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# DELIVERABLE D3.2 – Data Integration: Second Case Study: Trust in Institutions and Satisfaction with Governance and Welfare System in Europe Before and After COVID-19

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## Executive Summary

This study investigates shifts in *Trust in Institutions* and *Satisfaction with Country Conditions* in European countries before and after the COVID-19 pandemic, leveraging data from the *European Social Survey* (ESS) Wave 9 (2018) and Wave 11 (2023) as well as the *Eurobarometer* (2023) to construct a consistent pseudo-panel framework. The analysis focuses on countries with comparable data availability across the two periods and integrates both observed and latent variables to ensure conceptual and measurement equivalence.

The methodological framework unfolds in several stages. First, we identify common countries and harmonize observed variables, ensuring comparability in sociodemographic, political, and attitudinal indicators. Latent constructs are then estimated through confirmatory factor analysis, covering dimensions such as *Interpersonal Trust*, *Political Participation*, and the *Human Values* scale. Two latent variables serve as the primary outcomes of interest: *Trust in Institutions* and *Satisfaction with Country Conditions*.

We next assess the dependence of these target variables on the matching covariates to evaluate potential confounding and the suitability of matching approaches. For the construction of the pseudo-panel enabling longitudinal inference, we apply a range of statistical matching techniques:

- **Propensity Score Matching (PSM):** Using both nearest-neighbour and full optimal matching (Ho et al., 2007, 2011; Rosenbaum & Rubin, 1983), implemented via the MatchIt package. Full optimal matching is preferred for its ability to minimize global imbalance and preserve the full matched sample.
- **Nonparametric Hot-Deck Matching:** Based on Gower's similarity coefficient (Gower, 1971), enabling matching on mixed-type covariates without imposing parametric assumptions.
- **Predictive Mean Matching (PMM):** Implemented within a multiple imputation framework using mice (Rubin, 1987; van Buuren & Groothuis-Oudshoorn, 2011), combining parametric modelling with nonparametric donor selection in the predicted outcome space.

The pseudo-panel allows estimation of shifts in the target latent variables by regressing the difference between observed and imputed baseline values, with

inference conducted using linear models, g-computation (Schafer & Kang, 2008; Snowden et al., 2011), and pooling across imputations where applicable. Across methods, results are broadly consistent, lending robustness to our conclusions.

Overall, the findings reveal heterogeneous country-level patterns. In terms of *Trust in Institutions*, notable increases are observed in Bulgaria, Spain, Finland, Ireland, Italy, Lithuania, Montenegro, Portugal, Slovenia, and Slovakia, while declines are recorded in Austria, Great Britain, Hungary, the Netherlands, and Poland. For *Satisfaction with Country Conditions*, the largest decreases occur in Austria, Belgium, Germany, Finland, Great Britain, Hungary, the Netherlands, Norway, and Portugal, whereas positive changes are seen in Croatia and Ireland. Several countries, including Cyprus, Latvia, and Serbia, display no statistically significant shifts in either measure. The convergence of results across PSM, hot-deck, and PMM approaches underscores the reliability of the detected trends and highlights the utility of integrating parametric and nonparametric statistical matching methods for retrospective longitudinal analysis.

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# 1 Investigating Shifts in Trust in Institutions and Satisfaction with Governance and Welfare Systems in Europe Before and After COVID-19

In our second case study, we aim to investigate whether the COVID-19 pandemic had a measurable impact on Trust in Institutions and Satisfaction with Country Conditions across European countries. This analysis seeks to capture how citizens' evaluations of their governments, public services, and national circumstances evolved from the period immediately preceding the pandemic to its aftermath. To this end, we draw on data from the European Social Survey rounds 9 (2018) and 11 (2023), which offer comparable cross-national measures for both periods. Round 9 data were collected between 30 August 2018 and 27 January 2020, providing a detailed snapshot of public attitudes before COVID-19 spread in Europe. Round 11 data, collected between 8 March 2023 and 4 July 2024, reflect perceptions after the pandemic. This before-and-after design allows us to identify shifts in trust and satisfaction with national conditions and institutions, exploring whether these changes were uniform across countries or varied according to specific socio-demographic and contextual factors. In doing so, the study seeks to shed light on the broader social and political consequences of the pandemic and to contribute to understanding how large-scale crises influence public perceptions of governance, the economy, and key societal sectors.

For this study, we consider two main groups of variables to derive latent traits that capture public perceptions:

- **Trust in Institutions:** includes respondents' trust in various political and legal bodies, measured by the following indicators: trust in the country's parliament, the legal system, the police, politician, political parties, the European Parliament, and the United Nations.
- **Satisfaction with Country Conditions:** reflects how satisfied respondents are with key national aspects, including the present state of the economy, the national government (stfgov), the functioning of democracy, the current state of education, and health services.

Together, these variables provide a comprehensive view of trust and satisfaction relating to governance, welfare, and institutional performance.

To estimate the causal impact of the COVID-19 pandemic on Trust in Institutions and Satisfaction with Country Conditions, we adopt a counterfactual framework. The fundamental challenge is to compare outcomes measured before and after the pandemic while controlling for differences in the composition of respondents in each survey wave. In this context, the pre-pandemic survey (round 9) represents the observed state without the pandemic, while the post-pandemic survey (round 11) reflects outcomes after exposure to the pandemic's effects.

However, since the respondents surveyed in the two rounds differ might differ in their socio-demographic and attitudinal profiles, any naïve comparison risks confounding bias. To approximate the counterfactual – what the post-pandemic responses would have looked like had the pandemic not occurred – we implement a matching procedure that balances the distribution of key covariates across the

two samples. This allows us to reduce selection bias and better isolate changes attributable to the pandemic rather than to differences in sample composition.

In our analysis we consider both observed and latent matching covariates as detailed in Section 2. By matching on this comprehensive set of observed confounders, we aim to emulate a randomized experimental design, thereby enhancing the credibility of inferences regarding changes in trust and satisfaction attributable to the COVID-19 pandemic.

## 2 Analyzed datasets

In this section, we provide information on the geographic coverage, the matching observed and latent variables, and on the target latent variables.

### 2.1 Common countries

The countries common to the two rounds of the ESS are represented in Table 1 and Figure 1.

Table 1: Respondents by Country in 2018 and 2023

<b>Code</b>	<b>Country</b>	<b>2018</b>	<b>2023</b>
AT	Austria	1810	1706
BE	Belgium	1539	1299
BG	Bulgaria	637	1440
CH	Switzerland	983	910
CY	Cyprus	453	463
DE	Germany	1982	2000
ES	Spain	1052	1400
FI	Finland	1516	1332
FR	France	1471	1237
GB	United Kingdom	1638	894
HR	Croatia	1318	1124
HU	Hungary	1048	1427
IE	Ireland	1481	1342
IS	Iceland	574	615
IT	Italy	1503	1711
LT	Lithuania	819	783
LV	Latvia	219	388
ME	Montenegro	648	945
NL	Netherlands	1305	1304
NO	Norway	1004	1061
PL	Poland	871	917
PT	Portugal	729	929
RS	Serbia	948	743
SE	Sweden	1210	963
SI	Slovenia	825	787
SK	Slovakia	798	1013

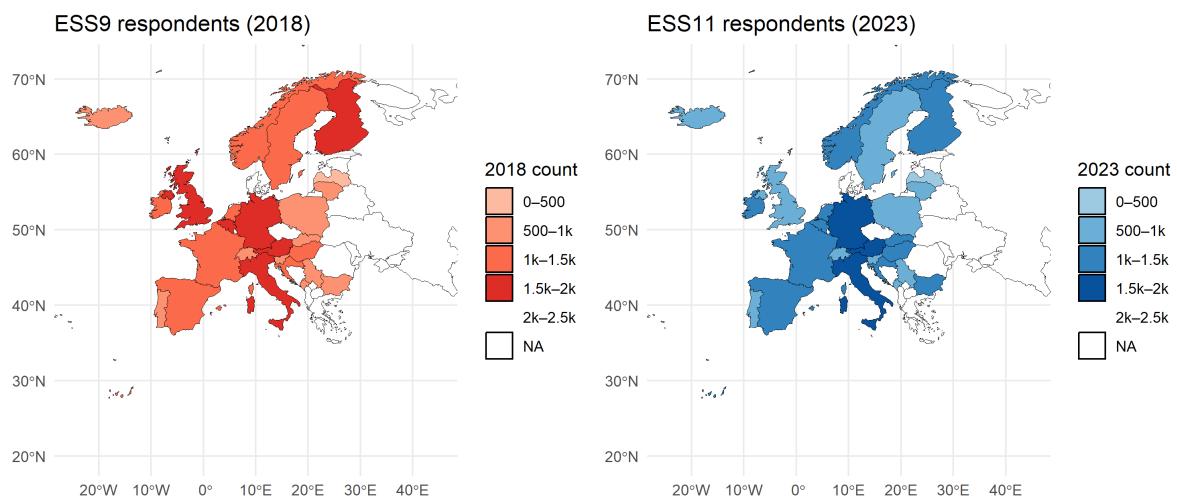


Figure 1: Common countries and number of respondents.

## 2.2 Matching observed variables

As observed matching variables, we selected the following:

- **socio-demographic profile:**

- gender (gindr),
- age (agea),
- marital status (marsts),
- type of area (domicil),
- education (eisced),
- occupation of respondent (mnactic),
- feeling about household's income (hincfel),
- satisfaction with life as a whole (stflife),
- happiness (happy)

- **political interest, religiosity, and perceived discrimination:**

- interest in politics (polintr),
- voted in last national election (vote),
- placement on left-right ideological scale (lrscale),
- emotional attachment to country (atchctr),
- emotional attachment to Europe (atcherp),
- degree of religiosity (rlgdgr),
- membership in a group discriminated against in this country (dscrgrp)

### Common matching variables distributions across the ESS9 and the ESS11 rounds

Table 2 presents the marginal distributions of the categorical variables jointly observed in both datasets and used for the matching procedure.

<b>Variable</b>	<b>Category</b>	<b>Count 2018</b>	<b>% 2018</b>	<b>Count 2023</b>	<b>% 2023</b>
<b>Gender</b>	Man	13,938	49.1	14,181	49.4
	Woman	14,443	50.9	14,552	50.6
<b>Domicile</b>	Big city or suburbs	8,974	31.6	8,981	31.3
	Town or small city	8,741	30.8	8,376	29.2
	Rural area	10,666	37.6	11,376	39.6
<b>Occupation</b>	Paid work	14,986	52.8	15,683	54.6
	Retired	7,444	26.2	7,707	26.8
	Others	5,951	21.0	5,343	18.6
<b>Marital status</b>	Married or in union	14,867	52.4	15,172	52.8
	Separated/Divorced/Widowed	5,195	18.3	5,185	18.0
	None of these	8,319	29.3	8,376	29.2
<b>Education</b>	ISCED I-II	6,000	21.1	5,223	18.2
	ISCED III-IV	14,735	51.9	14,750	51.3
	ISCED V	7,646	26.9	8,760	30.5
<b>Religiosity</b>	Not/Somewhat religious	16,487	58.1	16,954	59.0
	Quite/Very religious	11,894	41.9	11,779	41.0
<b>Economic difficulty</b>	Living comfortably	10,474	36.9	10,890	37.9
	Coping	12,857	45.3	12,890	44.9
	Difficult/Very difficult	5,050	17.8	4,953	17.2
<b>Discrimination</b>	Yes	2,203	7.8	2,325	8.1
	No	26,178	92.2	26,408	91.9
<b>Happiness</b>	Not happy	5,635	19.9	6,277	21.8
	Fairly happy	13,961	49.2	14,123	49.2
	Very happy	8,785	31.0	8,333	29.0
<b>Life satisfaction</b>	Not/Not very satisfied	5,133	18.1	5,201	18.1
	Fairly satisfied	15,341	54.1	16,096	56.0
	Very satisfied	7,907	27.9	7,436	25.9
<b>Political interest</b>	Very interested	3,944	13.9	3,992	13.9
	Quite interested	10,671	37.6	10,715	37.3
	Hardly interested	9,709	34.2	9,867	34.3
	Not at all interested	4,057	14.3	4,159	14.5
<b>Political position</b>	Left	6,866	24.2	6,832	23.8
	Center	14,757	52.0	14,749	51.3
	Right	6,758	23.8	7,152	24.9
<b>Voted</b>	Yes	22,292	78.5	22,486	78.3
<b>Attachment to country</b>	No/Not eligible	6,089	21.5	6,247	21.7
	Not attached	3,820	13.5	4,216	14.7
	Fairly attached	11,985	42.2	11,929	41.5
<b>Attachment to EU</b>	Very attached	12,576	44.3	12,588	43.8
	Not attached	10,582	37.3	10,716	37.3
	Fairly attached	13,642	48.1	13,562	47.2
	Very attached	4,157	14.6	4,455	15.5

Table 2: Comparison of socio-demographic and attitudinal variables between ESS9 (2018) and ESS11 (2023)

Figures 2 to 17 show the distributions of the observed matching variables across the countries common to both the ESS9 and ESS11 datasets.



