Macrointerest Across Countries

December 04, 2024

Supplementary material

A Survey Items Used to Estimate Macrointerest

National and cross-national surveys have often included questions tapping interest in politics over the past four decades, but the resulting data are both sparse, that is, unavailable for many countries and years, and incomparable, generated by many different survey items. In all, we identified 54 such survey items that were asked in no fewer than five country-years in countries surveyed at least twice; these items were drawn from 396 different survey datasets. These items are listed in Table A1 below, along with the dispersion (α) and difficulty (β) scores estimated for each from the DCPO model. Lower values of dispersion indicate questions that better identify publics with a higher level of trust from those with lower. Items have one less difficulty score than the number of response categories.

In accordance with the advice offered by Hu, Tai, and Solt (2022) to avoid data-entry errors by automating data collection, the `DCPOtools` R package (Solt, Hu, and Tai 2019) was used to compile the responses to these questions. The current version of the software facilitates the entire practical data generation process: from facilitating the acquisition of original survey datasets and converting them into R standard format for quicker loading; through standardizing country names, identifying survey years, and extracting the desired survey items; to restructuring the resulting data for analysis with the DCPO model. The primary objective is to limit manual interventions, thereby maximizing reproducibility and reducing the error potential inherent in human-operated data preparation tasks. The survey dataset codes listed in Table A1 correspond to those used in that package; Table **??** lists the codes of each individual survey with the citation of each dataset.

Together, the survey items in the source data were asked in 127 different countries in at least two time points over 41 years, from 1982 to 2023, yielding a total of 2,738 country-year-item observations.[1] The number of items observed in the source data for each country-year is plotted in Figures A1 and A2 below. The macrointerest scores of country-years with more observed items are likely to be estimated more precisely. The estimates for country-years with fewer (or no) observed items rely more heavily (or entirely) on the random-walk prior and are therefore less certain.

[1] A few surveys—`ees1989`, `issp1990`, and `evs_combo`—include Northern Ireland but do not provide a sampling weight to include those respondents in the United Kingdom as a whole. For clarity, we removed them from the estimation. The estimated trends and conclusions do not change by including or excluding the small amount of data on Northern Ireland.

Table A1: Survey Items Used to Estimate Macrointerest

Survey Item Code	Country-Years	Question Text	Response Categories	Dispersion	Difficulties	Survey Dataset Codes*
int4__wvs	282	How interested would you say you are in politics?	1 Very interested / 2 Somewhat interested / 3 Not very interested / 4 Not at all interested	0.70	-0.57, 0.83, 2.64	wvs
int4__lb	263	How interested are you in politics?	1 Very interested / 2 Fairly interested / 3 A little interested / 4 Not at all interested	1.02	-0.75, 1.15, 3.13	lb
int4__ess	256	How interested are you in politics?	1 Very interested / 2 Quite interested / 3 Hardly interested / 4 Not at all interested	0.63	-0.39, 1.00, 2.62	ess, ress
int4__amb	190	How interested are you in politics?	1 A lot / 2 Some / 3 Little / 4 None	1.09	-1.04, 0.96, 2.95	amb
eu4__eb	168	Would you say that you are very interested, fairly interested, not very interested or not at all interested in European affairs?	1 Very interested / 2 Fairly interested / 3 Not very interested / 4 Not at all interested	0.70	-0.81, 0.76, 2.85	eb
int4__evs	130	How interested would you say you are in politics?	1 Very interested / 2 Somewhat interested / 3 Not very interested / 4 Not at all interested	0.99	-0.76, 0.93, 3.18	evs
int3__eb	126	Let us talk about those issues in the news which interest you. For each issue I read out, tell me if you are very interested, moderately interested or not at all interested in it. Politics	1 Very interesting / 2 Moderately interesting / 3 Not at all interesting	0.81	-0.36, 1.98	eb
int4__ees	116	To what extent would you say you are interested in politics?	1 A great deal / 2 To some extent / 3 Not much / 4 Not at all	0.45	-0.41, 0.78, 2.10	ees
int4__issp	106	How interested would you say you personally are in politics?	1 Very interested / 2 Fairly interested / 3 Not very interested / 4 Not at all interested	0.62	-0.54, 0.90, 2.63	issp
int5__issp	101	How interested would you say you personally are in politics?	1 Very interested / 2 Fairly interested / 3 Somewhat interested / 4 Not very interested / 5 Not at all interested	0.70	-0.89, 0.35, 1.61, 3.02	issp
int4__afrob	100	How interested are you in politics and government?	1 Very interested / 2 Somewhat interested / 3 Now and then / 4 Not interested	0.58	-0.84, 0.35, 1.98	afrob
int4__eb	74	To what extent would you say you are interested in politics?	1 A great deal / 2 To some extent / 3 Not much / 4 Not at all	0.76	-0.61, 0.94, 2.74	eb
int4__asianb	63	How interested would you say you are in politics?	1 Not at all interested / 2 A little interested / 3 Somewhat interested / 4 Very interested	0.76	-0.57, 0.96, 2.93	asianb, sasianb
int2__eb	59	What sort of things in life interest you a lot? I am going to show you a list of things. which of these really interest you? Politics in [country]	1 Mentioned / 2 Not mentioned	1.32	2.46	eb

Table A1: Survey Items Used to Estimate Macrointerest *(continued)*

Survey Item Code	Country-Years	Question Text	Response Categories	Dispersion	Difficulties	Survey Dataset Codes*
int2c__eb	52	For each of the following propositions, please tell me if it rather corresponds or rather does not correspond to your attitude or your opinion. You are very interested in politics	1 Yes, rather / 2 No, rather does not	1.36	1.05	eb, feb
int4__cnep	49	Would you say that you are very, somewhat, not very or not at all interested in politics?	0 Not at all interested / 1 Not very interested / 2 Somewhat interested / 3 Very interested	0.59	-0.61, 0.77, 2.38	cnep
int4__arabb	35	Generally speaking, how interested would you say you are in politics?	1 Very interested / 2 Interested / 3 Little interested / 4 Not interested	0.58	-0.06, 1.29, 2.75	arabb
int4__neb	31	How interested are you in politics?	1 Very interested / 2 Somewhat interested / 3 Not very interested / 4 Not at all interested	1.03	-0.57, 1.24, 3.60	neb
int5__bsa	30	How much interest do you have in politics?	1 A great deal / 2 Quite a lot / 3 Some / 4 Not very much / 5 Not at all	1.21	-1.93, -0.02, 1.87, 3.88	bsa
dom4__eb	29	Would you say that you are very interested, fairly interested, not very interested or not at all interested in domestic affairs?	1 Very interested / 2 Fairly interested / 3 Not very interested / 4 Not at all interested	0.47	-0.93, 0.25, 1.80	eb
int2a__eb	28	Please tell me if you are fairly interested or not in each of the following topics? Politics	1 Interested / 2 Not interested	0.92	0.88	cceb, eb
int4a__eb	28	To what extent do the following topics interest you? Would you say you are very interested, fairly interested, not very interested or not at all interested in ...? Politics and economics in	1 Very interested / 2 Fairly interested / 3 Not very interested / 4 Not at all interested	0.82	-1.36, 0.27, 2.19	cceb, eb
int2b__eb	27	In which of the following news related issues are you most interested in...? Politics	0 Not mentioned / 1 Mentioned	0.90	1.37	eb
eu4a__eb	27	Some people follow what's going on in European Union politics, whether there's an election going on or not. Others aren't that interested. Would you say you follow what's going on in European Union politics:	1 Most of the time / 2 From time to time / 3 Rarely / 4 Never or almost never	1.21	-1.86, 0.07, 2.71	eb
int5__polit	26	How interested are you in politics?	1 Very strong / 2 Strong / 3 Somewhat / 4 Hardly / 5 Not at all	1.26	-2.65, -1.07, 1.63, 4.06	politbarometer

