



The mobile Web only population – socio-demographic characteristics and potential bias

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Mobile Web Onlys

Background

- Challenge for Web survey researchers:

- The number of respondents using a smartphone or tablet computer to complete Web surveys is steadily increasing.
- Phenomenon of unintended smartphone and tablet respondents in Web surveys

(Wells et al. 2013; de Bruijne and Wijnant, 2014; Revilla forthcoming)

- Mobile device characteristics:

- Type of data entry (touch screen vs. computer mouse & keyboard)
- **Screen size**

- Two different types of Web surveys:

- Web surveys permitting desktop, laptop and tablet computers only
- Web surveys using an adaptive design approach that accommodates all devices

(Antoun, 2015)

Research Questions

- Does the mobile Web only population differ from the remaining Web population?
- Does omitting mobile Web only users from Web surveys cause considerable bias?
- How do bias estimates arising from the mobile Web only population develop with respect to the mobile Web only penetration rate?

Data Basis

Special Eurobarometer

- Trend survey of the European Commission
- Special Eurobarometer on "Cyber Security"

→

QE3	What devices do you use to access the Internet?
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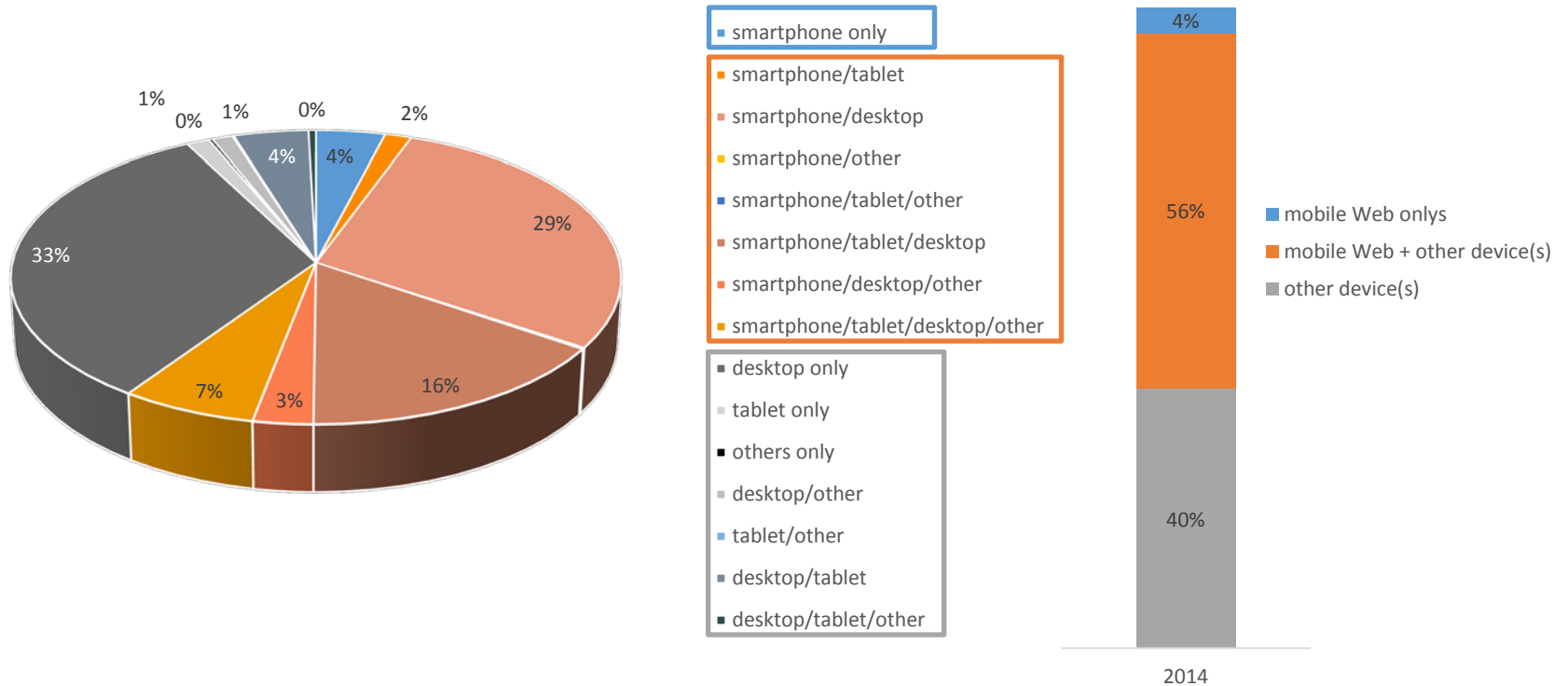
(SHOW CARD – READ OUT – MULTIPLE ANSWERS POSSIBLE)
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Desktop computer	1,
Laptop computer\ Netbook	2,
Tablet computer\ Touchscreen	3,
Smartphone	4,
Other (SPONTANEOUS)	5,
DK	6,

