

Beyond the Assembly: Estimating Multidimensional Foreign Policy Preferences from Multi-Modal Data

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Prepared for the 2021 Lussier Conference for Graduate Research on International Conflict

Thanks for letting me join your conflict conference

As you'll notice, not typical conflict paper, rather it has evolved first and foremost as methods paper, but my hope is that if even if the paper itself does not make contribution to conflict, as a tool it can be useful to conflict researchers

First draft, excited for feed back

Also, thanks to Prof. Erik Voeten for taking time to read and discuss my paper, no better qualified discussant. I am grateful

The UN General Assembly and Foreign Policy Preferences

- Measures of foreign policy preferences based on United Nations General Assembly (UNGA) votes are ubiquitous in IR (Ball, 1951; Lijphart, 1963; Moon, 1985; Vengroff, 1976; Russett, 1966)



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stable — Liberal West versus the rest dimension is consistent, explains most voting patterns

well-validated — associated with regime changes, predicts conflict, picks up major shifts in foreign policy preferences; scholars agree on it

We can only learn to the extent that the model and data let us. There's a trade-off between model complexity and reliability/stability. UNGA represents but one forum in which countries express preferences — recurring agenda items, IO fragmentation and delegation of tasks to other bodies

Countries express a rich set of preferences on issues beyond the assembly

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- Pros:
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- Cons:
 - model-constrained
 - data-constrained



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Motivation & Aims

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- Use of UNGA votes often a case of satisficing
- We want a reliable measure of foreign policy preferences with BSV's characteristics (dynamic, stable, validated)
- Does one size fit all?

Examples¹:

- Proximity of geopolitical interests (Thacker, 1999; Oatley and Yackee, 2004; Barro and Lee, 2005; Nelson, 2014)
- (Dis)satisfaction with US-led international order (Liao and McDowell, 2016)
- UNGA human rights votes as preference convergence w. China Flores-Macías and Kreps, 2013

- Can we do better?

A one-dimensional measure based on UNGA roll calls might capture each of these desired variables, but also many extraneous things as well.

One-dimensional model dominated by West vs. rest, but also includes Global North-South, and Palestine-Israel splits

Any time a researcher wants to measure foreign policy preferences this is the go-to measure even though we know preferences are not unidimensional

¹Not all these use BSV measures, but rather some measure based on UNGA votes

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 - agnostic about data* and dimensions
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- I utilize non-parametric beta process priors (Knowles and Ghahramani, [2011](#); McAlister, [2020](#)) and extended rank likelihood (Hoff, [2007](#); Murray et al., [2013](#)) to build a multidimensional factor analysis model that generalizes to multi-modal data

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- Hence, **multi-modal beta process factor analysis** ($_{mm}BPFA$)

Outline

Motivation & Aims

Model

Validation

UNGA Votes and UPR Statements

Moving Forward

Model

Basic IRT Model

Let $i \in [1, \dots, N]$ denote individuals, $\nu \in [1, \dots, P]$ denote votes, and $t \in [1, \dots, T]$ denote time periods. Then we have a dynamic IRT given by:

$$X_{it\nu} = \lambda_\nu \omega_{it} - \alpha_\nu + \epsilon_{it\nu}$$
$$\epsilon \sim \mathcal{N}(0, 1)$$

- $X_{it\nu}$ is individual i 's latent preference for vote ν at time t
- λ_ν is vote ν 's "discriminatory" effect
- ω_{it} is individual i 's ideal point at time t
- α_ν is vote ν 's (scaled) difficulty

The item difficulty parameter is optional.

In the dynamic version, ideal points are linked over time by using ideal points from previous period as priors for this period. Helps smooth out estimates over time.

Assumes one dimension, i.e. each vote only has one discrimination parameter and each individual only has one ideal point per time period.

Backed by fact that one dimension usually explains most variation in a data set, but not always true.

Can be extended to multiple dimensions but then you have to fix this value *a priori*.
What if you don't know?

Basic IRT Model

Continuous, latent preferences X must be connected with discrete, observed data (vote choice) somehow. Usually:

$$Y_{itv} = \begin{cases} \text{yea} & \text{if } X_{itv} < \gamma_{1v} \\ \text{abstain} & \text{if } \gamma_{1v} < X_{itv} < \gamma_{2v} \\ \text{nay} & \text{if } X_{itv} > \gamma_{2v} \end{cases}$$

- γ_{cv} are cut points
- The number of cut points c is the number of outcomes less one

In other words, when the latent preference is less than the lower cut point γ_{1v} , we observe a yea vote, abstain when it falls between the two cut points, and nay when it is above the upper cut point γ_{2v} .

Here we have 3 outcomes, so there will be 2 cut points

Cut points must be estimated individually, so for prohibitive for ordinal outcomes with many choices, counts, continuous, etc.

mmBPFA

- I extend the basic IRT with two adjustments

Theoretically, there's an infinite number of possible dimensions, but finite amount only ever realized

Basically, it looks at the first vote and decides how many dimensions it needs to explain variation in behavior, then assigns vote to those dimensions. Say 2 dimensions needed. Then second vote comes in and it looks to see whether the currently active dimensions can explain sufficiently well, and assign it to best dimension. If not, new dimension added.