Table A1: Survey Items Used to Estimate Macrointerest *(continued)*

Survey Item Code	Country-Years	Question Text	Response Categories	Dispersion	Difficulties	Survey Dataset Codes*
int4b__eb	25	For each of the following statements, please tell me if it applies to you often, sometimes, rarely or never. I am interested in what is going on in politics	1 Often / 2 Sometimes / 3 Rarely / 4 Never	0.64	-0.88, 0.17, 1.36	eb
int4__uspew	24	Some people seem to follow what's going on in government and public affairs most of the time, whether there's an election or not. Others aren't that interested. Would you say you follow what's going on in government and public affairs	1 Most of the time / 2 Some of the time / 3 Only now and then / 4 Hardly at all	0.84	-1.56, -0.25, 1.28	uspew
int4a__arabb	23	Generally speaking, how interested would you say you are in politics?	1 Very interested / 2 Interested / 3 Uninterested / 4 Very uninterested	1.12	0.26, 2.01, 3.97	arabb
int5__allbus	20	How interested in politics are you?	1 Very strongly / 2 Strongly / 3 Middling / 4 Very little / 5 Not at all	1.10	-1.74, -0.01, 2.21, 3.90	allbus
int4a__ases	18	How interested are you in politics?	1 Very interested / 2 Fairly interested / 3 Not very interested / 4 Not at all interested	0.50	-0.70, 0.66, 1.67	ases
int3a__eb	16	In everyday life, we have to deal with many different problems and situations, where we feel more or less interested and confident. I am going to read you a number of statements. I am interested in what is going on in politics	1 Most of the time / 2 Some of the time / 3 Hardly any of the time	0.75	0.02, 1.53	eb
int3__afrob	16	How interested are you in public affairs?	0 Not interested / 1 Somewhat interested / 2 Very interested	0.72	-0.80, 1.59	afrob
int5__fsdeva	15	I am interested in politics and follow it actively	1 Strongly agree / 2 Agree to some extent / 3 Difficult to say / 4 Disagree to some extent / 5 Strongly disagree	0.69	-0.38, 0.67, 0.99, 2.32	fsdeva
int4__aes	15	How much interest do you usually have in what's going on in politics?	1 A good deal / 2 Some / 3 Not much / 4 None	0.76	-1.63, 0.05, 1.91	aes, nsss
int4__anes	13	Some people seem to follow	1 Hardly at all / 2 Now and then / 3 Some of the time / 4 Most of the time	0.97	-1.03, 0.54, 2.40	anes
int4__cid	12	In general, how interested are you in politics?	1 Very interested / 2 Fairly interested / 3 Not very interested / 4 Not at all interested	0.54	-0.18, 1.09, 2.42	cid
int5__icenes	12	Do you consider your interest in politics…	1 Very great / 2 Great / 3 Some / 4 Little / 5 None	0.80	-1.47, 0.32, 2.17, 3.54	icenes

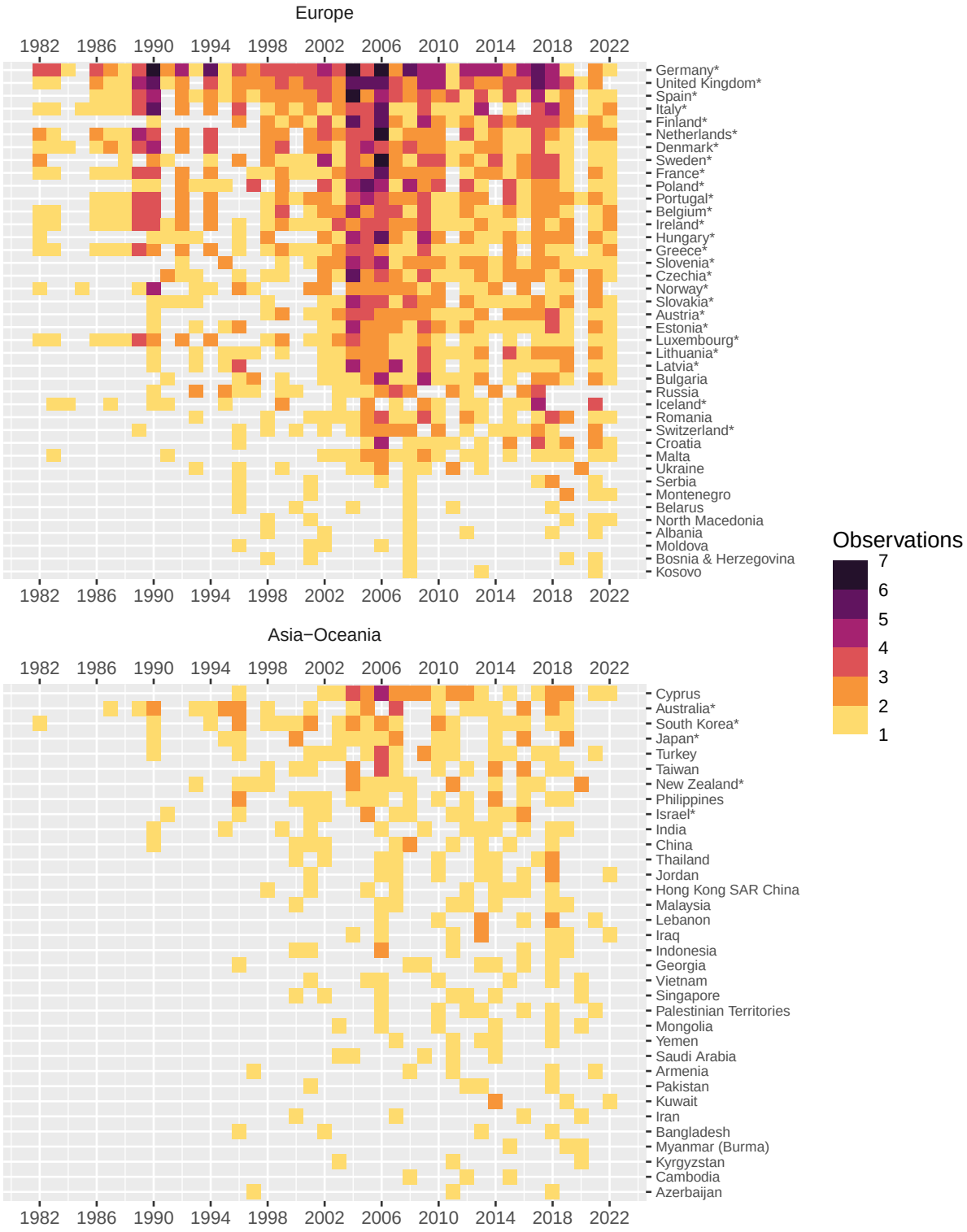
Table A1: Survey Items Used to Estimate Macrointerest *(continued)*