- Three survey waves: 2012/March, N = 25,722; 2013/May-June, N = 25,852; 2014/October, N = 25,956
- 27 European member states
- 500-1500 face-to-face interviews in each country
→ relatively complete coverage
- European population 18 years and older

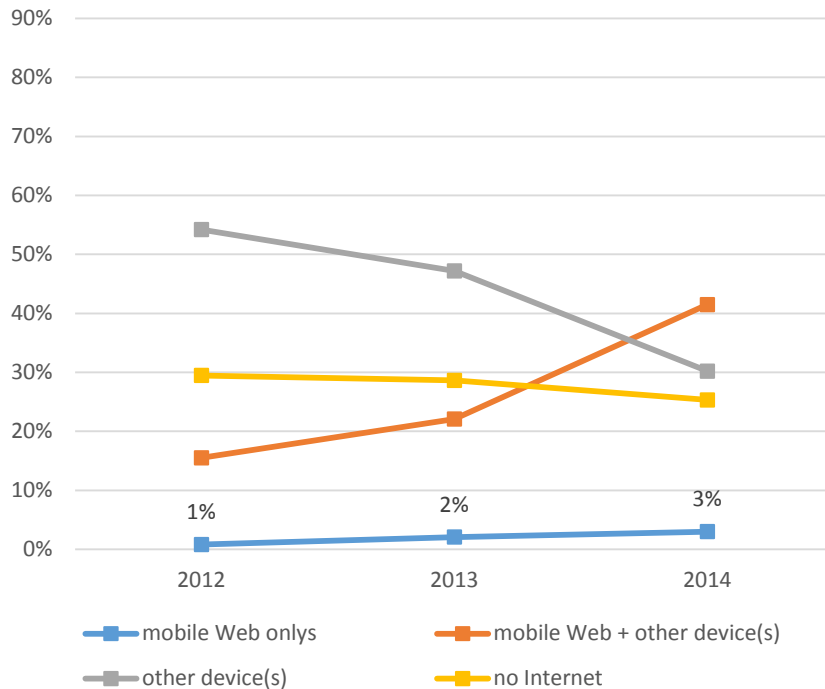
Internet Device Europe 2014

What device do you use to access the Internet?

