How does smartphone participation in probability-based web surveys differ across Europe?

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Introduction I

- Web surveys are a key data collection method in social research
  - *Web survey market is growing continuously* (Knowledge Sourcing Intelligence, 2023)
  - *Major cross-national surveys implement web modes* (Luijkx et al., 2021)
  - *Web surveys offer time and location flexibility* (Callegaro et al., 2015)

- On-going discussion on smartphone participation in web surveys
  - *Concerns regarding data quality* (Mavletova, 2013; Tourangeau et al., 2018)
  - *Smartphones enable additional data collection* (Revilla, 2022; Struminskaya et al., 2020)

- Smartphones introduce novel measurement opportunities
  - *Voice answers* (Höhne et al., 2024; Revilla & Couper, 2021)
  - *GPS and acceleration data* (Elevelt et al., 2021; Kern et al., 2021)
  - *Mobile browsing and app data* (Bach & Wenz, 2020; Bosch & Revilla, 2022)

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Introduction II

- Estimates of smartphone participation in web surveys lack empirical basis
  - *Previous studies are outdated or focus on single countries* (Gummer et al., 2023; Peterson et al., 2017; Revilla et al., 2016)
  - *Prevalence of smartphone participation is unknown (at least in Europe)*

- Some respondents are more likely to participate via smartphone
  - *Young, female, and less educated respondents* (Bosnjak et al., 2017; Lugtig et al., 2016; Revilla & Höhne, 2020)
  - *As smartphone penetration has increased, these findings may not hold anymore*

- Instability of smartphone participation across panel waves
  - *Respondents often switch between devices* (Poggio et al., 2015)
  - *Increased mobile internet access may have facilitated more stable smartphone participation*

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Research Questions (RQs)

- **RQ1**: How prevalent is smartphone participation in web-based panel surveys across Europe?

- **RQ2:** What factors determine smartphone participation in web-based panel surveys across Europe?

- **RQ3**: How stable is smartphone participation in web-based panel surveys across Europe?

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Method: CRONOS-2 Panel

- CROss-National Online Survey 2 (CRONOS-2)
  - *Follow-up online panel that is part of European Social Survey (ESS)*
  - *Invitation to CRONOS-2 at the end of ESS round 10*
  - *Fielded in **12 countries** between **October 2021** and **March 2023***

- In total, 8,147 respondents participated in up to seven waves (N = 39,840)
  - *Mean age: 49*
  - *Female: 54%*
  - *Medium education: 50%*
  - *High education: 39%*

- No restrictions regarding participation device (mixed-device)
  - *Smartphone: 50%*
  - *Computer: 41%*
  - *Tablet: 3%*

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Method: Countries and Waves

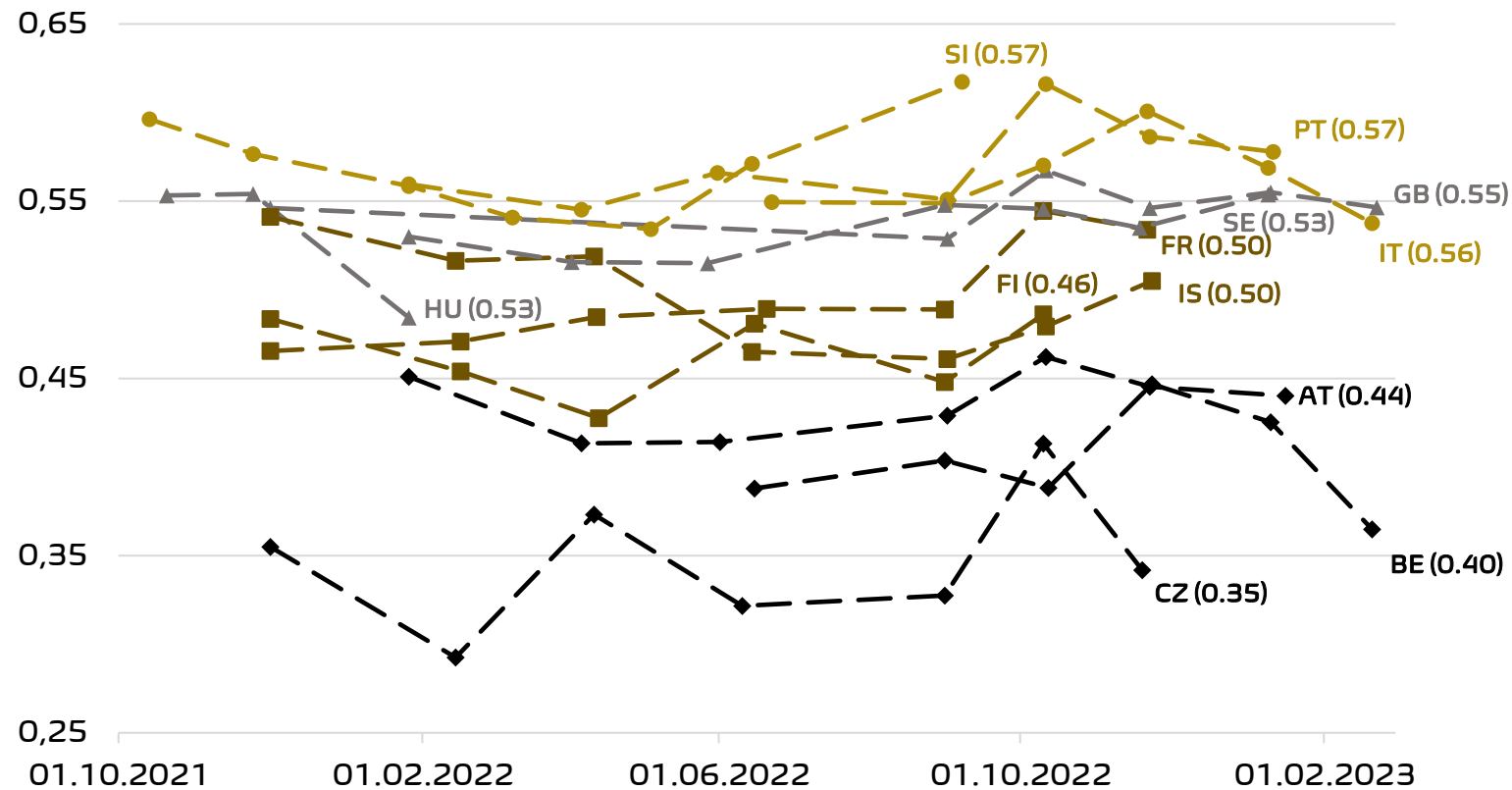Table 1. Timing of CRONOS-2 welcome survey (WS) and substantive waves (W1-W6)