Survey Item Code	Country-Years	Question Text	Response Categories	Dispersion	Difficulties	Survey Dataset Codes*
int4__cces	10	Some people seem to follow what's going on in government and public affairs most of the time, whether there's an election going on or not. Others aren't that interested. Would you say you follow what's going on in government and public affairs most of the time, some of the time, only now and then, or hardly at all?	1 Most of the time / 2 Some of the time / 3 Only now and then / 4 Hardly any of the time	1.00	-1.89, -0.54, 1.09	cces
int4__itanes	10	How interested are you in politics?	1 Very much / 2 Somewhat / 3 A little / 4 Not at all	0.08	-0.16, 0.72, 1.76	itanes
int5__pgss	10	How interested would you say you personally are in politics?	1 Extremely interested / 2 Very much interested / 3 Fairly interested / 4 A little interested / 5 Not at all interested	0.79	-0.93, 0.37, 2.31, 3.65	pgss
int4__nes	9	How interested are you in politics?	1 Very interested / 2 Fairly interested / 3 Not very interested / 4 Not at all interested	0.51	-0.49, 0.88, 2.59	anes, autnes, bes, ptvs
int4__dkes	9	How interested are you in politics?	1 Very / 2 Somewhat / 3 Only a little / 4 Not at all	0.56	-0.58, 1.01, 2.44	dkes
int4__snes	9	How interested would you say you personally are in politics?	1 Very interested / 2 Fairly interested / 3 Not very interested / 4 Not at all interested	0.73	-0.80, 1.04, 2.94	snes
int4__pew	8	Generally speaking, how much interest would you say you have in politics …	1 No interest at all / 2 Only a little / 3 A fair amount / 4 A great deal	1.10	-1.18, 1.04, 3.13	pew
int3__npes	8	How interested are you in politics?	1 Very interested / 2 Fairly interested / 3 Not interested	0.31	0.48, 2.04	npes
int4__nores	8	In general, how interested are you in politics?	1 Very interested / 2 Fairly interested / 3 A little interested / 4 Not at all interested	0.60	-0.89, 0.81, 2.53	nores
int4__nzes	8	How interested would you say you personally are in politics?	1 Very interested / 2 Somewhat interested / 3 Slightly / 4 Not at all	0.47	-0.95, 0.60, 1.97	nzes
int5__gles	7	Generally speaking, you are interested in politics	1 Very strongly / 2 Fairly strongly / 3 Moderately / 4 Less strongly / 5 Not at all	0.54	-0.55, 0.50, 1.67, 2.82	gles, ges
int5__nes	7	Some people are very interested in politics. Others are not interested at all. Are you very interested in politics, or are you not at all interested?	1 Very interested / 2 A lot / 3 More or less / 4 A little / 5 None	0.20	-0.82, 0.22, 1.23, 2.33	belgiumes, bes
int11__ces	7	How interested are you in politics generally?	0 No interest at all / 123456789 / 10 A great deal of interest	1.01	-1.86, -1.46, -0.89, -0.35, 0.10, 0.87, 1.43, 2.26, 3.37, 4.14	canadianes
int4__kobar	7	How interested are you in politics these days?	1 A lot / 2 Some / 3 Not much / 4 Not at all	0.71	-0.77, 0.70, 2.20	kobar
int4a__evs	6	How interested would you say you are in politics?	1 I take an active interest in politics / 2 I am interested in politics but don't t / 3 My interest in politics is not greater / 4 I'm not interested in politics at all	0.76	-0.50, 0.93, 3.05	evs

Table A1: Survey Items Used to Estimate Macrointerest *(continued)*

Survey Item Code	Country-Years	Question Text	Response Categories	Dispersion	Difficulties	Survey Dataset Codes*
int3_polit	5			0.72	0.35, 2.44	politbarometer
int4_vpcpce	5	How interested are you in politics?	1 Very interested / 2 Quite interested / 3 Only a little interested / 4 Not at all interested	0.68	-0.68, 1.19, 2.85	vpcpce

* Survey dataset codes correspond to those used in the DCPOtools R package (Solt, Hu, and Tai 2019).



Starred countries are OECD democracies, the sample employed in the analysis of macrointerest presented in the main text.

Figure A1: Source Data Observations by Country and Year

Starred countries are OECD democracies, the sample employed in the analysis of macrointerest presented in the main text.

Figure A2: Source Data Observations by Country and Year, cont.

B The DCPO Model

A number of recent studies have developed latent variable models of aggregate survey responses based on cross-national survey data (see Claassen 2019; Caughey, O'Grady, and Warshaw 2019; McGann, Dellepiane-Avellaneda, and Bartle 2019; Kolczynska et al. 2020). To estimate macrointerest across countries and over time, we employ the latest of these methods that is appropriate for data that is not only incomparable but also sparse, the Dynamic Comparative Public Opinion (DCPO) model elaborated in Solt (2020b). The DCPO model is a population-level two-parameter ordinal logistic item response theory (IRT) model with country-specific item-bias terms.

DCPO models the total number of survey responses expressing at least as much macrointerest as response category r to each question q in country k at time t, y_{ktqr}, out of the total number of respondents surveyed, n_{ktqr}, using the beta-binomial distribution:

$$a_{ktqr} = \phi\eta_{ktqr} \tag{1}$$

$$b_{ktqr} = \phi(1 - \eta_{ktqr}) \tag{2}$$

$$y_{ktqr} \sim \text{BetaBinomial}(n_{ktqr}, a_{ktqr}, b_{ktqr}) \tag{3}$$

where ϕ represents an overall dispersion parameter to account for additional sources of survey error beyond sampling error and η_{ktqr} is the expected probability that a random person in country k at time t answers question q with a response at least as interested as response r.[2]

This expected probability, η_{ktqr}, is in turn estimated as follows:

$$\eta_{ktqr} = \text{logit}^{-1}\left(\frac{\bar{\theta'}_{kt} - (\beta_{qr} + \delta_{kq})}{\sqrt{\alpha_q^2 + (1.7 * \sigma_{kt})^2}}\right) \tag{4}$$

In this equation, β_{qr} represents the difficulty of response r to question q, that is, the degree of political the response expresses. The δ_{kq} term represents country-specific item bias: the extent to which all responses to a particular question q may be more (or less) difficult in a given country k due to translation issues, cultural differences in response styles, or other idiosyncrasies that render the same survey item not equivalent across countries.[3] The dispersion of question q, its noisiness in relation to the latent variable, is α_q. The mean and standard deviation of the unbounded latent trait of macrointerest are $\bar{\theta'}_{kt}$ and σ_{kt}, respectively.

[2]The ordinal responses to question q are coded to range from 1 (expressing the least political interest) to R (expressing the most political interest), and r takes on all values greater than 1 and less than or equal to R.

[3]Estimating δ_{kq} requires repeated administrations of question q in country k, so when responses to question q are observed in country k in only a single year, the DCPO model sets δ_{kq} to zero by assumption, increasing the error of the model by any country-item bias that is present. Questions that are asked repeatedly over time in only a single country pose no risk of country-specific item bias, so δ_{kq} in such cases are also set to zero.

