.206). In other words, ministers cluster within the ideological extremes while cross-bloc ties are associated with movement apart over time, with the sharpest fragmentation involving the center and the right.

These estimates are consistent with Sweden's polarized party system, but the interpretation should be dynamic rather than static. The combination of positive party homophily and strong network inertia indicates that Sweden's public communication environment is party-organized and persistent. More importantly, the attraction–repulsion matrix implies that, conditional on prior ties, cross-bloc pairings tend to move farther apart over time in latent space, especially those involving the center and the right, whereas ties within the right bloc tend to generate movement toward one another. In that sense, the Swedish case is best understood as one of reinforcing discursive polarization: public ties

do not open cross-bloc corridors, but instead reproduce and intensify bloc separation over time. In terms of the hypotheses, H1 (Party Centrism) is confirmed, H2 (Inertia and Stability) is confirmed, H3 (Covariate Structuring) is rejected, H4 (Right Bloc Coalescence) is confirmed, H5 (Centrist Brokerage) is rejected, and H6 (Discursive and Coalitional Isomorphism) receives its strongest support in Sweden because the estimated dynamics most clearly mirror a coalition environment in which cross-bloc public alignment is difficult and within-right consolidation is especially pronounced.

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