Happy to chat more in Q/A or privately after talk

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- I extend the basic IRT with two adjustments

First allow for infinite dimensionality, but induce sparsity with **beta process prior** (Knowles and Ghahramani, 2011; McAlister, 2020) z_ν :

$$X_{i\nu} = (z_\nu \odot \lambda_\nu) \omega_i - \alpha_\nu + \epsilon_{i\nu}$$

$$\epsilon \sim \mathcal{TN}(0, 1, x_{i\nu}^l, x_{i\nu}^u)$$

$$z_\nu \sim \text{Bern}(\pi_{\nu k})$$

$$\pi_{\nu k} \sim \text{Beta}\left(\frac{a}{K^+}, b(1 - \frac{1}{K^+})\right)$$

- \mathbf{Z} is a $\nu \times K^+$ matrix of 0s and 1s where K^+ is the number of active dimensions

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$$X_{i\nu} = (\textcolor{blue}{z}_\nu \odot \lambda_\nu) \omega_i - \alpha_\nu + \epsilon_{i\nu}$$

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- Nice properties:

- Will learn “true” number of dimension
- dimensionality allowed to grow with the data

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Rather than using cut points, connect latent preferences to observed data via **extended rank likelihood** (Hoff, 2007; Murray et al., 2013)

$$X_{itv} = (z_v \odot \lambda_v) \omega_{it} - \alpha_v + \epsilon_{iv}$$
$$\epsilon \sim \mathcal{TN}(0, 1, x_{iv}^l, x_{iv}^u)$$

y_v	x_v
0	-0.316
0	0.178
0	0.124
1	0.783
-2	-1.748
-1	-0.652
-1	-0.682
-1	-1.412
-1	-0.775
-1	-0.768

Take advantage of the fact that a weak ordering is must be preserved when moving back and forth between latent and observed spaces

Pretend on a given item we observe values of -2, -1, 0, and 1. To get lower and upper cutpoints for all -1 values, we can use the maximum of the -2 values and the minimum of 0, respectively.

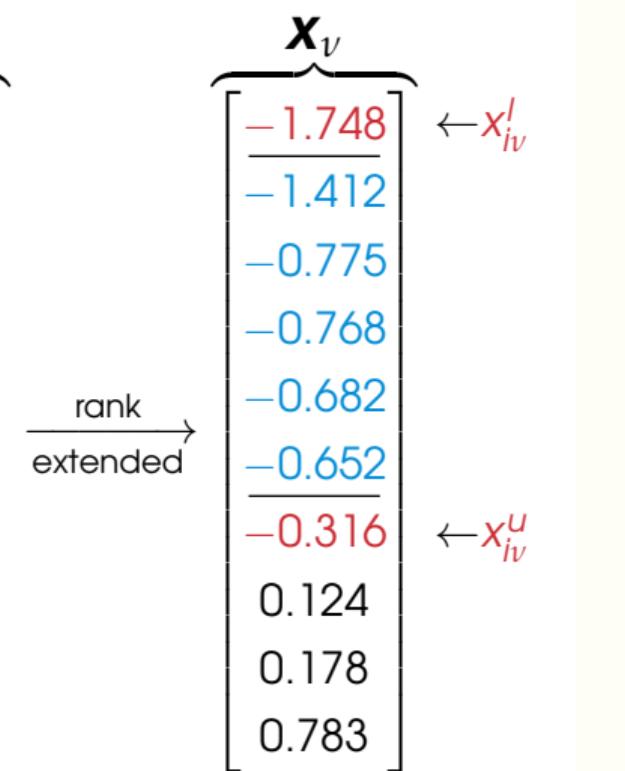
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$$\begin{aligned} X_{itv} &= (z_v \odot \lambda_v) \omega_{it} - \alpha_v + \epsilon_{iv} \\ \epsilon &\sim \mathcal{T}\mathcal{N}(0, 1, x_{iv}^l, x_{iv}^u) \end{aligned}$$

- Infer cut points from data:

$$\text{Lower bound } x_{iv}^l = \max\{x_{i'v} : y_{i'v} < y_{iv}\}$$

$$\text{Upper bound } x_{iv}^u = \min\{x_{i'v} : y_{i'v} > y_{iv}\}$$



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Validation

Dimensionality of UNGA Voting

Median number across sessions is three, but lower bound of 1/2 most sessions.
This corroborates Bailey and Voeten 2018