Random-walk priors are used to account for the dynamics in $\bar{\theta'}_{kt}$ and σ_{kt}, and weakly informative priors are placed on the other parameters.[4] The dispersion parameters α_q are constrained to be positive and all survey responses are coded with high values indicating more political interest to fix direction. The difficulty β of "to some extent" (the third response on the four-point, "not at all" to "a great deal" scale) to the European Social Survey's question "To what extent would you say you are interested in politics?" is set to 1 to identify location, and for each question q the difficulties for increasing response categories r are constrained to be increasing. The sum of δ_{kq} across all countries k is set to zero for each question q:

$$\sum_{k=1}^{K} \delta_{kq} = 0 \tag{5}$$

Finally, the logistic function is used to transform $\bar{\theta'}_{kt}$ to the unit interval and so give the bounded mean of macrointerest, $\bar{\theta}_{kt}$, which is our parameter of interest here (see Solt 2020b, 3–8).[5]

The DCPO model accounts for the incomparability of different survey questions with two parameters. First, it incorporates the *difficulty* of each question's responses, that is, how much political interest is indicated by a given response. That each response evinces more or less of our latent trait is most easily seen with regard to the ordinal responses to the same question: indicating that one is "strongly interested" exhibits more political interest than stating one is "fairly interested," which is a more interested response that "not very interested," which in turn is more interested than "not at all." But this is also true across questions. For example, indicating that politics is among "the sort of things in life interest you a lot" likely expresses even more interest than agreeing that one is interested in politics "most of the time." Second, the DCPO model accounts for each question's *dispersion*, its noisiness with regard to our latent trait. The lower a question's dispersion, the better that changes in responses to the question map onto changes in macrointerest. Together, the model's difficulty and dispersion estimates work to generate comparable estimates of the latent variable of macrointerest from the available but incomparable source data.

To address the sparsity of the source data—the fact that there are gaps in the time

[4]The dispersion parameters α_q are drawn from standard half-normal prior distributions, that is, the positive half of N(0, 1). The first difficulty parameters for each question, β_{q1}, are drawn from standard normal prior distributions, and the differences between βs for each r for the same question q are drawn from standard half-normal prior distributions. The item-bias parameters δ_{kq} receive normally-distributed hierarchical priors with mean 0 and standard deviations drawn from standard half-normal prior distributions. The initial value of the mean unbounded latent trait for each country, $\bar{\theta'}_{k1}$, is assigned a standard normal prior, as are the transition variances $\sigma^2_{\bar{\theta'}}$ and σ^2_{σ}; the initial value of the standard deviation of the unbounded latent trait for each country, σ_{k1}, is drawn from a standard lognormal prior distribution. The overall dispersion, ϕ, receives a somewhat more informative prior drawn from a gamma(4, 0.1) distribution that yields values that are well scaled for that parameter.

[5]Alternative approaches exist for transforming data to the unit interval. For example, a probit transformation, that is, the cumulative distribution function (CDF) of the normal distribution is one option, one that facilitates the interpretation of the values of the resulting measure as percentiles. The advantage of the logistic transformation compared to the probit transformation is its heavier tails, which allow for differences among very low and among very high values to be distinguished more clearly.

series of each country, and even many observed country-years have only one or few observed items—DCPO uses simple local-level dynamic linear models, i.e., random-walk priors, for each country. That is, within each country, each year's value of macrointerest is modeled as the previous year's estimate plus a random shock. These dynamic models smooth the estimates of macrointerest over time and allow estimation even in years for which little or no survey data is available, albeit at the expense of greater measurement uncertainty.

It is worth noting that not all sources of incomparability are likely to be fully addressed by the DCPO model. To the extent that survey sample representation issues—such as from variations in population definitions (such as age range, minority inclusion, and territorial exclusions) and sample designs (like probability versus non-probability samples, and older surveys' reliance on quota or random route samples without enumeration)—vary across years for a single country and item (as is typically the case, as more recent surveys are more likely to be fully representative), the country-specific item bias terms will not remedy this problem. And although survey weights are easily incorporated in the source data (and indeed the `DCPOtools` package does so automatically), not all available weights yield fully representative samples, and some surveys lack weights entirely. Unlike the model employed by Caughey, O'Grady, and Warshaw (2019), the DCPO model does not incorporate poststratification to correct for these issues. While this does increase computational tractability and decrease data demands, the downside is clearly greater measurement uncertainty in the estimates in country-years where the data are relatively rich (via ϕ) and potential bias in the estimates where data are more sparse.

C Comparing Coverage of the Macrointerest Data and the ESS

After creating the cross-sectional time-series of macrointerest, we tested theories of macrointerest formation in the thirty-seven advanced democracies of the OECD. Figure A3 visualizes the advantages of our macrointerest data over one of the largest and most-used datasets for studying political attitudes in the advanced democracies, the European Social Survey (ESS). The observations covered by ESS are marked with the light rectangles, and the additional country-years the DCPO macrointerest data provide are marked dark. By taking advantage of all of the available survey data on political interest, our macrointerest estimates allow the comparison to extend to the nine OECD members in the Americas, East Asia, and the Antipodes, and it also provides continuous time series in Europe that extend well beyond the available ESS data. In all, the macrointerest data provide well over *five times* as many country-years for analysis than are available in the ESS.