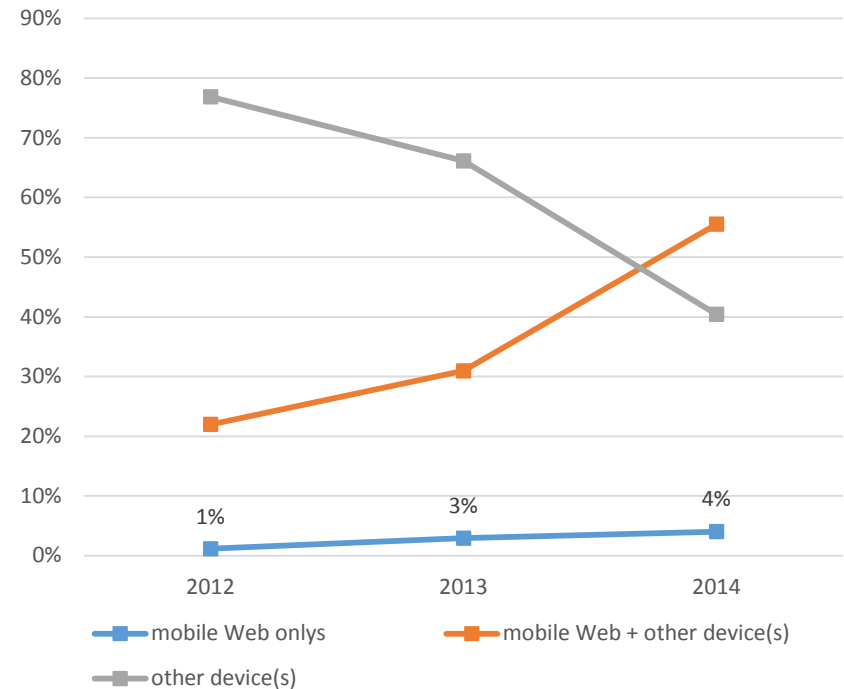


Mobile Web only rate

Among the whole population

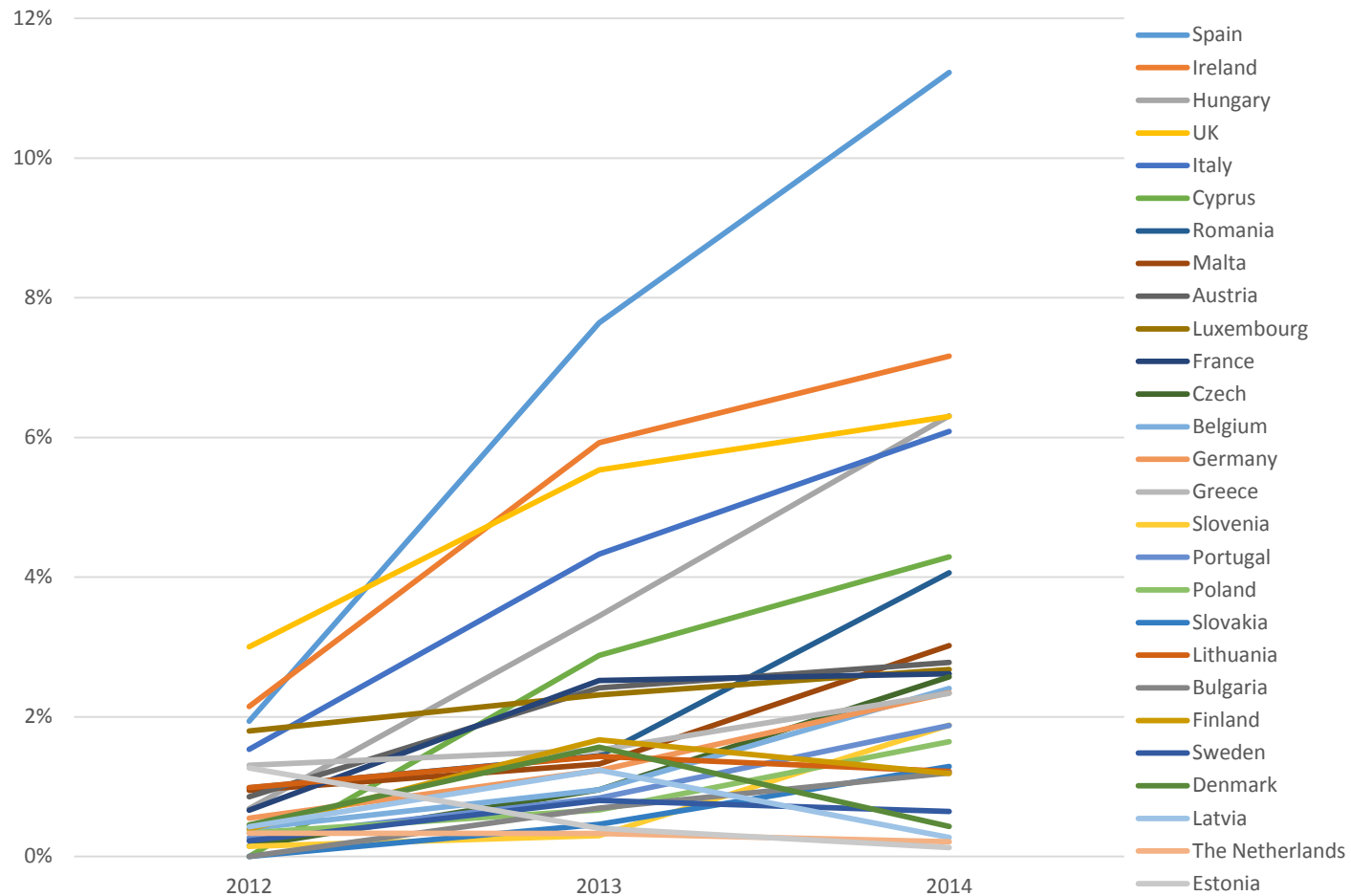


Among the Web population



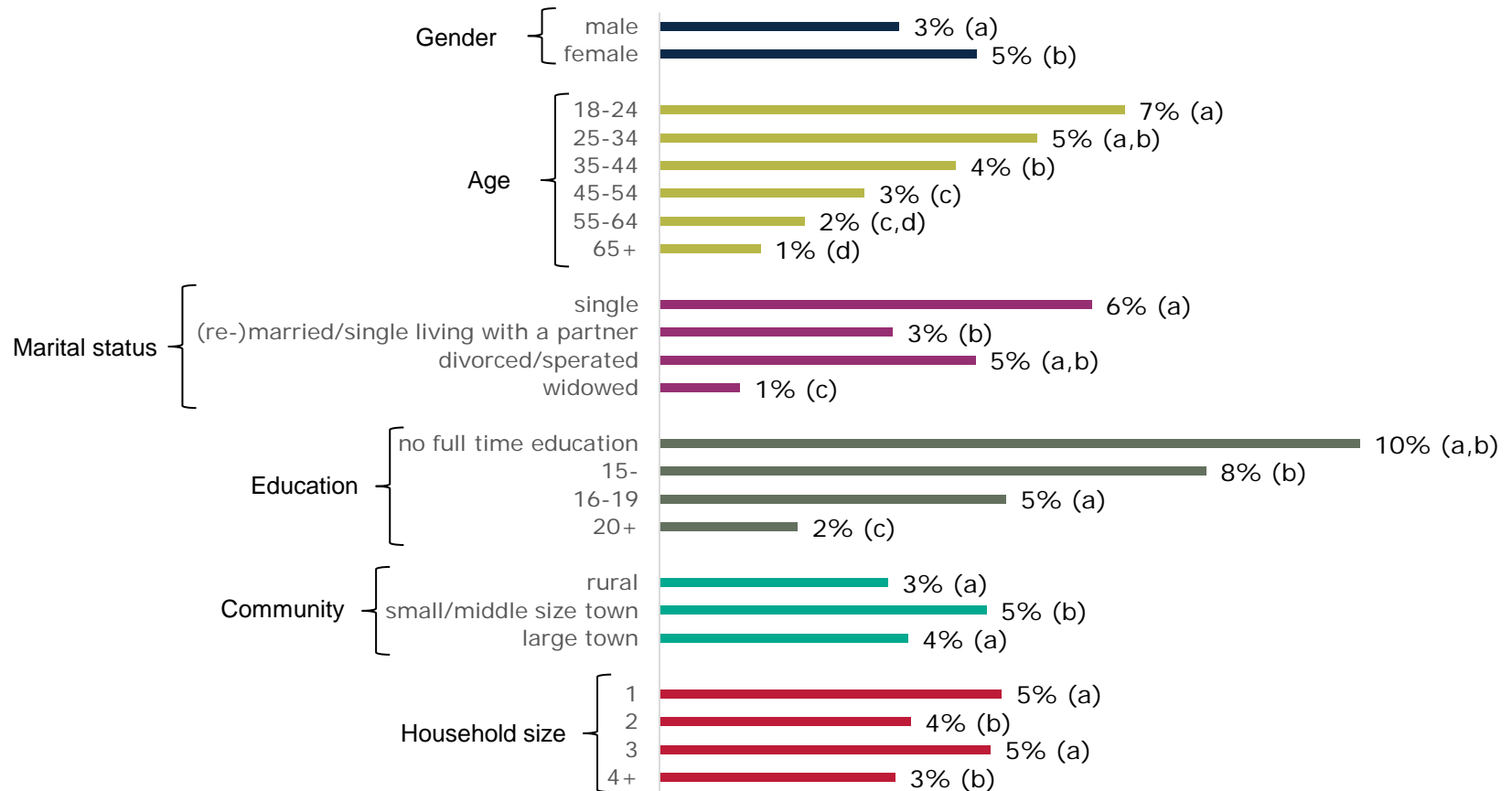
Mobile Web only rates

European countries



Mobile Web Onlys

Socio-demographics 2014



Note. Z-test using the Bonferroni correction. Significant differences ($p < .05$ or less) between the categories of the socio-demographic variable respectively are indicated using different letters assigned to the bars.