Figure 2: Gender by country

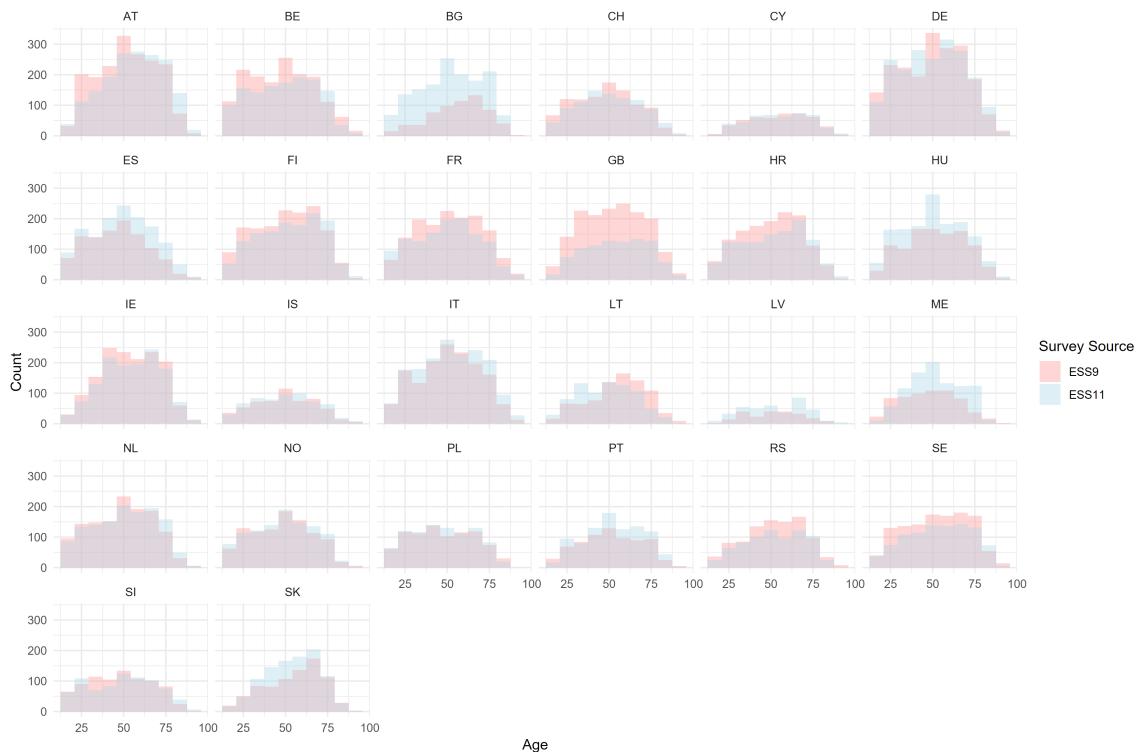


Figure 3: Age by country



Figure 4: Domicile by country

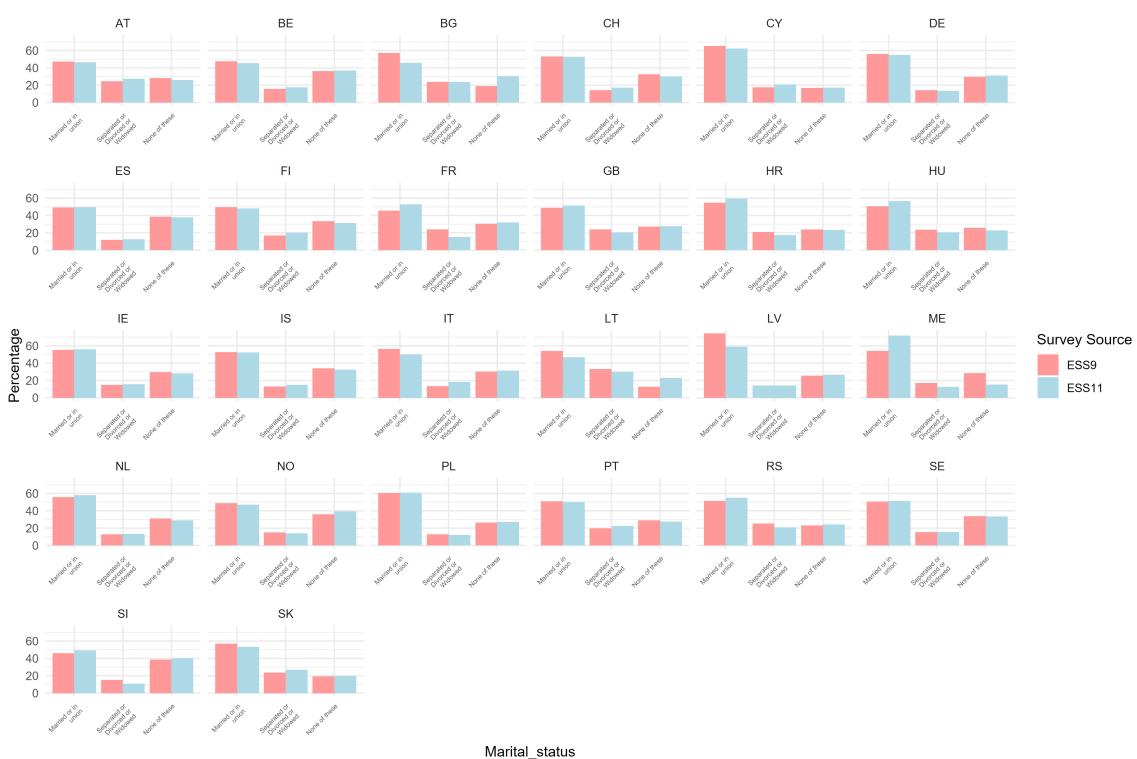


Figure 5: Marital status by country



Figure 6: Occupation by country

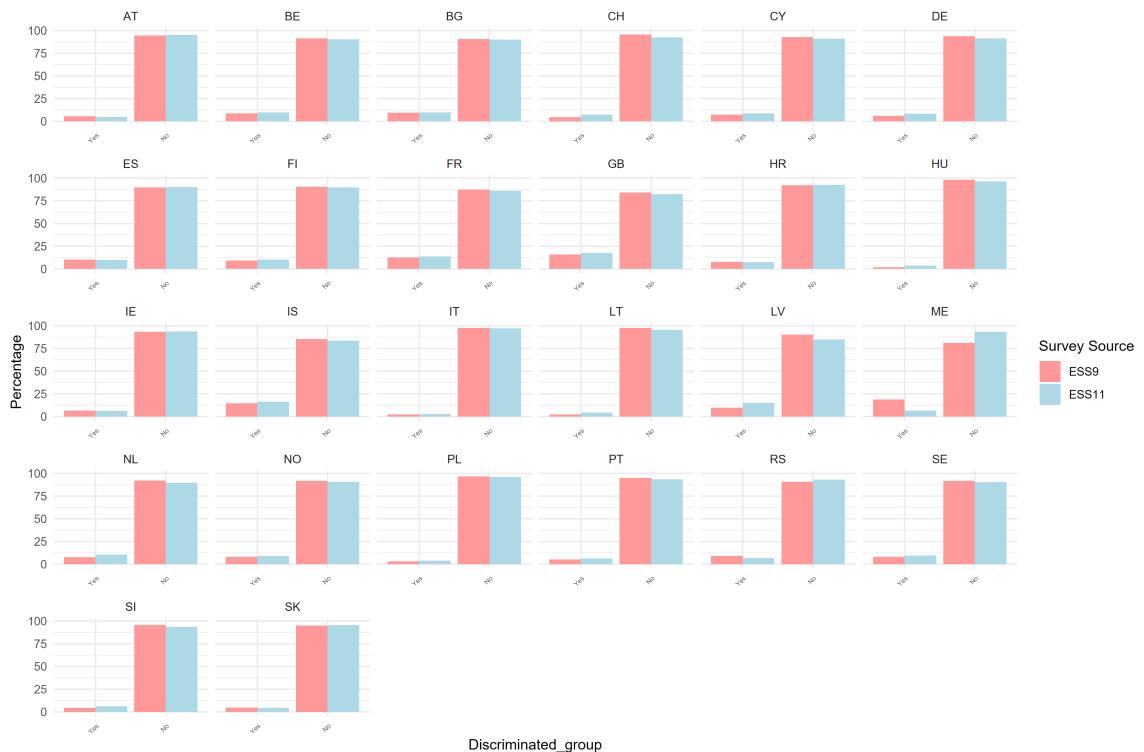


Figure 7: Belonging to a discriminated group by country

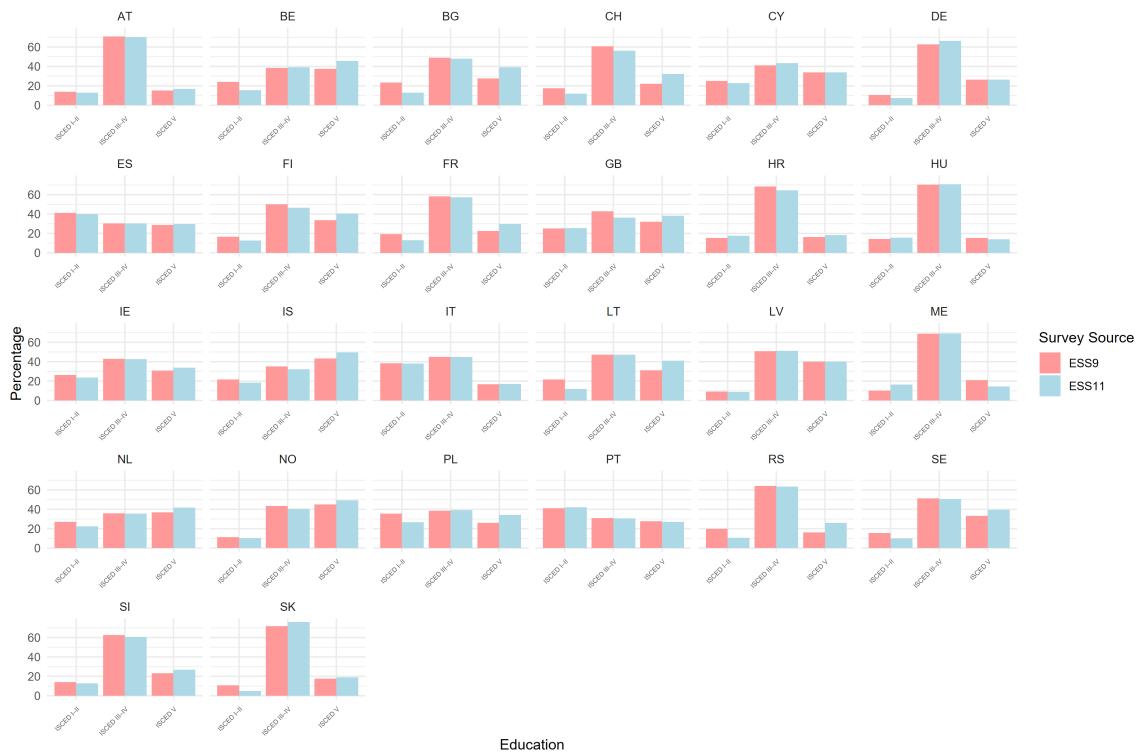


Figure 8: Education by country

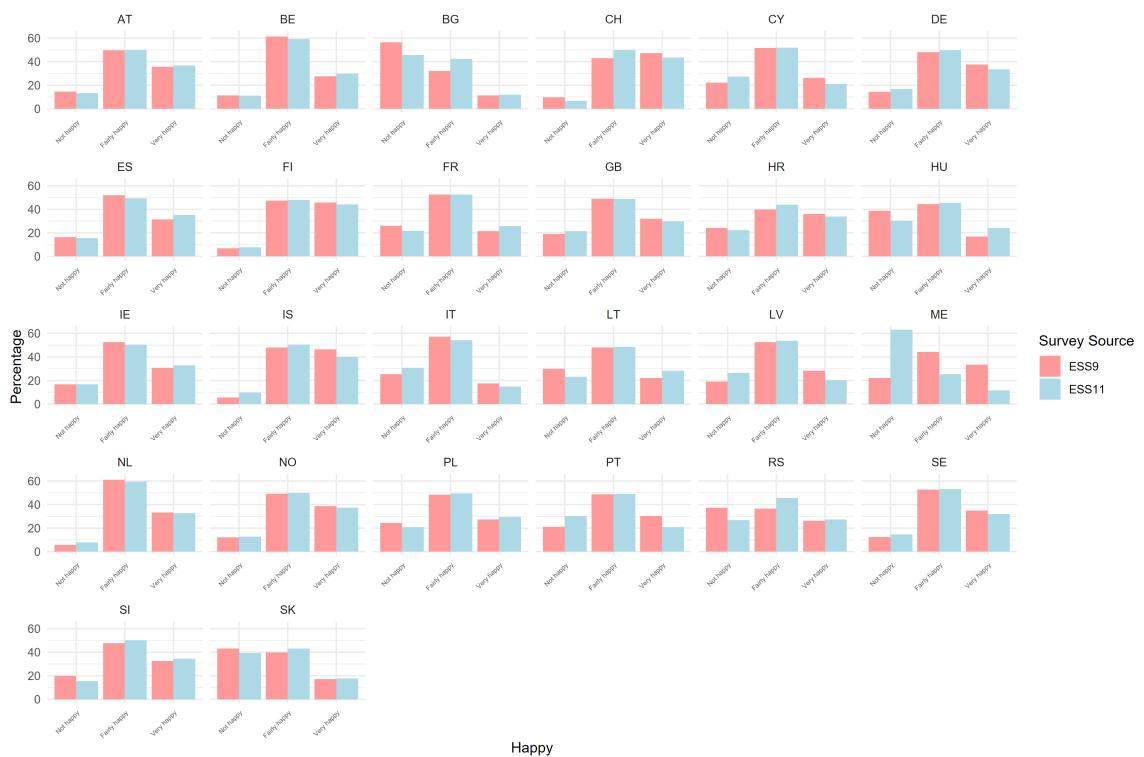


Figure 9: Happy by country



Figure 10: Interested in politics by country

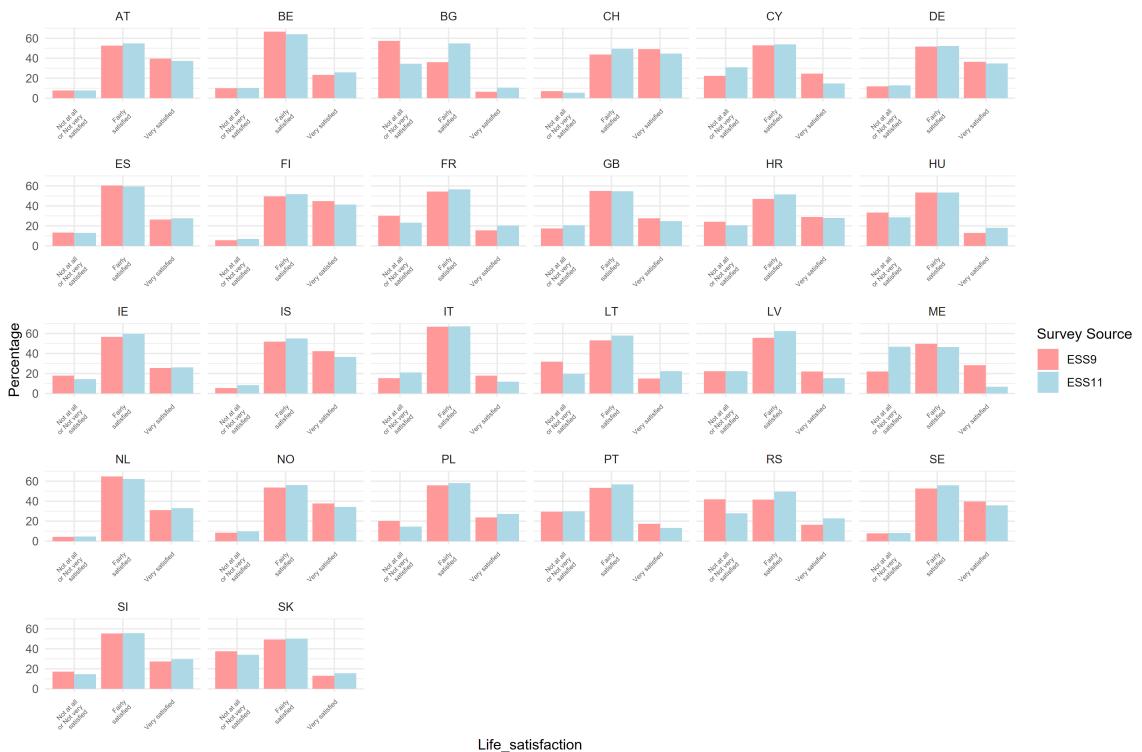


Figure 11: Life satisfaction by country



Figure 12: Political position by country



Figure 13: Religiosity level by country

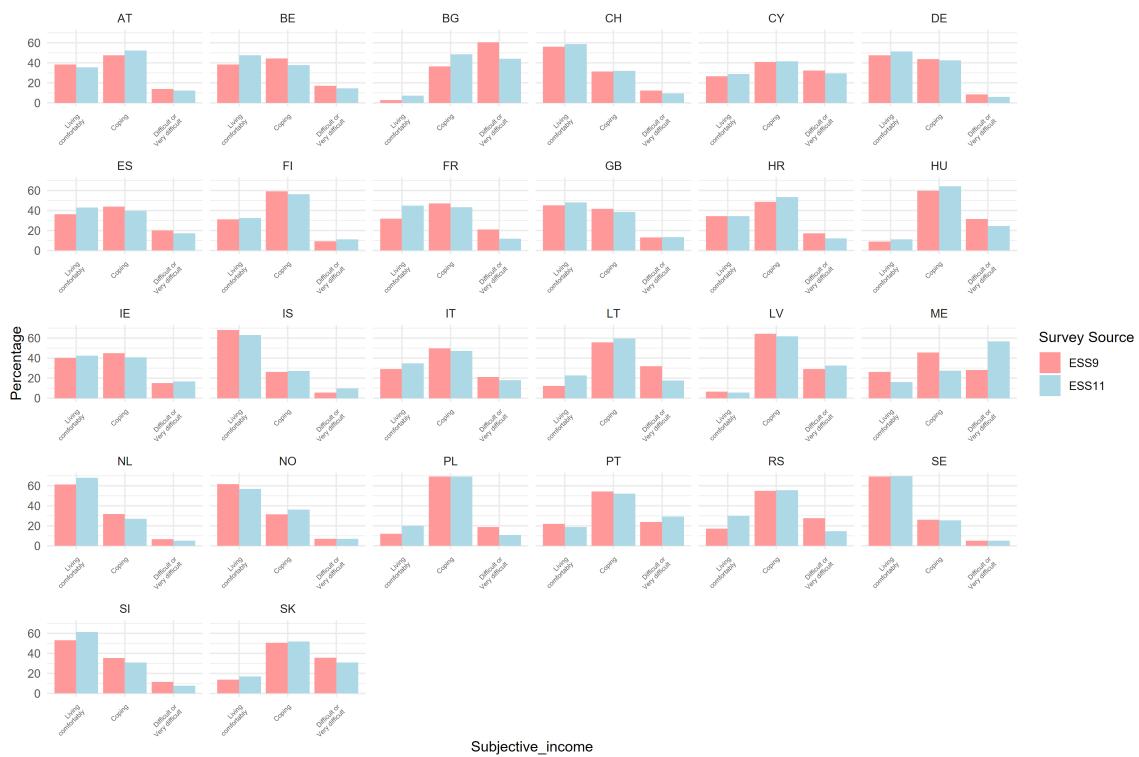


Figure 14: Economic difficulty by country

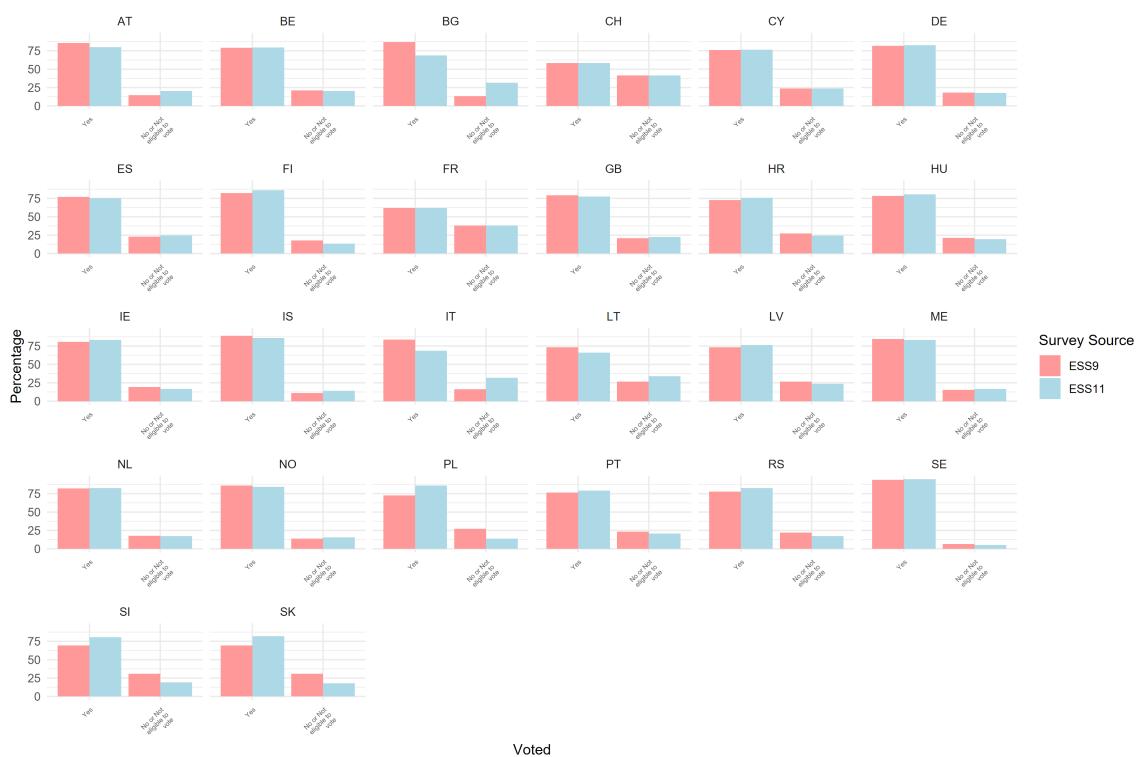


Figure 15: Voted in last election by country

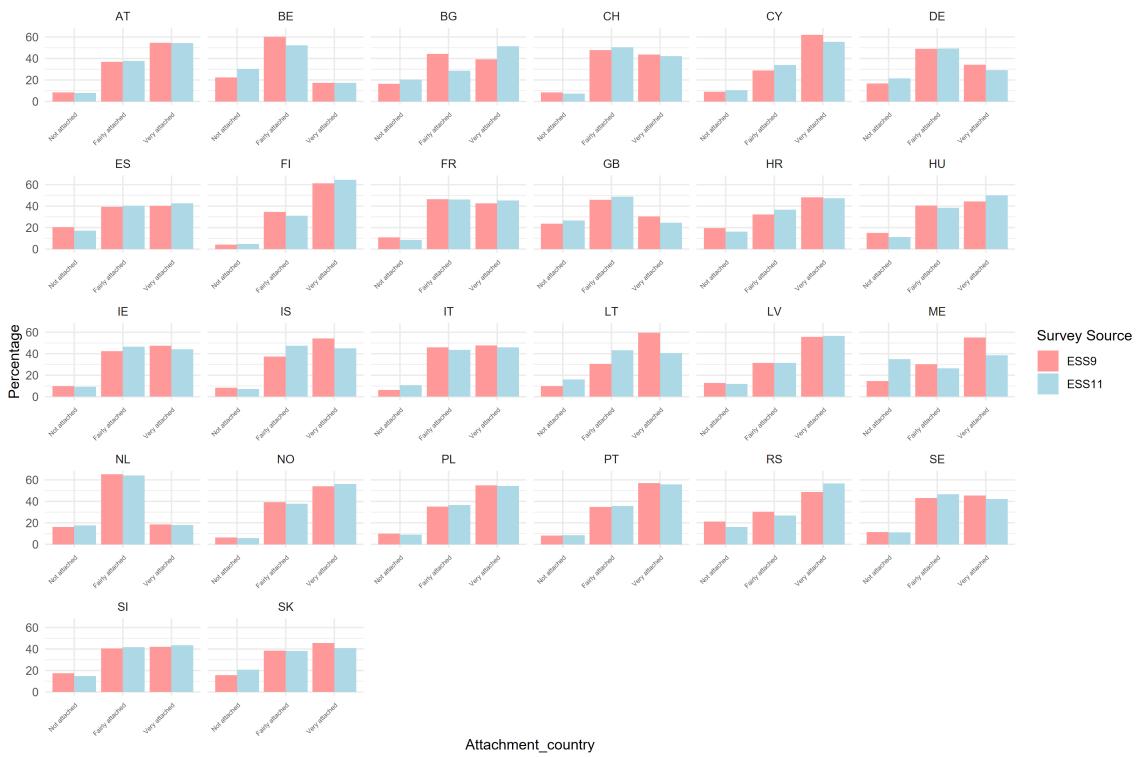


Figure 16: Attachment to country by country

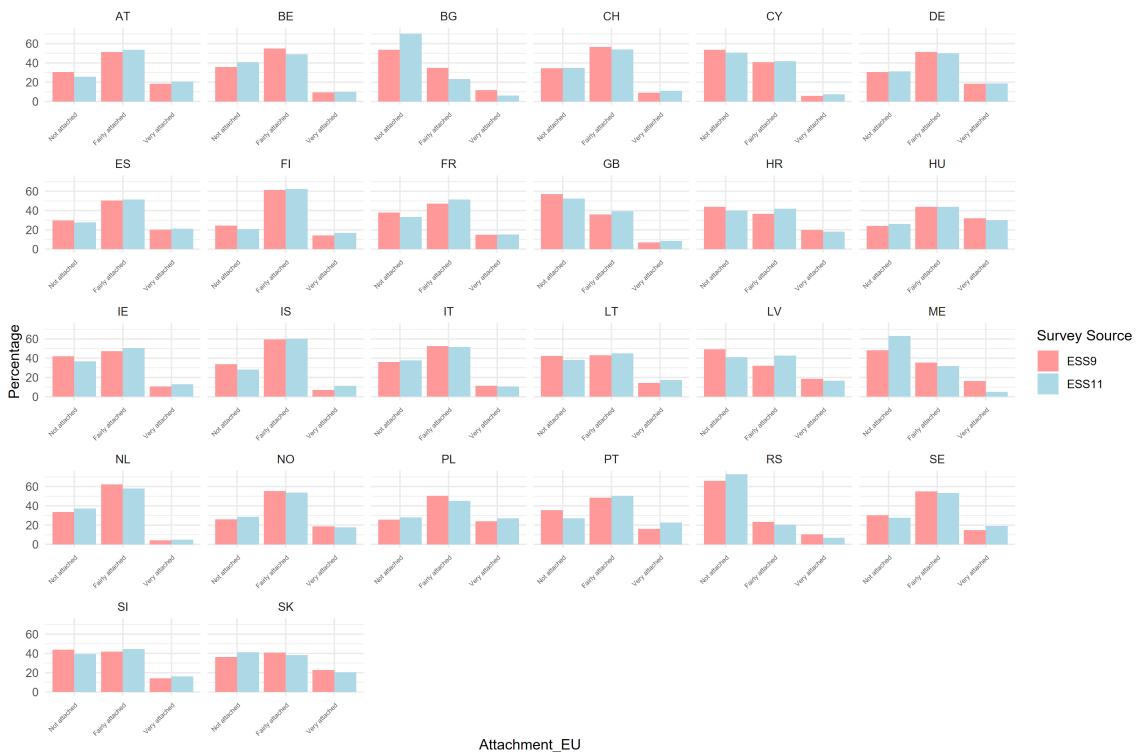


Figure 17: Attachment to EU by country

## 2.3 Matching Latent variables

In addition to the observed matching variables, we incorporated dimensions from the *Human Values Scale* (HVS) and latent traits related to *Political Participation* and *Interpersonal Trust* to further improve the balance between the samples.

To derive these latent traits, we used the `lavaan` package in R (Rosseel, 2012). For each scale, we conducted a multigroup confirmatory factor analysis (CFA). Given the ordinal nature of the scale items, model parameters were estimated using the WLSMV estimator.

Since our interest lies in comparing the pre- and post-COVID-19 periods within each country, we estimated a separate model for each country based jointly on data from the two survey rounds. By default, `lavaan` sets the mean of each latent trait to 0 and its variance to 1 in the reference group. This parameterization allows for direct comparison of latent means between the two time points within each country.

### 2.3.1 Interpersonal Trust

To estimate scores related to *Interpersonal Trust*, we considered the following items, which are common to both the ESS9 and ESS11 rounds:

1. Most people can be trusted, or you can't be too careful (`ppltrst`);
2. Most people try to take advantage of you, or try to be fair (`pplfair`);
3. Most of the time people are helpful, or mostly looking out for themselves (`pplhlp`).

In all cases, responses are measured on an ordinal scale whose verbal anchors differ across items (e.g., “*You can't be too careful*” to “*Most people can be trusted*”), but where higher values consistently indicate a greater level of interpersonal trust.

**Factor loading and threshold estimates** Table 3 provides the estimated factor loadings and the thresholds obtained through the multigroup CFA assuming configural invariance across the common countries

Table 3: Multigroup CFA model for Interpersonal Trust: estimates of factor loadings and thresholds.

Country	Most of the time people helpful			Most people can be trusted			Most people try to be fair			Most of the time people helpful		
	Most people can be trusted	Most people try to be fair	$\lambda_3$	t1	t2	t3	t1	t2	t3	t1	t2	t3
AT	0.78	0.78	0.79	-2.23	-0.40	2.21	-2.71	-0.79	1.76	-2.33	-0.54	2.13
BE	0.67	0.58	0.79	-2.13	-0.02	3.03	-2.19	-0.40	2.23	-1.52	0.24	2.38
BG	0.88	0.74	0.83	-1.04	1.46	3.74	-1.91	1.08	4.42	-0.88	1.26	3.46
CH	0.76	0.60	0.76	-2.34	-0.49	2.34	-2.97	-1.01	2.00	-2.09	-0.31	1.88
CY	0.77	0.64	0.77	-0.87	0.93	3.15	-1.40	0.89	3.15	-0.84	0.87	2.72
DE	0.74	0.63	0.69	-1.74	0.01	2.51	-2.55	-0.54	2.01	-1.87	0.10	2.29
ES	0.74	0.50	0.71	-1.86	0.01	2.59	-2.12	-0.15	2.36	-1.08	0.44	2.13
FI	0.79	0.59	0.71	-2.85	-1.33	1.62	-3.46	-1.62	1.59	-2.38	-0.66	1.84
FR	0.66	0.58	0.62	-1.30	0.55	2.84	-2.15	-0.46	1.92	-1.37	0.54	2.34
GB	0.76	0.66	0.76	-1.88	-0.06	2.68	-2.37	-0.41	2.41	-2.15	-0.34	2.14
HR	0.68	0.54	0.74	-1.10	0.81	2.77	-1.41	0.36	2.04	-0.81	0.73	2.19
HU	0.82	0.81	0.81	-1.35	0.41	2.87	-1.84	0.27	3.05	-1.54	0.41	3.24
IE	0.76	0.76	0.68	-1.60	-0.21	2.05	-2.52	-0.76	2.01	-2.33	-0.65	2.02
IS	0.83	0.57	0.67	-2.41	-0.82	1.65	-3.72	-1.74	1.69	-2.73	-0.92	1.47
IT	0.85	0.76	0.80	-1.64	0.33	3.30	-2.13	0.50	3.75	-1.28	0.73	3.38
LT	0.80	0.76	0.80	-1.50	0.32	2.67	-2.10	0.09	2.49	-1.48	0.40	2.69
LV	0.61	0.61	0.64	-0.99	0.64	2.35	-2.00	-0.22	1.68	-1.41	0.20	2.22
ME	0.82	0.65	0.71	-0.88	0.91	2.83	-1.37	1.14	3.43	-0.88	0.87	2.67
NL	0.81	0.51	0.76	-2.77	-0.96	2.62	-3.71	-1.50	2.67	-1.99	-0.30	2.37
NO	0.87	0.58	0.74	-2.93	-1.09	1.68	-4.16	-1.74	2.03	-2.33	-0.44	1.75
PL	0.73	0.62	0.71	-1.07	0.61	2.55	-1.68	0.29	2.29	-0.95	0.74	2.39
PT	0.69	0.54	0.77	-1.14	0.77	3.26	-1.89	0.18	2.39	-0.87	0.89	2.54
RS	0.77	0.68	0.77	-1.00	0.82	2.54	-0.97	0.65	2.22	-0.40	1.09	2.38
SE	0.83	0.57	0.70	-2.47	-0.77	1.91	-3.75	-1.42	2.13	-2.26	-0.54	1.81
SI	0.81	0.55	0.72	-1.26	0.46	2.69	-2.18	0.16	2.72	-1.44	0.14	1.99
SK	0.85	0.74	0.82	-0.80	1.09	3.04	-1.67	0.77	3.11	-1.00	0.94	2.73

The factor loadings indicate that all three items are generally good indicators of the latent trust construct, with consistently high values ( $\lambda > 0.7$ ) in most countries. Notably, Hungary, Bulgaria, and Slovakia showed the strongest item loadings, while Belgium and France showed slightly weaker associations.

The threshold parameters highlight cross-national variation in the tendency to endorse higher trust responses. Northern European countries such as Finland, Norway, and Sweden exhibited more negative thresholds, reflecting higher general trust. In contrast, countries like Bulgaria and Cyprus displayed higher thresholds, suggesting more conservative or skeptical attitudes toward trust.

**Factor score estimates** Figures 18 and 19 display the distribution of latent trait scores both at the aggregate level (all countries combined) and disaggregated by country.

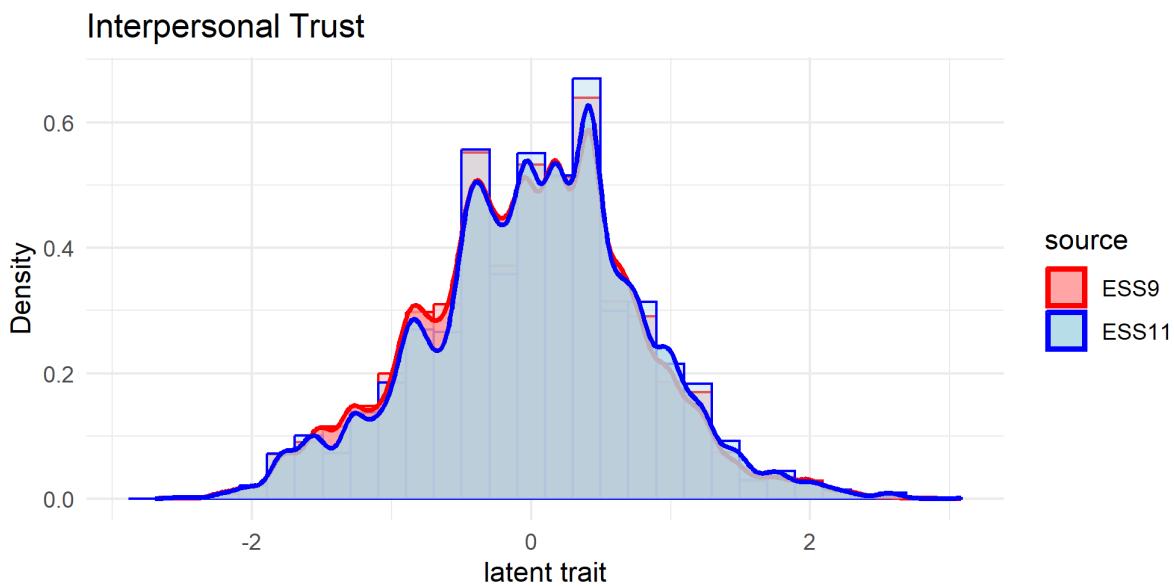


Figure 18: Interpersonal Trust score estimates for the ESS9 and ESS11 rounds

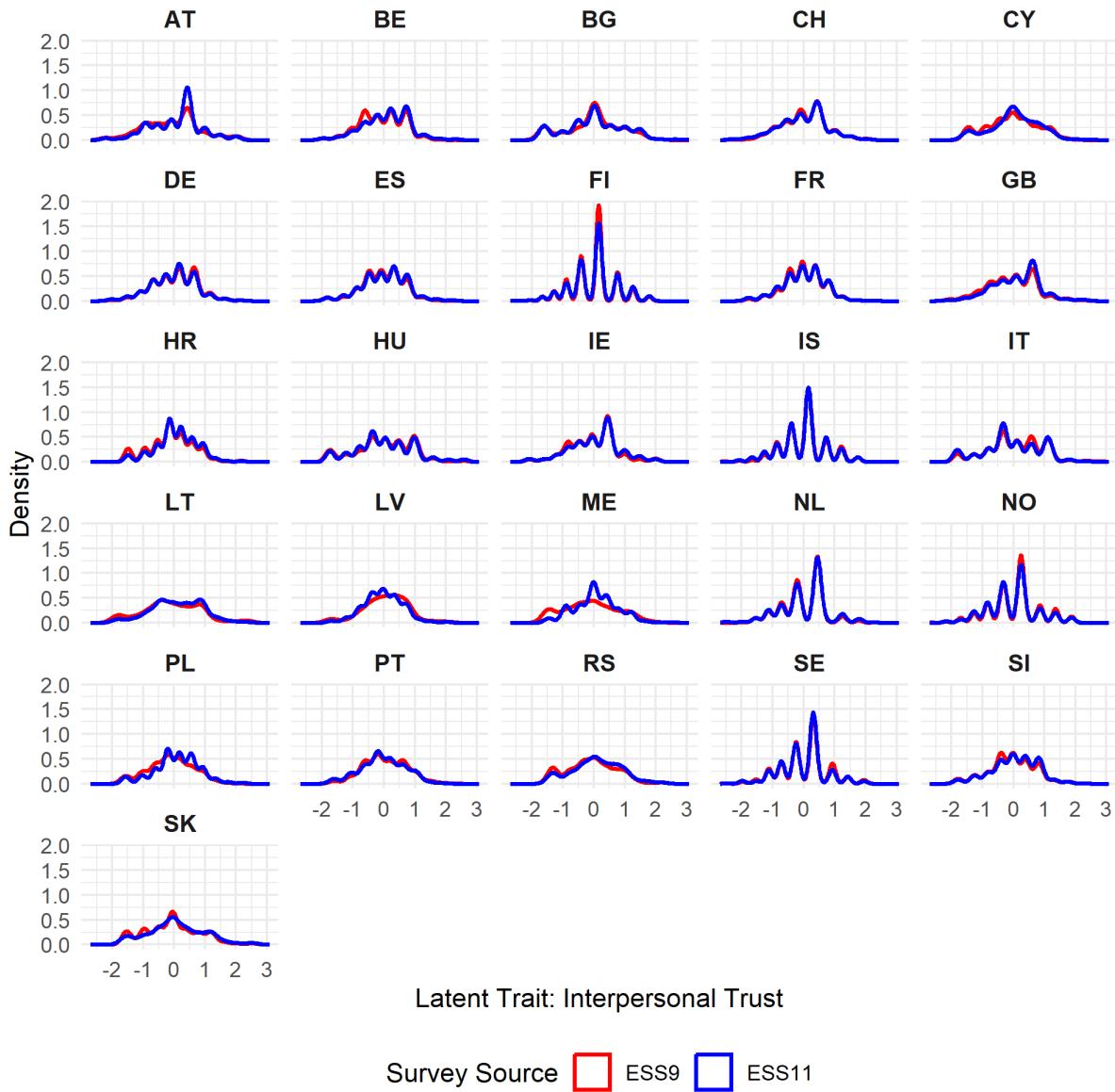


Figure 19: Interpersonal Trust score estimates for the ESS9 and ESS11 rounds by country

### 2.3.2 Political Participation

To estimate scores related to *Political Participation*, we considered the following items, which are common to both the ESS9 and ESS11 rounds:

1. Political system allows people to have a say in what government does (psppsgva);
2. Political system allows people to have influence on politics (psppipla)
3. Able to take active role in political group (actrolgga);
4. Confident in own ability to participate in politics (cptppola).

In all cases, responses are measured on an ordinal scale whose verbal anchors differ across items, but where higher values consistently indicate a greater level of political participation.

**Factor loading and threshold estimates** Table 4 provides the estimated factor loadings and the thresholds obtained through the multigroup CFA assuming configural invariance across the common countries

Table 4: Multigroup CFA model for Political Participation: estimates of factor loadings and thresholds.

Country	Political system allows people to have a say in what government does				Able to take active role in political group			Political system allows people to have influence on politics			Confident in own ability to participate in politics					
	$\lambda_1$	$\lambda_2$	$\lambda_3$	$\lambda_4$	t1	t2	t3	t1	t2	t3	t1	t2	t3			
AT	0.81	0.79	0.80	0.76	-1.67	0.15	2.20	-1.45	0.27	1.84	-1.78	0.12	2.37	-1.62	0.03	1.28
BE	0.81	0.83	0.70	0.64	-0.99	0.37	1.93	-0.75	0.63	2.37	-1.03	0.56	2.18	-0.79	0.72	2.59
BG	0.76	0.41	0.91	0.87	-0.49	0.84	2.28	-0.04	0.85	1.77	0.03	1.84	4.05	-0.23	0.53	1.47
CH	0.76	0.74	0.74	0.69	-2.19	-1.20	0.19	-1.21	0.22	1.45	-2.15	-0.93	0.67	-2.02	-0.46	0.95
CY	0.89	0.91	0.64	0.54	-0.35	0.42	1.86	-0.64	0.94	2.71	-0.38	0.50	1.87	-0.85	0.91	3.01
DE	0.69	0.68	0.79	0.73	-1.62	-0.06	1.57	-1.11	0.29	1.42	-1.83	-0.08	1.77	-1.88	-0.29	1.00
ES	0.84	0.78	0.67	0.57	-0.78	0.48	1.61	-0.53	1.21	2.43	-0.65	0.82	2.13	-0.89	0.60	1.75
FI	0.73	0.73	0.77	0.69	-1.70	0.19	2.05	-1.53	0.48	1.37	-2.51	-0.42	1.87	-1.38	0.56	1.70
FR	0.76	0.81	0.66	0.58	-0.74	0.42	1.73	-0.61	0.62	1.96	-0.66	0.60	2.06	-1.29	0.50	2.41
GB	0.68	0.63	0.81	0.74	-1.56	0.38	2.18	-0.89	0.27	1.41	-1.61	0.59	2.74	-0.95	0.09	1.28
HR	0.71	0.63	0.82	0.73	0.07	1.62	3.31	-0.10	1.33	2.18	-0.12	1.94	3.78	-0.21	1.05	1.98
HU	0.85	0.81	0.89	0.84	-0.83	0.73	2.86	-0.48	0.96	2.62	-0.92	1.09	3.84	-0.38	0.96	2.49
IE	0.80	0.79	0.83	0.77	-1.48	0.28	2.05	-1.19	0.16	1.58	-1.53	0.51	2.56	-1.16	0.25	1.61
IS	0.71	0.69	0.84	0.77	-2.21	-0.19	1.77	-1.62	-0.28	1.13	-2.82	-0.42	2.11	-2.03	-0.50	1.08
IT	0.84	0.82	0.83	0.81	-0.77	1.50	3.42	-0.99	1.06	3.18	-0.89	1.69	3.53	-1.46	0.67	2.61
LT	0.86	0.83	0.82	0.77	-1.06	0.38	2.28	-0.65	1.31	3.14	-0.77	0.92	2.65	-0.58	1.28	2.90
LV	0.80	0.70	0.80	0.74	-0.74	0.50	2.03	-0.29	1.68	2.82	-0.67	0.75	2.45	-0.23	1.24	2.23
ME	0.86	0.86	0.72	0.68	-0.78	0.38	2.04	-0.89	0.97	2.77	-0.75	0.55	2.15	-0.92	0.71	2.63
NL	0.84	0.81	0.79	0.73	-1.84	-0.31	1.49	-0.70	0.65	2.33	-2.01	-0.23	1.70	-0.74	0.54	2.11
NO	0.74	0.64	0.82	0.70	-2.49	-0.86	1.11	-1.97	-0.37	0.98	-2.99	-1.06	1.01	-1.58	-0.41	0.95
PL	0.75	0.79	0.79	0.71	-1.33	0.23	2.00	-0.92	0.55	1.94	-1.32	0.52	2.56	-0.90	0.59	2.22
PT	0.89	0.87	0.73	0.65	-0.90	0.42	1.81	-0.49	1.58	2.99	-0.61	0.82	2.29	-0.45	1.61	3.00
RS	0.85	0.87	0.79	0.77	-0.43	0.98	2.36	-0.40	1.04	2.08	-0.56	1.02	2.33	-0.42	1.16	2.40
SE	0.80	0.81	0.75	0.72	-2.19	-0.16	1.44	-1.84	-0.31	1.32	-2.55	-0.49	1.35	-1.89	-0.40	1.28
SI	0.87	0.84	0.67	0.62	-0.96	0.62	2.29	-0.95	0.99	3.03	-0.96	0.71	2.38	-0.82	0.87	2.91
SK	0.86	0.82	0.76	0.64	-0.87	0.57	2.01	-0.72	1.30	3.35	-0.73	1.00	2.77	0.24	1.79	3.15

The multi-group CFA shows that the four items measuring political efficacy load well on the latent factor across countries, indicating consistent measurement. Factor loadings are generally strong, especially in countries like Portugal and Hungary, suggesting reliable item performance.

Thresholds vary more substantially, with lower thresholds in countries such as Sweden and Norway—indicating lower likelihood of expressing political efficacy—and higher thresholds in Italy and Slovakia, where respondents are more likely to endorse higher levels of efficacy. These differences reflect meaningful cross-country variation in both the strength and distribution of political efficacy perceptions.

**Factor score estimates** Figures 20 and 21 display the distribution of latent trait scores both at the aggregate level (all countries combined) and disaggregated by country.

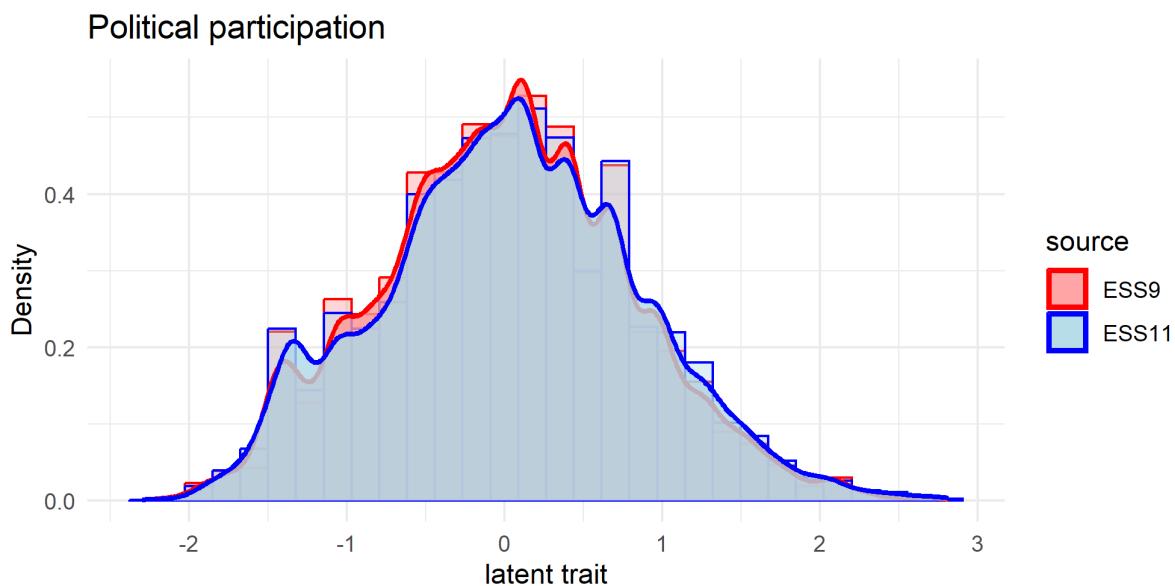


Figure 20: Interpersonal Trust score estimates for the ESS9 and ESS11 rounds

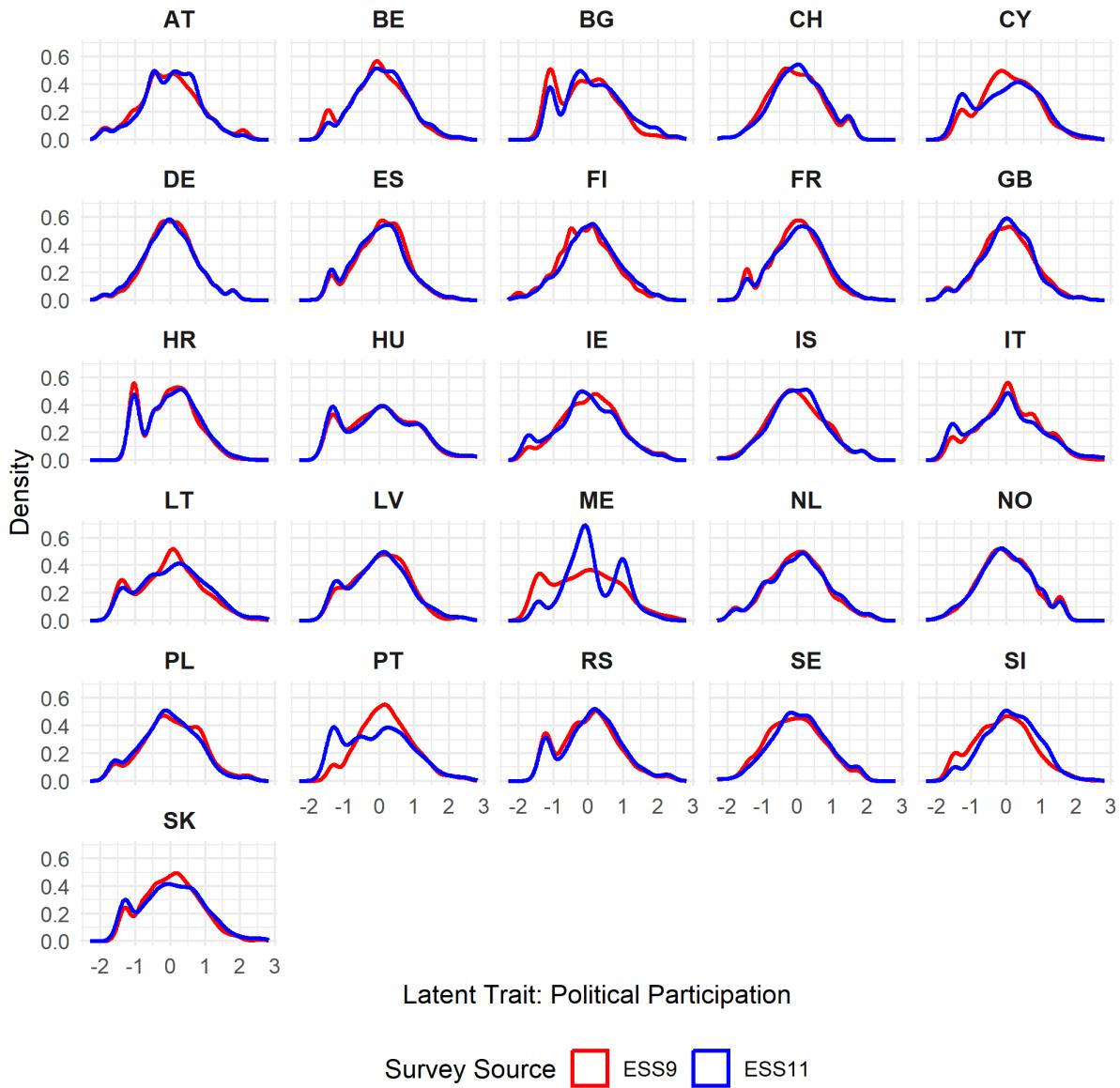


Figure 21: Interpersonal Trust score estimates for the ESS9 and ESS11 rounds by country

### 2.3.3 Human Value scale

The *Human Values Scale* (HVS) (Schwartz, 1992) items included in the analysis, along with their corresponding basic values and higher-order dimensions, are presented in Table 5. We included the four higher-order dimensions (*Conservation*, *Openness to Change*, *Self-Enhancement*, and *Self-Transcendence*) in our analysis. Given the universalism of the HVS and the well-established evidence of its measurement invariance across countries, the latent scores were estimated using data from all countries jointly, rather than through a multigroup analysis. The rating scale goes from "Not like me at all/Not like me" to "Very much like me" after recoding.

Table 5: Human Values Scale items grouped by higher-order dimension

Code	Item description	Basic value
<b>Conservation</b>		
impsafe	Important to live in secure and safe surroundings	Security
imptrad	Important to follow traditions and customs	Tradition
ipbhprp	Important to behave properly	Conformity
ipfrule	Important to do what is told and follow rules	Conformity
ipmodst	Important to be humble and modest, not draw attention	Tradition
ipstrgv	Important that government is strong and ensures safety	Security
<b>Openness to Change</b>		
impdiff	Important to try new and different things in life	Self-Direction
impfree	Important to make own decisions and be free	Self-Direction
impfun	Important to seek fun and things that give pleasure	Hedonism
ipadvnt	Important to seek adventures and have an exciting life	Stimulation
ipcrtiv	Important to think new ideas and being creative	Self-Direction
ipgdtim	Important to have a good time	Hedonism
<b>Self-Enhancement</b>		
imprich	Important to be rich, have money and expensive things	Power
iprspot	Important to get respect from others	Power
ipshabt	Important to show abilities and be admired	Achievement
ipsuces	Important to be successful and that people recognise achievements	Achievement
<b>Self-Transcendence</b>		
impenv	Important to care for nature and environment	Universalism
ipeqopt	Important that people are treated equally and have equal opportunities	Universalism
iphlppl	Important to help people and care for others' well-being	Benevolence
iplylfr	Important to be loyal to friends and devote to people close	Benevolence
ipudrst	Important to understand different people	Universalism

**Factor loading and threshold estimates** Table 6 provides the estimated factor loadings obtained through CFA while Table 7 reports the estimated thresholds.