Country	N	2021			2022												2023		
		10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03
Austria (AT)	739				WS	WS		W1	W2	W2		W3	W3	W4	W5	W5	W6	W6	
Belgium (BE)	719									WS	WS	W1	W1	W2	W4/5	W4/5		W6	W6
Czechia (CZ)	367		WS	WS		W1	W1	W2	W2	W3	W3	W4	W4	W5	W6	W6			
Finland (FI)	982		WS	WS		W1	W1	W2	W2	W3	W3	W4	W4	W5	W5				
France (FR)	855		WS	WS		W1	W1	W2	W2	W3	W3	W4	W4	W5	W6	W6			
Great Britain (GB)	606		WS	WS								W1	W1	W2	W4		W5	W5	W6
Hungary (HU)	535	WS	WS	W1	W2	W2													
Iceland (IS)	650		WS	WS		W1	W1	W2	W2	W3	W3	W4	W4	W5	W6	W6			
Italy (IT)	390									WS	WS	W1	W1	W2	W4	W4	W5	W6	W6
Portugal (PT)	521				WS	WS		W1	W2	W2		W3	W3	W4	W5	W5	W6	W6	
Slovenia (SI)	634	WS	WS	W1	W2	W2	W3	W3	W4	W5		W6	W6						
Sweden (SE)	1,149				WS	WS		W1	W2	W2		W3	W3	W4	W5	W5	W6	W6	

Method: Analytical Strategy

- RQ1: Comparing smartphone participation levels between countries

- RQ2: Mixed effects logistic regression with IVs on three levels
  - *Survey level: Months since first CRONOS-2 survey*
  - *Respondent level: Age, female, education, daily internet use (in hours), digital knowledge*
  - *Country level: Internet access via smartphone, Internet access via computer, laptop, or tablet*

- RQ3: Comparing stability of smartphone participation across countries
  - *Three groups:*
    - *(1) Respondents that always participate via smartphone*
    - *(2) Respondents that participate via smartphone at least once but not always*
    - *(3) Respondents that never participate via smartphone*
  - *Determine proportions across countries and differences between groups*

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Results: Research Question 1

Figure 1. Smartphone respondents by country

Note. N = 39,840. Mean smartphone participation across waves in parentheses.

- Different levels of smartphone participation
  - *Q4: SI, PT, IT*
  - *Q3: GB, SE, HU*
  - *Q2: FR, IS, FI*
  - *Q1: AT, BE, CZ*