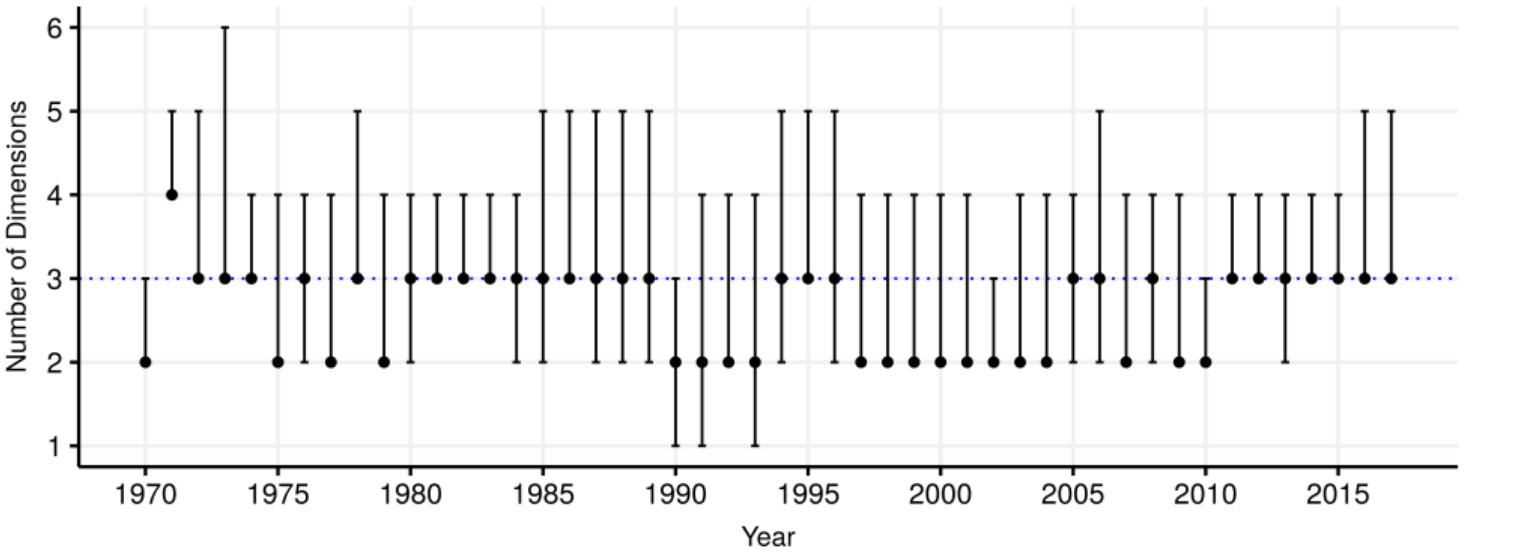
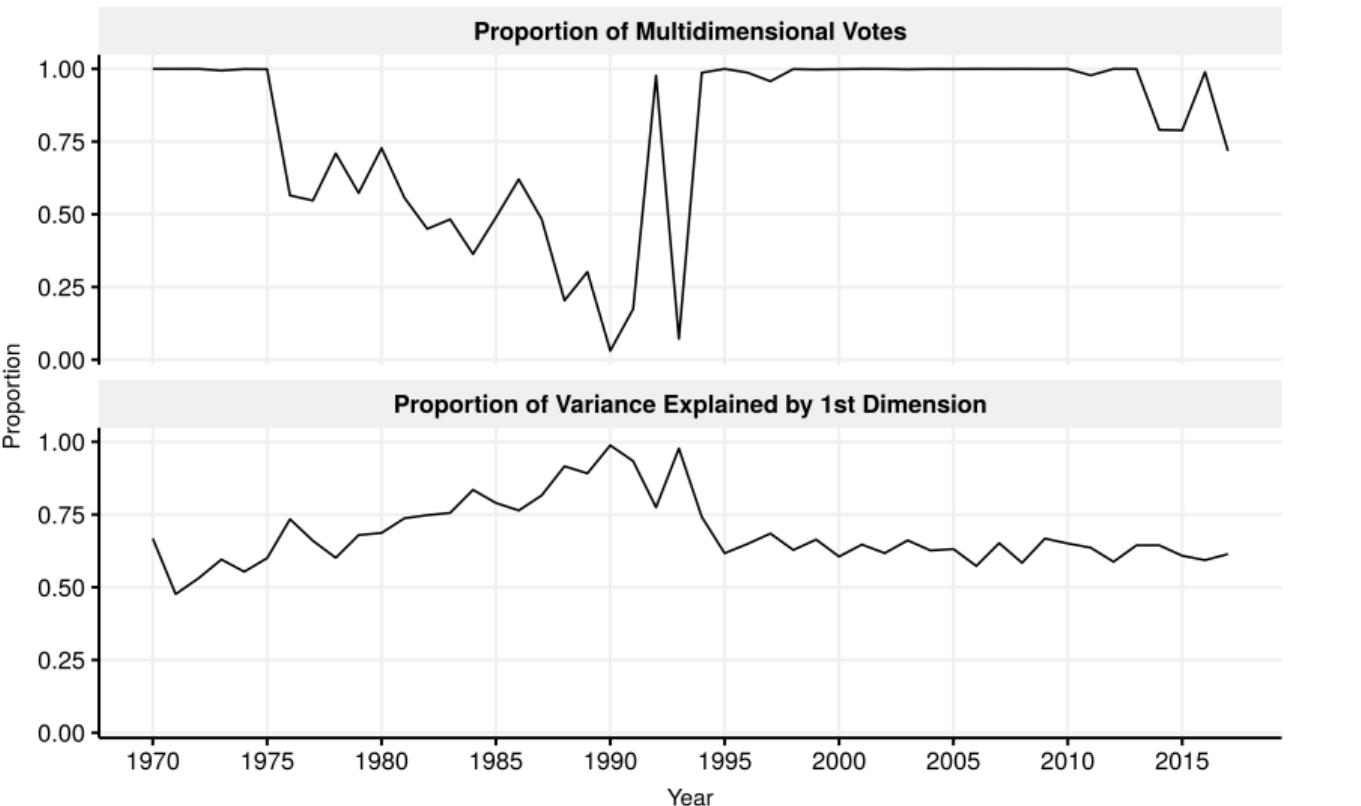


Figure: Dimensionality of the 25th–72nd UN General Assembly. Points indicate the median posterior number of dimensions mmBPFA found after burn-in. Bars represent 95% HPD intervals. The median number of dimensions across sessions is 3, indicated by the blue dotted-line.