Table 6: Loadings of indicators on latent dimensions from the Human Values Scale (HVS)

<b>Latent Dimension</b>	<b>Indicator</b>	<b>Loading</b>
Conservation	impsafe	0.68
	imptrad	0.54
	ipbhprp	0.67
	ipfrule	0.47
	ipmodst	0.46
	ipstrgv	0.70
Openness to Change	impdiff	0.68
	impfree	0.61
	mpfun	0.65
	ipadvnt	0.59
	ipcrtiv	0.56
	ipgdtim	0.63
Self-Enhancement	imprich	0.50
	iprspot	0.62
	ipshabt	0.74
	ipsuces	0.80
Self-Transcendence	impenv	0.62
	ipeqopt	0.60
	iphlppl	0.74
	iplylfr	0.74
	ipudrst	0.65

Table 7: Thresholds for latent dimensions across four time points

Latent Dimension	t1	t2	t3	t4
Conservation	-1.47	-0.94	-0.34	0.60
	-1.10	-0.60	-0.01	0.89
	-1.28	-0.73	-0.09	0.97
	-0.72	-0.21	0.39	1.32
	-1.33	-0.74	-0.07	0.97
	-1.55	-1.00	-0.36	0.63
Openness to Change	-0.97	-0.39	0.25	1.13
	-1.80	-1.22	-0.53	0.48
	-1.11	-0.50	0.18	1.13
	-0.29	0.26	0.85	1.56
	-1.41	-0.82	-0.10	0.83
	-1.08	-0.51	0.15	1.10
Self-Enhancement	0.00	0.61	1.25	1.96
	-0.80	-0.25	0.38	1.27
	-0.76	-0.24	0.37	1.28
	-0.84	-0.29	0.38	1.30
Self-Transcendence	-1.96	-1.34	-0.61	0.44
	-1.88	-1.34	-0.67	0.41
	-2.11	-1.38	-0.58	0.58
	-2.17	-1.57	-0.89	0.31
	-1.81	-1.16	-0.41	0.78

**Factor score estimates** Figures 22 displays the distribution of latent trait scores the aggregate level (all countries combined) while the details for each country are provided in Figures 23 to 26.

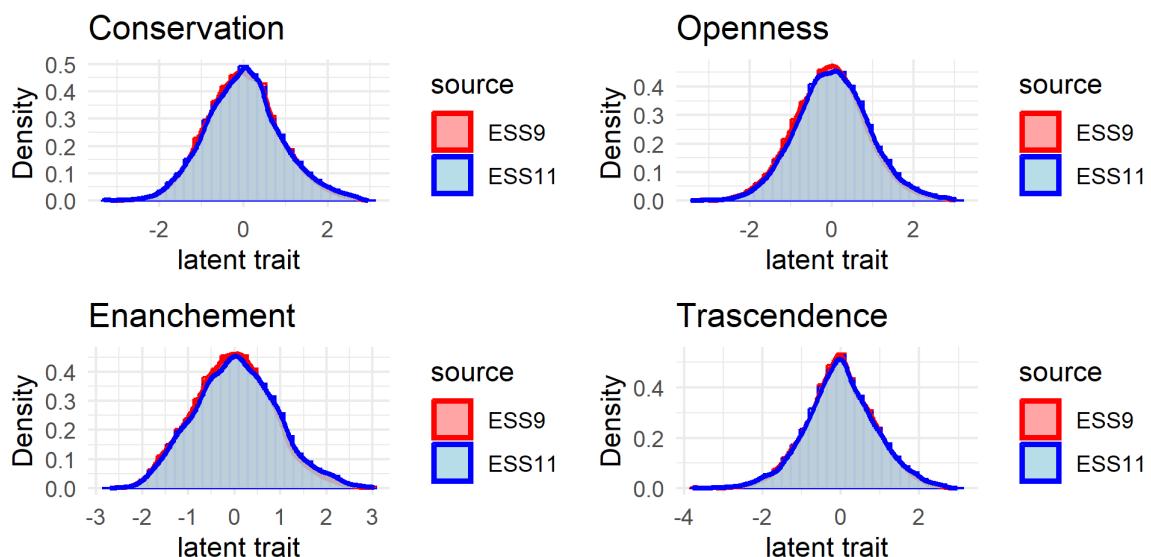


Figure 22: HVS latent traits: score estimates for the ESS9 and ESS11 rounds

## HVS: CONSERVATION

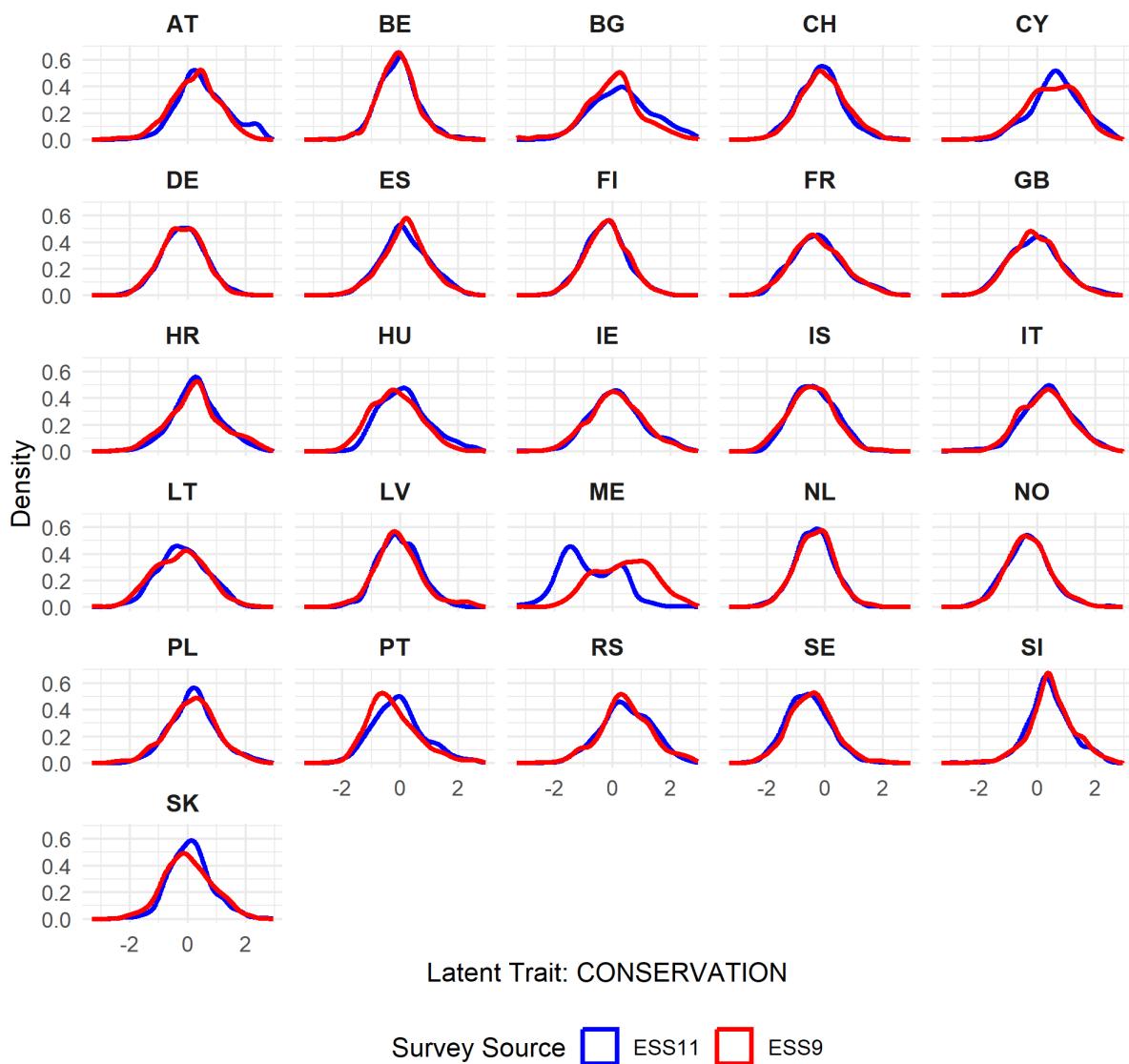


Figure 23: Conservation score estimates for the ESS9 and ESS11 rounds by country

## HVS: OPENNESS

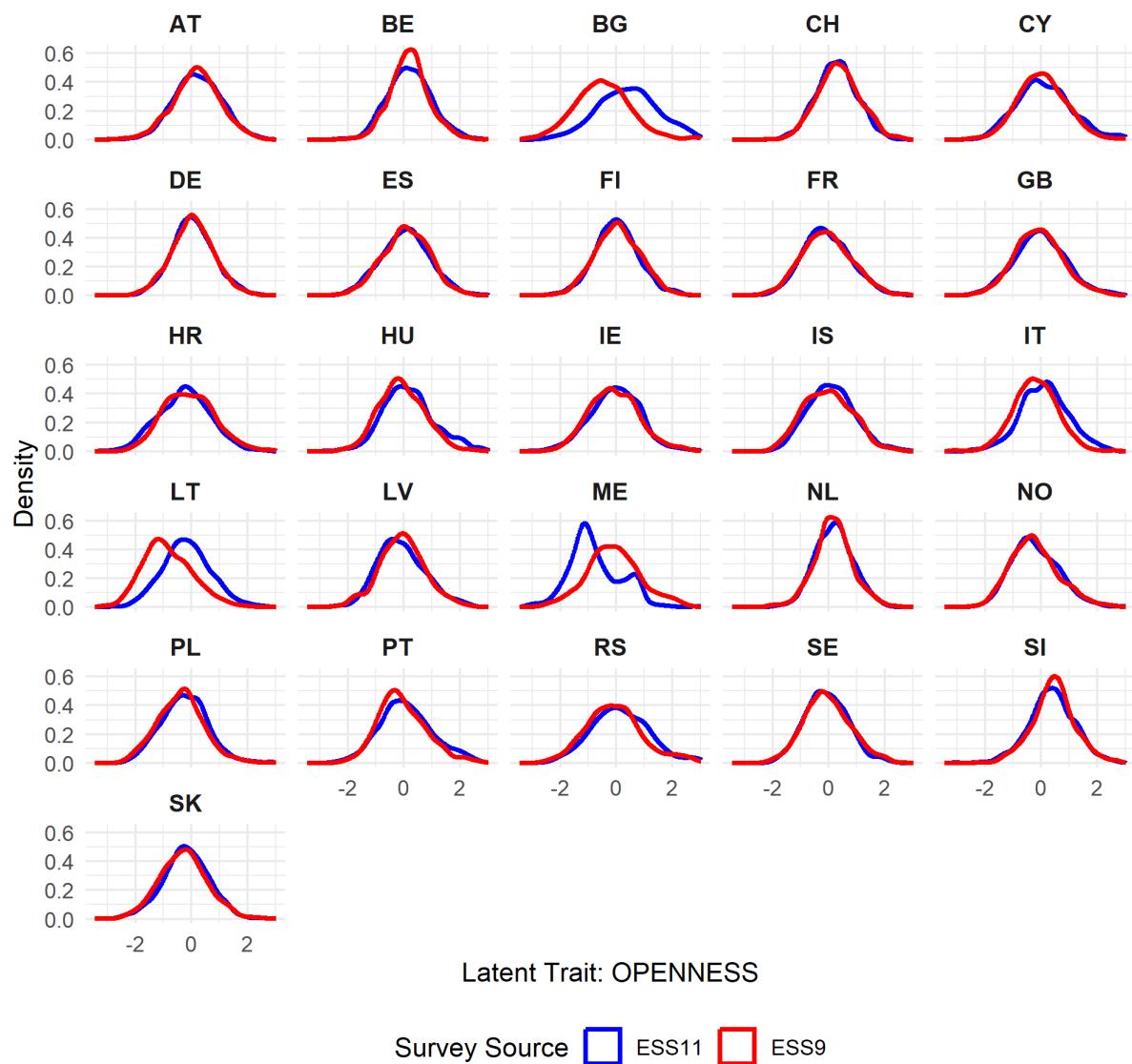


Figure 24: Openness to Change score estimates for the ESS9 and ESS11 rounds by country

### HVS: ENHANCEMENT

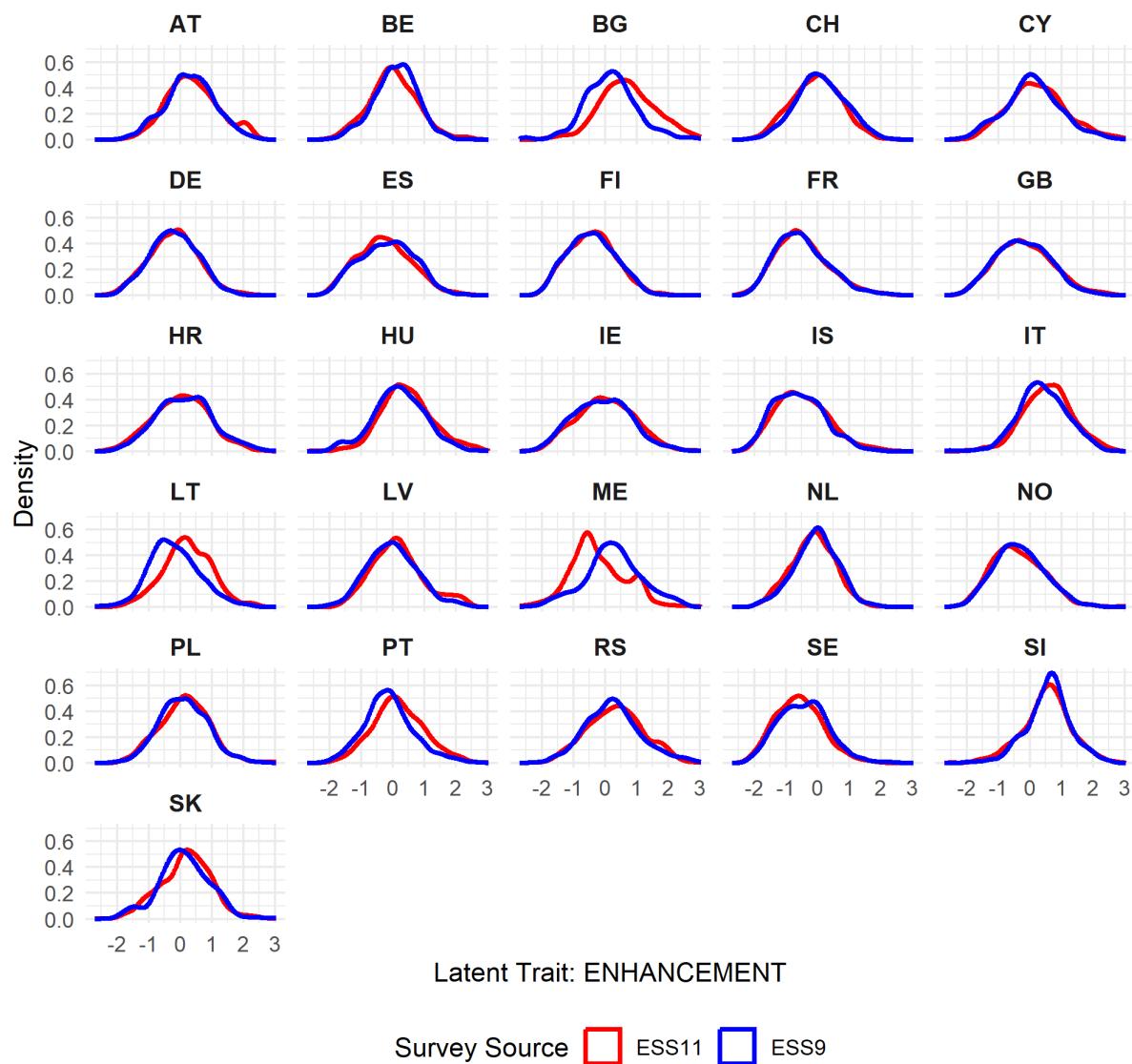


Figure 25: Enhancement score estimates for the ESS9 and ESS11 rounds by country

## HVS: TRANSCENDENCE

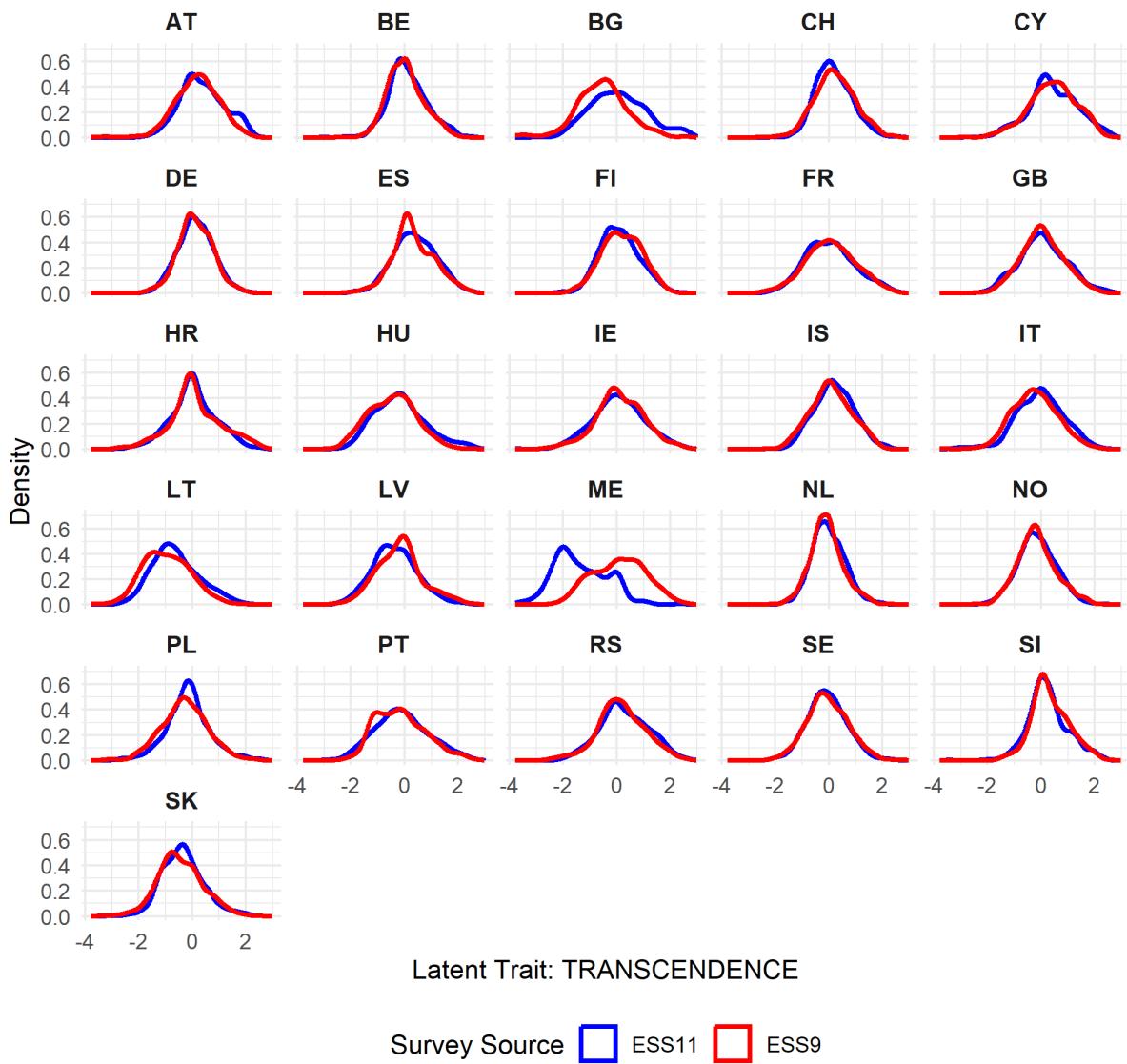


Figure 26: Transcendence score estimates for the ESS9 and ESS11 rounds by country

## 2.4 Target Latent Variables

The target variables are measured by the following indicators, respectively

- **Trust in Institutions:** includes respondents' trust in various political and legal bodies, measured by the following indicators:
  - Trust in the country's parliament (`trstpr1`)
  - The legal system (`trstlgl`)
  - The police (`trstplc`)
  - Politicians (`trstplt`)
  - Political parties (`trstpprt`)
  - The European Parliament (`trsttep`)

- The United Nations (trstun)
- **Satisfaction with Country Conditions:** reflects how satisfied respondents are with key national aspects, including:
  - The present state of the economy (stfeco)
  - The national government (stfgov)
  - The functioning of democracy (stfdem)
  - The current state of education (stfedu)
  - Health services (stfhlt)

To estimate the latent trait scores, we fitted two unidimensional model using multigroup confirmatory factor analysis (CFA), jointly modeling both survey rounds within each country. We assumed configural invariance – meaning the factor structure is the same across groups – but did not impose metric or scalar invariance. This approach enables latent trait scores to be estimated separately within each country. By estimating the model simultaneously on both rounds for each country, the latent means are not constrained to zero per round, allowing direct evaluation of shifts in the latent traits over time within countries. This approach yields latent scores that are comparable across time points within each country, facilitating analysis of change between pre- and post-COVID-19 periods.

## 2.4.1 Trust in Institutions

For all the indicators, responses are measured on an ordinal scale with higher values indicating higher trust.

**Factor loading and threshold estimates** Tables 8 and 9 provide the estimated factor loadings and thresholds, respectively.

Table 8: Multigroup CFA model for Trust in Institutions: estimates of factor loadings.

Country	Parliament	EU	UN	Legal System	Police	Political parties	Politician
	$\lambda_1$	$\lambda_2$	$\lambda_3$	$\lambda_4$	$\lambda_5$	$\lambda_6$	$\lambda_7$
AT	0.78	0.84	0.80	0.75	0.67	0.93	0.94
BE	0.82	0.84	0.74	0.71	0.57	0.92	0.93
BG	0.87	0.81	0.84	0.86	0.84	0.93	0.96
CH	0.76	0.74	0.70	0.74	0.65	0.85	0.88
CY	0.71	0.71	0.65	0.68	0.63	0.92	0.93
DE	0.81	0.83	0.76	0.70	0.58	0.91	0.92
ES	0.76	0.84	0.77	0.66	0.54	0.95	0.96
FI	0.79	0.79	0.65	0.74	0.68	0.91	0.93
FR	0.75	0.84	0.72	0.69	0.55	0.86	0.88
GB	0.81	0.70	0.66	0.73	0.65	0.91	0.93
HR	0.78	0.84	0.83	0.70	0.59	0.87	0.93
HU	0.82	0.70	0.72	0.81	0.67	0.91	0.93
IE	0.77	0.83	0.78	0.71	0.62	0.96	0.96
IS	0.85	0.68	0.66	0.68	0.60	0.92	0.97
IT	0.73	0.82	0.80	0.63	0.55	0.94	0.95
LT	0.77	0.79	0.70	0.66	0.50	0.90	0.93
LV	0.86	0.72	0.68	0.77	0.68	0.92	0.95
ME	0.76	0.83	0.85	0.81	0.69	0.84	0.89
NL	0.84	0.79	0.70	0.72	0.58	0.91	0.94
NO	0.82	0.70	0.66	0.76	0.68	0.91	0.95
PL	0.76	0.66	0.66	0.72	0.54	0.91	0.92
PT	0.76	0.83	0.79	0.70	0.56	0.93	0.97
RS	0.77	0.77	0.76	0.75	0.74	0.91	0.93
SE	0.76	0.70	0.60	0.76	0.68	0.88	0.93
SI	0.81	0.86	0.79	0.76	0.62	0.90	0.94
SK	0.85	0.84	0.82	0.81	0.74	0.91	0.94

Table 9: Multigroup CFA model for Trust in Institutions: estimates of thresholds.

	Parliament			EU			UN			Legal System			Police			Political parties			Politician		
	t1	t2	t3	t1	t2	t3	t1	t2	t3	t1	t2	t3	t1	t2	t3	t1	t2	t3	t1	t2	t3
AT	-1.87	-0.78	1.41	-1.38	-0.16	2.07	-1.32	-0.49	1.51	-2.38	-1.55	0.17	-2.52	-1.74	-0.34	-1.73	0.33	3.97	-1.90	0.19	3.86
BE	-1.71	-0.51	2.41	-1.76	-0.66	2.33	-1.75	-0.91	1.49	-1.58	-0.73	1.23	-2.06	-1.43	0.47	-1.97	0.03	4.70	-2.07	-0.17	4.77
BG	-0.07	1.43	4.18	-1.11	-0.09	1.88	-1.22	-0.25	1.95	-0.77	0.34	2.18	-1.44	-0.49	1.40	0.33	2.47	5.82	0.49	3.44	8.20
CY	-2.85	-1.73	0.70	-1.49	-0.51	1.93	-1.67	-0.76	1.29	-2.75	-1.79	0.15	-2.64	-1.99	-0.22	-2.67	-1.23	2.45	-2.97	-1.47	2.38
CY	-0.89	0.04	2.18	-1.29	-0.49	1.69	-1.08	-0.23	1.60	-1.02	-0.22	1.59	-1.35	-0.65	1.07	-0.26	1.55	5.82	-0.52	1.57	5.99
DE	-1.70	-0.57	1.48	-1.57	-0.29	2.16	-1.58	-0.49	1.57	-2.00	-1.09	0.40	-2.19	-1.48	-0.08	-1.69	0.25	4.26	-1.65	0.29	4.23
ES	-1.04	-0.13	2.00	-1.57	-0.54	2.13	-1.47	-0.64	1.44	-1.22	-0.42	1.16	-1.85	-1.30	0.05	-0.10	2.11	6.68	-0.13	2.30	7.39
FI	-2.53	-1.48	0.81	-2.20	-1.16	1.57	-2.13	-1.44	0.49	-2.78	-1.95	-0.36	-2.99	-2.47	-1.14	-3.04	-1.26	3.18	-3.16	-1.26	3.67
FR	-1.05	-0.05	2.07	-1.19	-0.05	2.55	-1.47	-0.68	1.41	-1.39	-0.60	1.19	-1.87	-1.28	0.43	-0.69	0.93	4.03	-1.11	0.45	3.85
GB	-1.01	0.08	2.32	-0.56	0.27	2.13	-1.32	-0.62	1.24	-1.80	-0.90	0.88	-1.91	-1.21	0.39	-0.97	0.88	4.65	-0.80	1.14	5.22
HR	0.11	1.06	2.74	-1.15	-0.03	2.28	-1.30	-0.28	1.66	-0.07	0.84	2.44	-1.34	-0.53	0.80	0.67	2.08	4.49	1.13	2.93	6.02
HU	-1.22	-0.27	1.65	-1.44	-0.47	1.28	-1.74	-0.79	1.01	-1.76	-0.77	1.18	-1.96	-1.14	0.48	-1.47	0.10	3.16	-1.70	-0.02	3.39
IE	-1.50	-0.53	1.72	-1.84	-0.82	1.71	-1.77	-0.99	1.10	-1.56	-0.79	1.07	-1.82	-1.20	0.40	-2.22	0.08	5.46	-2.31	-0.10	5.32
IS	-2.19	-1.02	1.93	-1.87	-1.15	1.13	-2.15	-1.55	0.28	-2.06	-1.25	0.61	-2.37	-1.78	-0.35	-2.14	-0.47	4.08	-3.76	-1.23	6.35
IT	-1.24	-0.22	1.98	-1.49	-0.44	2.32	-1.70	-0.80	1.83	-1.58	-0.78	1.10	-2.11	-1.48	0.39	-1.04	1.10	5.95	-1.25	1.13	6.22
LT	-0.73	0.43	2.70	-1.71	-0.76	1.55	-1.46	-0.69	1.23	-1.29	-0.42	1.22	-1.72	-1.13	0.16	-0.81	1.00	4.36	-1.13	0.98	4.96
LV	-0.69	0.42	3.49	-1.15	-0.41	1.62	-0.88	-0.24	1.39	-1.11	-0.34	1.69	-1.59	-0.87	0.84	-0.24	1.61	5.08	-0.63	1.76	6.93
ME	-1.04	-0.02	1.80	-1.95	-0.96	1.28	-2.05	-1.13	1.40	-1.30	-0.13	2.04	-1.60	-0.59	1.16	-0.95	0.42	2.94	-1.00	0.60	3.47
NL	-2.62	-1.34	1.89	-2.00	-0.98	2.12	-2.13	-1.38	1.27	-2.53	-1.65	0.43	-2.63	-1.89	0.12	-3.42	-1.60	3.93	-3.70	-1.75	4.70
NO	-2.95	-1.91	0.28	-1.91	-1.04	1.36	-2.47	-1.79	0.17	-3.15	-2.29	-0.45	-2.73	-2.09	-0.44	-3.53	-1.57	2.82	-4.16	-1.87	3.79
PL	-0.89	0.07	2.00	-0.97	-0.17	1.62	-1.52	-0.67	1.18	-1.04	-0.09	1.86	-1.46	-0.74	0.90	-0.55	1.12	4.24	-0.52	1.22	4.62
PT	-1.15	-0.17	1.79	-1.60	-0.55	1.88	-1.85	-1.02	1.12	-1.10	-0.05	1.76	-1.84	-1.11	0.51	-0.39	1.57	5.07	-0.51	2.42	8.01
RS	-0.67	0.09	1.62	-0.12	0.67	2.24	-0.30	0.45	2.00	-0.67	0.12	1.70	-1.19	-0.50	1.04	0.22	1.40	3.64	0.12	1.51	3.97
SE	-2.44	-1.32	0.66	-1.76	-0.73	1.58	-2.03	-1.12	0.59	-2.59	-1.58	0.36	-2.53	-1.76	0.05	-2.65	-0.80	2.90	-3.15	-0.82	3.79
SI	-1.18	0.20	2.47	-1.30	-0.11	2.34	-1.46	-0.35	1.57	-1.18	-0.06	1.75	-1.92	-1.07	0.52	-0.54	1.36	4.66	-0.71	1.65	6.10
SK	-0.75	0.40	2.29	-1.09	-0.09	1.78	-1.41	-0.45	1.30	-1.22	-0.15	1.62	-1.41	-0.54	1.02	-0.96	0.68	3.30	-0.94	0.85	3.83

While loadings are substantially stable across countries, thresholds vary both across countries and items, reflecting differences in how readily individuals endorse higher levels of trust. Notably, items related to politicians and political parties consistently exhibit high upper thresholds, indicating a general reluctance to express high trust in these institutions. Northern European countries tend to have lower thresholds, suggesting generally higher levels of trust or more uniform response patterns.

**Factor score estimates** Figures 27 and 28 display the distribution of latent trait scores both at the aggregate level (all countries combined) and disaggregated by country.