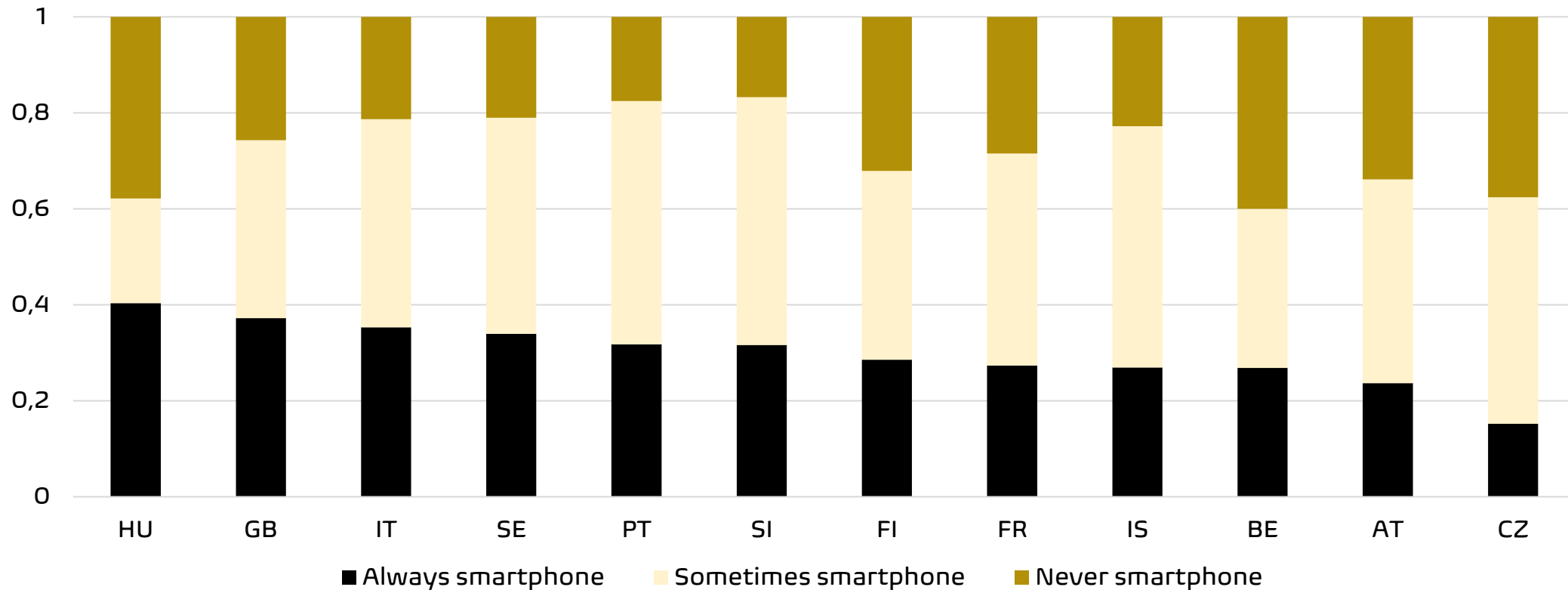# Results: Research Question 2

Table 2. Three-level mixed effects logistic regression with random intercepts

DV: Smartphone participation (1 = yes)	Model 1		Model 2		Model 3		Model 4	
	OR	SE	OR	SE	OR	SE	OR	SE
Months since first survey			**1.02**	0.00	**1.03**	0.00	**1.03**	0.00
Age (in years)					**0.93**	0.00	**0.93**	0.00
Female					**2.82**	0.24	**2.82**	0.24
Medium education					0.74	0.11	0.74	0.11
High education					**0.40**	0.06	**0.40**	0.06
Daily internet use (in hours)					**0.95**	0.01	**0.95**	0.01
Digital knowledge					**0.80**	0.04	**0.80**	0.04
Smartphone prevalence (in %)							1.02	0.05
Other devices prevalence (in %)							0.99	0.02
Country-level ICC	0.02		0.02		0.03		0.02	
Individual-level ICC	0.76		0.76		0.73		0.73	
N	36,517		36,517		36,517		36,517	

Note. Coefficients with p < 0.001 in bold and underlined. OR = Odds ratio. SE = Standard error. Listwise deletion of missing values.

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Results: Research Question 3

Figure 2. Stability of smartphone participation across countries

Note. N = 7,326. We considered only respondents that participated in at least two waves. Countries are ordered by the proportion of respondents that always participated via smartphone.

Results: Research Question 3

Table 3. Comparing respondents that always, sometimes, or never participate via smartphone

	Always smartphone	Sometimes smartphone	Never smartphone	Total
Age (in years)	45	49	56	50
Female (%)	63%	53%	43%	54%
Medium education (%)	56%	47%	49%	50%
High education (%)	31%	43%	42%	39%
Daily internet use (in hours)	4.0	4.2	3.6	4.0
Digital knowledge (1 'low' to 5 'high')	3.5	3.7	3.6	3.6

Note. N = 7,326. We only considered respondents that participated in at least two waves. We report means for age, daily internet use, and digital knowledge. For the remaining variables, we report proportions.

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Discussion and Conclusion

- Smartphone participation levels vary across Europe
  - *Mean smartphone participation between 35% (Czechia) and 57% (Portugal)*
  - *Smartphone participation is increasing over time*

- Smartphone participation is mainly driven by respondent characteristics
  - *Young, female, and less educated respondents are more likely to participate*
  - *Tech-savvy respondents and heavy internet users are less likely to participate*

- Some respondents never participate via smartphone
  - *Between 17% (Slovenia) and 40% (Belgium)*
  - *Older, male, and high educated respondents are overrepresented in this group*

- Take home message: Majority of respondents participate via smartphone, but some population groups are overrepresented.

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Many thanks for your attention!

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