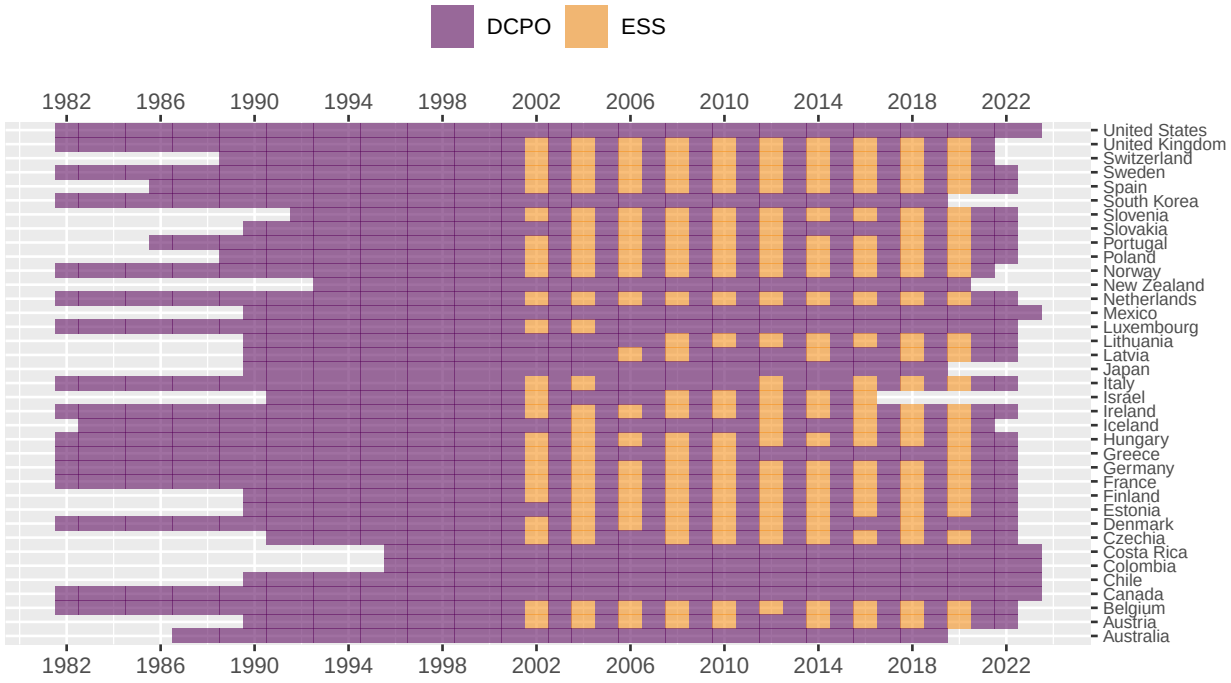
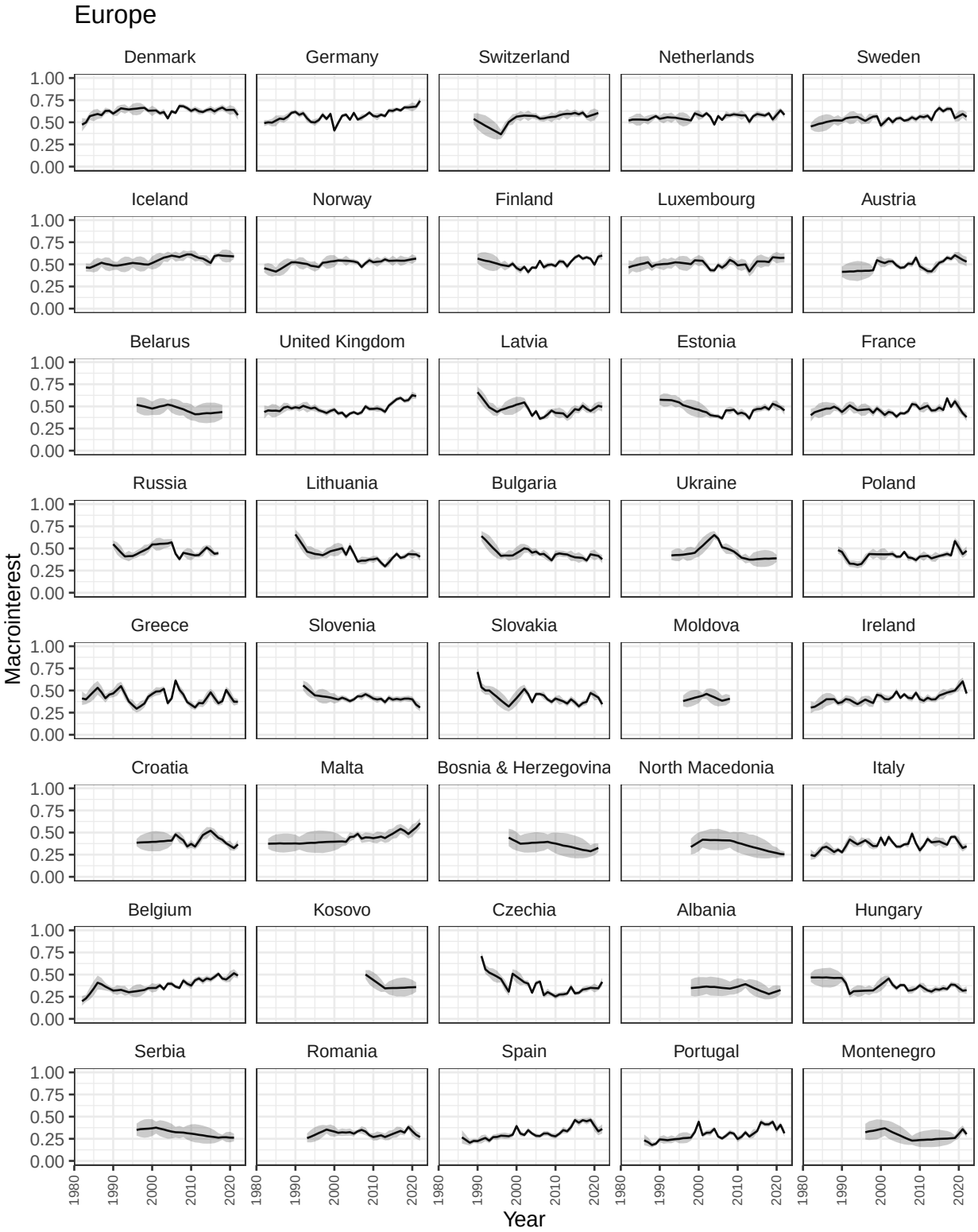
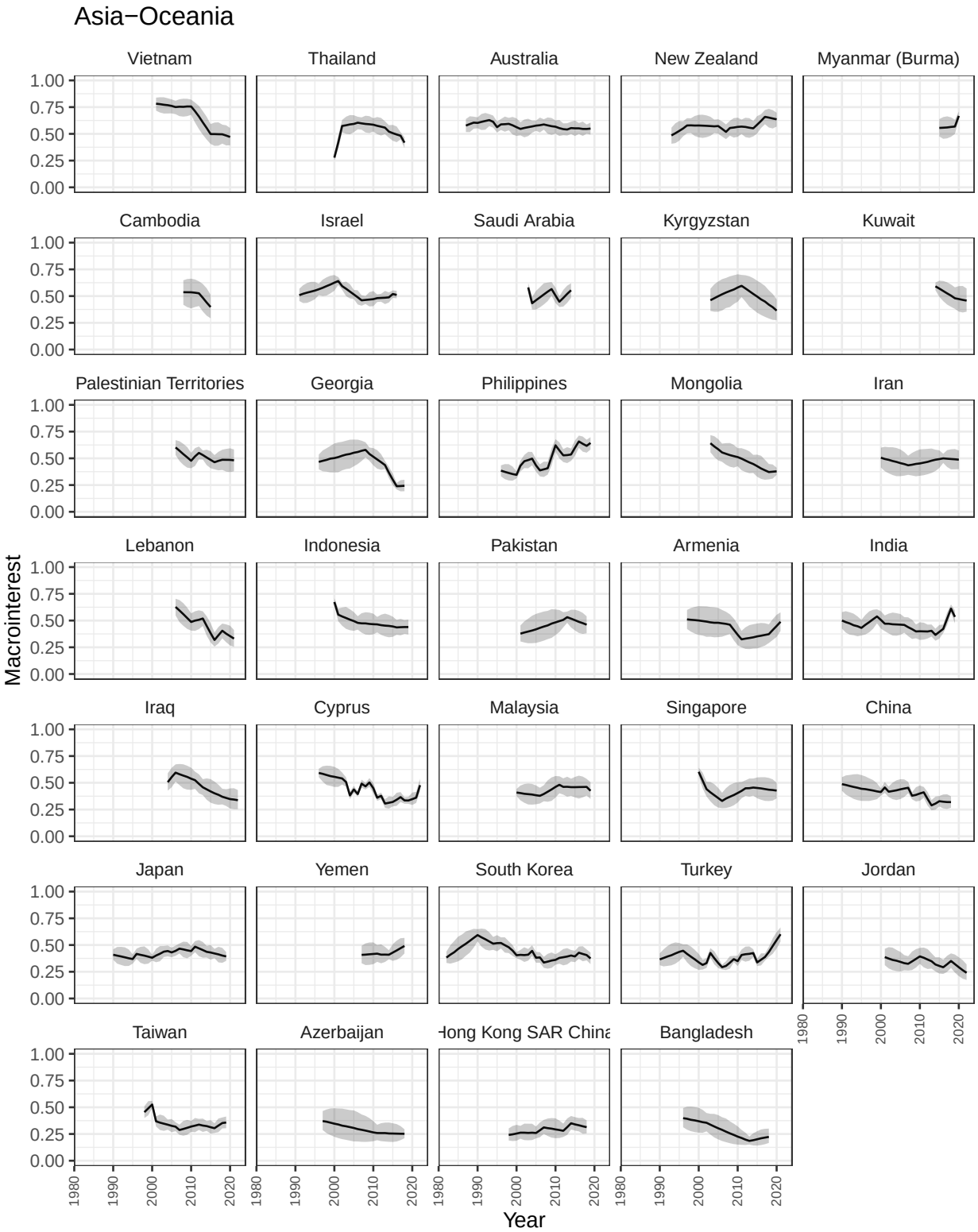