Importance of Multidimensionality in UNGA Voting



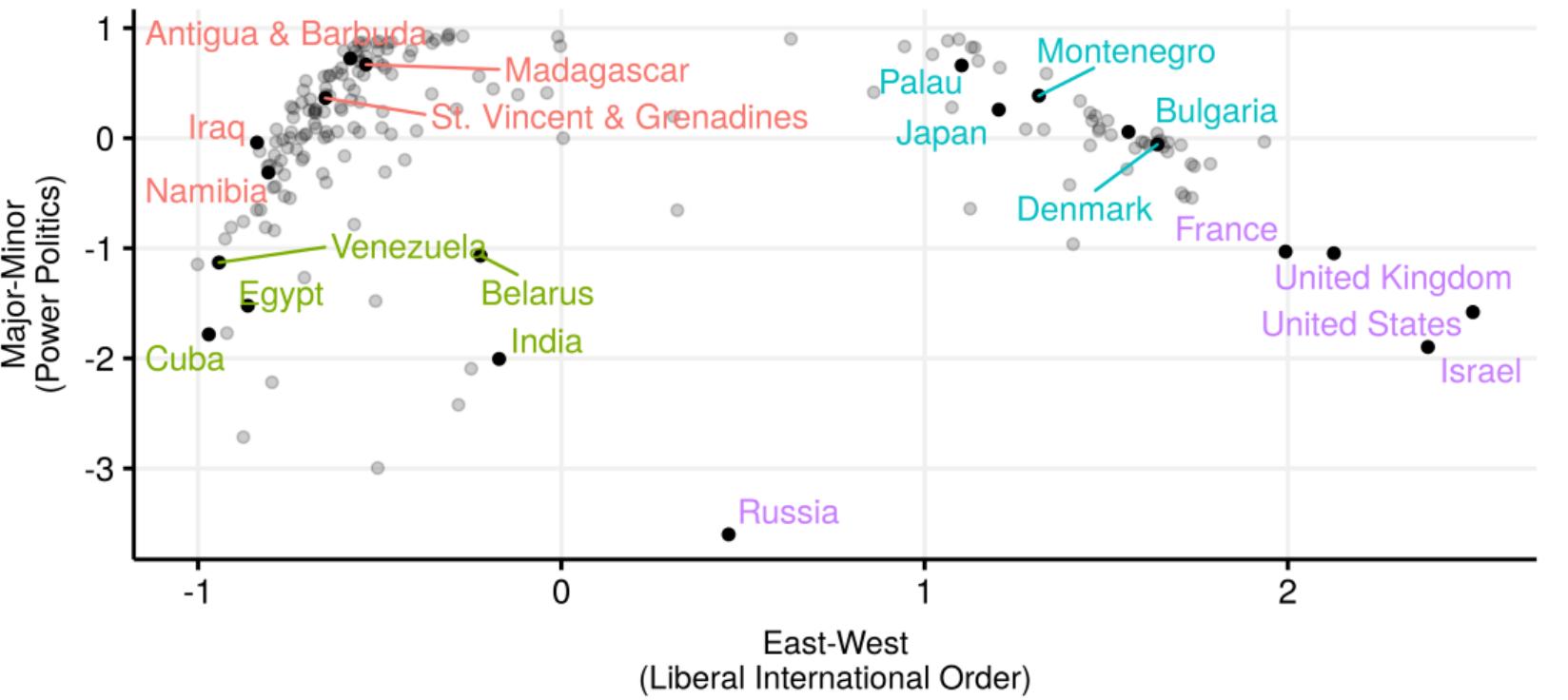
Just because we find higher dimensions, doesn't mean they are that important. For instance, in American Congress we know that the first dimension explains a voting behavior on a majority of bills, with certain exceptions.

Top panel shows prop. of multidimensional votes over time. Bottom panel shows prop. of variance explain by the first dimensions. As we can see as the Cold War progresses, the UNGA became increasingly unidimensional, but that follows period in 60-70s where the Non-aligned movement leads to a strong second dimension

Following Cold War, we're back to multidimensional voting.

PVE shows the relative importance of higher dimensions vis-a-vis the first dimension. Following Cold War, higher dimensions consistently account for 40% of voting patterns

Model Interpretation



Session 70

Scatter plot of first versus second dimension

First dim west-versus-rest, we see long tail of US and close allies on one Pole and most the rest of the world occupying other pole

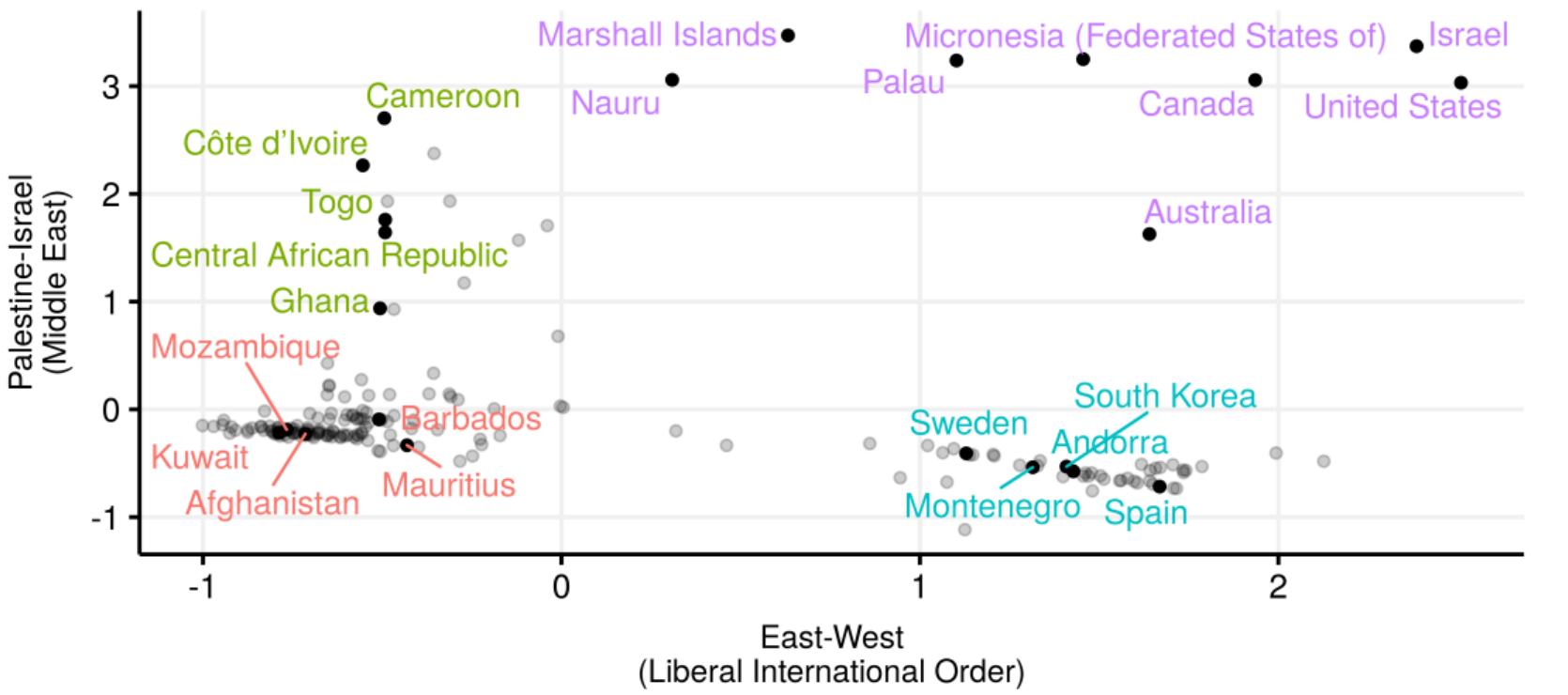
Second dimension coined as Major-Minor power, Bailey and Voeten have called this a more of a North-South division, but based on the highly discriminatory resolutions and ideal points, it appears concerns about protecting sovereignty and military development really behavior.