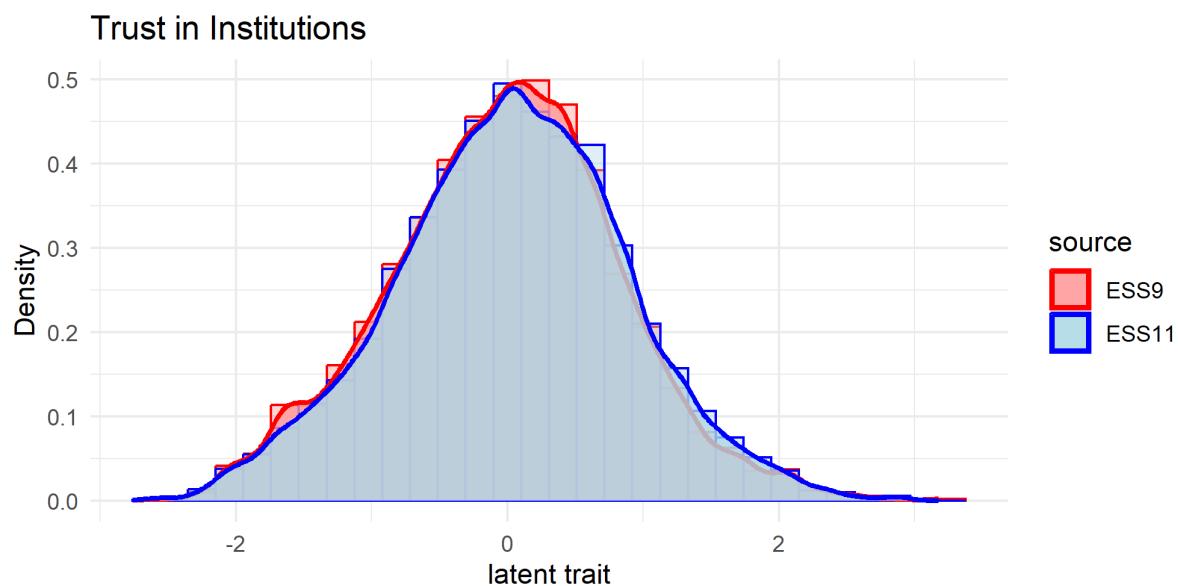


Figure 27: Trust in Institutions score estimates for the ESS9 and ESS11 rounds

### Trust in Institutions by Country

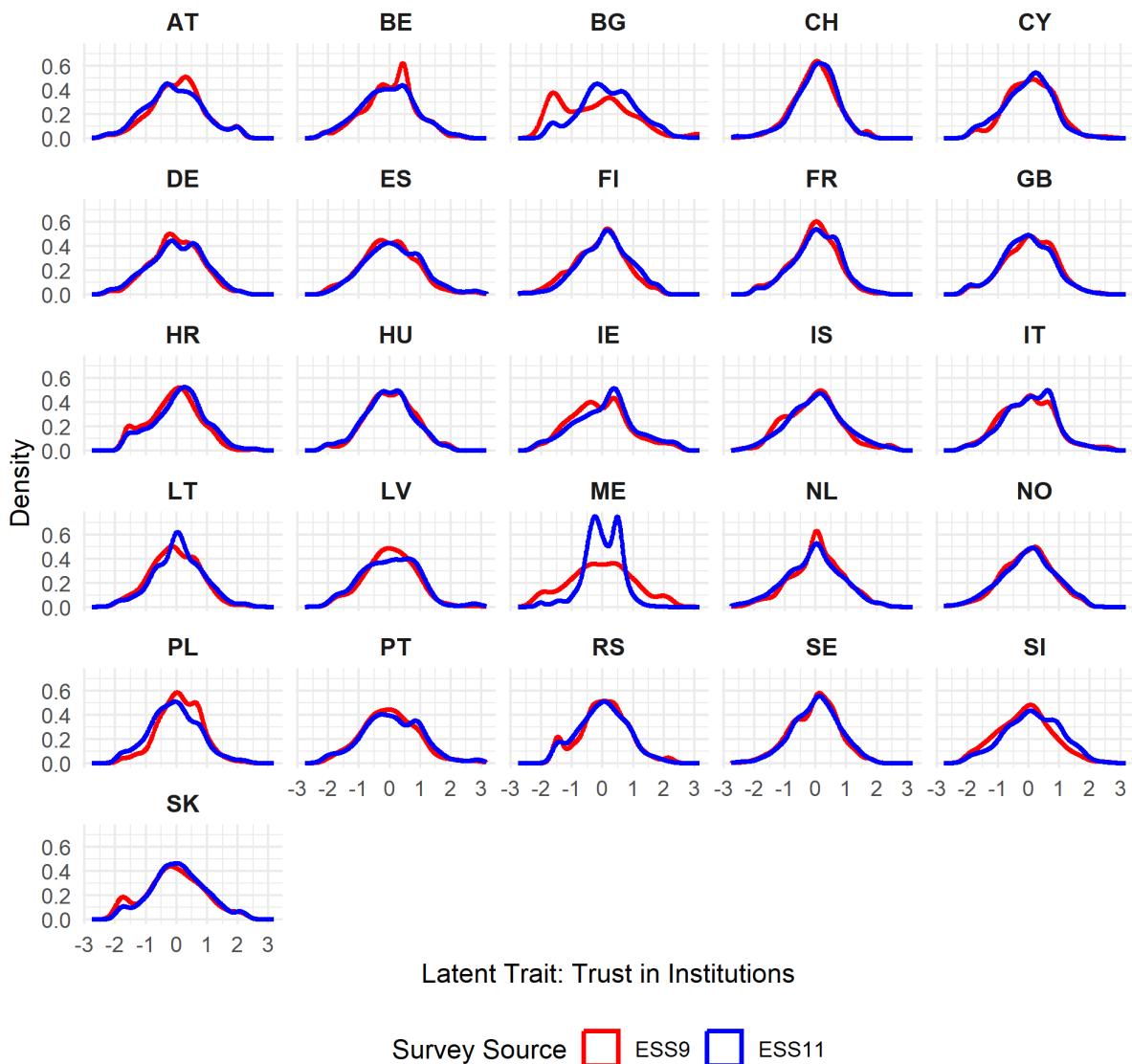


Figure 28: Trust in Institutions score estimates for the ESS9 and ESS11 rounds by country

## 2.4.2 Satisfaction with Country Conditions

For all the indicators, responses are measured on an ordinal scale with higher values indicating higher level of satisfaction.

**Factor loading and threshold estimates** Tables 10 and 11 provide the estimated factor loadings and thresholds, respectively.

Table 10: Multigroup CFA model for Satisfaction with Country Conditions: estimates of factor loadings.

Country	Government	Democracy	Economy	Education	Health
	$\lambda_1$	$\lambda_2$	$\lambda_3$	$\lambda_4$	$\lambda_5$
AT	0.78	0.82	0.65	0.64	0.71
BE	0.83	0.74	0.71	0.52	0.56
BG	0.90	0.87	0.76	0.68	0.66
CH	0.80	0.79	0.64	0.57	0.57
CY	0.85	0.84	0.68	0.56	0.51
DE	0.75	0.70	0.64	0.59	0.63
ES	0.78	0.75	0.72	0.61	0.53
FI	0.70	0.69	0.67	0.54	0.58
FR	0.87	0.79	0.75	0.54	0.49
GB	0.88	0.73	0.76	0.56	0.58
HR	0.89	0.81	0.74	0.61	0.60
HU	0.95	0.91	0.87	0.82	0.79
IE	0.90	0.77	0.76	0.55	0.59
IS	0.83	0.73	0.67	0.50	0.60
IT	0.75	0.77	0.75	0.66	0.57
LT	0.71	0.78	0.72	0.63	0.69
LV	0.89	0.75	0.77	0.57	0.59
ME	0.81	0.78	0.75	0.74	0.72
NL	0.83	0.76	0.65	0.54	0.60
NO	0.74	0.71	0.68	0.50	0.56
PL	0.81	0.83	0.69	0.64	0.50
PT	0.86	0.71	0.75	0.64	0.63
RS	0.93	0.87	0.81	0.64	0.64
SE	0.65	0.60	0.56	0.63	0.60
SI	0.79	0.81	0.67	0.59	0.63
SK	0.71	0.84	0.67	0.64	0.60

Table 11: Multigroup CFA model for Satisfaction with Country Conditions: estimates of thresholds.

	Government			Democracy			Economy			Education			Health		
	t1	t2	t3	t1	t2	t3	t1	t2	t3	t1	t2	t3	t1	t2	t3
<b>AT</b>	-1.29	-0.30	1.58	-2.39	-1.27	0.59	-1.98	-1.18	0.70	-2.01	-1.02	0.50	-2.43	-1.48	0.07
<b>BE</b>	-1.80	-0.44	2.95	-1.75	-0.77	1.58	-2.03	-0.92	1.57	-1.84	-0.99	0.82	-2.58	-1.75	-0.04
<b>BG</b>	-0.43	1.55	4.98	-0.75	0.79	4.24	-0.50	0.94	3.35	-1.04	-0.03	2.05	-0.66	0.31	2.08
<b>CH</b>	-3.10	-2.06	0.71	-3.57	-2.55	-0.40	-2.82	-1.87	0.06	-2.46	-1.48	0.14	-2.23	-1.37	0.15
<b>CY</b>	-1.37	-0.08	2.86	-1.76	-0.46	2.50	-0.93	0.15	2.32	-1.15	-0.19	1.66	-1.22	-0.34	1.20
<b>DE</b>	-0.98	0.22	2.45	-1.74	-0.77	0.79	-1.68	-0.72	0.81	-1.15	0.02	1.55	-1.58	-0.51	1.01
<b>ES</b>	-0.58	0.48	2.50	-1.27	-0.37	1.65	-1.17	0.03	2.24	-1.42	-0.44	1.40	-1.46	-0.66	0.80
<b>FI</b>	-1.35	-0.47	1.49	-2.35	-1.44	0.36	-2.21	-1.08	1.07	-2.66	-1.89	-0.35	-2.29	-1.40	0.16
<b>FR</b>	-0.97	0.53	3.50	-1.18	0.02	2.05	-0.92	0.45	3.05	-1.29	-0.26	1.61	-1.56	-0.65	0.75
<b>GB</b>	-0.69	0.79	3.61	-1.29	-0.31	1.48	-1.13	0.16	2.44	-1.59	-0.62	1.25	-1.41	-0.45	1.01
<b>HR</b>	-0.15	1.20	3.49	-0.90	0.39	2.44	-0.57	0.63	2.69	-1.49	-0.60	1.08	-1.28	-0.51	0.89
<b>HU</b>	-2.00	-0.36	3.14	-1.53	-0.21	2.48	-1.60	-0.20	2.41	-1.30	-0.18	2.12	-0.68	0.36	2.31
<b>IE</b>	-2.29	-0.62	2.69	-2.00	-0.98	1.01	-1.94	-0.73	1.36	-2.24	-1.41	0.23	-0.80	0.10	1.47
<b>IS</b>	-1.44	-0.31	2.52	-1.91	-1.02	0.83	-1.47	-0.65	1.35	-2.18	-1.20	0.63	-1.66	-0.57	1.29
<b>IT</b>	-1.30	-0.19	2.08	-1.95	-0.71	1.93	-1.31	0.13	2.70	-1.77	-0.67	1.58	-1.51	-0.62	1.20
<b>LT</b>	-1.03	0.19	2.18	-1.66	-0.32	1.91	-1.46	-0.23	1.93	-1.49	-0.44	1.36	-1.51	-0.35	1.54
<b>LV</b>	-0.97	0.56	4.08	-1.30	-0.27	1.85	-1.11	0.14	2.49	-1.05	-0.10	1.86	-0.85	0.06	2.03
<b>ME</b>	-1.38	-0.36	1.96	-1.19	-0.30	1.97	-1.22	-0.01	2.01	-1.29	0.03	1.89	-1.52	-0.45	1.53
<b>NL</b>	-2.26	-0.87	2.68	-2.60	-1.54	0.93	-2.44	-1.36	0.76	-2.37	-1.19	0.99	-2.31	-1.38	0.50
<b>NO</b>	-1.76	-0.54	1.68	-2.66	-1.85	-0.16	-2.24	-1.25	0.39	-2.85	-1.87	-0.10	-2.57	-1.63	0.05
<b>PL</b>	-1.14	-0.32	1.66	-1.95	-0.89	1.52	-1.99	-0.88	1.25	-1.55	-0.60	0.98	-0.83	0.12	1.65
<b>PT</b>	-1.24	0.18	2.98	-1.48	-0.46	1.53	-1.20	0.14	2.58	-1.27	-0.19	1.63	-0.91	0.01	1.62
<b>RS</b>	-1.13	0.15	2.58	-0.65	0.33	2.22	-0.86	0.21	2.23	-1.03	-0.20	1.23	-0.64	0.18	1.44
<b>SE</b>	-1.25	-0.21	1.83	-2.10	-1.19	0.35	-1.81	-0.76	0.91	-1.79	-0.60	1.50	-1.89	-0.75	1.04
<b>SI</b>	-1.24	-0.07	2.26	-1.56	-0.28	2.01	-1.74	-0.65	1.40	-1.54	-0.57	1.02	-1.08	-0.11	1.47
<b>SK</b>	-0.80	0.17	1.77	-1.47	-0.15	2.08	-0.88	0.19	1.85	-1.47	-0.44	1.28	-0.52	0.32	1.88

Factor loadings confirm that the measurement model is robust across countries, but the thresholds reveal meaningful cross-national differences in response patterns. High positive t3 values (BG, HU, LV) suggest a more stringent use of top categories, whereas lower t3 values (SE, NO) point to more generous ratings. This indicates potential cultural or contextual influences on how respondents rate Government, Democracy, Economy, Education, and Health, even when the underlying construct is measured consistently.

**Factor score estimates** Figures 29 and 30 display the distribution of latent trait scores both at the aggregate level (all countries combined) and disaggregated by country.

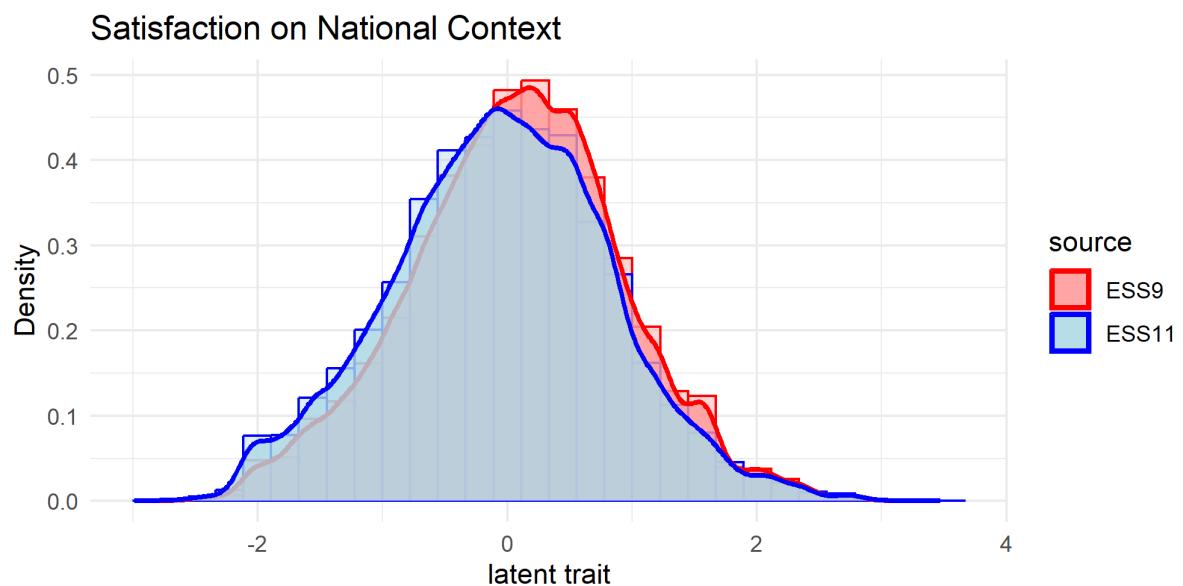


Figure 29: Satisfaction with Country Conditions score estimates for the ESS9 and ESS11 rounds

### Satisfaction on National Context by Country

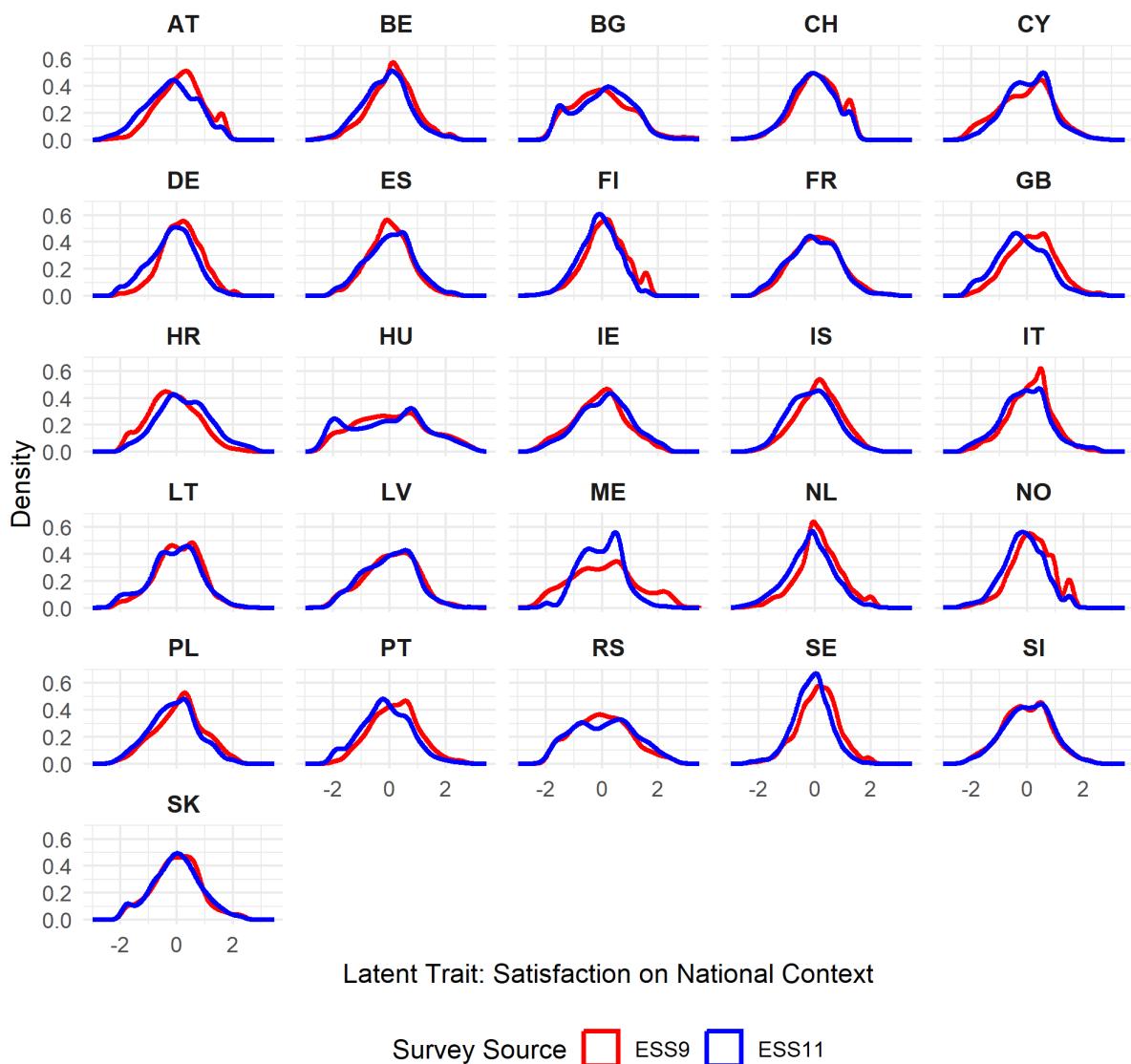


Figure 30: Satisfaction with Country Conditions score estimates for the ESS9 and ESS11 rounds by country

## 2.5 Dependence of target variables on matching variables

To assess how well the common variables explained the target variables, we conducted regression analyses using the latent traits *Trust in Institutions* and *Satisfaction with Country Conditions* as dependent variables. For ordinal predictors, such as education level, we applied orthogonal polynomial contrasts (linear, quadratic, and cubic) to capture potential non-linear patterns. The linear contrast tests for a steady increase or decrease across categories, whereas the quadratic and cubic contrasts identify curvilinear relationships, such as plateauing or U-shaped trends.

Figures 31 and 32 present a graphical overview of the direct relationships, while Tables 12 and 13 provide country-level details. The models identify several significant predictors.

For both *Trust in Institutions* and *Satisfaction with Country Conditions*, the regression results—estimated separately for each country—reveal a mix of consistent and heterogeneous patterns in the determinants.

Political position shows high consistency for the *Trust* latent trait: respondents identifying at the centre or on the right exhibit significantly higher trust compared to those on the left (baseline) across most countries. For satisfaction, there is no significant effect of being at the centre compared to the left in most countries, whereas being on the right generally has a positive effect.

Political participation and interpersonal trust display a robust and positive association with both institutional trust and satisfaction. Strong attachment to one's country and to the European Union consistently predicts higher trust in several countries.

Economic difficulties have a generally negative impact, while life satisfaction, happiness, and religiosity are positively related to trust and satisfaction in most contexts.

The influence of human values (HVS) is more heterogeneous, with significance levels and signs varying by value dimension and national context.

Overall, the results highlight the interplay of structural, cultural, and personal factors, with some drivers showing remarkable stability across Europe and others being strongly country-dependent.

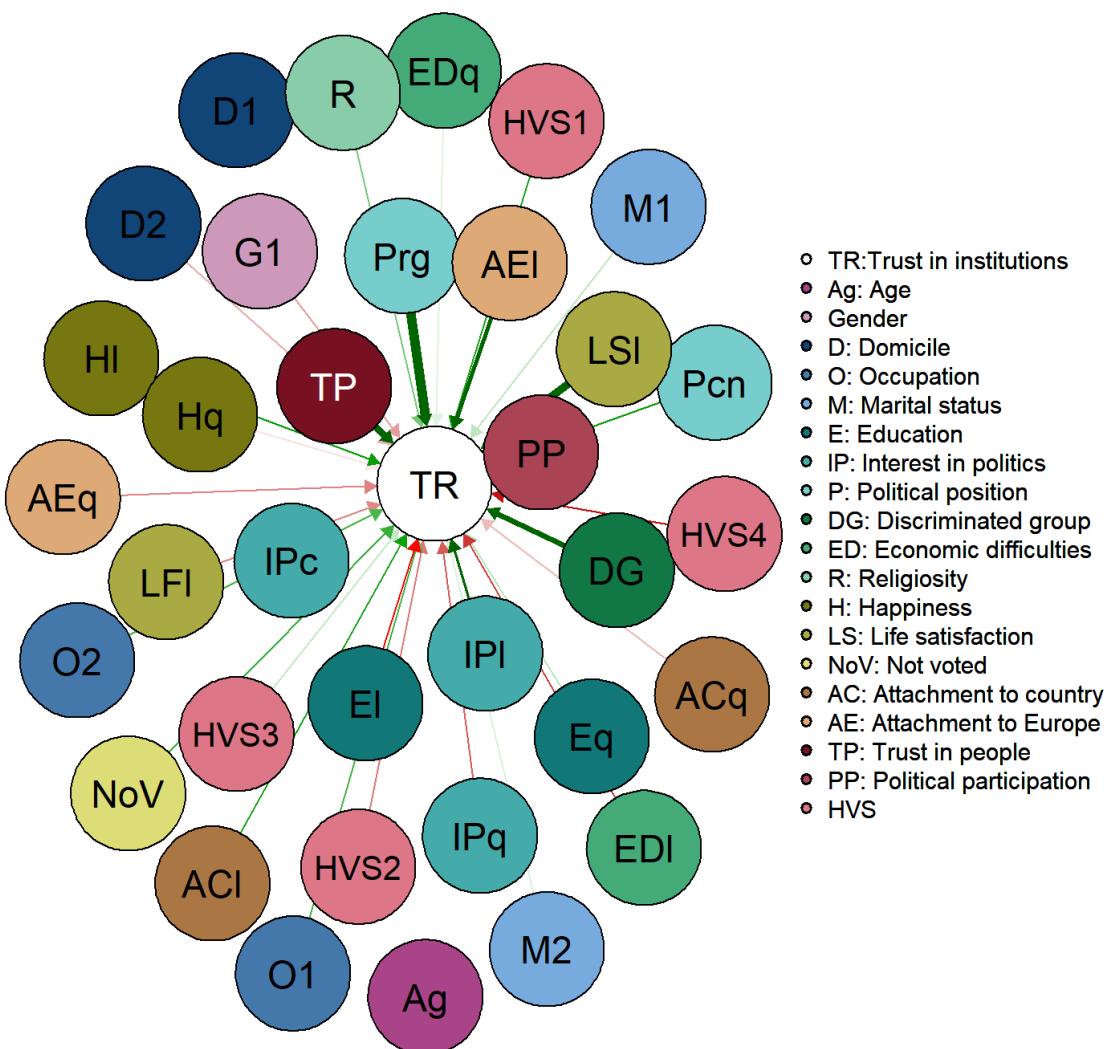


Figure 31: Graphical representation of the regression coefficients for Trust on Institutions on the matching variables

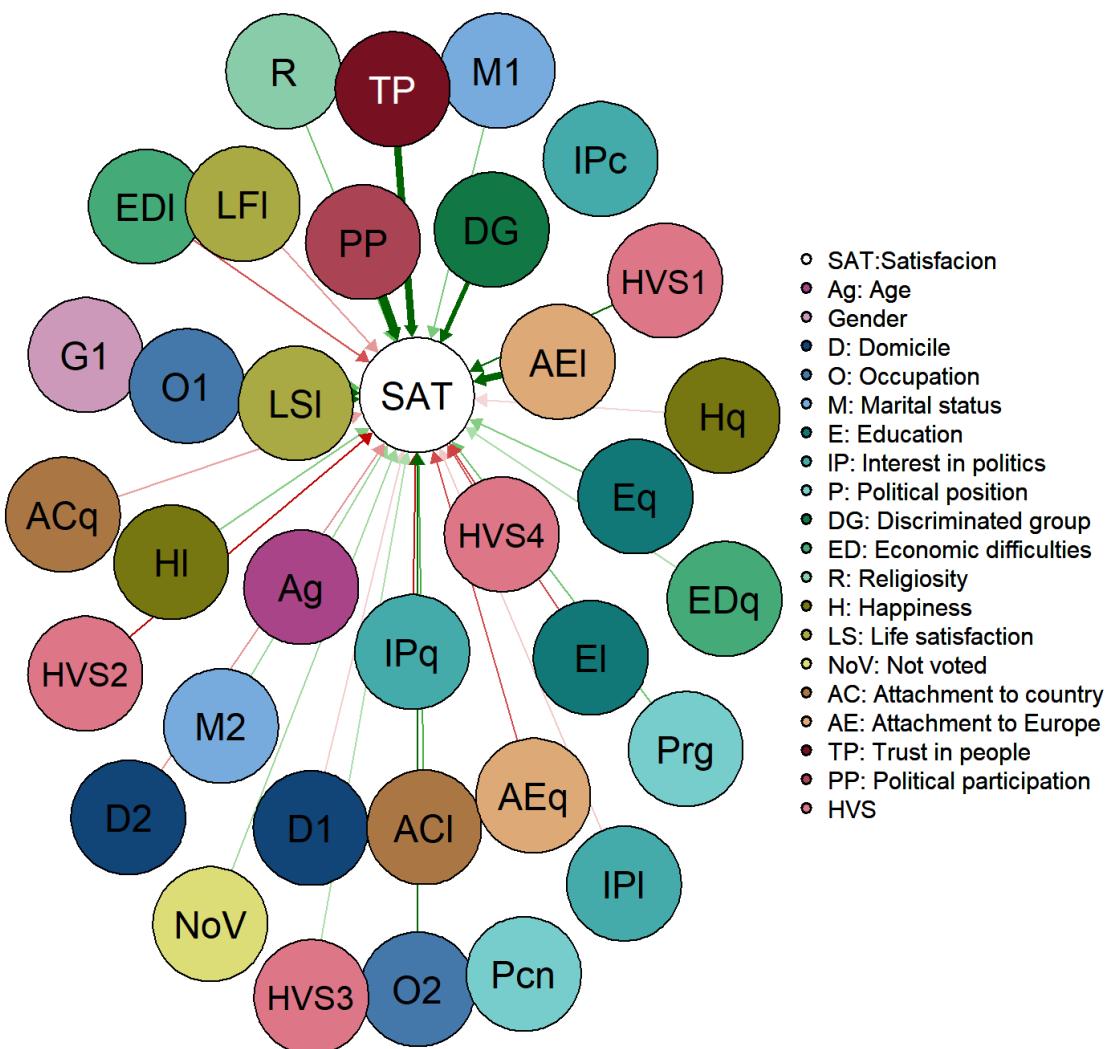


Figure 32: Graphical representation of the regression coefficients for Satisfaction with Country Conditions on the matching variables

Table 12: Regression coefficients for Trust on Institutions on the matching variables by country. Shaded cells highlight statistically significant effects.

	ALL	AT	BE	BG	CH	CY	DE	ES	FI	FR	GB	HR	HU	IE	IS	IT	LT	LV	ME	NL	NO	PL	PT	RS	SE	SI	SK	
(Intercept)	-0.35	-0.12	-0.23	-0.02	-0.36	-0.62	-0.01	-0.18	-0.39	-0.27	-0.29	-0.71	-1.36	-0.48	-0.88	-0.51	-0.38	-1.06	-0.14	-0.13	-0.36	-0.94	-0.15	-1.02	-0.34	-0.24	-0.11	
Age	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	
Woman	-0.04	-0.09	-0.02	0.12	-0.14	-0.08	-0.08	0.03	-0.16	-0.08	-0.07	-0.01	0.09	0.09	-0.13	0.01	-0.01	0.04	0.07	0.07	-0.13	-0.09	-0.06	-0.08	-0.05	-0.04	-0.08	-0.01
Domicile: Town or small city	0.00	0.15	-0.06	0.07	0.07	0.10	0.00	-0.05	-0.03	-0.02	-0.01	0.09	0.21	-0.11	-0.07	0.08	-0.07	0.11	-0.07	-0.06	0.00	0.03	-0.09	0.02	0.04	0.05	-0.10	
Domicile: Country village or Farm	-0.04	0.12	-0.13	0.14	-0.04	0.02	-0.07	-0.07	0.00	-0.07	-0.02	0.02	0.19	-0.17	-0.01	-0.04	0.04	0.23	0.00	-0.02	-0.04	0.03	-0.17	0.12	-0.03	-0.07	-0.18	
Occupation: Retired	0.09	0.09	0.07	0.01	0.08	0.05	0.14	0.10	0.18	0.08	0.08	0.16	-0.06	0.07	0.07	-0.05	0.14	-0.01	-0.08	0.10	0.09	0.08	0.17	0.17	0.05	0.09	0.08	
Occupation: Others	0.08	0.13	0.08	0.05	0.13	-0.08	0.08	0.02	0.11	0.15	0.03	0.09	-0.06	0.10	0.07	-0.03	0.09	0.12	-0.05	0.11	0.09	0.09	0.21	0.16	0.09	0.14	0.06	
Marital status: Separated or Divorced or Widowed	0.03	0.06	0.03	0.02	0.01	-0.03	0.05	0.04	0.02	0.00	0.09	0.10	-0.01	0.02	-0.05	0.01	-0.06	0.06	0.05	0.02	-0.02	0.10	0.12	0.02	0.04	-0.09	0.02	
Marital status: None of these	0.02	-0.06	-0.06	-0.11	0.06	-0.09	0.06	0.06	-0.03	0.05	0.07	0.13	0.04	0.00	0.12	-0.04	0.06	0.10	0.05	0.01	-0.01	0.09	-0.03	0.09	0.03	0.02	0.01	
Education.L	-0.12	-0.20	-0.05	-0.24	-0.05	-0.14	-0.09	-0.12	-0.04	-0.08	-0.11	-0.25	-0.24	0.06	0.01	-0.06	-0.05	-0.25	-0.18	-0.03	0.01	-0.15	-0.06	-0.42	-0.10	-0.22	-0.28	
Education.Q	0.03	0.02	0.00	0.11	0.07	-0.07	0.06	-0.05	0.03	0.06	0.02	0.04	0.00	0.06	0.07	0.03	0.01	0.03	0.00	0.01	0.04	-0.03	-0.02	0.03	0.00	0.07	0.06	
Interested politics.L	0.14	0.34	0.07	0.02	0.09	0.07	0.13	0.00	0.19	0.18	0.26	0.09	0.04	0.07	0.15	0.12	-0.09	-0.16	0.19	0.11	0.16	0.24	-0.12	0.09	0.18	0.25	-0.06	
Interested politics.Q	-0.07	-0.10	-0.03	-0.02	-0.09	-0.09	-0.07	-0.07	-0.10	-0.08	-0.16	-0.07	-0.02	0.02	-0.08	0.04	0.03	-0.03	0.08	-0.13	-0.08	-0.03	-0.06	-0.19	-0.10	-0.06	-0.02	
Interested politics.C	0.00	0.06	0.03	0.02	0.01	-0.01	-0.01	-0.07	-0.01	-0.03	-0.01	0.02	-0.05	-0.01	-0.06	-0.02	-0.01	-0.04	0.02	0.03	-0.03	0.00	-0.01	0.03	-0.02	0.05	0.00	
Political position:Center	0.11	0.13	0.13	0.14	0.04	0.33	-0.05	-0.15	0.21	0.27	0.25	0.23	0.61	0.18	0.15	0.23	0.07	0.43	-0.07	0.08	0.03	0.30	-0.11	0.03	0.05	-0.09	-0.10	
Political position: Right	0.26	0.20	0.15	0.49	0.02	0.68	-0.14	-0.37	0.42	0.21	0.50	0.50	1.30	0.42	0.42	0.44	0.22	0.39	0.26	0.14	0.10	0.78	-0.35	0.09	-0.04	-0.32	-0.09	
Discriminated group: No	0.19	0.05	0.20	0.08	0.11	0.10	0.20	0.16	0.24	0.12	0.20	0.26	0.10	0.22	0.27	0.15	0.13	0.48	0.34	0.22	0.26	0.24	-0.01	0.31	0.31	0.31	0.32	
Economic difficulties.L	-0.09	-0.10	-0.18	-0.06	-0.05	-0.19	-0.01	-0.06	-0.25	-0.13	-0.10	-0.13	-0.04	-0.14	-0.16	-0.06	-0.15	-0.22	-0.14	-0.15	-0.20	-0.04	0.02	-0.17	-0.18	-0.07	-0.27	
Economic difficulties.Q	0.01	-0.04	-0.03	0.10	0.02	-0.10	0.02	-0.02	-0.05	-0.03	-0.02	0.03	0.04	0.00	-0.01	0.04	0.09	-0.04	0.10	-0.01	-0.04	0.00	-0.07	-0.02	-0.01	0.03		
Religious.L	0.06	0.05	0.07	0.02	-0.01	0.10	0.09	0.05	0.07	0.04	0.12	0.05	0.15	0.10	0.00	0.06	0.08	0.01	-0.01	-0.02	0.06	0.17	0.04	0.07	0.07	0.02	0.14	
Happy.L	0.11	0.06	0.10	0.01	0.31	0.09	0.07	0.14	0.09	0.05	0.18	0.14	0.12	0.15	0.17	0.11	0.02	0.09	0.12	0.17	0.11	0.19	0.17	0.16	0.11	0.21	0.07	
Happy.Q	-0.01	-0.05	0.01	-0.06	-0.02	-0.05	-0.01	0.05	-0.03	-0.04	-0.01	-0.05	0.04	0.01	0.01	-0.04	-0.05	0.02	-0.13	0.02	-0.01	-0.02	-0.01	-0.02	-0.01	-0.07	0.03	
Life satisfaction.L	0.23	0.33	0.34	0.10	0.17	0.12	0.28	0.14	0.22	0.30	0.27	0.17	0.44	0.25	0.27	0.15	0.37	0.21	0.17	0.20	0.17	0.10	0.25	0.32	0.15	0.22	0.22	
Life satisfaction.Q	-0.05	-0.08	-0.09	-0.08	-0.01	-0.04	-0.06	-0.06	-0.07	-0.03	-0.04	-0.13	-0.11	-0.14	-0.06	-0.06	-0.03	0.00	0.00	0.01	-0.12	0.00	-0.01	0.01	0.02			
Voted: No or Not eligible to vote	0.09	0.07	0.21	-0.15	0.16	0.12	0.21	0.23	0.08	0.09	0.16	-0.02	0.09	0.16	0.39	0.04	0.03	-0.10	-0.15	0.03	0.20	0.01	0.20	0.00	0.18	0.08	0.00	
Attachment country.L	0.11	0.05	0.07	-0.11	0.21	0.02	0.18	0.06	0.06	0.04	0.22	0.16	0.33	0.00	0.11	0.18	0.08	0.09	0.08	0.07	0.12	0.05	0.13	0.22	0.11	0.14	-0.02	
Attachment country.Q	-0.03	0.02	-0.06	0.05	-0.09	0.03	-0.03	-0.11	0.01	-0.06	-0.06	-0.03	-0.02	-0.02	0.02	-0.03	-0.07	-0.03	0.02	-0.04	-0.07	-0.03	0.10	-0.01	-0.05	-0.09		
Attachment EU.L	0.16	0.25	0.32	0.24	0.20	0.34	0.22	0.23	0.19	0.43	0.05	0.28	-0.15	0.33	0.04	0.11	0.18	0.19	0.26	0.20	0.16	0.09	0.17	-0.07	0.12	0.20	0.28	
Attachment EU.Q	-0.06	-0.12	-0.06	-0.09	0.01	-0.11	-0.04	-0.06	-0.07	-0.06	-0.01	-0.07	-0.01	-0.04	-0.04	-0.05	0.00	-0.04	-0.21	-0.08	-0.02	-0.06	0.02	-0.06	0.00	-0.07	0.00	
Interpersonal Trust	0.21	0.19	0.22	0.27	0.26	0.18	0.21	0.20	0.20	0.19	0.18	0.22	0.18	0.15	0.15	0.15	0.13	0.25	0.23	0.20	0.11	0.21	0.13	0.18	0.22	0.21	0.21	
Political Participation	0.25	0.21	0.18	0.27	0.15	0.08	0.24	0.22	0.19	0.24	0.28	0.20	0.42	0.24	0.31	0.20	0.15	0.19	0.16	0.26	0.26	0.20	0.18	0.22	0.25	0.25	0.11	
HVS: Conservation	0.10	0.21	0.09	-0.13	0.15	0.14	0.01	-0.02	0.05	0.12	0.14	0.22	0.08	0.04	0.21	0.12	-0.10	0.40	0.20	0.11	0.01	0.25	0.00	0.31	0.13	0.10	0.28	
HVS: Openness	-0.06	-0.08	-0.08	-0.23	-0.05	-0.06	-0.16	-0.19	-0.01	-0.05	-0.01	-0.02	-0.11	-0.13	0.07	0.00	-0.12	0.29	0.08	-0.14	-0.08	0.10	-0.13	-0.04	-0.03	-0.05	0.22	
HVS: Enhancement	0.03	0.02	0.08	0.26	0.02	0.00	0.10	0.18	0.00	0.00	0.02	0.01	0.07	0.11	-0.05	0.00	0.11	-0.30	-0.08	0.09	0.09	-0.09	0.05	0.01	0.03	-0.02	-0.16	
HVS: Trascendence	-0.11	-0.15	-0.08	0.03	-0.04	-0.08	0.01	0.04	-0.05	-0.09	-0.13	-0.26	-0.19	-0.06	-0.21	-0.21	-0.01	-0.39	-0.24	-0.05	0.01	-0.33	-0.01	-0.21	-0.10	-0.07	-0.39	

Table 13: Regression coefficients for Satisfaction with Country Conditions on the matching variables by country. Shaded cells highlight statistically significant effects.