Figure A3: Data Availability: DCPO Macrointerest vs. ESS

D Macrointerest Scores Over Time



Note: Countries are ordered by their median macrointerest score; gray shading represents 80% credible intervals.



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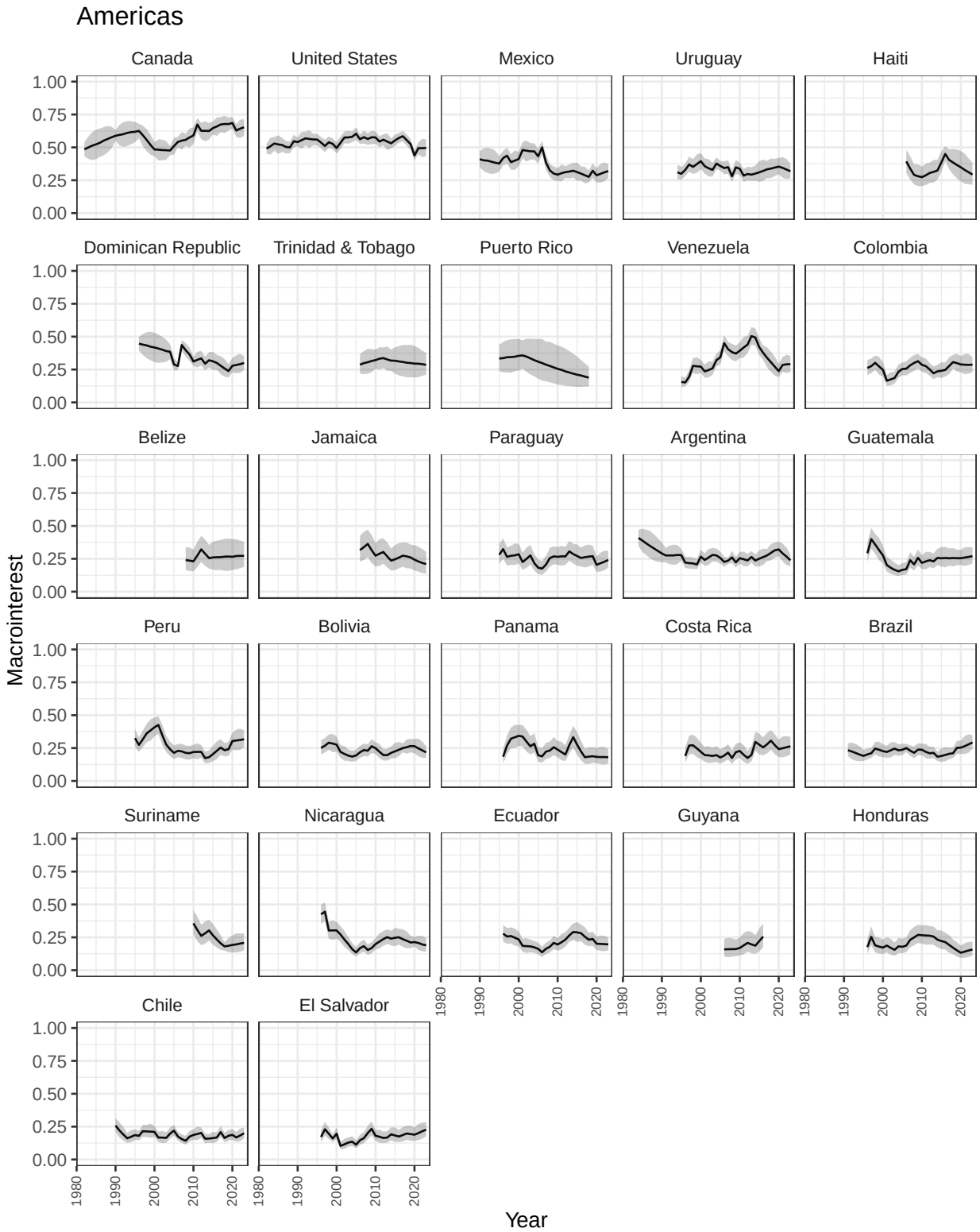
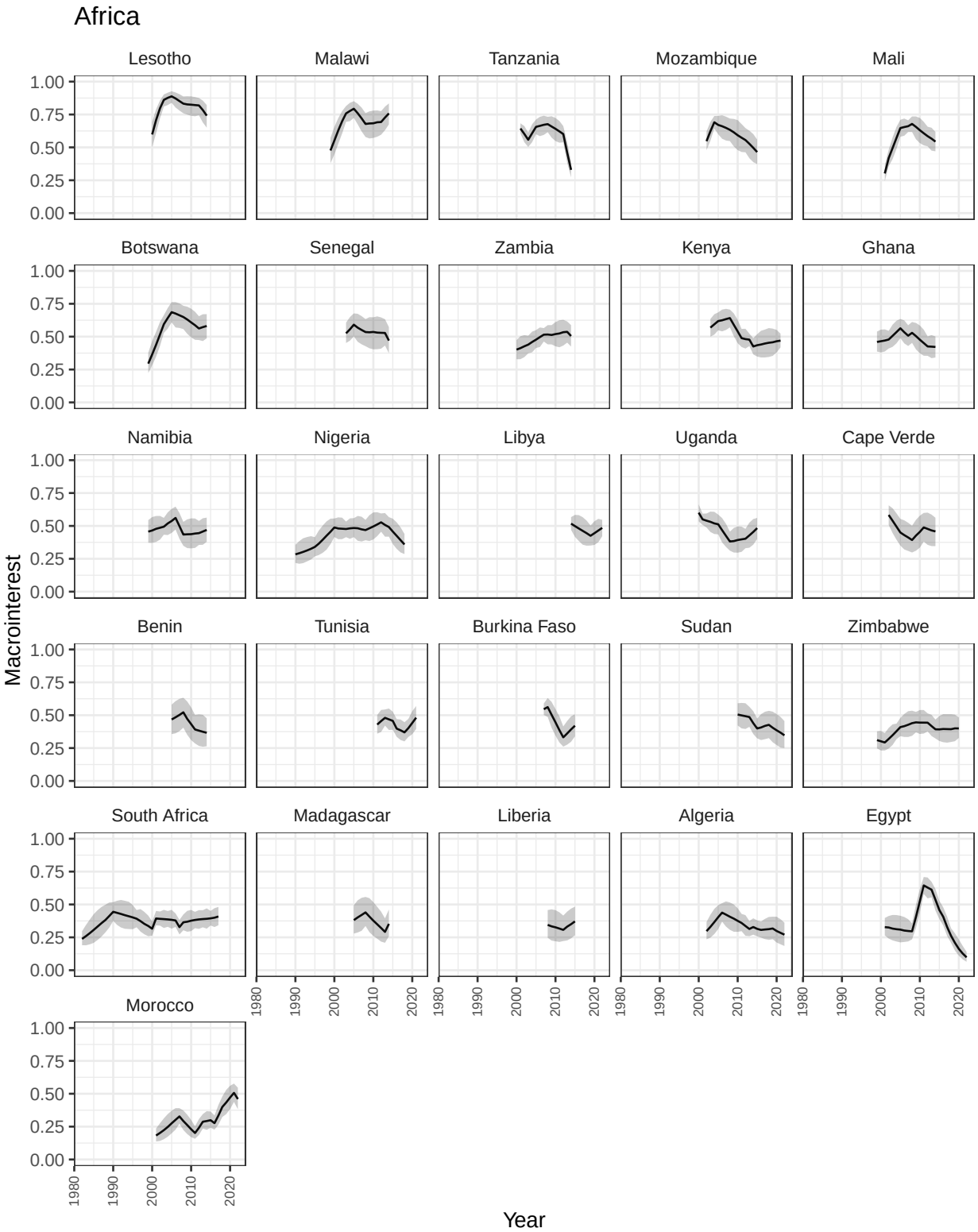