Moreover, as we move down, many countries are either current or one-time aspiring regional powers that have employed military force or gone to war with neighbors.

Model Interpretation

▶ Example

Third dimension is a Palestine-Israel split, we see most countries actually closer to zero, but Israel's closest allies are driving almost all the action here, voting along with Israel and against resolutions counter to Israel's interests



UNGA Votes and UPR Statements

Universal Periodic Review

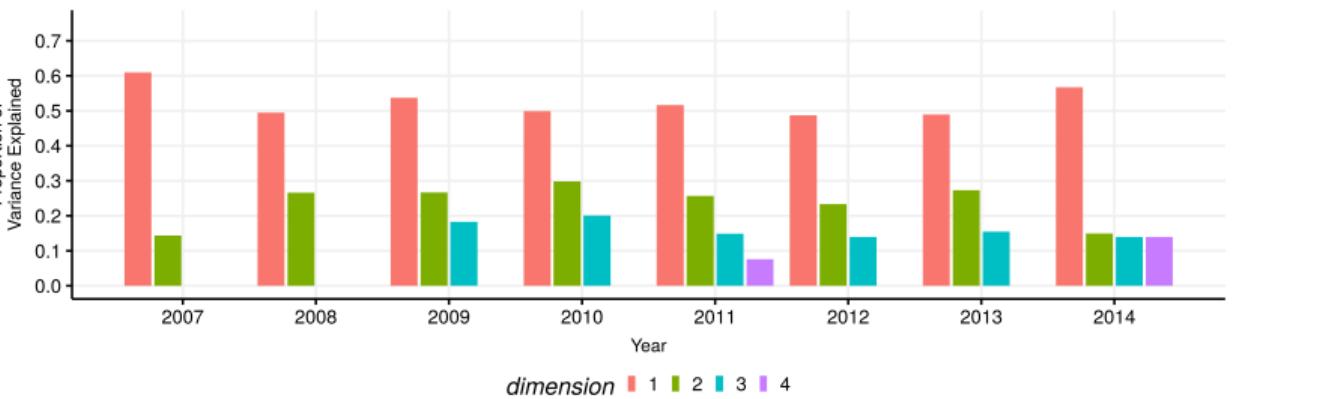
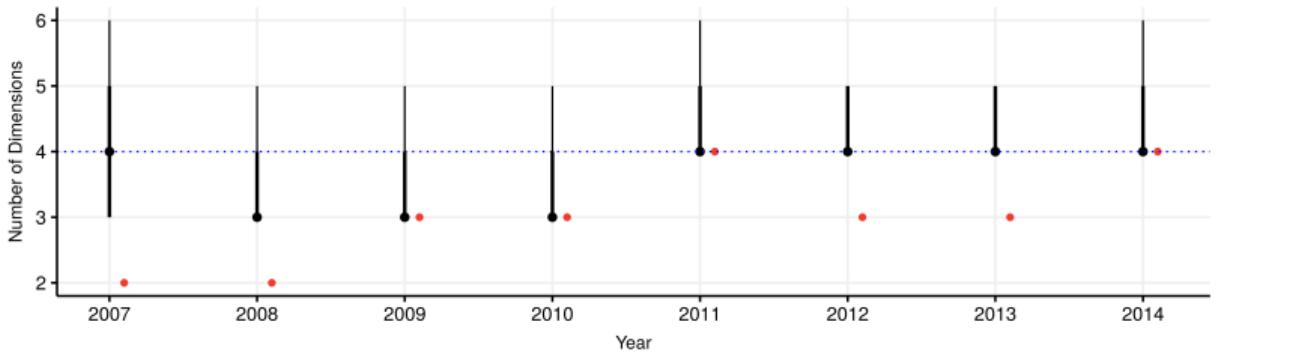
- Conducted by the UN Human Rights Council, the UPR is a mechanism to regularly analyze the human rights practices of member states
- 47 member UPR Working Group meets three times yearly to review 14-16 countries
- Relies on peer review: member states and permanent observers may opt to issue recommendations for improvements
- Recommendations categorized into 47 different topics and recorded by Reviewer-Reviewee dyad (UPR Info)
- Data from Terman and Voeten ([2018](#))

I use the first 20 sessions of the UPR

Combine with UNGA session, since there's not directly overlap, I match UPR session with contemporaneous UNGA session, then aggregated topic counts by reviewer

Obviously, there is concern that the counts do not reflect genuine preferences since we know countries select into reviewing allies/adversaries, severity of criticism influenced by strategic interests

Dimensionality of Votes-UPR



Identifying Dimensions

1. Socioeconomic vs Political/Civil Liberty Human Rights

- highly correlated with West-vs-Rest
- influenced more by human rights resolutions

Unidirectional means that dimension is driven by "positive" or "negative" agenda-setting wherein there is a set of issues that countries advocate or are against, but no substitute issues on the other end of the dimension.

Countries that are not emphasizing race, social justice, and Minorities are not emphasizing some other set of human rights issues instead.