Mobile Web Onlys

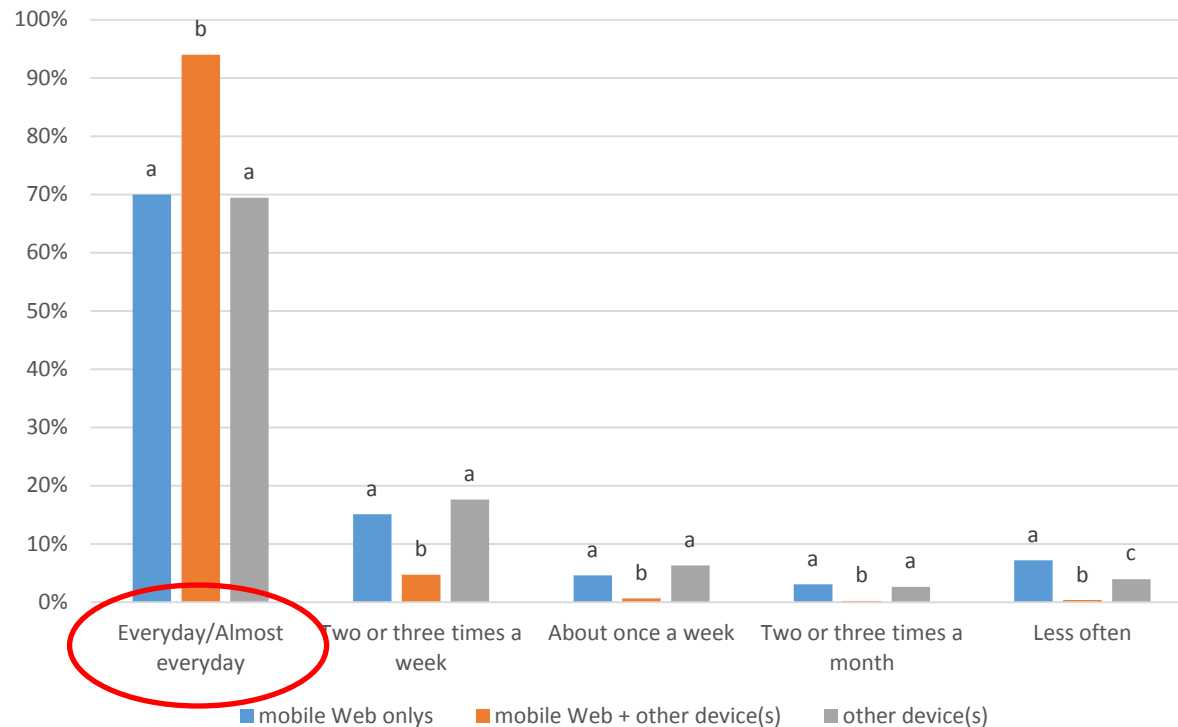
Socio-demographics

Variable	Model 0	Model 1	Model 2
Year:			
2013 (2012)		3.64***	4.13***
2014 (2012)		2.46***	2.60***
Socio-demographics:			
Gender (male)			.81**
Age (18-34)			2.81***
Education (20+)			.39***
Community (rural)			.88
Marital Status (single)			1.64***
Household size (single-person household)			1.16
Log likelihood	-4382.71	-4279.85	-4033.87
Variance country	.6482	.6594	.5964
ICC	.1646		
R ²		-.0028	.0132

Note. Hierarchical logistic models with the variable „mobile Web onlys“ (0=no; 1=yes) as dependent variable. The table shows odds ratios with ***p < .001, **p < .01, *p < .05. The variable „country“ was used a level-2 identifier.

Mobile Web Only population

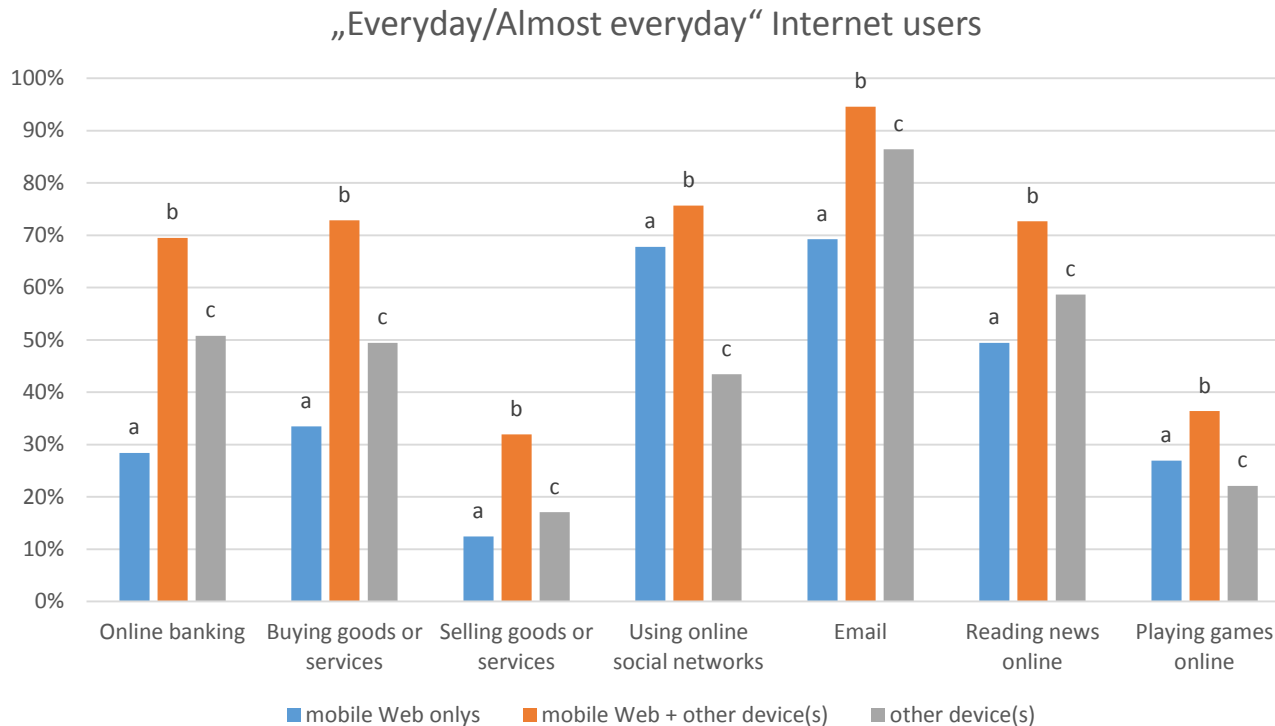
Internet frequency 2014



Note. Z-test using the Bonferroni correction: Significant differences ($p < .05$ or less) between the Internet subgroups are indicated using different letters assigned to the bars.

Mobile Web Only population

Internet activities 2014



Note. Z-test using the Bonferroni correction: Significant differences ($p < .05$ or less) between the Internet subgroups are indicated using different letters assigned to the bars.