Note: Countries are ordered by their median macrointerest score; gray shading represents 80% credible intervals.



Note: Countries are ordered by their median macrointerest score; gray shading represents 80% credible intervals.

E Tabular Version of Results Presented in Figure 5

Table A2: Tabular Version of Results Presented Graphically in Figure 5

	(1)
Election Year	0.788
	[0.168, 1.417]
Parliamentarism	5.921
	[3.600, 8.178]
Federalism	6.612
	[-0.988, 13.779]
Disproportionality, Mean	-0.231
	[-0.935, 0.475]
Disproportionality, Difference	-0.158
	[-0.296, -0.019]
GDPpc, Mean	0.169
	[-0.077, 0.412]
GDPpc, Difference	0.083
	[0.011, 0.149]
GDP Growth, Mean	0.889
	[-1.599, 3.433]
GDP Growth, Difference	-0.016
	[-0.146, 0.115]
Unemployment, Mean	-0.633
	[-1.649, 0.392]
Unemployment, Difference	-0.016
	[-0.139, 0.095]
Income Inequality, Mean	-0.511
	[-1.003, -0.048]
Income Inequality, Difference	-0.051
	[-0.296, 0.203]
Num.Obs.	1246
RMSE	4.94

95-percent credible intervals are in brackets.

F Comparison with Peterson et al. (2022)

This study extends the pivotal concept of "macrointerest" from Peterson et al. (2022), but it is not intended to replicate that paper: both the method and data employed diverge considerably between the two projects. Still, a comparison of the macrointerest estimates generated for the United States in both projects is valuable.

Our work diverges methodologically by employing the Dynamic Comparative Public Opinion (DCPO) model instead of the dyad ratio algorithm, commonly referred to as "Wcalc," used by Peterson et al. (2022, 208). Apart from the primary rationale stated in the main text—that Wcalc is inherently tailored for generating public opinion time series within a single country rather than for cross-national comparison—there are also methodological and operational distinctions between these two approaches.

The dynamic ratio algorithm primarily seeks to uncover shared variance over time among various survey items. Its process involves initially pairing these items, subsequently calculating the ratio for each unique pair, and then analyzing the distribution of these ratios. DCPO instead directly models the relationship between the latent variable and survey item responses using a Bayesian Item Response Theory (IRT) approach (for more on the differences between dyad ratios and IRT, see McGann (2014), which finds that a single-country IRT model provides a better fit to a collection of U.K. public opinion data meant to capture "policy mood" than the dyad ratio algorithm). The DCPO method provides a probabilistic framework, enabling the estimation of response probabilities contingent on both the level of the latent trait and specific characteristics of the survey items (for more details, see Appendix B).

Additionally, these methods adopt differing strategies for addressing missing data at certain time points. The dynamic ratio algorithm tackles this challenge by estimating values for unobserved series at each time point, basing these estimations on the calculated ratio of missing survey items to those observed in the corresponding period. For the same issue, DCPO, on the other hand, employs dynamic linear models at the local level for each country, leveraging random-walk priors. This approach not only smooths the estimates of macrointerest over time but also facilitates estimation in years characterized by limited or absent survey data and simultaneously provides specific uncertainty estimates.

As Peterson et al. (2022, 210) points out, to conduct the dyad ratio algorithm, researchers must first dichotomize each survey question by collapsing responses and (possibly, as in this case) excluding moderate opinions. DCPO, on the other hand, incorporates an ordered logistic model and so does require the transformation of any of the original item responses. It also produces credible intervals of the estimates from the Bayesian process, rather than relying on ex-post bootstrapping for uncertainty estimation. DCPO additionally implements a logistic function to confine the outcome estimates within the unit interval.

Finally, it is worth noting that the data employed in each paper differs. The estimates of Peterson et al. (2022) are based on sixteen series with observations in at least two quarters. The data on which our macrointerest estimates for the United States are based on eleven series with at least five country-year observations across all countries. These latter data are dated annually, and nearly all of them are drawn from cross-national surveys. Only

two series, drawn from the American National Election Survey and from surveys by the Pew Research Center, are included in both source-data datasets. This is due partly to the minimum of five country-year observations we use, partly to the shorter time span covered by this project (because of the paucity of data for other countries in earlier decades), partly to our practice of using only surveys for which the entire survey dataset rather than only survey marginals is available to ensure survey weights are applied, partly to the omission of cross-national surveys by Peterson et al. (2022), and partly to the combination of these factors.