	ALL	AT	BE	BG	CH	CY	DE	ES	FI	FR	GB	HR	HU	IE	IS	IT	LT	LV	ME	NL	NO	PL	PT	RS	SE	SI	SK
(Intercept)	-0.17	-0.16	-0.05	0.16	0.14	-0.19	0.03	-0.24	-0.09	-0.15	0.08	-0.45	-0.29	-0.39	-0.80	-0.19	-0.23	-0.63	-0.20	0.18	-0.20	-0.51	-0.19	-0.49	-0.17	-0.28	0.01
Age	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
Woman	0.05	0.05	0.06	0.06	0.03	0.06	0.05	0.14	0.01	0.03	0.02	0.05	0.08	0.05	0.13	0.06	0.08	0.07	0.11	-0.01	0.01	0.06	0.07	0.09	0.02	0.08	0.07
Domicile: Town or small city	-0.02	-0.02	-0.10	0.10	-0.03	-0.05	0.01	0.00	-0.02	-0.07	-0.01	0.06	0.05	-0.02	-0.16	0.02	-0.08	0.06	-0.03	-0.06	-0.01	-0.06	-0.10	-0.05	0.08	0.12	0.01
Domicile: Country village or Farm	-0.03	0.05	-0.14	0.20	-0.13	-0.01	-0.01	-0.02	-0.05	-0.10	0.00	0.04	0.00	-0.01	-0.17	-0.05	0.02	0.22	0.06	-0.03	-0.12	0.00	-0.22	0.01	0.03	0.01	-0.09
Occupation: Retired	0.08	0.07	0.08	0.01	0.07	0.07	0.16	0.14	0.20	0.01	0.12	0.12	-0.02	0.11	0.05	-0.04	0.23	0.02	-0.09	0.13	0.15	0.07	0.08	0.10	-0.07	0.23	0.17
Occupation: Others	0.10	0.21	0.14	0.05	0.10	0.07	0.04	0.02	0.08	0.20	0.10	0.05	-0.01	0.08	-0.01	0.06	0.18	0.24	-0.02	0.10	0.11	0.07	0.11	0.18	0.00	0.24	0.09
Marital status: Separated or Marital status: None of these	0.04	0.11	0.09	0.11	-0.02	0.04	0.01	0.06	0.05	-0.01	0.00	0.07	0.02	0.05	-0.05	0.04	0.03	0.00	-0.02	0.01	0.08	0.01	0.12	0.06	0.03	-0.08	0.16
Education.L	-0.06	-0.16	-0.04	-0.16	0.03	-0.17	-0.10	-0.07	0.00	-0.03	-0.05	-0.20	-0.10	0.09	-0.05	-0.06	0.02	-0.13	-0.13	-0.01	0.07	-0.11	-0.05	-0.32	-0.01	-0.16	-0.10
Education.Q	0.04	0.09	0.00	0.09	0.05	-0.05	0.07	-0.07	0.01	0.03	0.01	0.04	0.02	0.11	0.01	-0.02	0.07	0.01	0.03	0.06	0.00	0.00	0.05	0.00	0.07	-0.01	
Interested politics.L	-0.02	0.06	-0.09	-0.22	0.08	-0.10	-0.02	-0.18	0.03	0.03	-0.03	0.08	-0.14	-0.10	-0.30	0.01	0.00	0.09	-0.06	-0.14	0.00	0.12	0.17	-0.28			
Interested politics.Q	-0.08	-0.06	-0.06	0.00	-0.12	-0.08	-0.08	-0.14	-0.15	-0.10	-0.07	-0.13	0.10	-0.06	-0.17	0.03	-0.01	-0.07	0.10	-0.16	-0.09	-0.08	-0.06	-0.14	-0.07	-0.11	-0.12
Interested politics.C	0.01	0.07	-0.02	0.02	-0.04	-0.02	0.00	-0.10	-0.01	-0.04	0.02	-0.03	-0.02	0.06	-0.06	-0.05	0.00	0.00	-0.02	-0.01	0.04	0.10	-0.01	0.04	0.00		
Political position:Center	0.01	0.00	0.04	0.02	-0.03	0.04	-0.03	-0.05	0.03	0.11	0.03	0.11	0.00	0.06	0.05	-0.03	0.09	0.37	0.07	0.01	-0.01	0.02	-0.02	0.00	-0.02	-0.07	-0.08
Political position: Right	0.05	-0.13	0.02	0.21	-0.01	0.18	-0.16	-0.12	0.04	0.04	0.10	0.28	0.25	0.33	0.15	0.03	0.27	0.31	0.20	-0.09	0.00	0.20	-0.04	0.04	-0.16	-0.08	-0.01
Discriminated group: No Economic difficulties.L	0.17	0.12	0.20	-0.08	0.12	0.11	0.23	0.25	0.18	0.09	0.17	0.21	0.08	0.22	0.30	0.06	0.08	0.24	0.22	0.16	0.27	0.20	0.11	0.24	0.20	0.36	0.08
Economic difficulties.Q	-0.05	-0.23	-0.11	0.02	-0.02	-0.17	0.00	0.00	-0.15	-0.05	-0.04	-0.10	-0.07	-0.07	-0.17	-0.09	-0.10	-0.06	-0.04	-0.09	-0.15	0.06	0.00	-0.05	-0.07	-0.02	-0.16
Religious.L	0.05	0.06	0.05	-0.06	0.06	0.05	0.06	0.12	0.07	0.04	0.09	-0.02	0.08	0.11	0.03	0.07	0.09	0.04	-0.07	0.02	0.06	0.10	0.05	0.01	0.06	0.02	0.03
Happy.L	0.04	0.06	0.01	-0.12	0.15	0.04	0.00	-0.03	0.13	0.02	0.14	0.04	-0.04	0.13	0.25	0.02	-0.07	0.03	0.02	0.17	0.01	0.08	0.04	0.03	0.12	0.14	0.04
Happy.Q	-0.01	-0.05	0.00	-0.11	-0.04	-0.01	0.05	0.03	-0.08	-0.04	-0.03	-0.04	-0.04	0.01	-0.04	0.02	-0.03	-0.04	-0.07	-0.05	0.01	0.00	-0.03	-0.01	-0.03	-0.05	-0.02
Life satisfaction.L	0.12	0.16	0.23	0.17	0.01	0.04	0.18	0.11	0.02	0.14	0.08	0.10	0.20	0.07	0.08	0.20	0.19	0.08	0.13	0.10	0.12	0.08	0.16	0.21	0.04	0.01	0.22
Life satisfaction.Q	-0.03	-0.06	-0.06	-0.12	0.00	-0.06	-0.03	-0.04	0.00	-0.02	-0.04	-0.01	-0.02	-0.08	-0.11	-0.07	-0.04	-0.03	0.03	0.04	0.00	-0.01	-0.09	0.01	0.01	-0.03	0.05
Voted: No or Not eligible to vote	0.03	-0.04	0.11	-0.03	0.05	-0.02	0.05	0.19	-0.03	0.01	0.07	-0.05	-0.02	0.08	0.16	0.03	0.04	0.02	-0.19	-0.08	0.21	0.06	0.08	-0.14	0.16	0.07	0.00
Attachment country.L	0.06	0.02	0.05	-0.07	0.06	0.06	0.05	0.01	0.13	0.10	0.11	-0.04	0.07	0.13	-0.02	0.09	0.10	0.02	0.18	-0.09	0.06	0.05	0.15	0.05	0.03		
Attachment country.Q	-0.03	-0.02	-0.04	0.07	-0.04	-0.06	-0.02	-0.07	0.00	-0.04	-0.07	-0.03	-0.02	0.00	-0.07	0.06	0.01	-0.01	-0.03	-0.01	-0.12	-0.02	-0.04	0.01	-0.07	-0.04	-0.07
Attachment EU.L	0.25	0.28	0.39	0.19	0.22	0.32	0.33	0.32	0.36	0.34	0.24	0.32	0.12	0.32	0.21	0.22	0.23	0.18	0.26	0.37	0.20	0.22	0.24	0.13	0.18	0.30	0.23
Attachment EU.Q	-0.06	-0.06	-0.07	0.04	-0.04	-0.03	-0.07	-0.08	-0.06	-0.06	-0.06	-0.07	-0.05	-0.07	-0.10	-0.10	-0.02	-0.11	-0.16	-0.06	-0.05	-0.04	0.05	-0.08	-0.02	-0.06	0.00
Interpersonal Trust	0.24	0.24	0.31	0.27	0.24	0.19	0.28	0.24	0.30	0.24	0.24	0.19	0.21	0.18	0.17	0.15	0.09	0.27	0.20	0.29	0.25	0.22	0.26	0.15	0.25	0.30	0.22
Political Participation	0.32	0.29	0.28	0.38	0.26	0.12	0.39	0.36	0.37	0.31	0.34	0.26	0.23	0.30	0.43	0.26	0.24	0.28	0.20	0.35	0.41	0.22	0.32	0.27	0.39	0.33	0.14
HVS: Conservation	0.09	0.22	0.12	0.04	0.23	-0.11	0.03	0.03	0.13	0.08	0.08	0.06	0.01	0.10	0.28	-0.02	-0.08	0.39	0.19	0.03	0.03	0.13	0.13	0.16	0.09	0.10	0.30
HVS: Openness	-0.08	-0.05	-0.08	0.01	-0.01	-0.19	-0.11	-0.09	-0.10	-0.08	-0.14	-0.13	-0.12	-0.09	0.11	-0.05	-0.13	0.21	0.11	-0.19	-0.16	-0.03	0.05	-0.08	-0.06	-0.02	0.17
HVS: Enhancement	0.03	0.02	0.02	-0.05	-0.07	0.15	0.06	0.06	0.02	0.03	0.08	0.03	0.12	0.03	-0.09	0.03	0.11	-0.32	-0.17	0.08	0.09	-0.05	-0.06	0.05	0.04	-0.07	-0.11
HVS: Trascendence	-0.06	-0.16	-0.08	0.01	-0.11	0.14	-0.01	0.02	-0.06	-0.02	-0.02	-0.05	-0.07	-0.09	-0.21	-0.04	0.08	-0.32	-0.25	0.02	0.06	-0.10	-0.18	-0.14	-0.07	-0.08	-0.32

## 3 Statistical matching for longitudinal inference

To compare levels of *Trust in Institutions* and *Satisfaction with Country Conditions* between 2018 and 2023, using the two cross-sectional ESS rounds, it is essential to address potential heterogeneity between the samples. Meaningful temporal comparisons require analyses on harmonized samples, i.e., samples composed of the same units observed over time, or on paired samples, i.e., samples of units that are similar according to a set of pre-defined control variables. When repeated cross-sectional surveys are used to assess changes in a key relationship over time, a common approach is to create a pooled dataset aggregating data from different years. However, without pairing comparable units, mean-level comparisons of latent traits across independent samples may be misleading, as observed differences could stem from structural discrepancies rather than genuine changes in the underlying phenomenon (Disegna et al., 2018).

In this context, *statistical matching* improves comparability by creating balanced groups through statistical adjustment for differences in relevant covariates. The core idea is to match units observed at Time 1 and Time 2 so that they are balanced on these covariates. Matched individuals can then be regarded as comparable (or exchangeable) with respect to the matching characteristics, so that any observed difference in the outcome may be attributed to temporal change rather than compositional effects. By treating matched pairs as repeated observations of the same unit, a pseudo-panel is obtained, enabling longitudinal inference from cross-sectional data. If the matching is sufficiently close, linked records across waves can approximate the behaviour of true panel data, providing insight into individual-level changes in the latent traits of interest.

After matching, outcomes can be compared using simple mean differences or regression adjustment, yielding an estimate of the average change in *Trust in Institutions* and *Satisfaction with Country Conditions* from 2018 to 2023.

Various matching strategies are available. The most common is *Propensity Score Matching* (PSM) (Rosenbaum & Rubin, 1983; Stuart, 2010). Alternative approaches include hot-deck techniques that directly match on the covariate space. Moreover, *Predictive Mean Matching* (PMM), while traditionally used in multiple imputation, can also be adapted to generate counterfactuals by matching units with similar predicted outcomes across time points.

### 3.1 Propensity score matching

In the context of pseudo-panel construction, Disegna et al., 2018 suggest using propensity score matching (PSM) (Rosenbaum & Rubin, 1983) to reduce the multidimensionality of the matching problem to a single dimension. Although originally developed for causal inference (i.e., for estimating the causal effect of a binary treatment or exposure on an outcome while controlling for measured pre-treatment variables, typically confounding variables or variables prognostic of the outcome), PSM can be applied to identify donors in standard imputation or statistical matching scenarios. Here, the propensity score can be seen as the conditional probability that an observation belongs to the donor (ESS9) or recipient (ESS11) dataset given a set of covariates common to both.

Operationally, both datasets (ESS9 and ESS11) are augmented with a binary

indicator taking the value 0 for ESS9 and 1 for ESS11, and a logit or probit model is estimated with this indicator as the dependent variable and the matching covariates as predictors. The fitted propensity score represents the estimated probability of belonging to ESS11 (versus ESS9) conditional on covariates. Matching proceeds on the estimated propensity scores.

We implement matching with the `MatchIt` (Ho et al., 2007, 2011) package in R.

In `MatchIt`, matching is a form of subset selection, that is, the pruning and weighting of units to arrive at a (weighted) subset of the units from the original dataset.

At the heart of `MatchIt` are three classes of methods: distance matching, stratum matching, and pure subset selection. Here we consider, distance matching which involves considering a focal group (ESS11) and selecting members of the non-focal group (ESS9) to pair with each member of the focal group based on the distance between units. Members of either group that are not paired are dropped from the sample. To compute the distance, we implement:

- **Nearest neighbor matching (`PSMnear`):** The most common form of matching, it proceeds by running through the list of treated units and pairing each with the closest eligible control unit. This method is also called *greedy matching* because each pairing is made without considering how other units will be or have been paired, and thus does not aim to optimize any global criterion. Nearest neighbor matching requires specifying a distance measure to determine which control unit is “closest” to each treated unit. The default and most widely used distance is the *propensity score difference*—the absolute difference between the propensity scores of the treated and control units.
- **Optimal pair matching (`PSMopt`):** Optimal pair matching—often referred to simply as *optimal matching*—is similar to nearest neighbor matching in that it pairs each treated unit with one or more control units. However, unlike nearest neighbor matching, it is *optimal* rather than greedy: matches are chosen to collectively optimize a global criterion rather than being formed sequentially without regard to future pairings. As with nearest neighbor matching, a distance measure between units must be specified. In essence, optimal pair matching can be viewed as an alternative approach to determining the matching order in nearest neighbor matching, and in many cases both methods produce identical or very similar matched samples.
- **Optimal full matching (`PSMfull`):** Optimal full matching—often called *full matching*—assigns every treated and control unit to a subclass containing at least one unit from each group. The number of subclasses and the assignment of units are chosen to minimize the total within-subclass distance. Weights based on subclass membership act like propensity score weights and allow estimation of a weighted treatment effect, ideally free of measured confounding. Like other distance-based methods, it requires specifying a distance measure. Full matching can be viewed as a hybrid of distance matching and stratification: subclasses may contain varying numbers of treated and control units but are formed solely to minimize within-group distances.

**Initial Imbalance on matching covariates** Table 14 reports the initial imbalance measured by standardized mean differences. Values close to zero indicate good balance between treated and control groups. As shown, several values exceed the

conventional threshold of 0.1 in absolute magnitude, indicating notable imbalance. The highest imbalance is observed in Montenegro (ME), Lithuania (LT), and Bulgaria (BG), where many covariates deviate substantially from their ideal balanced values.

Table 14: Initial imbalance in matching covariates measured by standardized mean differences. Shaded cells denote absolute values above 0.1, indicating poor balance.

Covariate	AT	BE	BG	CH	CY	DE	ES	FI	FR	GB	HR	HU	IE	IS	IT	LT	LV	ME	NL	NO	PL	PT	RS	SE	SI	SK	
distance	<b>0.58</b>	<b>0.51</b>	<b>1.69</b>	<b>0.47</b>	<b>0.70</b>	<b>0.40</b>	<b>0.43</b>	<b>0.46</b>	<b>0.54</b>	<b>0.46</b>	<b>0.53</b>	<b>0.72</b>	<b>0.52</b>	<b>0.54</b>	<b>0.84</b>	<b>1.13</b>	<b>0.94</b>	<b>2.32</b>	<b>0.39</b>	<b>0.33</b>	<b>0.71</b>	<b>0.80</b>	<b>0.74</b>	<b>0.44</b>	<b>0.55</b>	<b>0.58</b>	
Age	<b>0.22</b>	0.08	<b>-0.26</b>	<b>0.12</b>	0.04	0.02	<b>0.15</b>	<b>0.12</b>	-0.10	0.10	0.08	-0.07	0.08	0.02	-0.07	-0.39	0.05	<b>0.26</b>	<b>0.10</b>	0.04	-0.01	<b>0.10</b>	-0.01	0.07	0.05	-0.07	
Man	-0.07	0.03	0.05	-0.01	<b>-0.11</b>	-0.02	<b>-0.12</b>	0.00	0.08	<b>0.11</b>	<b>-0.14</b>	-0.09	-0.04	-0.01	-0.04	<b>0.26</b>	0.07	0.01	0.01	-0.07	0.03	0.00	0.04	0.04	0.07	0.02	
Woman	0.07	-0.03	-0.05	0.01	<b>0.11</b>	0.02	<b>0.12</b>	0.00	-0.08	<b>-0.11</b>	<b>-0.14</b>	0.09	0.04	0.01	0.04	-0.26	-0.07	-0.01	-0.01	0.07	-0.03	0.00	-0.04	-0.04	-0.07	-0.02	
A big city	-0.04	0.02	-0.04	0.05	-0.20	0.00	0.05	<b>-0.16</b>	0.10	<b>-0.12</b>	0.03	-0.10	0.07	<b>-0.27</b>	<b>0.33</b>	<b>0.39</b>	<b>0.10</b>	0.01	0.05	0.01	0.03	<b>-0.14</b>	-0.07	-0.09	-0.07	-0.07	
Town or small city	0.06	-0.08	-0.02	-0.03	<b>0.18</b>	-0.08	-0.08	0.05	-0.09	<b>-0.46</b>	-0.17	0.05	0.03	0.04	0.03	<b>0.14</b>	<b>-0.17</b>	<b>-0.15</b>	0.02	-0.04	-0.06	0.00	-0.03	<b>0.15</b>	0.02	-0.01	0.03
Country village or Farm	-0.02	0.05	0.06	-0.02	0.05	0.07	0.02	<b>-0.15</b>	<b>0.12</b>	-0.01	0.09	<b>0.34</b>	<b>0.23</b>	<b>-0.17</b>	<b>0.15</b>	<b>-0.41</b>	<b>-0.18</b>	0.05	0.03	0.01	-0.01	0.00	0.01	0.06	0.09	0.04	
Paid work	<b>-0.12</b>	-0.07	<b>0.19</b>	0.03	0.02	0.08	-0.01	0.01	0.09	0.00	0.06	0.04	0.03	0.03	0.04	<b>-0.17</b>	<b>-0.15</b>	0.05	-0.01	0.07	<b>0.11</b>	<b>0.26</b>	-0.03	0.01	<b>0.19</b>		
Retired	<b>0.14</b>	<b>-0.11</b>	<b>-0.30</b>	0.06	0.08	0.02	<b>0.10</b>	0.04	<b>-0.11</b>	0.10	0.02	-0.05	<b>0.11</b>	0.05	-0.01	<b>-0.32</b>	<b>0.21</b>	0.09	0.08	0.04	-0.06	<b>0.11</b>	-0.09	0.05	0.07	<b>-0.16</b>	
Others	-0.04	-0.03	0.10	<b>-0.11</b>	<b>-0.14</b>	<b>-0.12</b>	-0.08	0.00	<b>-0.13</b>	<b>-0.11</b>	-0.02	-0.18	0.08	-0.02	0.14	-0.03	<b>0.08</b>	<b>-0.14</b>	-0.02	-0.02	<b>-0.30</b>	<b>-0.23</b>	-0.03	-0.08	-0.06		
Married or in union	-0.01	-0.05	<b>-0.23</b>	-0.01	-0.06	-0.02	0.01	-0.03	<b>0.15</b>	0.05	0.09	<b>0.12</b>	0.01	-0.01	<b>-0.12</b>	<b>-0.14</b>	<b>-0.31</b>	<b>0.39</b>	0.04	-0.04	0.00	-0.02	0.07	0.02	0.06	-0.07	
Separated or Divorced or Widowed	0.06	0.04	0.00	0.08	-0.02	0.02	0.08	<b>-0.25</b>	-0.07	<b>-0.10</b>	-0.08	0.02	0.05	<b>0.12</b>	-0.07	<b>0.41</b>	<b>-0.13</b>	0.00	-0.03	-0.03	-0.06	<b>-0.11</b>	-0.01	-0.15	0.07		
None of these	-0.05	<b>0.01</b>	<b>0.24</b>	-0.05	0.00	0.03	-0.02	0.03	0.01	0.02	-0.07	-0.03	0.02	<b>0.25</b>	0.03	-0.37	-0.05	0.06	0.02	-0.03	0.02	-0.01	0.03	0.01			
ISCED I-II	-0.03	<b>-0.24</b>	<b>-0.32</b>	<b>-0.18</b>	-0.05	<b>-0.13</b>	-0.02	<b>-0.11</b>	<b>-0.18</b>	0.01	0.06	0.04	-0.07	-0.09	-0.01	<b>-0.31</b>	-0.01	<b>0.17</b>	<b>-0.11</b>	-0.04	<b>0.20</b>	0.02	<b>-0.31</b>	<b>-0.19</b>	-0.04	<b>-0.26</b>	
ISCED III-IV	-0.02	0.01	-0.02	-0.09	0.05	0.07	0.00	-0.07	-0.02	<b>-0.14</b>	-0.09	0.00	-0.01	-0.06	0.00	0.00	0.01	-0.01	-0.06	0.01	-0.01	-0.01	-0.04	0.10			
ISCED V	0.05	<b>0.16</b>	<b>0.24</b>	<b>0.22</b>	0.00	0.00	0.02	<b>0.14</b>	<b>0.16</b>	<b>0.13</b>	0.05	-0.04	0.06	<b>0.13</b>	0.00	<b>0.20</b>	0.00	-0.19	0.10	0.08	<b>0.17</b>	-0.01	<b>0.23</b>	<b>0.12</b>	0.08	0.04	
Very interested in politics	-0.04	<b>0.14</b>	-0.04	0.07	-0.06	0.07	0.00	<b>0.15</b>	-0.05	0.09	0.07	0.07	-0.05	-0.03	<b>-0.21</b>	-0.03	-0.07	<b>-0.11</b>	0.07	-0.03	<b>0.12</b>	-0.02	0.08	0.04	-0.01	<b>0.12</b>	
Quite interested in politics	0.05	-0.04	<b>0.13</b>	0.02	0.02	<b>-0.12</b>	<b>-0.20</b>	0.09	0.06	0.03	-0.08	<b>0.11</b>	-0.08	0.07	0.01	<b>0.12</b>	<b>-0.12</b>	<b>0.23</b>	0.00	-0.06	0.01	0.01	0.04	0.02			
Hardly interested in politics	0.02	0.02	-0.09	-0.07	-0.06	0.03	0.09	<b>-0.20</b>	0.00	<b>0.17</b>	0.07	<b>-0.13</b>	<b>0.12</b>	-0.08	0.03	-0.08	0.01	0.20	-0.09	0.06	-0.07	<b>0.11</b>	0.02	-0.07	0.01	0.00	
Not at all interested in politics	-0.09	<b>-0.14</b>	-0.03	-0.03	0.08	0.08	<b>0.10</b>	-0.07	-0.02	0.04	0.04	-0.02	0.02	0.05	0.05	-0.04	<b>0.18</b>	<b>-0.44</b>	0.05	0.06	<b>-0.16</b>	<b>0.29</b>	-0.09	0.03	-0.06	<b>-0.13</b>	
Left	<b>-0.15</b>	-0.04	0.01	<b>0.12</b>	<b>0.16</b>	<b>-0.11</b>	-0.08	0.08	0.05	<b>0.11</b>	<b>-0.20</b>	0.00	0.03	-0.05	-0.01	-0.04	-0.05	<b>-0.15</b>	0.03	-0.05	<b>0.14</b>	-0.08	-0.06	<b>0.13</b>	-0.09	0.08	
Center	<b>0.20</b>	-0.06	<b>0.11</b>	-0.08	0.08	0.01	-0.07	<b>-0.16</b>	-0.06	<b>-0.07</b>	<b>0.12</b>	0.03	0.03	0.04	-0.09	-0.05	<b>0.21</b>	0.00	0.02	-0.03	-0.01	-0.03	0.08	-0.06			
Right	<b>-0.10</b>	<b>0.11</b>	-0.01	0.00	-0.06	0.03	0.08	<b>-0.20</b>	0.00	<b>0.17</b>	0.07	<b>-0.13</b>	<b>0.12</b>	-0.08	0.03	-0.08	0.01	<b>0.20</b>	-0.08	-0.03	0.03	-0.10	0.09	<b>0.08</b>	-0.01		
Discriminated group: Yes	-0.04	0.04	0.02	<b>0.11</b>	0.06	0.09	-0.01	0.03	0.03	0.04	-0.01	0.09	-0.01	0.05	0.03	0.09	<b>0.15</b>	<b>-0.51</b>	0.09	0.04	0.04	0.05	-0.10	0.05	0.08	-0.02	
Discriminated group: No	-0.04	-0.04	-0.02	<b>-0.11</b>	-0.06	0.09	0.01	-0.03	-0.03	0.04	-0.01	0.01	-0.01	-0.05	-0.03	-0.09	<b>-0.15</b>	<b>-0.51</b>	-0.09	-0.04	-0.04	-0.05	0.10	-0.05	0.08	0.02	
Living comfortably	-0.06	<b>0.19</b>	<b>0.17</b>	0.05	0.05	0.07	<b>0.14</b>	0.03	<b>0.26</b>	0.05	0.00	0.08	0.05	<b>-0.10</b>	<b>0.12</b>	<b>0.25</b>	-0.03	-0.28	<b>0.14</b>	-0.10	<b>0.20</b>	-0.08	<b>0.27</b>	0.01	<b>0.17</b>	0.08	
Coping	0.09	<b>-0.14</b>	<b>0.25</b>	0.01	0.01	-0.02	-0.08	-0.06	-0.07	0.10	0.10	-0.08	0.03	-0.05	0.08	-0.05	<b>-0.41</b>	<b>-0.11</b>	0.10	0.00	-0.04	0.01	-0.01	-0.10	0.03		
Difficult or Very difficult	-0.05	-0.08	<b>-0.34</b>	-0.10	-0.06	<b>-0.11</b>	-0.07	0.06	<b>-0.29</b>	0.01	<b>-0.15</b>	<b>-0.16</b>	0.05	<b>0.13</b>	<b>-0.09</b>	<b>-0.37</b>	0.07	0.08	-0.08	0.00	<b>-0.25</b>	<b>0.12</b>	-0.37	0.01	<b>-0.14</b>	<b>-0.10</b>	
Not at all or Somewhat religious	0.07	<b>0.11</b>	0.09	0.06	<b>-0.12</b>	0.09	<b>0.11</b>	<b>-0.12</b>	-0.08	-0.06	0.05	<b>0.15</b>	0.05	0.07	-0.01	0.04	<b>-0.25</b>	<b>-0.11</b>	-0.01	0.01	0.07	-0.03	<b>0.15</b>	0.08	0.02	0.03	
Quite or Very religious	-0.07	<b>-0.11</b>	-0.09	-0.06	<b>0.12</b>	-0.09	<b>0.11</b>	<b>-0.12</b>	-0.08	-0.06	0.05	<b>0.15</b>	0.05	0.07	0.01	-0.04	-0.25	<b>0.11</b>	0.01	-0.01	-0.07	0.03	<b>0.15</b>	-0.08	0.02	-0.03	
Not happy	-0.04	0.00	-0.22	<b>-0.12</b>	<b>0.12</b>	0.06	-0.02	0.03	<b>-0.11</b>	0.00	-0.04	<b>-0.18</b>	0.00	<b>0.14</b>	<b>-0.12</b>	<b>-0.16</b>	<b>0.16</b>	<b>0.85</b>	0.08	0.02	-0.08	<b>0.20</b>	<b>-0.24</b>	0.07	<b>-0.12</b>	<b>-0.08</b>	
Fairly happy	0.00	-0.04	<b>0.21</b>	<b>0.14</b>	0.00	0.03	-0.05	0.02	0.00	0.00	0.08	0.02	-0.05	0.01	-0.04	0.02	<b>-0.44</b>	-0.03	0.01	0.02	0.01	<b>0.18</b>	0.01	0.05	0.07		
Very happy	0.02	0.05	0.02	-0.08	<b>-0.13</b>	-0.08	0.03	-0.10	-0.05	-0.05	<b>0.17</b>	0.05	<b>-0.13</b>	-0.08	<b>0.14</b>	<b>-0.20</b>	<b>-0.68</b>	-0.01	-0.02	0.05	<b>-0.24</b>	0.03	0.06	0.04	0.02		
Not at all or Not very satisfied	0.00	0.01	<b>-0.48</b>	<b>-0.06</b>	<b>0.19</b>	0.03	-0.01	0.05	<b>-0.17</b>	0.08	-0.09	<b>-0.11</b>	<b>-0.10</b>	0.10	<b>0.14</b>	<b>-0.31</b>	0.00	<b>0.50</b>	0.01	0.04	<b>-0.16</b>	<b>0.01</b>	<b>-0.32</b>	0.01	-0.07	-0.08	
Fairly satisfied	0.05	-0.06	<b>0.38</b>	<b>0.11</b>	0.02	0.01	-0.02	0.04	0.01	0.08	0.00	0.06	0.06	0.01	<b>0.14</b>	<b>-0.07</b>	-0.05	0.05	0.04	0.07	<b>0.15</b>	0.07	0.01	0.02			
Very satisfied	-0.05	0.06	<b>0.13</b>	<b>-0.09</b>	<b>-0.27</b>	0.03	0.03	<b>-0.07</b>	<b>0.12</b>	-0.07	0.02	<b>0.13</b>	0.02	<b>-0.12</b>	<b>-0.18</b>	<b>0.18</b>	<b>-0.19</b>	<b>-0.86</b>	0.04	-0.08	0.08	<b>-0.12</b>	0.16	-0.08	0.05	0.07	
Voted: Yes	<b>-0.14</b>	0.02	<b>-0.39</b>	0.00	0.01	0.01	-0.04	<b>0.12</b>	0.00	-0.04	0.07	0.05	0.07	-0.08	<b>-0.33</b>	<b>-0.16</b>	0.07	-0.04	0.01	-0.05	<b>0.40</b>	0.07	<b>0.13</b>	0.05	<b>0.29</b>	<b>0.33</b>	
Not attached to country	-0.02	<b>0.1</b>																									

<b>AT</b>	<b>BE</b>	<b>BG</b>	<b>CH</b>	<b>CY</b>	<b>DE</b>	<b>ES</b>	<b>FI</b>
100.0	100.0	44.2	100.0	97.8	99.1	75.1	100.0
<b>FR</b>	<b>GB</b>	<b>HR</b>	<b>HU</b>	<b>IE</b>	<b>IS</b>	<b>IT</b>	<b>LT</b>
100.0	100.0	100.0	73.4	100.0	93.3	87.8	100.0
<b>LV</b>	<b>ME</b>	<b>NL</b>	<b>NO</b>	<b>PL</b>	<b>PT</b>	<b>RS</b>	<b>SE</b>
56.4	68.6	100.0	94.6	95.0	78.5	100.0	100.0
<b>SI</b>	<b>SK</b>						
100.0	78.8						

Table 15: Country codes and their coverage (%).