(Relative) Bias

Mobile Web onlys

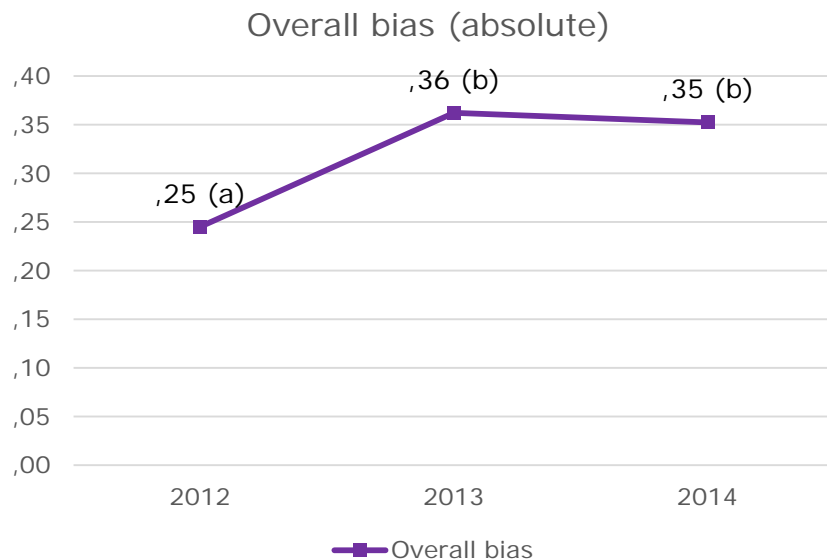
$$\text{Bias} = \frac{P(\text{Internet population w/o mobile Web onlys}) - P(\text{mobile Web onlys})}{P(\text{Internet population})}$$

$$\text{Relative Bias} = \frac{N_{(\text{mobile Web onlys})}}{N_{(\text{Internet population})}} \times \frac{P(\text{Internet population w/o mobile Web onlys}) - P(\text{mobile Web onlys})}{P(\text{Internet population})}$$

(based on Biemer & Lyberg, 2003)

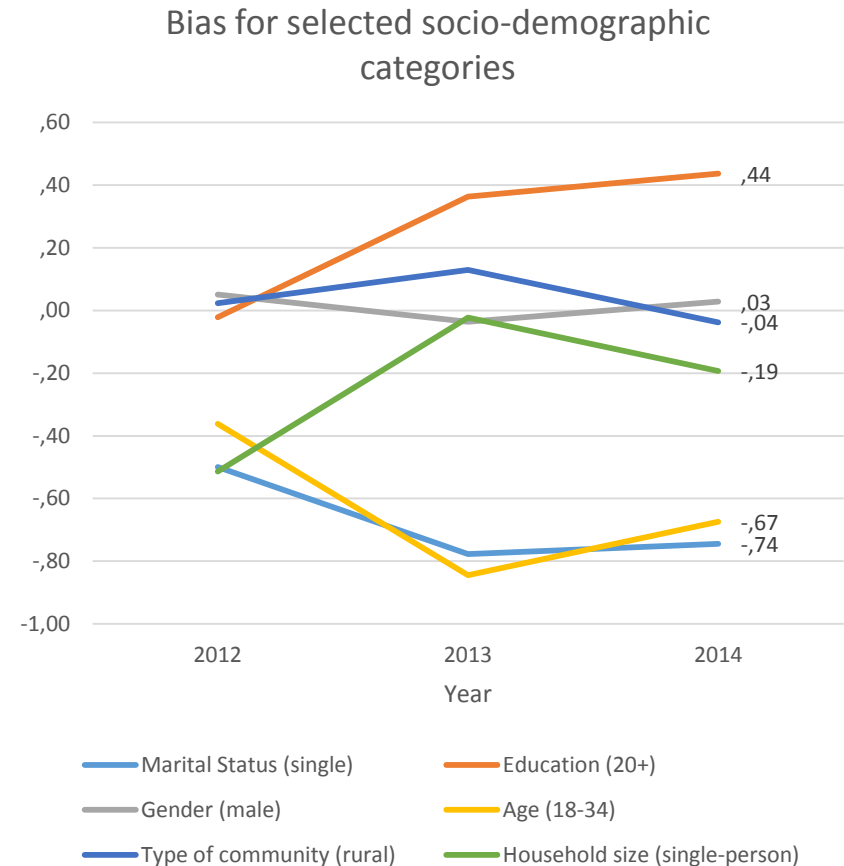
EU estimates of the bias

Overall & for selected socio-demographic categories



Note. Pairwise comparisons between years using Bonferroni correction: if a pair of values is significantly different at the .05 level (or less), the values have different letters assigned to them. Results of the overall F-test are significant: $F(2, 486) = 8.36$, $p < .001$, $\eta^2 = .033$