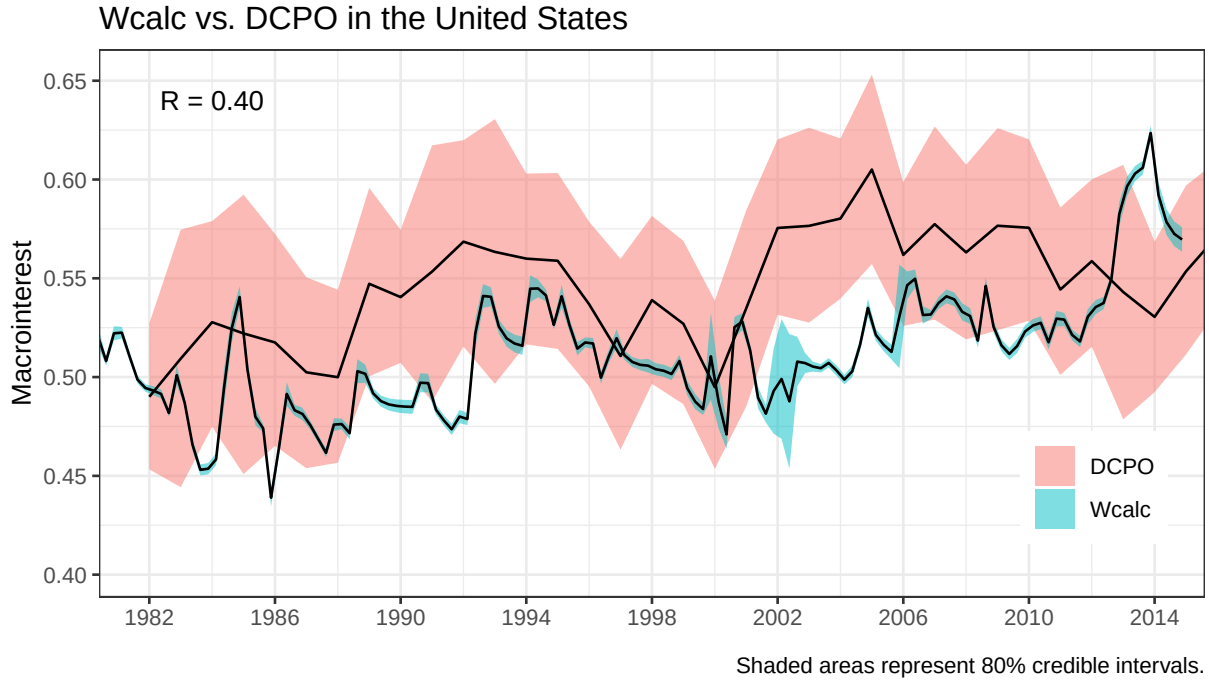


Figure A4: Comparison between DCPO and Wcalc

In Figure A4, we compare the outcomes from these two methods during the years they overlap, from 1982 to 2014. For the purpose of this comparison, the Wcalc scores of Peterson et al. (2022) are first divided by 100 to place them on the unit interval and then shifted nearly a quarter-point downward, which yields identical scores on both series in their first common year, 1982. Neither of these affect the shape of the Wcalc series; they work simply to overlay the two series for more straightforward comparison.

Two points stand out. First, the credible intervals of the DCPO series are considerably broader than the bootstrapped intervals for the Wcalc series. Whether these latter intervals are overconfident seems worth investigating by future users of this method, perhaps by cross-validation (cf. Solt 2020a, 11). Second, the two series are positively but not particularly strongly related; the bivariate correlation is just $R = 0.40$. The surge in macrointerest after the September 11, 2001 attacks documented in Peterson et al. (2022, 217), for example, is brief in the Wcalc series but longer-lasting in the DCPO series. Conversely, the sharp upturn

Table A3: Replication of Peterson et al. (2022), Table 2, 1983-2014

	Wcalc	Annual Wcalc	DCPO
Macrointerest (Lagged)	0.844***	0.655**	0.777***
	(0.050)	(0.206)	(0.185)
Trust (Lagged)	-0.097*	-0.214	0.114
	(0.044)	(0.145)	(0.126)
Trust (Difference)	-0.242*	-0.333	-0.400
	(0.100)	(0.292)	(0.306)
Presidential Approval (Lagged)	0.004	0.001	0.023
	(0.013)	(0.043)	(0.044)
Presidential Approval (Difference)	-0.008	-0.018	0.078
	(0.020)	(0.045)	(0.049)
Consumer Sentiment (Lagged)	0.001	-0.009	-0.043
	(0.012)	(0.039)	(0.041)
Consumer Sentiment (Difference)	0.026	0.032	0.001
	(0.026)	(0.052)	(0.059)
Presidential Election	0.440***	0.348	-0.075
	(0.100)	(0.342)	(0.336)
September 11	2.228*	2.215	5.094+
	(1.075)	(2.606)	(2.837)
N	128	32	32
R2	0.846	0.730	0.636
RSME	1.26	1.54	1.62

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

in the Wcalc macrointerest series that peaks in late 2013 does not appear in the DCPO series at all—it appears to be an artifact of the rather thin data in the Knowledge Networks series Peterson et al. (2022) employs (see also Peterson et al. (2022), Appendix C, which drops these observations as anomalous).

The two series are further compared in Table A3. The first column replicates the analysis of Peterson et al. (2022), Table 2, using only the years from 1983 to 2014, that is, the span for which DCPO estimates of macrointerest are also available. To preserve degrees of freedom, of the eight scandals and negative events, only the dummy variable for the attacks of September 11, 2001 (the only one to receive support in Peterson et al. (2022)) is included. The findings of Peterson et al. (2022) are reproduced in this truncated dataset.

In the second column, the Peterson et al. (2022) Wcalc macrointerest data are aggregated to the annual level over the same period, that is, each year's value is the mean of the values of that year's quarters, and the independent variables were similarly annualized. Over this time period and at this unit of analysis, macrointerest is predicted only by its lagged value: the coefficients for trust, presidential elections, and September 11 no longer reach statistical

significance. The DCPO macrointerest series for the United States yields similar results. It would appear that it is the unit of analysis—years as opposed to quarters—rather than the macrointerest series, that yields different conclusions in the Peterson et al. (2022) analysis.

References

Caughey, Devin, Tom O'Grady, and Christopher Warshaw. 2019. "Policy Ideology in European Mass Publics, 1981–2016." *American Political Science Review* 113 (3): 674–93.

Claassen, Christopher. 2019. "Estimating Smooth Country–Year Panels of Public Opinion." *Political Analysis* 27 (1): 1–20.

Hu, Yue, Yuehong Cassandra Tai, Hyein Ko, Byung-Deuk Woo, and Frederick Solt. 2023. "Support for Democracy Is Multidimensional: Why Unidimensional Latent Variable Measures of Democratic Support Are Invalid." SocArXiv.

Hu, Yue, Yuehong Cassandra Tai, and Frederick Solt. 2022. "On Data 'Janitor Work' in Political Science: The Case of Thermostatic Support for Democracy." SocArXiv.

Kolczynska, Marta, Paul-Christian Bürkner, Lauren Kennedy, and Aki Vehtari. 2020. "Trust in State Institutions in Europe, 1989-2019." SocArXiv. https://osf.io/preprints/socarxiv/3v5g7/.

McGann, Anthony. 2014. "Estimating the Political Center from Aggregate Data: An Item Response Theory Alternative to the Stimson Dyad Ratios Algorithm." *Political Analysis* 22 (1): 115–29.

McGann, Anthony, Sabastian Dellepiane-Avellaneda, and John Bartle. 2019. "Parallel Lines? Policy Mood in a Plurinational Democracy." *Electoral Studies* 58: 48–57.

Solt, Frederick. 2020. "Modeling Dynamic Comparative Public Opinion." SocArXiv. https://osf.io/preprints/socarxiv/d5n9p.

Data availability statement

Replication data for this paper can be found at https://doi.org/10.7910/DVN/TWPM9X.

Financial Support

Yue Hu appreciate the funding support from National Natural Science Foundation of China (grant number: 72374116) and Tsinghua University Initiative Scientific Research Program (grant number: 2024THZWJC01).

Competing interests

None.