In optimal full matching (`MatchIt`'s method = "full"), units are grouped into subclasses with 1:t or s:1 treated-control compositions. `MatchIt` supplies analysis weights that depend on the chosen estimand (ATT, ATC, ATE) so that, after weighting, covariates are balanced across treatment groups. Analyzing outcomes with these weights (and using robust or subclass-clustered standard errors) yields unbiased treatment effect estimates under no unmeasured confounding. Full matching typically preserves most or all units, improving efficiency relative to pair matching while controlling for confounding by measured covariates.

**Imbalance on matching covariates after matching** Table 16 reports the percentage of covariates with absolute standardized mean differences exceeding 0.1, both before and after matching, for each method and country. As shown, the best balance is achieved using full optimal matching (*PSMfull*), followed by optimal pair matching (*PSMopt*). However, even with full optimal matching, substantial imbalance remains for Bulgaria (BG), Latvia (LV), Montenegro (ME), and Lithuania (LT).

Table 16: Percentage of matching covariates whose absolute standardized mean differences are above 0.1 before the matching and after matching for each method and each country.

Country	Before	PSMnear	PSMopt	PSMfull
AT	26%	22%	22%	0%
BE	36%	4%	4%	0%
BG	60%	78%	38%	44%
CH	32%	14%	14%	0%
CY	36%	36%	32%	4%
DE	16%	16%	14%	0%
ES	20%	48%	2%	0%
FI	26%	6%	6%	0%
FR	30%	6%	6%	0%
GB	20%	0%	0%	4%
HR	26%	6%	6%	0%
HU	42%	64%	10%	4%
IE	22%	6%	6%	4%
IS	32%	40%	16%	2%
IT	34%	40%	20%	0%
LT	64%	60%	62%	26%
LV	46%	68%	16%	78%
ME	76%	84%	68%	68%
NL	14%	14%	14%	0%
NO	2%	16%	2%	0%
PL	32%	36%	28%	0%
PT	36%	46%	18%	14%
RS	54%	22%	24%	0%
SE	18%	2%	2%	0%
SI	22%	16%	16%	0%
SK	26%	58%	10%	0%

Table 17 reports, for each covariate, the percentage of countries where the absolute standardized mean difference exceeds 0.1, both before and after matching, for each method. Consistent with previous results, the best balance is achieved using full optimal matching (*PSMfull*), followed by optimal pair matching (*PSMopt*).

Table 17: Percentage of countries where the matching covariate absolute standardized mean difference are above 0.1 before the matching and after matching for each method and each covariate.

Covariate	Before	PSMnear	PSMopt	PSMfull
Age	35%	42%	15%	12%
Man	19%	27%	4%	8%
Woman	19%	27%	4%	8%
A big city	35%	35%	15%	4%
Town or small city	23%	23%	15%	4%
Country village or Farm	31%	27%	19%	12%
Paid work	31%	31%	23%	12%
Retired	38%	27%	12%	12%
Others	42%	42%	23%	12%
Married or in union	27%	27%	8%	8%
Separated or Divorced or Widowed	27%	23%	4%	15%
None of these	12%	12%	8%	12%
ISCED I-II	50%	31%	31%	15%
ISCED III-IV	4%	8%	4%	8%
ISCED V	46%	31%	27%	12%
Very interested in politics	23%	27%	12%	8%
Quite interested in politics	31%	35%	15%	12%
Hardly interested in politics	23%	19%	4%	12%
Not at all interested in politics	27%	23%	19%	8%
Left	35%	31%	19%	12%
Center	19%	15%	8%	8%
Right	27%	27%	4%	8%
Discriminated group: Yes	12%	15%	8%	12%
Discriminated group: No	12%	15%	8%	12%
Living comfortably	46%	58%	27%	8%
Coping	15%	31%	15%	8%
Difficult or Very difficult	50%	54%	27%	12%
Not at all or Somewhat religious	31%	19%	8%	15%
Quite or Very religious	31%	19%	8%	15%
Not happy	50%	46%	19%	8%
Fairly happy	15%	19%	15%	8%
Very happy	27%	38%	19%	4%
Not at all or Not very satisfied	38%	38%	23%	12%
Fairly satisfied	15%	15%	4%	12%
Very satisfied	42%	42%	19%	4%
Voted: Yes	35%	38%	23%	12%
Voted: No or Not eligible to vote	35%	38%	23%	12%
Not attached to country	31%	35%	12%	8%
Fairly attached to country	19%	19%	15%	12%
Very attached to country	35%	35%	23%	12%
Not attached to EU	35%	23%	12%	15%
Fairly attached to EU	19%	12%	4%	12%
Very attached to EU	23%	19%	8%	8%
Interpersonal Trust	50%	50%	27%	4%
Political Participation	46%	27%	15%	12%
Conservation	42%	31%	27%	0%
Openness	46%	42%	35%	12%
Enhancement	54%	46%	35%	12%
Transcendence	54%	42%	31%	4%

Table 18 demonstrates that full optimal matching achieves balance across most covariates and countries, with the notable exceptions of Bulgaria (BG), Latvia (LV), Montenegro (ME), and Lithuania (LT).

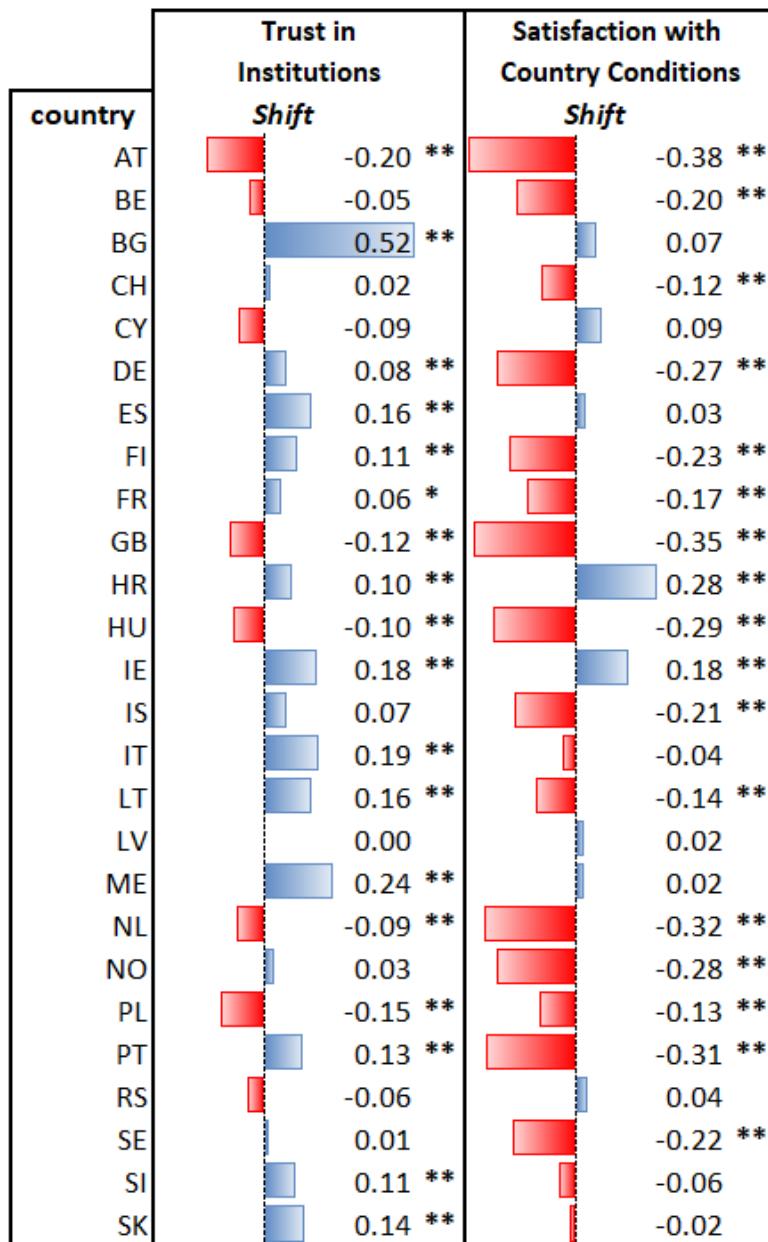
Table 18: Imbalance in matching covariates measured by standardized mean differences after full optimal matching. Shaded cells denote absolute values above 0.1, indicating poor balance.

Covariate	AT	BE	BG	CH	CY	DE	ES	FI	FR	GB	HR	HU	IE	IS	IT	LT	LV	ME	NL	NO	PL	PT	RS	SE	SI	SK
distance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Age	0.02	0.02	0.10	0.00	0.04	0.01	-0.03	-0.01	-0.01	-0.04	0.01	-0.07	-0.02	0.05	0.00	-0.13	0.38	-0.22	-0.01	0.03	-0.03	0.00	0.07	-0.03	0.05	-0.05
Man	-0.02	-0.02	-0.04	0.00	0.04	0.01	0.00	0.00	0.01	-0.04	-0.02	0.00	0.01	0.00	0.03	0.03	0.18	-0.09	-0.04	-0.07	0.07	-0.11	-0.05	0.01	0.08	0.02
Woman	-0.02	0.04	0.00	-0.04	-0.01	0.00	0.00	-0.01	0.04	0.02	0.00	-0.01	0.00	-0.03	-0.03	-0.18	0.09	0.04	0.07	-0.07	0.11	0.05	-0.01	-0.08	-0.02	
A big city	-0.08	0.04	0.07	0.01	0.01	0.01	0.00	-0.03	-0.03	0.04	0.00	0.00	-0.02	0.02	0.06	0.07	-0.12	0.03	0.02	-0.06	-0.04	0.00	-0.08	-0.01	0.04	-0.04
Town or small city	0.04	-0.01	0.05	-0.01	-0.02	0.01	-0.01	-0.01	-0.01	0.04	0.04	-0.04	0.00	-0.04	0.02	0.10	0.01	-0.01	-0.04	0.05	0.00	0.01	-0.03	0.01	0.00	0.01
Country village or Farm	0.04	-0.03	-0.12	0.00	0.00	-0.02	0.02	0.01	0.03	-0.03	0.02	0.01	-0.02	0.03	-0.03	0.11	-0.15	-0.03	0.06	0.07	-0.05	0.09	0.00	-0.01	0.02	
Paid work	0.03	-0.01	0.07	0.02	-0.05	-0.01	0.01	0.01	-0.02	0.02	-0.01	0.13	0.00	-0.04	-0.02	0.13	-0.26	0.09	0.01	0.03	-0.02	0.08	-0.04	0.01	0.02	0.02
Retired	-0.01	0.01	0.04	-0.02	0.05	-0.01	-0.02	-0.02	0.00	-0.02	0.03	-0.13	-0.02	0.02	0.01	0.04	0.23	-0.28	0.00	0.02	0.02	-0.05	0.03	0.00	0.02	-0.04
Others	-0.03	0.00	-0.14	-0.01	0.01	0.02	0.00	0.00	0.02	0.00	-0.03	-0.02	0.02	0.03	0.01	-0.11	0.07	0.16	-0.01	0.05	0.00	-0.05	0.01	0.00	-0.04	0.02
Married or in union	0.06	-0.02	-0.03	-0.02	0.01	0.00	-0.02	-0.03	-0.04	0.00	-0.02	-0.01	0.00	-0.09	0.11	0.07	-0.25	-0.02	0.07	0.03	-0.01	0.03	0.01	0.04	-0.01	
Separated or Divorced or Widowed	-0.02	0.00	0.16	0.06	-0.06	0.01	-0.01	0.05	0.00	-0.05	0.05	-0.02	0.01	0.01	0.05	-0.19	0.41	-0.19	0.01	-0.01	-0.03	0.02	0.01	-0.02	-0.01	0.00
None of these	-0.05	0.02	-0.12	-0.03	0.05	-0.01	0.03	-0.01	0.04	0.05	-0.02	0.03	0.00	-0.01	0.05	0.08	-0.40	-0.13	0.02	-0.06	0.00	0.03	-0.04	0.01	0.04	0.02
ISCED I-II	-0.01	-0.01	-0.10	-0.03	0.01	0.01	0.00	-0.03	0.02	-0.10	0.00	0.00	-0.05	-0.09	0.04	0.11	0.09	-0.23	0.02	0.04	0.01	0.02	0.02	-0.03	0.03	0.00
ISCED III-IV	0.02	-0.03	-0.05	0.03	0.03	0.01	-0.01	0.04	-0.01	0.03	-0.01	-0.01	0.03	0.11	-0.03	0.00	0.30	0.05	0.02	-0.04	0.05	0.01	0.06	0.03	0.04	0.01
ISCED V	-0.01	0.04	0.12	-0.01	-0.02	-0.02	0.01	-0.02	0.00	0.07	0.01	0.02	-0.03	-0.02	-0.07	-0.36	0.17	0.04	0.02	-0.06	-0.03	-0.08	-0.01	-0.06	-0.01	
Very interested in politics	-0.01	0.03	-0.28	0.06	0.05	-0.02	0.00	0.03	-0.03	0.07	0.01	0.00	0.04	-0.04	0.01	0.06	0.09	-0.56	-0.05	-0.04	-0.03	0.01	0.03	-0.05	0.05	0.04
Quite interested in politics	-0.02	0.03	-0.02	0.00	-0.07	-0.01	-0.01	-0.03	0.00	-0.01	-0.05	-0.01	0.00	-0.13	-0.47	0.11	-0.02	0.04	-0.01	-0.06	-0.07	0.04	0.04	0.03		
Hardly interested in politics	0.05	-0.04	0.03	-0.07	0.02	0.02	0.01	0.03	0.01	-0.02	0.06	0.05	0.01	0.06	-0.02	0.11	0.21	0.14	0.05	-0.02	0.04	0.05	0.01	0.02	0.02	
Not at all interested in politics	-0.04	-0.03	0.17	0.04	0.01	0.00	-0.06	0.03	-0.01	-0.06	-0.05	0.03	-0.02	0.02	0.06	0.24	-0.27	0.07	0.03	0.02	0.02	0.04	-0.04	-0.04	0.03	
Left	0.03	0.05	-0.10	-0.01	0.07	0.01	-0.03	0.00	0.02	-0.11	0.01	-0.06	-0.01	-0.06	-0.03	0.03	0.07	0.24	-0.07	0.01	0.04	-0.02	0.04	-0.04	-0.02	-0.05
Center	-0.01	0.01	0.01	0.06	-0.05	0.01	-0.06	0.01	-0.03	0.07	-0.05	-0.02	0.02	0.05	0.04	0.02	0.18	-0.31	0.10	-0.02	0.00	-0.03	0.06	-0.01	0.05	
Right	-0.02	-0.06	0.10	-0.05	-0.01	0.01	-0.03	0.01	-0.06	-0.04	0.05	0.03	-0.01	0.00	-0.02	-0.05	-0.23	0.11	-0.04	0.01	0.02	0.02	-0.03	0.03	0.00	
Discriminated group: Yes	0.01	0.01	-0.05	-0.04	-0.11	0.04	0.01	0.02	-0.01	0.03	0.05	0.02	-0.06	-0.02	0.08	0.21	0.05	0.01	-0.02	0.03	-0.15	-0.06	0.03	-0.03	0.03	
Discriminated group: No	-0.01	-0.01	0.05	0.04	0.11	-0.04	-0.01	-0.02	0.01	-0.03	0.04	-0.05	-0.02	0.06	-0.02	-0.21	-0.05	-0.01	0.02	-0.03	0.15	0.06	-0.03	0.03	-0.03	
Living comfortably	-0.04	-0.02	-0.20	0.00	0.05	-0.03	0.01	0.00	0.00	0.02	-0.05	0.08	-0.01	-0.02	-0.03	0.00	-1.01	0.09	0.02	0.02	-0.06	0.04	-0.06	-0.02	0.01	
Coping	0.02	0.00	-0.09	0.00	-0.03	0.04	0.03	0.00	-0.01	-0.05	0.05	-0.06	0.00	0.03	0.02	-0.02	0.23	0.17	0.00	0.00	0.05	0.03	0.09	0.04	0.02	0.01
Difficult or Very difficult	0.02	0.02	0.20	0.00	-0.01	0.00	-0.04	0.01	0.03	0.05	0.00	0.01	0.02	-0.01	0.03	0.25	-0.22	0.05	-0.05	0.01	-0.07	-0.05	0.00	0.00	-0.02	
Not at all or Somewhat religious	0.03	0.03	0.21	0.03	-0.01	0.02	0.03	-0.02	0.06	0.04	-0.03	-0.01	0.02	-0.04	0.02	0.00	0.12	-0.25	0.02	0.08	0.08	0.12	0.04	-0.02	-0.04	0.01
Quite or Very religious	-0.03	0.03	-0.21	-0.03	0.01	-0.02	-0.03	0.02	-0.06	-0.04	0.03	0.01	-0.02	0.00	-0.04	0.12	-0.25	0.02	0.08	0.08	0.12	0.04	-0.02	-0.04	-0.05	
Not happy	-0.02	-0.01	-0.05	-0.02	-0.10	0.03	-0.03	-0.01	-0.02	0.04	0.02	0.02	-0.04	0.05	0.03	0.21	0.30	0.01	0.01	0.01	0.04	-0.02	0.04	-0.03	0.05	
Fairly happy	0.04	0.07	-0.02	-0.02	0.05	-0.01	0.01	0.00	0.05	0.05	0.04	0.00	0.04	0.00	-0.05	-0.07	-0.25	-0.32	-0.01	0.05	-0.04	0.04	-0.01	0.03	0.02	
Very happy	-0.02	-0.06	0.11	0.03	0.04	-0.01	-0.01	-0.05	-0.03	-0.07	-0.02	-0.06	0.03	0.01	0.05	0.08	-0.01	0.00	0.04	-0.05	0.00	-0.03	-0.03	0.01	0.04	
Not at all or Not very satisfied	-0.04	-0.01	-0.24	0.01	-0.05	0.00	-0.01	0.04	0.03	-0.05	0.01	0.03	-0.03	-0.09	0.09	0.01	0.20	0.27	0.02	-0.03	0.00	0.01	0.03	0.06	0.02	0.00
Fairly satisfied	0.05	0.05	0.27	0.05	0.06	0.04	0.01	-0.06	0.05	0.02	0.02	0.00	0.08	0.04	-0.07	-0.08	-0.20	-0.29	0.00	-0.02	0.06	0.07	0.00	-0.01	-0.03	0.01
Very satisfied	-0.03	-0.04	-0.06	-0.05	-0.02	-0.04	-0.01	0.04	0.03	0.02	-0.03	-0.07	0.01	-0.01	0.08	0.04	0.03	0.01	0.04	-0.06	-0.12	-0.04	-0.03	0.02	-0.01	
Voted: Yes	0.03	0.02	-0.08	0.01	0.07	0.01	-0.02	-0.01	0.00	0.01	0.00	0.07	0.00	0.01	-0.03	-0.16	-0.21	-0.26	-0.02	-0.03	0.04	0.02	0.04	0.03	-0.03	0.02
Not attached to country	-0.05	-0.02	-0.01	0.10	0.03	-0.01	0.03	-0.02	-0.01	0.00	0.02	0.01	-0.03	0.01	-0.04	0.16	0.21	0.26	0.02	0.03	0.04	-0.02	-0.04	-0.03	-0.01	-0.01
Fairly attached to country	0.03	0.03	0.01	-0.01	-0.10	0.02	0.01	0.02	0.00	0.02	-0.01	0.01	0.11	0.00	0.01	-0.03	-0.53	-0.13	0.04	0.01	-0.01	0.05	-0.01	0.02	-0.01	-0.02
Very attached to country	0.00	-0.03	-0.09	-0.01	0.10	-0.01	-0.03	-0.02	-0.01	0.01	0.01	-0.02	0.11	0.02	0.01	0.04	0.43	-0.19	-0.03	-0.02	-0.01	0.00	0.04	-0.02	0.01	0.03
Not attached to EU	-0.02	0.00	0.31	-0.03	0.01	0.03	0.02	0.00	-0.01	0.01	0.04	-0.02	-0.01	0.00	-0.05	0.11	0.16	0.37	0.01	-0.05	-0.02	0.02	-0.04	0.00	0.03	0.02
Fairly attached to EU	0.05	0.03	-0.28	0.02	-0.02	-0.03	0.02	-0.01	0.00	-0.02	-0.06	-0.01	-0.05	0.00	0.03	-0.28	-0.38	-0.02	0.07	0.07	0.03	0.04	0.01	-0.03	-0.05	
Very attached to EU	-0.05	-0.04	-0.09	0.01	0.06	0.00	-0.05	0.01	0.00	0.03	0.00	0.08	-0.0													

potential outcomes, and their difference provides the estimated marginal treatment effect.

Table 19 shows the estimated shifts for the two target variables between 2018 and 2023 after the imputation using the full optimal method.

Table 19: *PSMfull*: estimated shifts for the two target variables between 2018 and 2023 a



Overall, the full optimal matching analysis reveals heterogeneous temporal shifts in the two latent constructs between 2018 and 2023. For Trust in Institutions, statistically significant increases are observed in several countries, most notably Bulgaria (+0.52), Montenegro (+0.24), Ireland (+0.18), and Italy (+0.19), while marked declines are evident in Great Britain (-0.12), Hungary (-0.10), the Netherlands (-0.09), and Poland (-0.15). In contrast, Satisfaction with Country Conditions exhibits a predominantly negative pattern, with substantial and significant drops in nearly all countries, particularly Great Britain (-0.35), Austria (-0.38), and the Netherlands

( $-0.32$ ). The few positive shifts (e.g., Croatia +0.28, Ireland +0.18) are exceptions to this overall decline. These results suggest that, while institutional trust has in some contexts improved over the period, satisfaction with the broader national context has tended to deteriorate more consistently across Europe.

**Geographical representation of the shift in Trust and Satisfaction** Figure 33 provides a graphical representation across the analyzed countries of the variations in the two targets variables between 2018 and 2023.

Values are classified into five categories based on magnitude: high negative ( $< -0.25$ ), negative ( $-0.25$  to  $-0.07$ ), invariate ( $-0.07$  to  $0.07$ ), positive ( $0.07$  to  $0.25$ ), and high positive ( $> 0.25$ ).

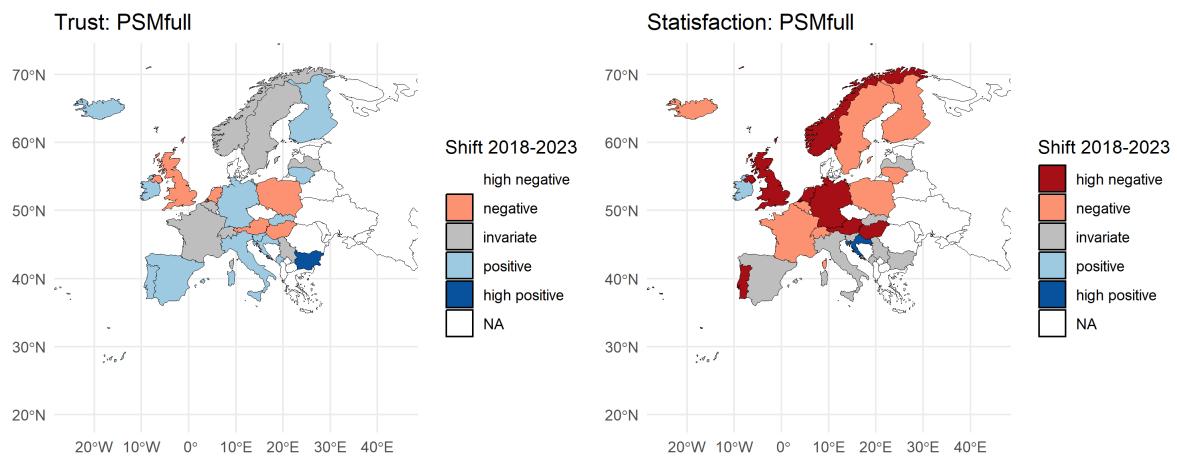


Figure 33: Geographical representation of the changes in Trust in Institutions and Satisfaction with Country Conditions. Categories: high negative ( $< -0.25$ ), negative ( $-0.25$  to  $-0.07$ ), invariate ( $-0.07$  to  $0.07$ ), positive ( $0.07$  to  $0.25$ ), and high positive ( $> 0.25$ )

## 3.2 Non parametric statistical methods for matching

To build the pseudo-panel without imposing strong model structure, we also implemented a non-parametric statistical-matching approach based on hot-deck nearest-neighbor (NN) matching (D’Orazio et al., 2006) under Gower distance (Gower, 1971). Gower’s coefficient is designed for mixed data (continuous, ordinal, and nominal) and yields a [0,1] similarity that naturally accommodates factor/ordered covariates, which fits our survey’s heterogeneous covariate set. We compute pairwise Gower distances within each country. Gower distance is

computed using the `daisy` function of the `cluster` (Maechler et al., 2025) package in R.

For every 2023 record, we select the closest 2018 donor; the donor's 2018 outcomes are then "hot-decked" into the 2023 record to form matched pre-post pairs.

This approach avoids outcome-model specification, preserves the empirical joint distribution of covariates, and is recommended for survey data integration when overlap is adequate.

**Distribution of the original and the imputed target latent variables** To evaluate the plausibility of the imputed values generated through the hot-deck nearest neighbor procedure based on the Gower distance, we compare the distributions of the original and imputed data for the two latent constructs considered. Figures 34 and 35 display density plots for *Trust in Institutions* and *Satisfaction with Country Conditions*, respectively. In both cases, the density curves of the imputed pseudo-panel values closely align with those of the observed data, indicating that the matching procedure preserved the empirical distribution of the variables while allowing for the construction of a harmonized dataset across the two ESS waves.

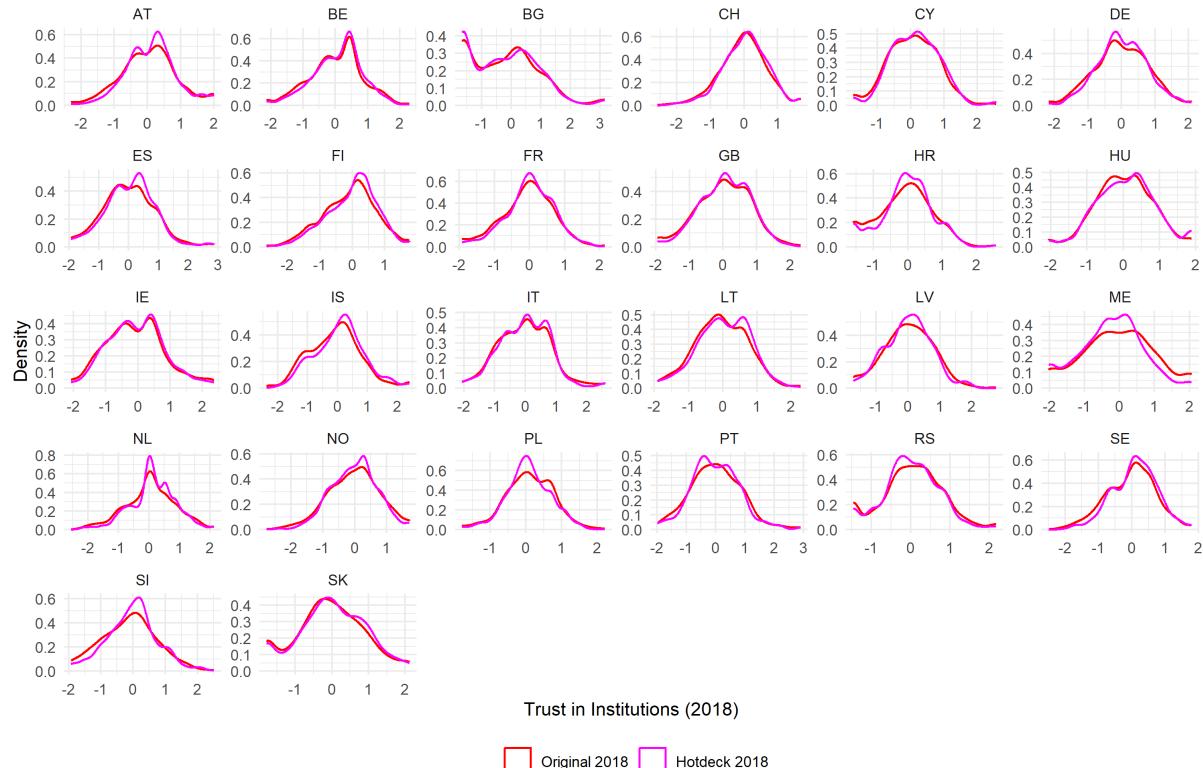


Figure 34: Hot-deck: Density plots comparing the original data for Trust in Institutions with the imputed data in the pseudo-panel.