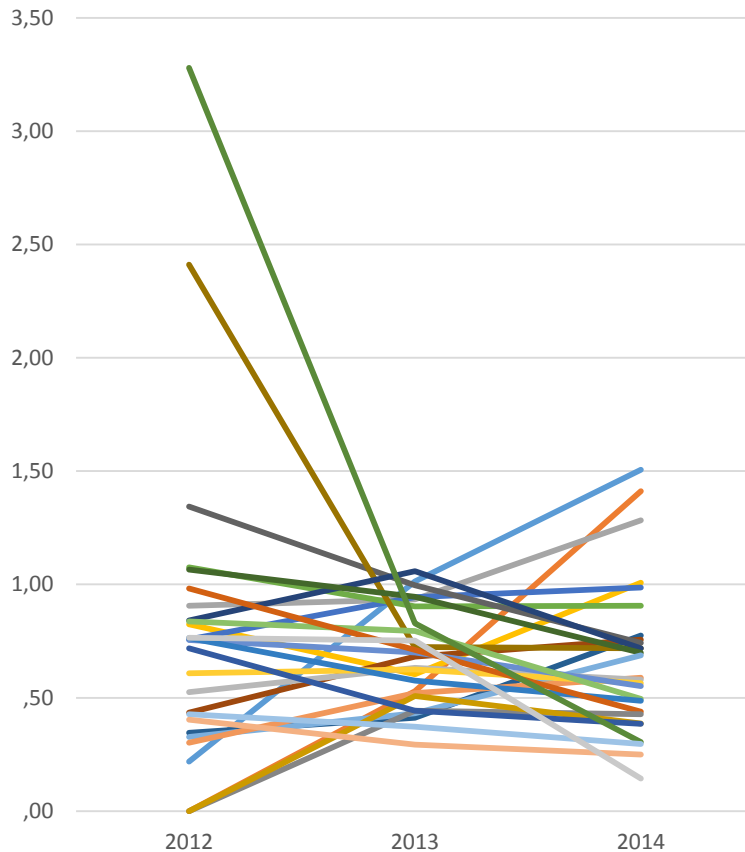
Note. The y-axis scaling differs between the two graphs.



Bias estimates on country level

Overall

Overall bias (absolute) by country



- Estonia
- Bulgaria
- Latvia
- Denmark
- The Netherlands
- Belgium
- Lithuania
- Luxembourg
- Finland
- Portugal
- Sweden
- Slovenia
- Austria
- Italy
- United Kingdom
- France
- Germany
- Poland
- Hungary
- Malta
- Slovakia
- Cyprus (Republic)
- Greece
- Czech Republic
- Ireland
- Spain
- Romania



- | | |
|-------------------|---------------------|
| ▪ Estonia | ▪ Luxembourg |
| ▪ Bulgaria | ▪ Austria |
| ▪ Latvia | ▪ Italy |
| ▪ Denmark | ▪ United Kingdom |
| ▪ The Netherlands | ▪ Slovakia |
| ▪ Lithuania | ▪ Cyprus (Republic) |



- | | |
|------------|------------------|
| ▪ Belgium | ▪ Hungary |
| ▪ Finland | ▪ Malta |
| ▪ Portugal | ▪ Greece |
| ▪ Sweden | ▪ Czech Republic |
| ▪ Slovenia | ▪ Ireland |
| ▪ France | ▪ Spain |
| ▪ Germany | ▪ Romania |
| ▪ Poland | |

Hierarchical linear models

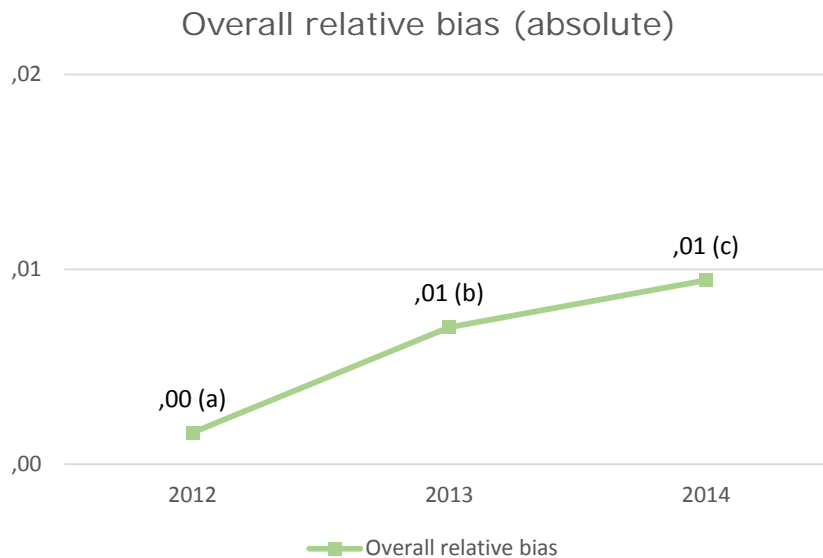
of bias estimates with country as level-2 identifier

Variable	Model 0	Model 1	Model 2	Model 3
Year (reference group, 2012):				
2013		-.13	-.13	.09
2014		-.12	-.12	.00
Bias estimates (reference group, gender):				
Marital status (single)			.85***	.85***
Education (20+)			.32*	.32*
Age (18-34)			.55***	.55***
Type of community (rural)			.29*	.29*
Household size (single-person)			.77**	.77***
Country variables (% of Web population):				
Single _a				-.15**
20 years and older at highest education _a				-.08
Male _a				.21***
18-34 years _a				.03
Rural community _a				-.04
Single-person household _a				.17**
Mobile Web only rate _a				-.22***
Log likelihood	-680.85	-679.88	-655.69	-641.18
Variance country	.0844	.0846	.0897	.0308
Unexplained variance	.9135	.9097	.8187	.7956
ICC	.0846			
R ²		.0036	.0897	.1719

Note. Hierarchical linear models with the variable „country bias estimates“ as dependent variable. The table shows standardized coefficients with ***p < .001, **p < .01, *p < .05. The variable „country“ was used as a level-2 identifier.