Fourth dim. explained by voting for weapons control resolutions at one pole, while avoiding references to public security, poverty, and development in UPR statements at the other.

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4. Economic and Military Development

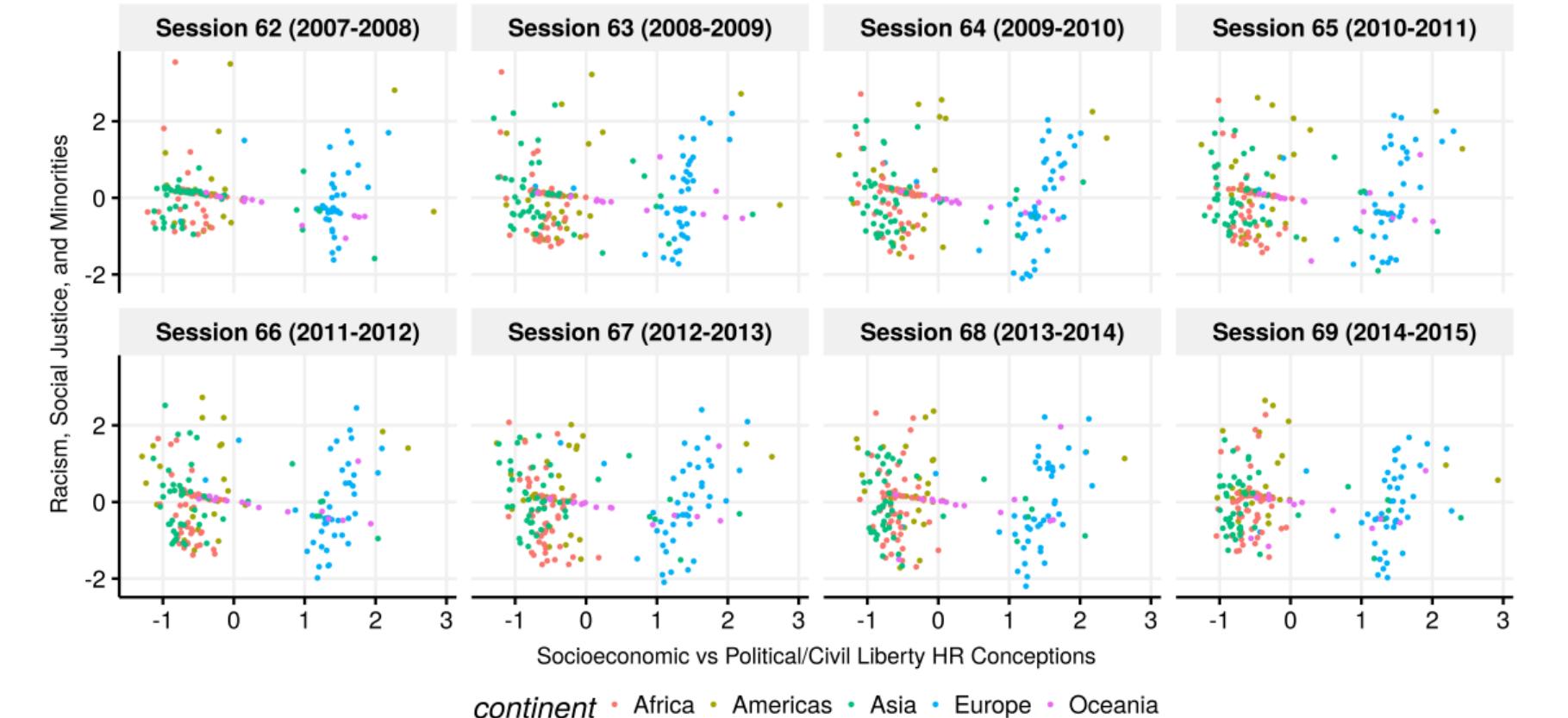
- difficult to pin down
- could be driven by underdeveloped, conflict-ridden countries

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Dimension One versus Two



Race, Social Justice, and Minorities

- Which countries drive attention to issue?
 - Latin America (MEX, BRA, URY, CHL, ARG)
 - Europe (ESP, FRA, NOR, SVN)
 - North America (CAN)
 - Africa (DZA, EGY, TUN)

Countries that most consistently avoid any reference to these issues are Eastern European and Balkan countries.

Might be interesting to see how ideal points on this dimension respond to changes in administrations. For instance, in Brazil under Bolsonaro you might expect a regression towards 0 given his administration's class/race-based populist platform.

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- Which countries avoid the issue?
 - Europe (LVA, SVK, POL, GRC, MDA, ISL, SRB, BGR, ALB, EST, ROU)
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- Jockeying likely due to review agenda

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Moving Forward

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- mmBPFA achieves similar results to BSV with less constraints
- At least 3 dimensions in roll call votes since 1975, second and third more fleeting
- Higher dimensions appear only when critical in explaining country preferences
- Human Rights contested along two dimensions
- Extensible to other data combinations
 - Beta version available at github.com/EandrewJones/mmBPFA
 - Careful validation prior to using higher order ideal points as IV/DV

Next Steps

- Model improvements:

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- Two papers

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Generative Model

$$P(x_{ij} | \text{---}) \sim \begin{cases} \mathcal{T}\mathcal{N}_{x_{ij}^l, x_{ij}^u}((\mathbf{z}_j \odot \boldsymbol{\lambda}_j)^\top \boldsymbol{\omega}_i - \boldsymbol{\alpha}_j, 1) & \text{if } y_{ij} \text{ is observed} \\ \mathcal{N}((\mathbf{z}_j \odot \boldsymbol{\lambda}_j)^\top \boldsymbol{\omega}_i - \boldsymbol{\alpha}_j, 1) & \text{if } y_{ij} \text{ is missing} \end{cases}$$

$$P(\boldsymbol{\Omega}_i) \sim \mathcal{N}_K(\mathbf{0}, \mathbf{I}_K)$$

$$P(\lambda_{jk} | z_{jk}, \gamma_k^{-1}) \sim z_{jk} \mathcal{N}_P(0, \gamma_k^{-1}) + (1 - z_{jk}) \delta_0$$

$$P(z_{jk} | \pi_{jk}) \sim \text{Bern}(\pi_{jk})$$

$$P(\pi_{jk} | a, b, K^+) \sim \text{Beta}(\frac{a}{K^+}, b(1 - \frac{1}{K^+})) \quad (1)$$

$$P(a | b, K^+) \sim \text{Gamma}\left(e + K^+, f + b \sum_{j=1}^P \frac{1}{b+j-1}\right)$$

$$P(b) \sim \text{Gamma}(2, 1)$$

$$P(\gamma_k) \sim \text{Gamma}\left(c + \frac{m_k}{2}, d + \sum_{j=1}^p \lambda_{jk}^2\right)$$

where x_{ij}^l and x_{ij}^u are the lower and upper bounds for the ij^{th} value based on the extended rank likelihood partial ordering, K^+ is the number of active features, and c, d, e and f are tunable hyperparameters.

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Lagged-Ideal Point versus Issue Proportion Regressions

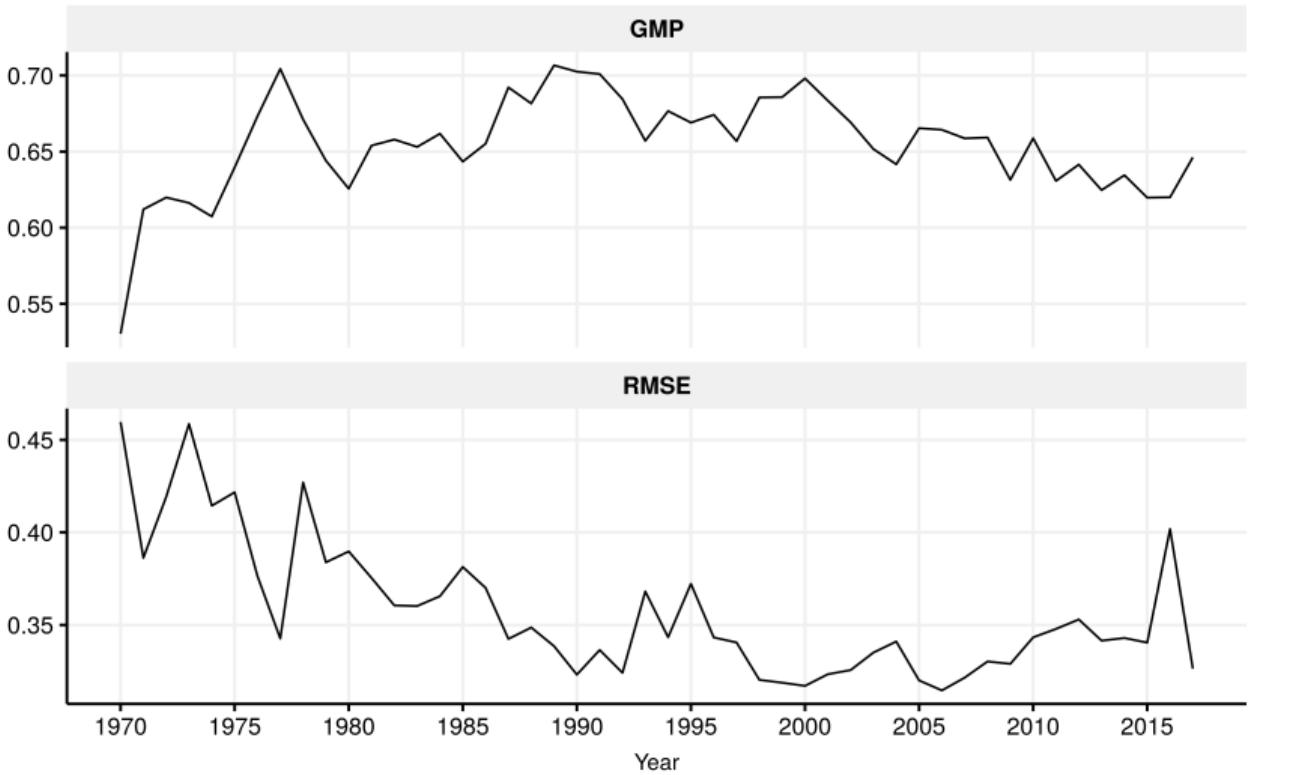
	(1) Issue Prop.	(2) Issue Prop. Δ
Lagged-Dependent Variable	0.804*** (0.020)	0.804*** (0.020)
Middle East	-0.026 (0.090)	-0.062 (0.112)
Nuclear	-0.005 (0.153)	0.024 (0.117)
Disarmament	0.015 (0.175)	0.018 (0.172)
Human Rights	0.011 (0.107)	0.003 (0.206)
Colonialism	-0.007 (0.201)	-0.005 (0.120)
Economic	-0.016 (0.108)	-0.013 (0.214)
Observations	8,052	8,052
R ²	0.6417	0.6418
Adjusted R ²	0.6414	0.6414

One-way (country) standard-errors in parentheses
Signif. Codes: ***: 0.01, **: 0.05, *: 0.1

Regress ideal points on lagged ideal points as well as issue proportions and changes in issue proportions

Despite not using any of BSV techniques such as bridging resolutions or dynamic priors, agenda shifts do not influence estimates and ideal points actually quite stable from session to session