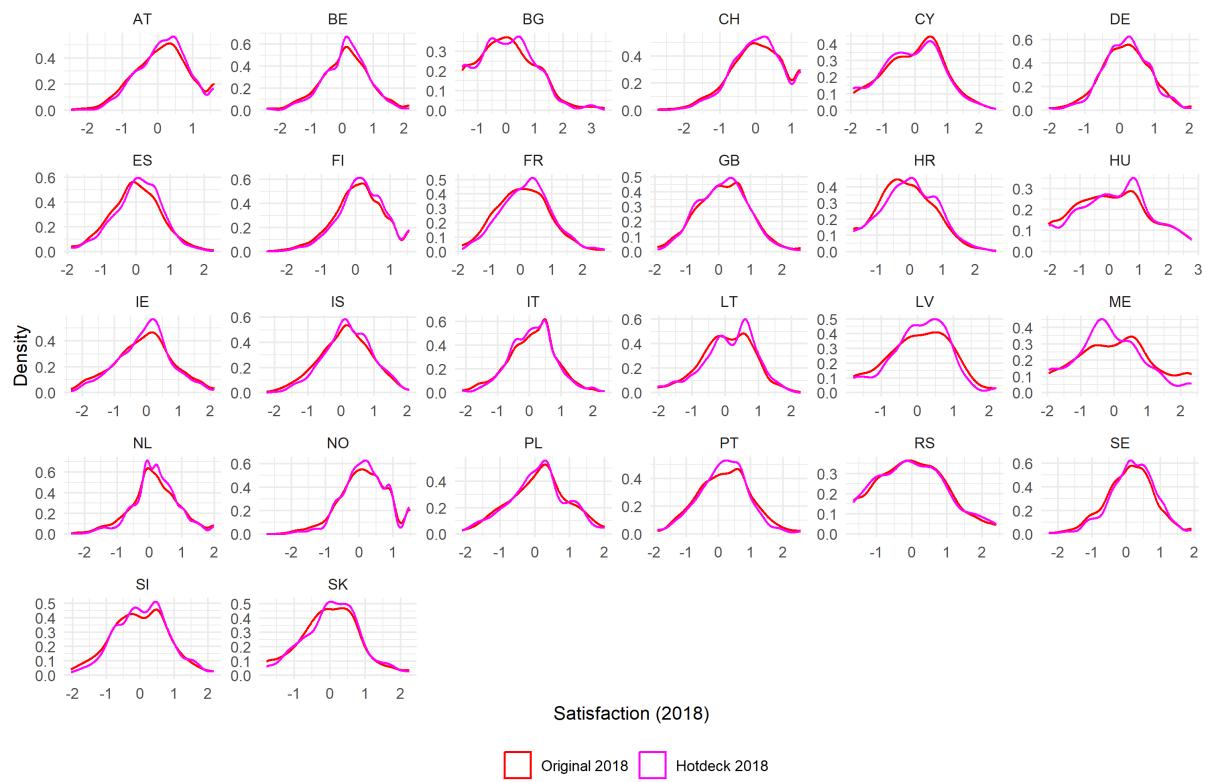


Figure 35: Hot-deck: Density plots comparing the original data for Satisfaction with Country Conditions with the imputed data in the pseudo-panel.

**Distribution of the target latent variables in 2018 and 2023** To further illustrate the outcome of the hot-deck nearest neighbor imputation based on the Gower distance, Figures 36 and 37 compare, for each latent construct, the distribution of the original data from ESS11 (2023) with that of the imputed pseudo-panel values for ESS9 (2018). For *Trust in Institutions* (Figure 36) and *Satisfaction with Country Conditions* (Figure 37), the distributions are similar for most countries, confirming that the matching procedure successfully generated 2018 counterfactual values aligned with the 2023 scale and variability, thus enabling consistent temporal comparisons. Some exception can be noted for Bulgaria (BG) and Montenegro (ME).

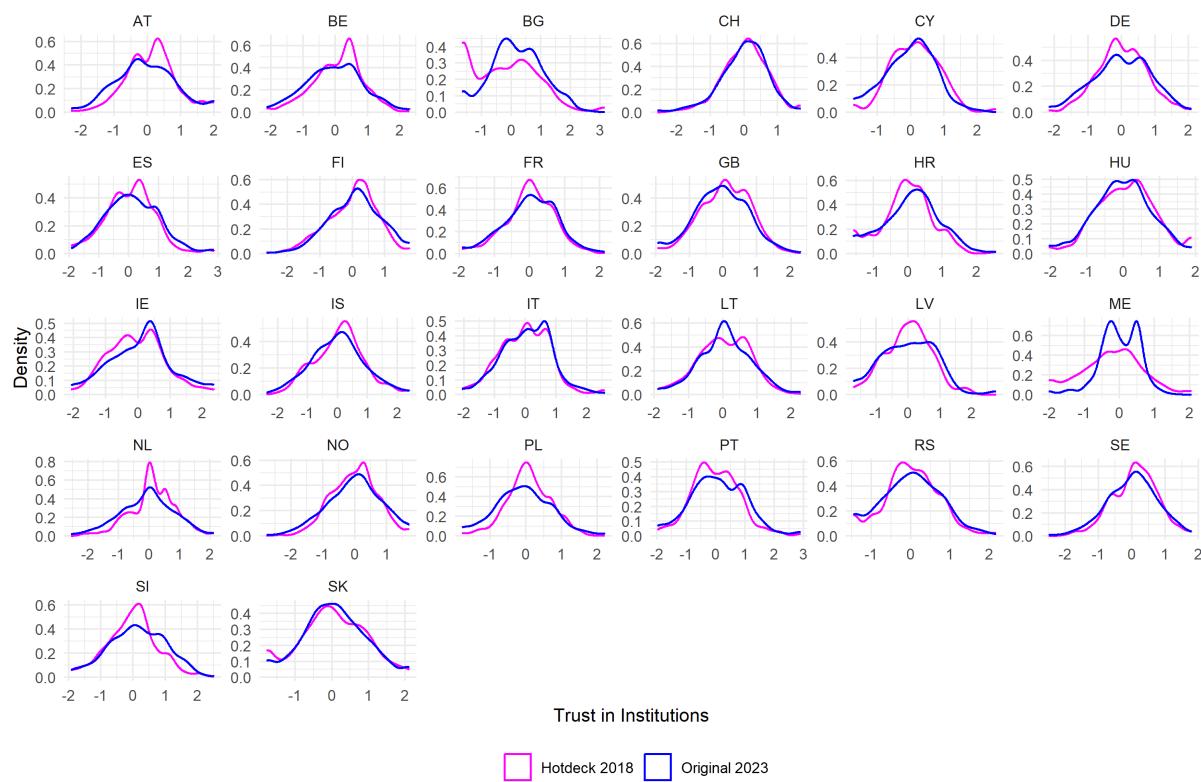


Figure 36: Hot-deck: Density plots comparing the original data for Trust in Institutions in 2023 and the imputed data for 2018.

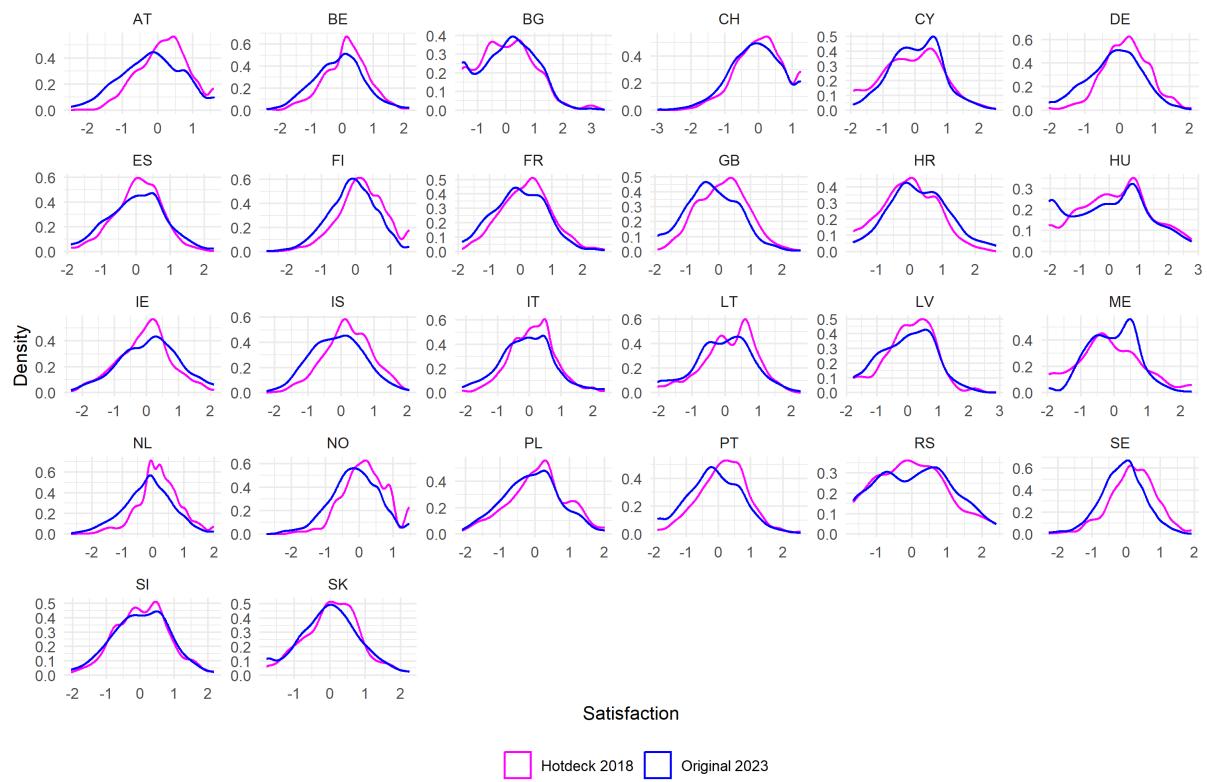
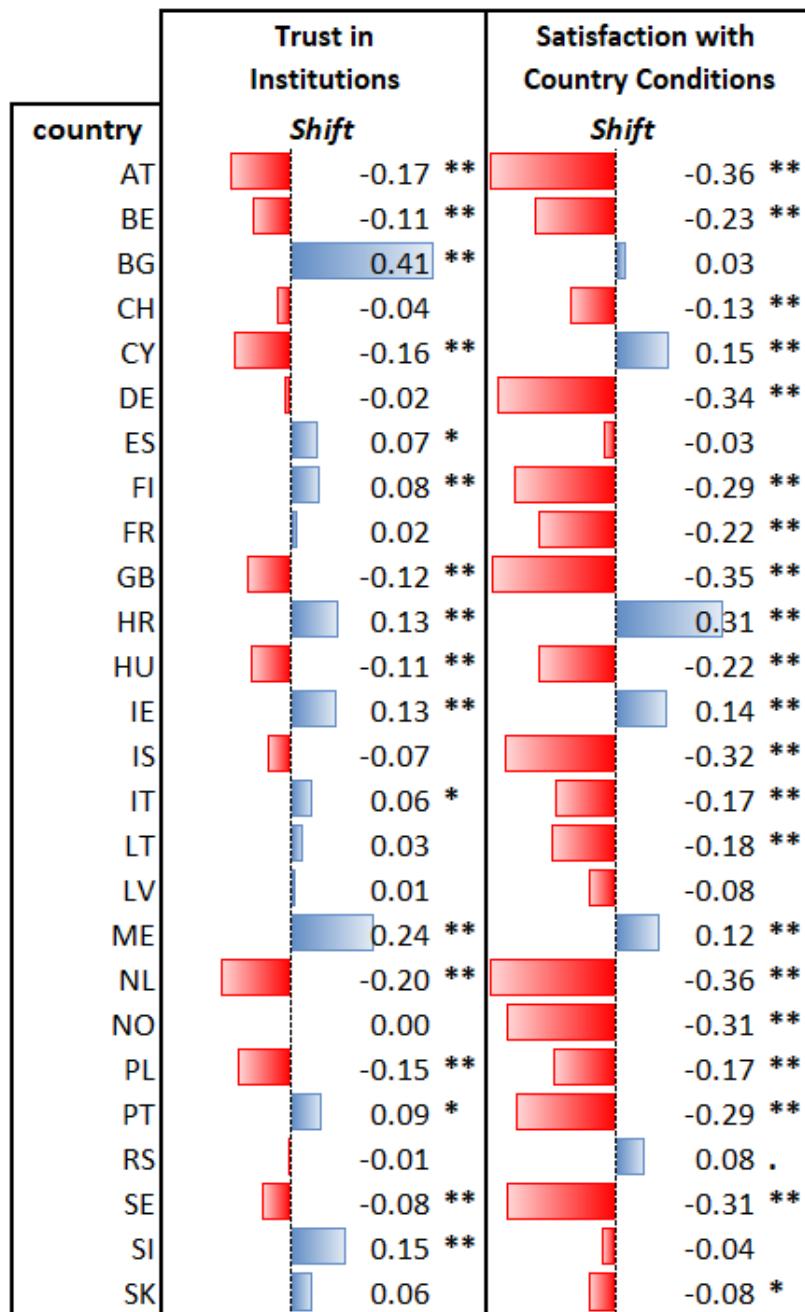


Figure 37: Hot-deck: Density plots comparing the original data for Satisfaction with Country Conditions in 2023 and the imputed data for 2018.

**Estimating the shifts in Trust in Institutions and Satisfaction with Country conditions** After performing hot-deck matching, we estimated the shift in Trust in Institutions and Satisfaction with Country Conditions by regressing the difference between the observed and donated values of the two latent variables. The results are consistent with those obtained using PSM with full optimal matching.

Table 20 shows the estimated shifts for the two target variables between 2018 and 2023 after the imputation using the full optimal method.

Table 20: *Hot-deck*: estimated shifts for the two target variables between 2018 and 2023 a



**Geographical representation of the shift in Trust and Satisfaction** Figure 38 provides a graphical representation across the analyzed countries of the variations in the two targets variables between 2018 and 2023.

Values are classified into five categories based on magnitude: high negative (< -0.25), negative (-0.25 to -0.07), invariate (-0.07 to 0.07), positive (0.07 to 0.25), and high positive (> 0.25).

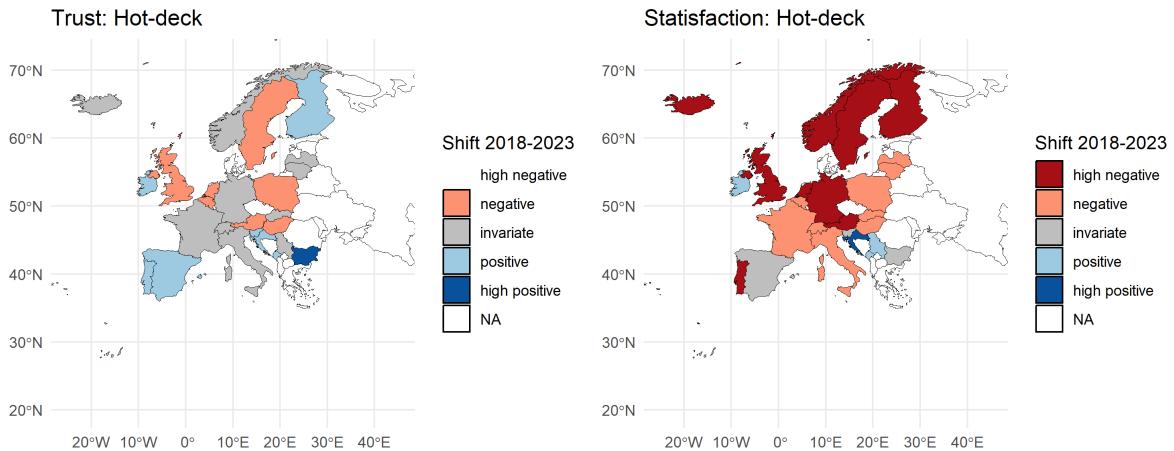


Figure 38: Geographical representation of the changes in Trust in Institutions and Satisfaction with Country Conditions. Categories: high negative ( $< -0.25$ ), negative ( $-0.25$  to  $-0.07$ ), invariate ( $-0.07$  to  $0.07$ ), positive ( $0.07$  to  $0.25$ ), and high positive ( $> 0.25$ )

### 3.3 Predictive mean matching

Parametric and nonparametric methods can be effectively combined within a *mixed imputation framework*, which is often conceptualized as a two-phase process. In the *first phase*, a parametric model is specified and fitted to the observed data in order to estimate the relationship between the target variable and a set of predictors. This step yields a set of model-based parameters that summarize the systematic component of the data. In the *second phase*, a nonparametric matching procedure – typically a hot-deck method – is applied, but *conditional* on the parameter estimates from the first stage. This conditioning ensures that donor-recipient pairs are not only similar in terms of raw covariates, but also in terms of their predicted outcomes under the parametric model.

For *continuous target variables*, a widely used mixed approach is *Predictive Mean Matching* (PMM) (Rubin, 1987). In PMM, predicted values from the fitted model are computed for all records, and each missing value is imputed by selecting a donor with the closest predicted value in the regression space. This combines the robustness of nonparametric matching with the efficiency of parametric estimation, reducing model dependence and preserving the original distribution of the target variable.

In this study, we implement PMM as a hot-deck procedure based on the nearest neighbor in the regression space. To account for uncertainty in the imputation process and produce valid statistical inferences, we adopt a *multiple imputation* strategy using the `mice` package for R (van Buuren & Groothuis-Oudshoorn, 2011),

generating multiple completed datasets ( $m = 20$ ) and pooling the results according to Rubin's rules. This approach provides distribution-preserving imputations while leveraging both parametric and nonparametric strengths.

**Distribution of the original and the imputed target latent variables** To evaluate the plausibility of the imputed values generated through the PMM procedure, we compare the distributions of the original and imputed data for the two latent constructs considered. Figures 39 and 40 display density plots for *Trust in Institutions* and *Satisfaction with Country Conditions*, respectively. In both cases, the density curves of the imputed pseudo-panel values closely align with those of the observed data.

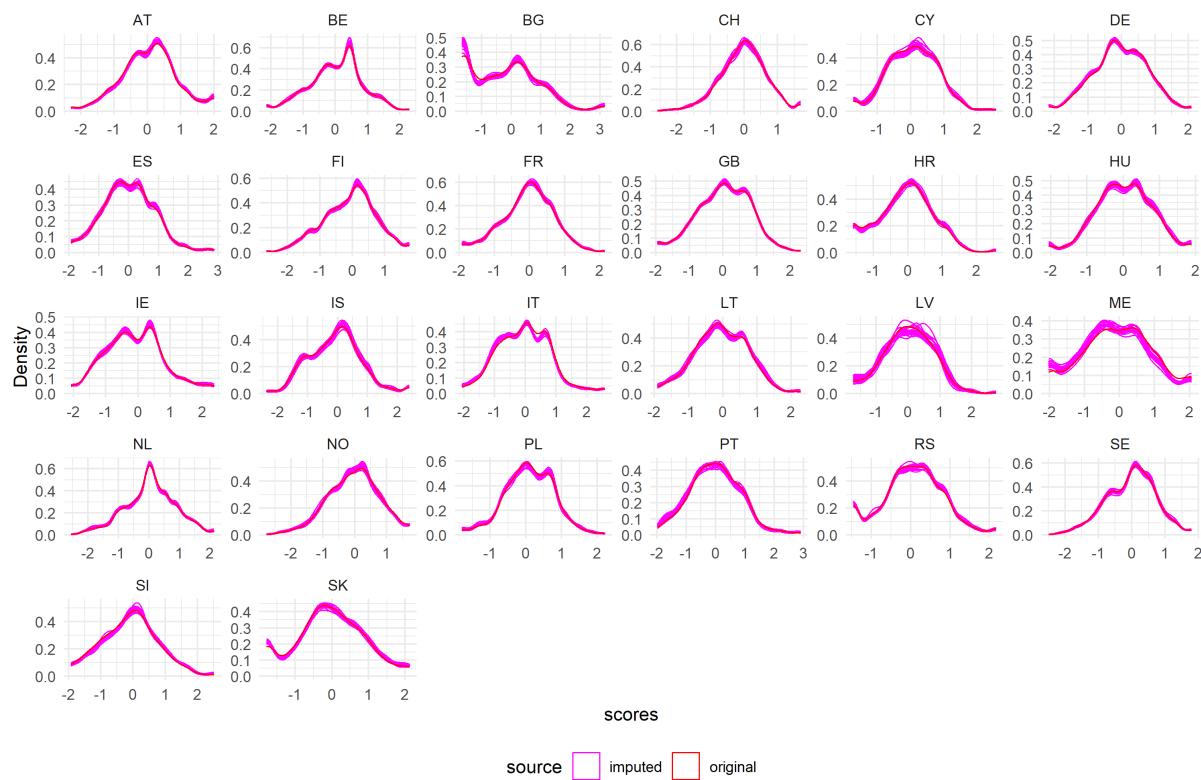


Figure 39: PMM: Density plots comparing the original data for Trust in Institutions with the imputed data in the pseudo-panel. Number of imputations  $m = 20$ .

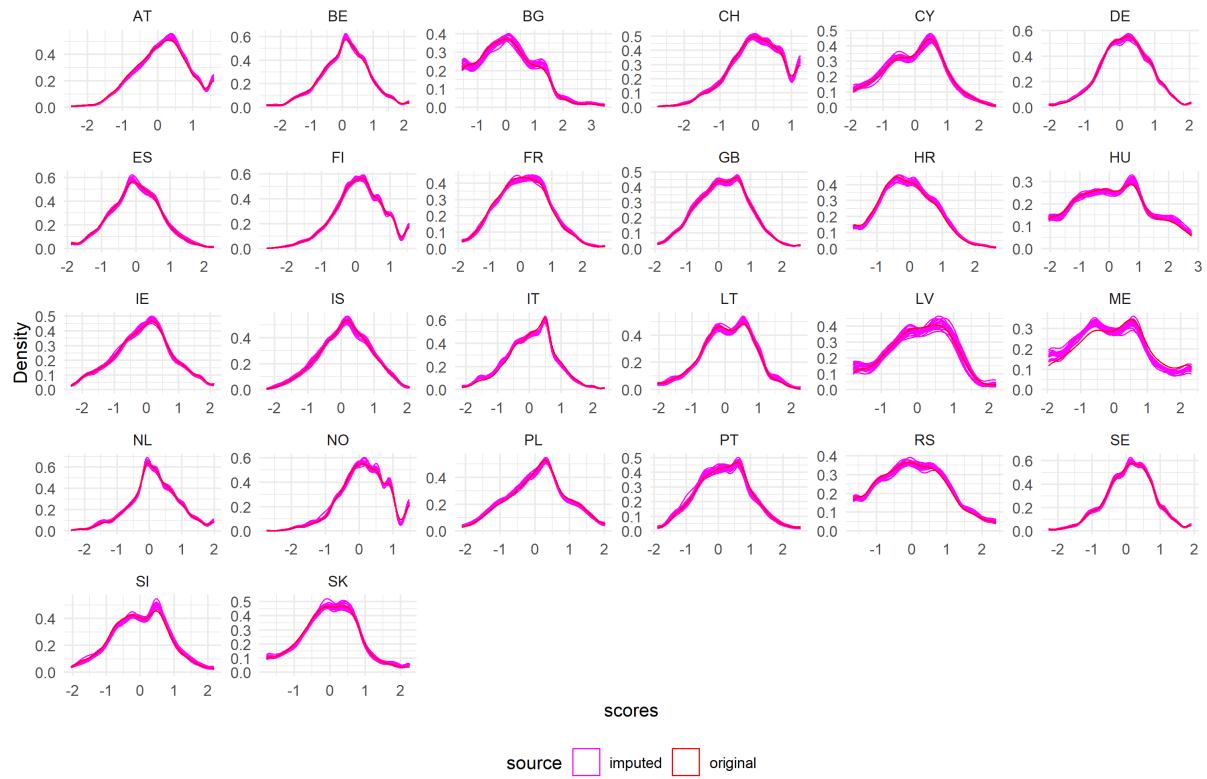


Figure 40: PMM: Density plots comparing the original data for Satisfaction with Country Conditions with the imputed data in the pseudo-panel. Number of imputations  $m = 20$ .

**Distribution of the target latent variables in 2018 and 2023** To further illustrate the outcome of the hPMM procedure, Figures 41 and 42 compare, for each latent construct, the distribution of the original data from ESS11 (2023) with that of the imputed pseudo-panel values for ESS9 (2018). For *Trust in Institutions* (Figure 41) and *Satisfaction with Country Conditions* (Figure 42), the distributions are similar for most countries and across repetition.

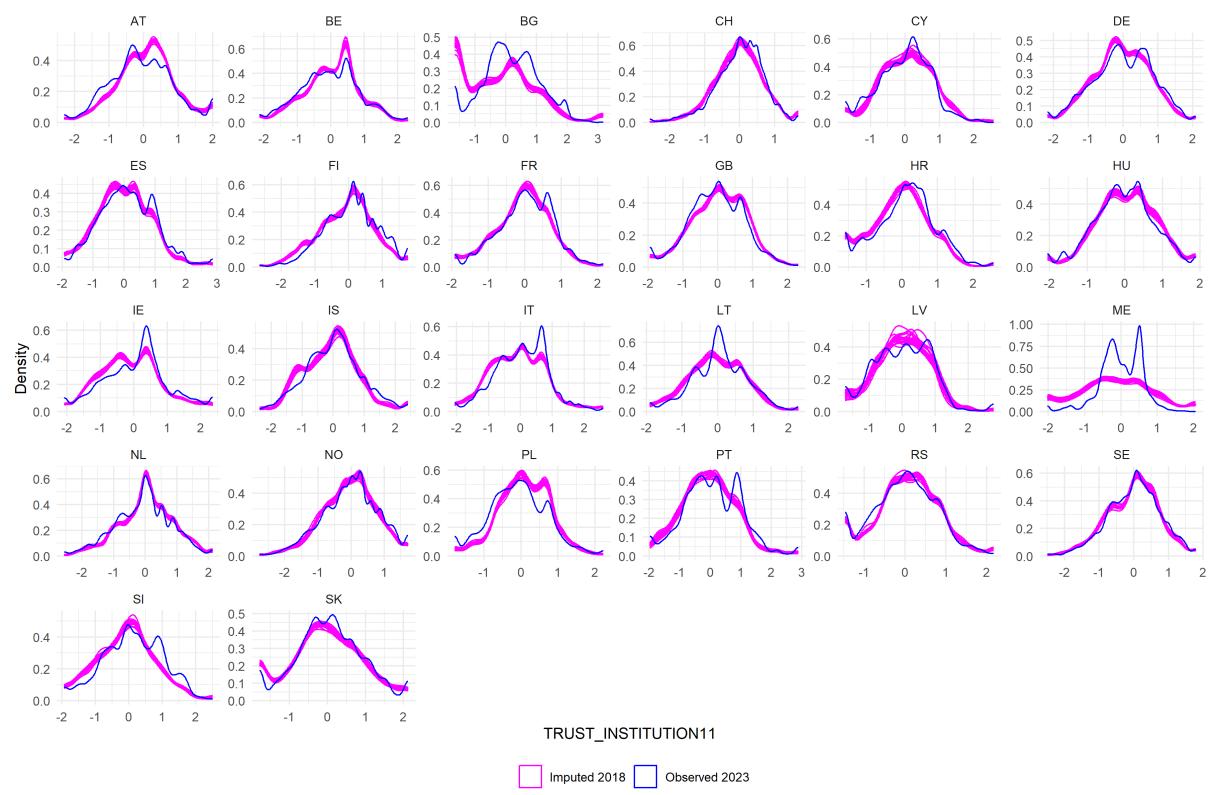


Figure 41: Hot-deck: Density plots comparing the original data for Trust in Institutions in 2023 and the imputed data for 2018.

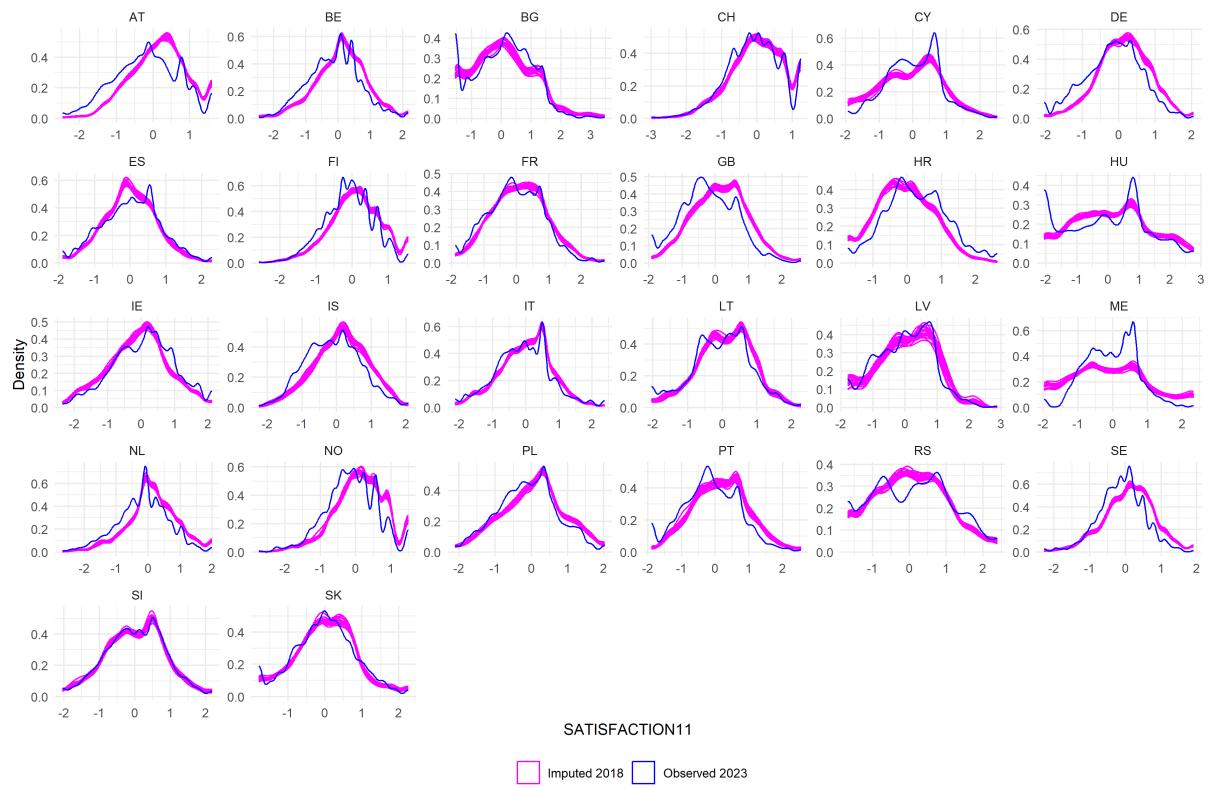


Figure 42: Hot-deck: Density plots comparing the original data for Satisfaction with Country Conditions in 2023 and the imputed data for 2018.

**Estimating the shifts in Trust in Institutions and Satisfaction with Country conditions** After implementing the mixed parametric–nonparametric imputation procedure, we estimated the shift in *Trust in Institutions* and *Satisfaction with Country Conditions* using multiple imputation and Rubin’s rules. Specifically, for each country we fit a regression model without covariate for the difference in trust/satisfaction levels within each imputed dataset (via `mice::with`), and then combined the estimates and standard errors across the  $m$  imputations using `mice::pool`. This procedure yields pooled point estimates, standard errors, and  $p$ -values that appropriately incorporate imputation uncertainty. The pooled results are consistent with those obtained using propensity score matching with full optimal matching and hot-deck matching, supporting the robustness of our findings across imputation strategies (Table 21)

Table 21: *Hot-deck*: estimated shifts for the two target variables between 2018 and 2023 a

country	Trust in Institutions		Satisfaction with Country Conditions	
	Shift		Shift	
AT	-0.18 **		-0.39 **	
BE	-0.08 .		-0.21 **	
BG	0.40 **		-0.04	
CH	0.03		-0.10 *	
CY	-0.08		0.13	
DE	0.07 *		-0.27 **	
ES	0.13 **		0.01	
FI	0.12 **		-0.22 **	
FR	0.06		-0.18 **	
GB	-0.10 *		-0.34 **	
HR	0.10 *		0.28 **	
HU	-0.08 .		-0.22 **	
IE	0.17 **		0.18 **	
IS	0.07		-0.22 **	
IT	0.18 **		-0.04	
LT	0.08		-0.17 *	
LV	0.01		-0.04	
ME	0.24 *		0.18 .	
NL	-0.10 *		-0.31 **	
NO	0.05		-0.25 **	
PL	-0.15 **		-0.11 *	
PT	0.15 *		-0.29 **	
RS	-0.08		-0.01	
SE	0.03		-0.23 **	
SI	0.14 *		-0.05	
SK	0.08		-0.05	

**Geographical representation of the shift in Trust and Satisfaction** Figure 43 provides a graphical representation across the analyzed countries of the variations in the two targets variables between 2018 and 2023.

Values are classified into five categories based on magnitude: high negative (< -0.25), negative (-0.25 to -0.07), invariate (-0.07 to 0.07), positive (0.07 to 0.25), and high positive (> 0.25).

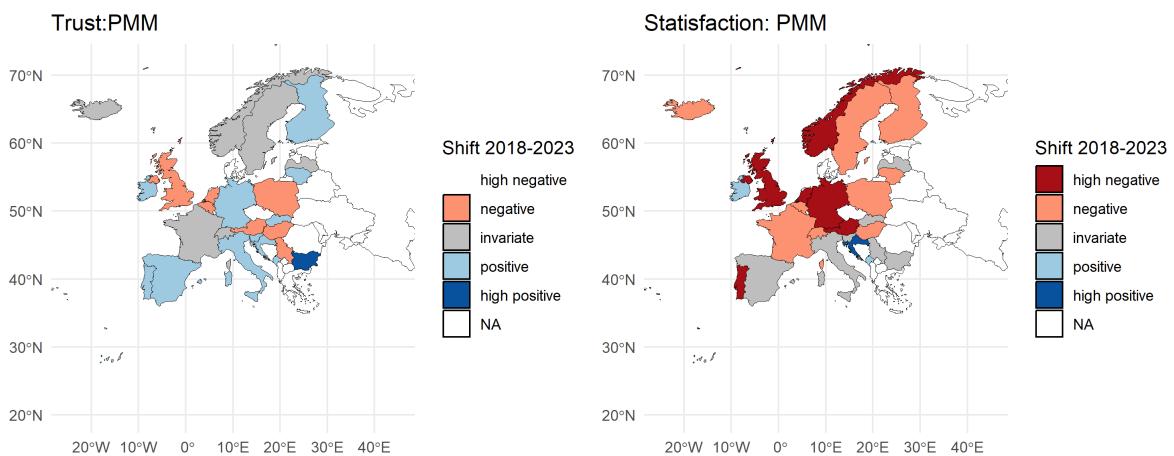


Figure 43: Geographical representation of the changes in Trust in Institutions and Satisfaction with Country Conditions. Categories: high negative ( $< -0.25$ ), negative ( $-0.25$  to  $-0.07$ ), invariate ( $-0.07$  to  $0.07$ ), positive ( $0.07$  to  $0.25$ ), and high positive ( $> 0.25$ )

## 4 Evaluation of the pseudo-panel construction

The three methods employed to construct the pseudopanel for comparing levels of trust in institutions and satisfaction with country conditions between 2018 and 2023 yielded consistent results. Overall, the three approaches largely concur on which countries experience the largest increases and decreases in the two latent traits considered. Cases involving sign reversals or large drops in significance generally correspond to small magnitude effects, where results are more sensitive to the particular matching or imputation strategy employed. A detailed comparison of the methods is presented in the following sections.