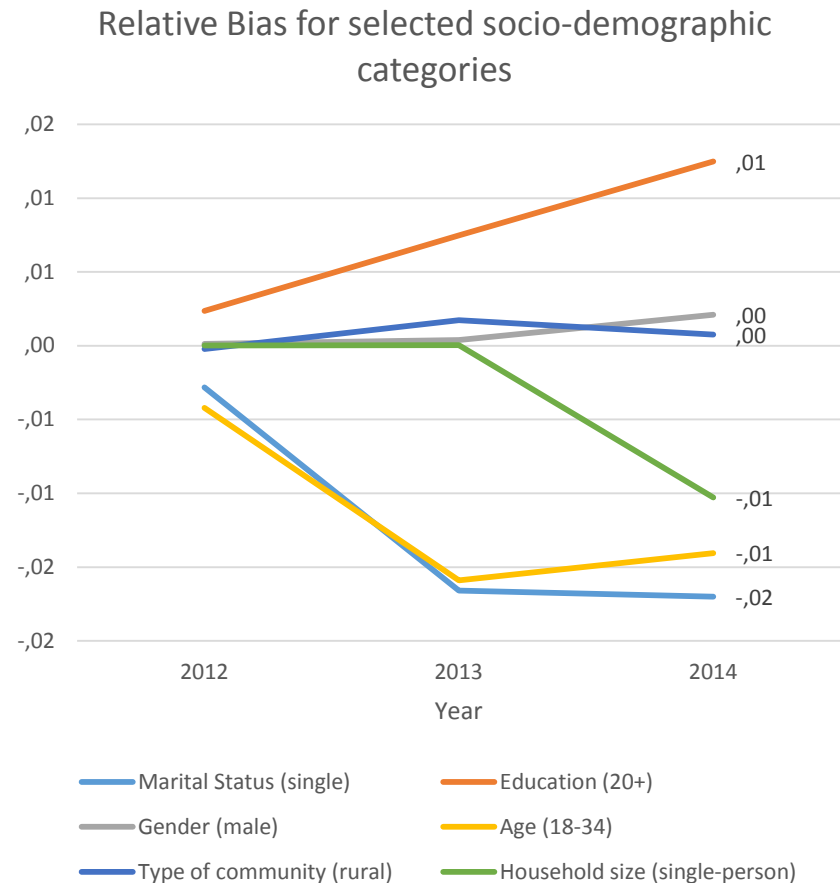
EU estimates of the relative bias

Overall & for selected socio-demographic categories



Note. Pairwise comparisons between years using Bonferroni correction: if a pair of values is significantly different at the .05 level (or less), the values have different letters assigned to them. Results of the overall F-test are significant: $F(2, 486) = 88.59, p < .001, \eta^2 = .268$

Note. The y-axis scaling differs between the two graphs.



Mobile Web Onlys

Summary

- From 2012 to 2014 the mobile Web only rate increased steadily in Europe, but was still on a low level in 2014 (4%).
- The mobile Web only population is more likely female, younger, more often single, less educated, less likely living in rural communities and in multi-person households compared to the remaining Web population.
- European estimates of the overall bias increased from 2012 to 2013 but remained stable from 2013 to 2014.
- In 2014, the European estimate of the bias for marital status was the largest followed by age and education. The European estimate of the bias for household size was at a moderate level and for community and gender close to zero.
- However, trends of overall bias estimates differ on country level and it is not clear whether bias estimates due to the mobile Web only population will increase or decrease.
- European estimates of the relative bias steadily increased from 2012 to 2014 but were still on a low level in 2014.
- As a consequence, even if the mobile Web only population and the remaining Web population converge, relative bias estimates may further increase due to increasing mobile Web only rates.

Mobile Web Onlys

Discussion

Conclusion:

- Web survey questionnaires should use an adaptive design approach that accommodates all devices since exclusion or underrepresentation of the mobile Web only population causes considerable bias.

* * *

Further Research:

- We defined mobile devices in terms of their screen sizes. Is our definition of mobile devices too narrow? Do we need a joint definition of mobile devices or does it depend on the respective research intention?
- Is the mobile Web mostly population similar to the mobile Web only population and what influence may mobile Web mostly users have on bias estimates?
- Did we address a nonresponse or coverage problem?
- Who are the mobile Web onlys - late Internet adopters or Internet device changers?



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Thank you.

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