Accuracy



Model Interpretation

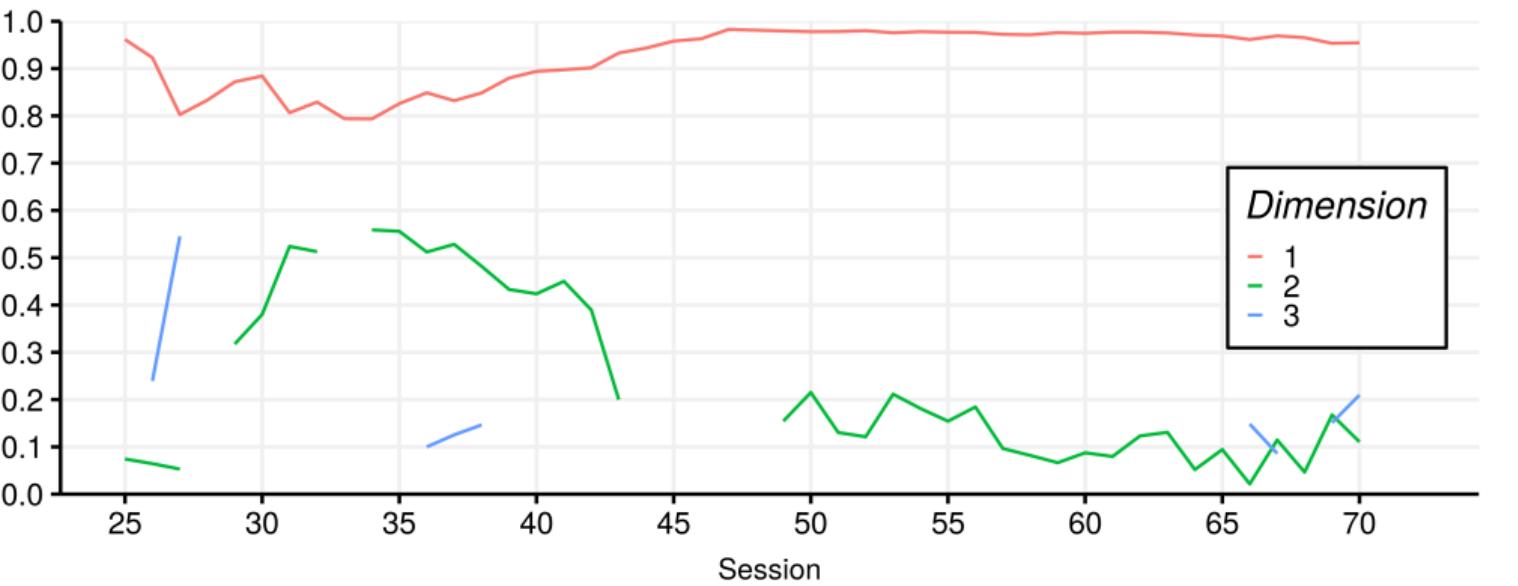
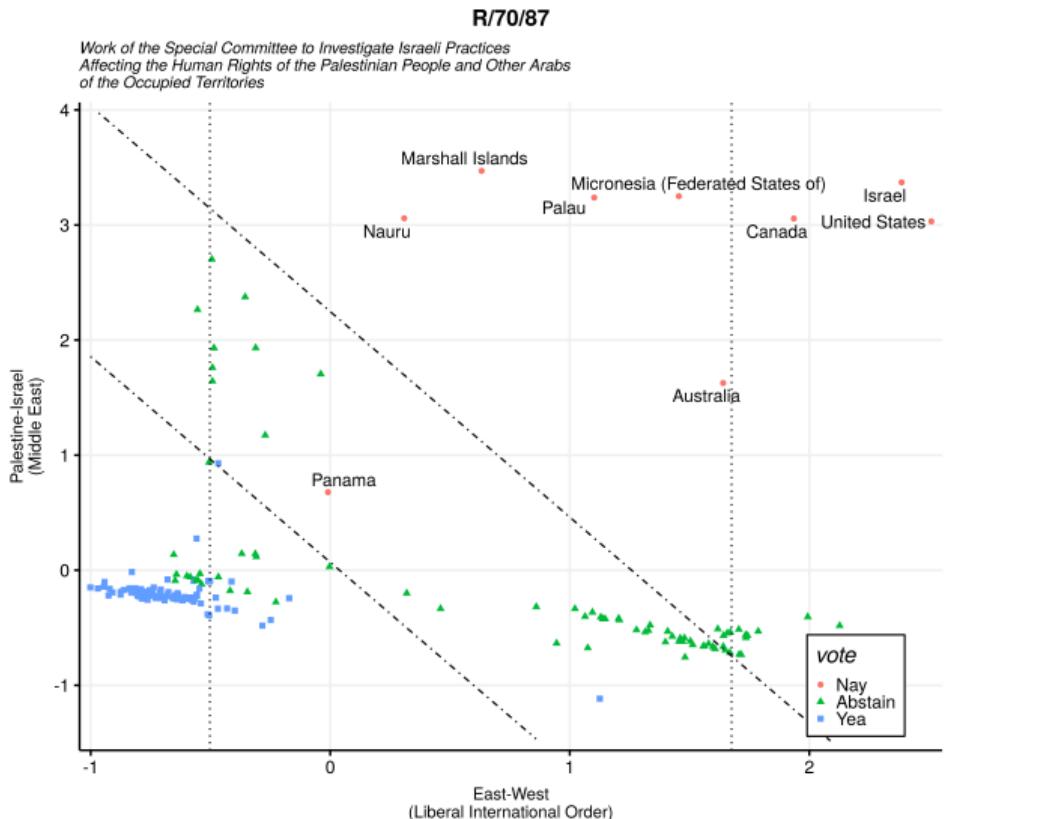


Figure: Correlation between mmBPFA Ideal Points and 1st Dimension of BSV

Model Interpretation

Cutpoints votes for Resolution 70/87 calling for special human rights investigation into Israel practices in Palestine.



- On votes/issues where higher dimensions appear, they should not be ignored
- mmBPFA under-determines importance of Israel-Palestine dimension
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