In addition, we evaluate the estimated shifts by examining their associations with macro-level indicators that are theoretically and empirically linked to trust in institutions and satisfaction with the country conditions.

### 4.1 Matching approach comparison for Trust in Institutions

Table 22 provides a comparison in the estimates and their significance across the three approaches used.

Table 22: Estimated changes in Trust in Institutions between 2018 and 2023 across different approaches. Only statistically significant coefficients are highlighted.

country	Trust in Institutions		
	PSMfull	Hot-deck	PMM
AT	-0.20 **	-0.17 **	-0.18 **
BE	-0.05	-0.11 **	-0.08 .
BG	0.52 **	0.41 **	0.40 **
CH	0.02	-0.04	0.03
CY	-0.09	-0.16 **	-0.08
DE	0.08 **	-0.02	0.07 *
ES	0.16 **	0.07 *	0.13 **
FI	0.11 **	0.08 **	0.12 **
FR	0.06 *	0.02	0.06
GB	-0.12 **	-0.12 **	-0.10 *
HR	0.10 **	0.13 **	0.10 *
HU	-0.10 **	-0.11 **	-0.08 .
IE	0.18 **	0.13 **	0.17 **
IS	0.07	-0.07	0.07
IT	0.19 **	0.06 *	0.18 **
LT	0.16 **	0.03	0.08
LV	0.00	0.01	0.01
ME	0.24 **	0.24 **	0.24 *
NL	-0.09 **	-0.20 **	-0.10 *
NO	0.03	0.00	0.05
PL	-0.15 **	-0.15 **	-0.15 **
PT	0.13 **	0.09 *	0.15 *
RS	-0.06	-0.01	-0.08
SE	0.01	-0.08 **	0.03
SI	0.11 **	0.15 **	0.14 *
SK	0.14 **	0.06	0.08

**Sign Consistency** Across all three methods, the majority of countries maintain the direction of the estimated change in trust, indicating that the sign of the effect is generally robust to the choice of matching or imputation approach. Notably, countries such as Bulgaria (BG) and Montenegro (ME) exhibit large positive changes, while Austria (AT), Poland (PL), Great Britain (GB), Hungary (HU), and the Netherlands (NL) consistently show large negative changes in trust across methods.

A few countries display shifts in sign depending on the method, particularly Germany (DE), Iceland (IS), and Sweden (SE). However, these sign changes are typically accompanied by small effect sizes and statistical insignificance in at least one method, suggesting instability mainly in marginal effects.

**Magnitude Patterns** The PSM full method generally yields the largest absolute magnitudes of change, both positive and negative, while Hot-deck and PMM tend to produce slightly attenuated estimates. This attenuation is evident in Bulgaria, the Netherlands, and Italy.

**Statistical Significance** For most countries with substantial magnitude changes, statistical significance is preserved across all methods, including Bulgaria (BG), Montenegro (ME), Poland (PL), Austria (AT), Ireland (IE), and Great Britain (GB).

However, borderline cases—such as Belgium (BE), Hungary (HU), Portugal (PT), and Slovenia (SI)—occasionally gain or lose significance depending on the method applied.

Positive effects observed in PSMfull for Lithuania (LT), France (FR), and Italy (IT) often weaken or become non-significant in Hot-deck, indicating that the covariate rebalancing and donor selection intrinsic to this method may reduce precision.

**Outliers and Special Cases** Bulgaria (BG) exhibits a very large and consistently significant positive change across all methods. The Netherlands (NL) experiences a notable negative shift, particularly pronounced in Hot-deck, suggesting stronger donor-recipient contrasts in this approach. Cyprus (CY) and Sweden (SE) show statistically significant changes only in Hot-deck, possibly reflecting the more restrictive, country-specific matching that limits donor pools in this method.

## 4.2 Matching approach comparison for Satisfaction with Country Conditions

Table 23 provides a comparison in the estimates and their significance across the three approaches used. The results show strong overall agreement, alongside some method-specific variations, as detailed below.

Table 23: Estimated changes in Satisfaction with Country Conditions between 2018 and 2023 across different approaches. Only statistically significant coefficients are highlighted.

country	Satisfaction with Country Conditions		
	PSMfull	Hot-deck	PMM
AT	-0.38 **	-0.36 **	-0.39 **
BE	-0.20 **	-0.23 **	-0.21 **
BG	0.07	0.03	-0.04
CH	-0.12 **	-0.13 **	-0.10 *
CY	0.09	0.15 **	0.13
DE	-0.27 **	-0.34 **	-0.27 **
ES	0.03	-0.03	0.01
FI	-0.23 **	-0.29 **	-0.22 **
FR	-0.17 **	-0.22 **	-0.18 **
GB	-0.35 **	-0.35 **	-0.34 **
HR	0.28 **	0.31 **	0.28 **
HU	-0.29 **	-0.22 **	-0.22 **
IE	0.18 **	0.14 **	0.18 **
IS	-0.21 **	-0.32 **	-0.22 **
IT	-0.04	-0.17 **	-0.04
LT	-0.14 **	-0.18 **	-0.17 *
LV	0.02	-0.08	-0.04
ME	0.02	0.12 **	0.18 .
NL	-0.32 **	-0.36 **	-0.31 **
NO	-0.28 **	-0.31 **	-0.25 **
PL	-0.13 **	-0.17 **	-0.11 *
PT	-0.31 **	-0.29 **	-0.29 **
RS	0.04	0.08 .	-0.01
SE	-0.22 **	-0.31 **	-0.23 **
SI	-0.06	-0.04	-0.05
SK	-0.02	-0.08 *	-0.05

**Sign Consistency** Across all three methods, most countries preserve the direction of the estimated change, indicating that the sign of the effect is generally robust to the matching or imputation approach. Large positive changes are observed in Croatia (HR) and Ireland (IE), whereas large negative changes occur in Austria (AT), Belgium (BE), Germany (DE), Finland (FI), France (FR), Great Britain (GB), Hungary (HU), the Netherlands (NL), Norway (NO), Portugal (PT), and Sweden (SE), consistently appearing in the same direction across methods.

Some countries, including Cyprus (CY), Montenegro (ME), Italy (IT), and Lithuania (LT), show differences in significance or minor sign changes. These cases generally involve low-magnitude estimates and are statistically insignificant in at least one method, suggesting that the underlying effects are weak or unstable.

**Magnitude Patterns** The Hot-deck method typically produces the largest absolute magnitudes for both positive and negative changes. PSMfull and PMM tend to attenuate these effects slightly, a pattern particularly noticeable in Germany (-0.27 in PSM full-PMM vs. -0.34 in Hot-deck), Iceland (IS) (-0.21-0.22 vs. -0.32 in Hot-deck), and Montenegro (ME) (0.02 in PSM full vs. 0.18 in PMM).

**Statistical Significance** Countries with large estimated changes generally maintain significance across all three methods, including Austria (AT), Belgium (BE), Germany (DE), Finland (FI), France (FR), Great Britain (GB), Croatia (HR), Hungary (HU), the Netherlands (NL), Norway (NO), Portugal (PT), and Sweden (SE). Borderline cases such as Montenegro (ME), Cyprus (CY), Italy (IT), and Lithuania (LT) sometimes lose or gain significance depending on the method, reflecting sensitivity to the imputation strategy.

Certain positive effects—such as those in Cyprus (CY) and Italy (IT)—are significant only in Hot-deck.

**Outliers and Special Cases** Austria (AT) and Great Britain (GB) exhibit of the largest and most stable negative shifts with very high significance. Croatia (HR) shows a consistently large and strongly significant positive change across all methods. Iceland (IS) experiences a notably larger decline in Hot-deck compared to PSM full and PMM. Montenegro (ME) is unique in that its estimated magnitude increases from PSMfull to PMM, though significance weakens in PMM.

## 4.3 Comparison of estimated shifts on the target variables with macro-Level indicators

In this section, we compare the effects estimated from the pseudopanel data with variations in macro-level indicators extracted from the European Social Survey (ESS) dataset for the years 2018 and 2023. Given the consistency between the imputation procedures, here we consider the results of the PMM method. We focus on the following country-level variables that capture key economic and governance dimensions and that are available for all the countries considered in our analysis for the year 2018 and 2023:

- Gross National Income (GNI) per capita at current prices (US Dollars)
- Long-term unemployment (12 months and more, in thousands)
- Voice and accountability: perceptions of the extent to which a country's citizens can participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
- Control of corruption: perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption.
- Government effectiveness: perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
- Rule of law: perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
- Regulatory quality: perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

- Political stability and absence of violence: perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.
- Transparency International Corruption Perceptions Index score: aggregate indicator that ranks countries in terms of the degree to which corruption is perceived to exist among public officials and politicians.

The code of the variables and the sources are provided in Table24.

Table 24: Macro-level variables

Variable	Description
<b>General Economic Indicators</b>	
c_gnipc_2018	GNI per capita at current prices, US Dollars (2018)
c_gnipc_2023	GNI per capita at current prices, US Dollars (2023)
c_loun_ths_2018	Long-term unemployment (12 months and more) in 1000s (2018)
c_loun_ths_2023	Long-term unemployment (12 months and more) in 1000s (2023)
<b>Worldwide Governance Indicators</b>	
c_accountability_2018	Voice and accountability (2018)
c_accountability_2023	Voice and accountability (2023)
c_corruption_2018	Control of corruption (2018)
c_corruption_2023	Control of corruption (2023)
c_effectiveness_2018	Government effectiveness (2018)
c_effectiveness_2023	Government effectiveness (2023)
c_law_2018	Rule of law (2018)
c_law_2023	Rule of law (2023)
c_quality_2018	Regulatory quality (2018)
c_quality_2023	Regulatory quality (2023)
c_stability_2018	Political stability, no violence (2018)
c_stability_2023	Political stability, no violence (2023)
<b>Transparency International</b>	
c_ticpi_2018	Transparency International Corruption Perceptions Index score (2018)
c_ticpi_2023	Transparency International Corruption Perceptions Index score (2023)

For all the Worldwide Governance Indicators, a higher value indicates better governance performance, reflecting stronger institutions, more effective policies, greater stability, enhanced civil and political rights, and lower levels of corruption. As for the Corruption Perceptions Index score of Transparency International, higher values indicate a lower level of corruption. Therefore a positive variation in all these variables indicate an improvement in the perceived integrity of a country's public sector and in the measured governance dimension.

**Variations of Trust and Satisfaction and of the macro-level indicators between 2018 and 2023** The analysis examines whether the estimated shifts in *Trust in Institutions* and *Satisfaction with Country Conditions* are associated with contemporaneous variations in macro-level indicators between 2018 and 2023.

Figures 44 and 45 show the variation of the macro-level indicators and the level of Trust in Institutions between 2018 and 2023 and of the two target variables.

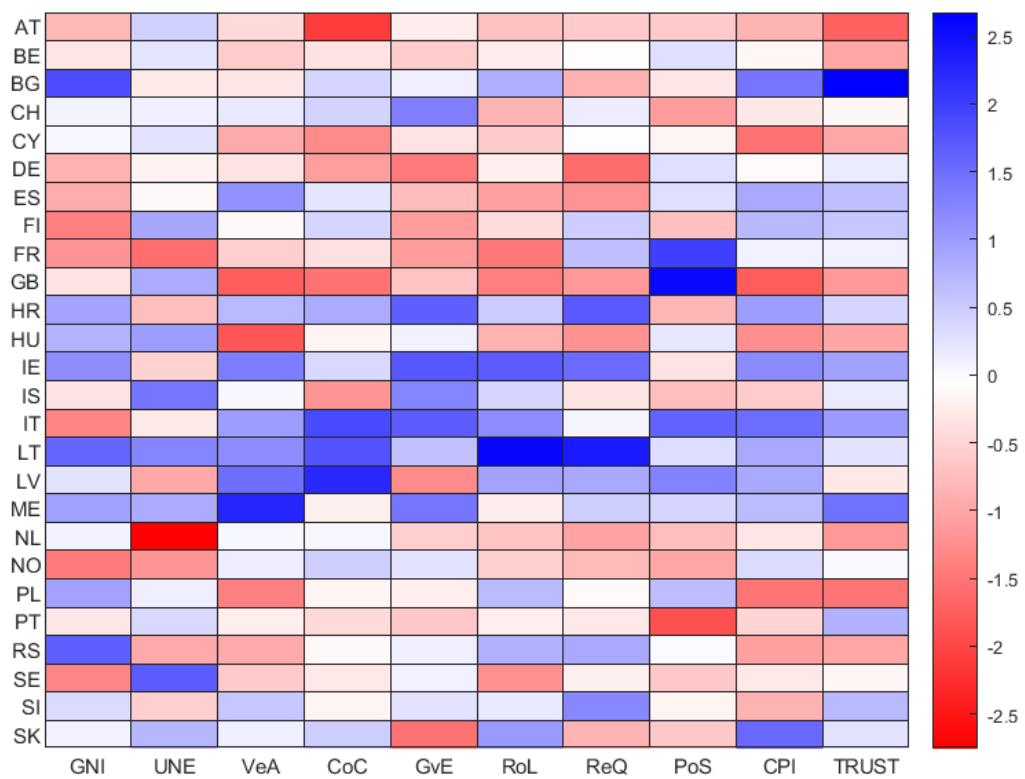


Figure 44: Heatmap of the variations of the macro-level indicators and the level of Trust in Institutions between 2018 and 2023. GNI: GNI per capita; UnE: Longterm unemployment; VeA: Voice and accountability; CoC: Control of corruption; GvE: Government effectiveness; RoL: Rule of law; ReQ: Regulatory quality; PoS: Political stability, no violence; CPI: Transparency International Corruption Perceptions Index score; TRUST: Trust in institutions

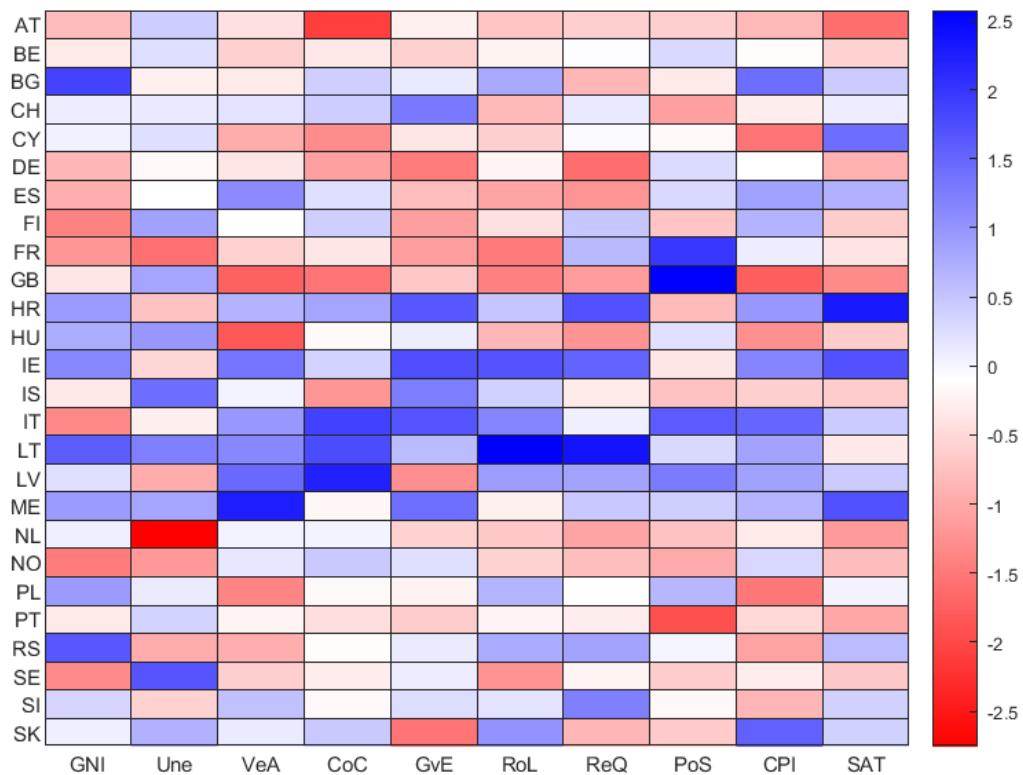


Figure 45: Heatmap of the variations of the macro-level indicators and the level of Satisfaction with Country Conditions between 2018 and 2023. GNI: GNI per capita; UnE: Longterm unemployment; VeA: Voice and accountability; CoC: Control of corruption; GvE: Government effectiveness; RoL: Rule of law; ReQ: Regulatory quality; PoS: Political stability, no violence; CPI: Transparency International Corruption Perceptions Index score; SAT: Satisfaction with country conditions

The comparison between the three approaches (PSMfull, Hot-deck, PMM) and the set of macro-level indicators reveals consistent patterns for both outcomes.

For *Trust in Institutions*, most governance-related indicators exhibit positive associations with changes in trust, suggesting that improvements in these macro-level measures tend to occur alongside increases in institutional trust. The strongest correspondences are found for the Corruption Perceptions Index and Voice and Accountability, indicating that countries with the largest gains in perceived integrity and democratic freedoms also show the largest increases in trust. Control of Corruption, Rule of Law, and Government Effectiveness display consistent moderate positive associations, while Political Stability shows small negative coefficients, pointing to a weak or inverse link between stability gains and trust growth. Changes in GNI per capita and long-term unemployment are only weakly aligned with trust changes.

For *Satisfaction with Country Conditions*, the patterns are similar but in some cases stronger. Increases in GNI are consistently associated with higher satisfaction, as are gains in governance indicators such as Regulatory Quality, Government Effectiveness, Rule of Law, and Voice and Accountability, all showing moderate to strong positive associations. Control of Corruption also aligns positively, although somewhat less strongly than for trust. Political Stability shows negligible

correspondence, while increases in long-term unemployment are negatively associated with satisfaction, consistent with a deterioration in perceived living conditions.

Overall, variation on CPI and governance indicators (VeA, RoL, GvE, CoC) are more strongly linked to variation in *trust*, while economic performance (GNI) and governance quality indicators dominate in explaining *satisfaction*. Differences between the three estimation approaches are minor.

Table 25: Correlation between the estimated changes in Trust in Institution and Satisfaction with Country conditions and the variation in the macro-level indicators.

Macro-level indicator	code	Trust in Institutions			Satisfaction with Country Conditions		
		PSMfull	Hot-deck	PMM	PSMfull	Hot-deck	PMM
GNI per capita	GNI	0.23	0.33	0.14	0.51	0.60	0.48
Longterm unemployment	UnE	0.04	-0.02	0.04	-0.17	-0.15	-0.12
Voice and accountability	VeA	0.55	0.54	0.58	0.49	0.40	0.52
Control of corruption	CoC	0.43	0.40	0.41	0.44	0.30	0.38
Government effectiveness	GvE	0.26	0.27	0.30	0.40	0.42	0.48
Rule of law	RoL	0.40	0.37	0.32	0.49	0.38	0.40
Regulatory quality	ReQ	0.17	0.29	0.18	0.52	0.51	0.51
Political stability, no violence	PoS	-0.12	-0.10	-0.14	0.01	-0.04	0.00
Corruption Perceptions Index score	CPI	0.75	0.67	0.72	0.47	0.31	0.40

**Representation of the shifts on Trust in Institutions and Satisfaction with country condition on the factorial space of the macro-level indicators** To represent the relationship across countries between the variations in the two target latent traits and the macro-level indicators, we use the factorial plane obtained from a principal component analysis (PCA) applied to the matrix of country-level indicator changes.

Table 26 provides the factor loadings for the first 3 components which account for 68% of the total variability.

Table 26: Factor loadings of macro-level indicators on the three principal components (PC1, PC2, PC3)

Macro-level indicator	Code	PC1	PC2	PC3
GNI per capita	GNI	0.258	0.504	0.354
Longterm unemployment	UNE	-0.069	0.390	-0.392
Voice and accountability	VeA	0.418	-0.250	-0.259
Control of corruption	CoC	0.426	-0.290	0.113
Government effectiveness	GvE	0.289	0.377	-0.219
Rule of law	RoL	0.433	0.188	0.141
Regulatory quality	ReQ	0.389	0.224	0.176
Political stability, no violence	PoS	-0.042	-0.209	0.693
Corruption Perceptions Index score	CPI	0.385	-0.419	-0.248

The three extracted components can be interpreted as follows:

- **PC1 – Institutional Quality and Governance:** This dimension is characterised by strong positive loadings for Voice and Accountability (VeA), Control of Corruption (CoC), Rule of Law (RoL), Regulatory Quality (ReQ), and the Corruption Perceptions Index (CPI). It reflects broad improvements in governance, institutional integrity, and transparency.

- **PC2 – Economic Capacity and Administrative Effectiveness:** Positive loadings for *GNI per capita* (GNI), *Longterm Unemployment* (UnE), and *Government Effectiveness* (GvE) indicate that this axis captures the interplay between economic performance and administrative capability.
- **PC3 – Political Stability vs. Socioeconomic Stress:** This factor is dominated by a strong positive loading for *Political Stability*, *No Violence* (PoS) and a negative loading for *Longterm Unemployment* (UnE). It distinguishes countries with stable political environments from those experiencing instability and economic stress.

For Trust in Institutions, the PCA map (Figure 46) reveals clear patterns in the relationship between macro-level indicator variations and shifts in trust in institutions. A cluster of countries with high PC1 scores (e.g., **LT, IE, HR, LV, IT**) shows a clear link between substantial improvements in governance-related indicators and positive trust shifts. In contrast, countries with strongly negative PC1 values (e.g., **GB, HU, AT, DE, PL**) tend to be associated to trust declines.

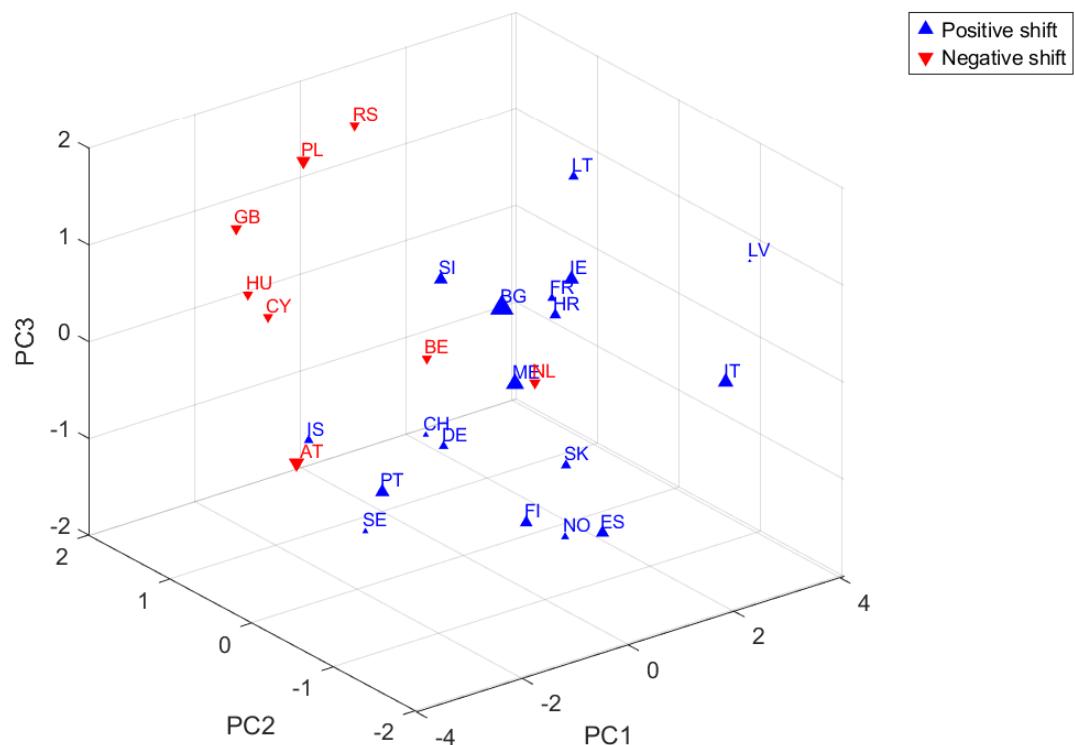


Figure 46: Representation of the shifts in Trust in Institutions across countries on the factorial space.

The three-dimensional PCA projection for variations in *Satisfaction with Country Conditions* (Figure 47) reveals distinct clustering patterns when compared with macro-level indicator variations. Countries with positive shifts (blue triangles), such as HR, IE, LT, and BG, tend to occupy regions with high PC1 and moderate PC2 values, suggesting alignment with increases in governance quality and economic

indicators. Negative shifts (red triangles) dominate the plot, with countries like GB, HU, PL, and RS concentrated in the positive PC3 space, reflecting associations with political stability changes and corruption-related dimensions. A separate cluster of Western and Northern European countries (e.g., DE, FI, NO, SE, PT) lies in the low PC1 and PC3 region, indicating relatively consistent declines despite differing positions along PC2. Overall, the spatial arrangement suggests that positive and negative shifts are not randomly distributed but instead follow macro-level indicator profiles, with governance and corruption dimensions (PC1) and economic stability (PC2) playing key roles in structuring the patterns.

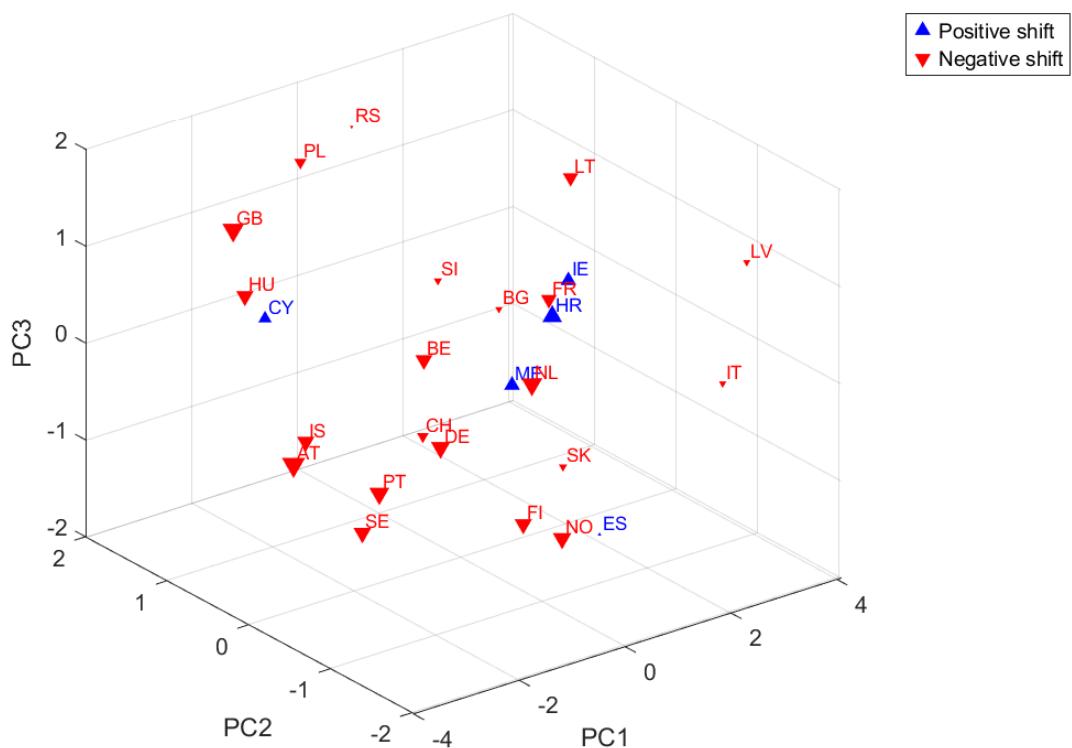


Figure 47: Representation of the shifts in Satisfaction with Country Condition across countries on the factorial space.

## 5 Conclusion

This study set out to examine how *Trust in Institutions* and *Satisfaction with Country Conditions* evolved in European countries between 2018 and 2023, a period marked by the COVID-19 pandemic. By integrating data from two rounds of the *European Social Survey* into a consistent pseudo-panel framework, we were able to overcome the absence of repeated measurements on the same individuals and draw meaningful inferences about temporal change.

Methodologically, the integration of confirmatory factor analysis with multiple statistical matching techniques allowed us to align conceptually equivalent latent constructs across datasets and mitigate confounding in estimating changes over time. The convergence of results across propensity score matching, nonparametric hot-deck matching, and predictive mean matching provides a strong indication that our conclusions are robust to the choice of matching strategy. This triangulation of approaches not only reinforces the credibility of the findings but also demonstrates the potential of combining parametric and nonparametric frameworks in retrospective longitudinal research.

Substantively, the results reveal a fragmented European landscape. While several countries experienced marked gains in trust, others – notably Austria, Great Britain, Hungary, and the Netherlands – registered significant declines. Patterns for *Satisfaction with Country Conditions* are partly aligned but also show divergences, with most of the countries showing a decrease.

Taken together, our findings highlight the importance of adopting a multidimensional perspective when evaluating the societal impact of major crises. Trust and satisfaction, though related, do not always evolve in parallel, and their trajectories reflect a complex interplay between governance performance, economic resilience, and public perceptions. The methodological framework developed here offers a replicable blueprint for future studies seeking to assess temporal change in the absence of true panel data, and the evidence presented underscores the need for continued monitoring of institutional trust and societal well-being in the post-pandemic era.

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## 6 Appendix

# ENCLOSE Data Processing and Matching Workflow

## 0. Data Preparation

### **Input files:**

- EES9.sav
- ESS11.sav

**Code:** ENCLOSE\_harmonization\_panel\_clean.Rmd

**Output:** h\_ENCLOSE\_data\_panel

### *Description:*

This step select variables from the two surveys, aligns coding, and produces an harmonized dataset.

---

## 1. Latent Trait Estimation

**Input:** h\_ENCLOSE\_data\_panel

**Code:** ENCLOSE\_Latent\_traits\_estimation\_configural\_clean.Rmd

**Output:** h\_ENCLOSE\_data\_panel\_latenttraits\_configural.RData

### *Description:*

Estimates latent traits under a configural model to capture underlying constructs (e.g., satisfaction, trust).

---

## 2. Matching Methods

### 2.1 Propensity Score Matching – Nearest Neighbor

**Input:** h\_ENCLOSE\_data\_panel\_latenttraits\_configural.RData

**Code:** ENCLOSE\_pseudo\_panel\_psm\_nn\_clean.Rmd

### **Output:**

- ENCLOSE\_pseudopanel\_psm\_nearest.RData
  - PSM\_nearest\_results.xlsx
- 

### 2.2 Propensity Score Matching – Optimal

**Code:** ENCLOSE\_pseudo\_panel\_psm\_optimal\_clean.Rmd

### **Output:**

- ENCLOSE\_pseudopanel\_psm\_optimal.RData
  - PSM\_optimal\_results.xlsx
-

## 2.3 Propensity Score Matching – Full Optimal

**Code:** ENCLOSE\_pseudo\_panel\_psm\_full\_clean.Rmd

**Output:**

- ENCLOSE\_pseudopanel\_psm\_full.RData
  - PSM\_full\_results.xlsx
- 

## 2.4 Hotdeck Imputation

**Code:** ENCLOSE\_pseudo\_panel\_hotdeck\_clean.Rmd

**Output:**

- ENCLOSE\_pseudopanel\_hotdeck.RData
- hotdeck\_change\_significance\_by\_country.xlsx

**Plots:**

- density\_SATISFACTION\_hotdeck.png (original vs. imputed)
  - density\_TRUST\_hotdeck.png (original vs. imputed)
  - density\_SATISFACTION\_1823\_hotdeck.png (2018–2023 comparison)
  - density\_TRUST\_1823\_hotdeck.png (2018–2023 comparison)
- 

## 2.5 Predictive Mean Matching (PMM)

**Code:** ENCLOSE\_pseudo\_panel\_pmm\_clean.Rmd

**Output:**

- ENCLOSE\_pseudopanel\_hotdeck.RData
- hotdeck\_change\_significance\_by\_country.xlsx

**Plots:**

- density\_SATISFACTION\_hotdeck.png
  - density\_TRUST\_hotdeck.png
  - density\_SATISFACTION\_1823\_hotdeck.png
  - density\_TRUST\_1823\_hotdeck.png
-

### 3. Summary Workflow Diagram

